

TENTATIVE AGENDA
STATE AIR POLLUTION CONTROL BOARD MEETING

THURSDAY, DECEMBER 3, 2020

ELECTRONIC COMMUNICATION MEETING

Registration Link: <https://attendee.gotowebinar.com/register/3963052634233014798>

**Persons Wishing To Address The Board, If Authorized By The Public Comment Policy,
On The U.S. Navy Norfolk Naval Shipyard Draft Permit
OR During The Public Forum Must Register By November 30, 2020**

Any Updates To The Details/Final Arrangements Or The Addition Of An In-Person Location
To Be Announced Through the Virginia Regulatory Town Hall

Convene – 10:00 A.M.

Agenda Item	Presenter	Tab
Call to Order	Hoagland	
Introductions	Board Members	
Review and Approve Agenda	Board Members	
Review and Approve Minutes (September 17, 2020)	Board Members	A
U.S. Navy Norfolk Naval Shipyard Draft Prevention Of Significant Deterioration Permit and Stationary Source Permit To Construct And Operate - Registration # 60326	Dowd/Corbett	
Memorandum		B
Attachment A - Draft Final Permit (clean copy)		C
Attachment B - Draft Permit Engineering Analysis (with track changes)		D
Attachment C - Air Quality Analyses Review		E
Attachment D - Public Participation Report - (including sampling of written comments received and the Summary and Response to Public Comments		F
Attachment E - NNSY Response to Public Comments		G
Sample Public Comments		H
High Priority Violations Report	Nicholas	I
Director/Division Director Report/Updates	Paylor/Dowd	
Topics include (i) DEQ budget, (ii) final ozone season results, Environmental Justice Study, (iv) pending permit applications, (v) upcoming regulatory actions (Hydrofluorocarbons and §10.1-1307 E), (vi) COVID-19 response, and (vii) VMA Appeal of Regulation Revision A20 to 9 VAC 5-140, Regulation for Emissions Trading Programs (Revised Trading Rule)		
Public Engagement Committee Update	Hoagland	
Board Member/Public Communications Discussion	Board Members/O'Dwyer	

Public Forum

Future Meetings (to be determined)

Adjourn

Board Members

Roy Hoagland

NOTE: The Board reserves the right to revise this agenda without notice unless prohibited by law. Revisions to the agenda include, but are not limited to, scheduling changes, additions or deletions. Questions on the latest status of the agenda should be directed to Cindy M. Berndt at (804) 698-4378.

PUBLIC COMMENTS AT STATE AIR POLLUTION CONTROL BOARD MEETINGS: The Board encourages public participation in the performance of its duties and responsibilities. To this end, the Board has adopted public participation procedures for regulatory action and for case decisions. These procedures establish the times for the public to provide appropriate comment to the Board for its consideration.

For REGULATORY ACTIONS (adoption, amendment or repeal of regulations), public participation is governed by the Administrative Process Act and the Board's Public Participation Guidelines. Public comment is accepted during the Notice of Intended Regulatory Action phase (minimum 30-day comment period) and during the Notice of Public Comment Period on Proposed Regulatory Action (minimum 60-day comment period). Notice of these comment periods is announced in the Virginia Register, by posting to the Department of Environmental Quality and Virginia Regulatory Town Hall web sites and by mail to those on the Regulatory Development Mailing List. The comments received during the announced public comment periods are summarized for the Board and considered by the Board when making a decision on the regulatory action.

For CASE DECISIONS (issuance and amendment of permits), the Board adopts public participation procedures in the individual regulations which establish the permit programs. As a general rule, public comment is accepted on a draft permit for a period of 30 days. In some cases a public hearing is held at the conclusion of the public comment period on a draft permit. In other cases there may an additional comment period during which a public hearing is held. In light of these established procedures, the Board accepts public comment on regulatory actions and case decisions, as well as general comments, at Board meetings in accordance with the following:

REGULATORY ACTIONS: Comments on regulatory actions are allowed only when the staff initially presents a regulatory action to the Board for final adoption. At that time, those persons who commented during the public comment period on the proposal are allowed up to 3 minutes to respond to the summary of the comments presented to the Board. Adoption of an emergency regulation is a final adoption for the purposes of this policy. Persons are allowed up to 3 minutes to address the Board on the emergency regulation under consideration.

CASE DECISIONS: Comments on pending case decisions at Board meetings are accepted only when the staff initially presents the pending case decision to the Board for final action. At that time the Board will allow up to 5 minutes for the applicant/owner to make his complete presentation on the pending decision, unless the applicant/owner objects to specific conditions of the decision. In that case, the applicant/owner will be allowed up to 15 minutes to make his complete presentation. The Board will then allow others who commented at the public hearing or during the public comment period up to 3 minutes to exercise their rights to respond to the summary of the prior public comment period presented to the Board. No public comment is allowed on case decisions when a FORMAL HEARING is being held.

POOLING MINUTES: Those persons who commented during the public hearing or public comment period and attend the Board meeting may pool their minutes to allow for a single presentation to the Board that does not exceed the time limitation of 3 minutes times the number of persons pooling minutes, or 15 minutes, whichever is less.

NEW INFORMATION will not be accepted at the meeting. The Board expects comments and information on a regulatory action or pending case decision to be submitted during the established public comment periods. However, the Board recognizes that in rare instances new information may become available after the close of the public comment period. To provide for consideration of and ensure the appropriate review of this new information, persons who commented during the prior public comment period shall submit the new information to the Department of Environmental Quality (Department) staff contact listed below at least 10 days prior to the Board meeting. The Board's decision will be based on the Department-developed official file and discussions at the Board meeting. In the case of a

regulatory action, should the Board or Department decide that the new information was not reasonably available during the prior public comment period, is significant to the Board's decision and should be included in the official file, the Department may announce an additional public comment period in order for all interested persons to have an opportunity to participate.

PUBLIC FORUM: The Board schedules a public forum at each regular meeting to provide an opportunity for citizens to address the Board on matters other than those on the agenda, pending regulatory actions or pending case decisions. Those persons wishing to address the Board during this time should indicate their desire on the sign-in cards/sheet and limit their presentations to 3 minutes or less.

The Board reserves the right to alter the time limitations set forth in this policy without notice and to ensure comments presented at the meeting conform to this policy.

Department of Environmental Quality Staff Contact: Cindy M. Berndt, Director, Regulatory Affairs, Department of Environmental Quality, 1111 East Main Street, Suite 1400, P.O. Box 1105, Richmond, Virginia 23218, phone (804) 698-4378; fax (804) 698-4346; e-mail: cindy.berndt@deq.virginia.gov.

Additional Meeting Information:

- Attendees are not entitled to be disorderly or disrupt the meeting from proceeding in an orderly, efficient, and effective fashion. Disruptive behavior may result in a recess or removal from the meeting.
- Possession or use of any device that may disrupt the conduct of business is prohibited, including but not limited to: voice-amplification equipment; bullhorns; blow horns; sirens, or other noise-producing devices; as well as signs on sticks, poles or stakes; or helium-filled balloons.
- All attendees are asked to be respectful of all speakers.
- Rules will be enforced fairly and impartially not only to ensure the efficient and effective conduct of business, but also to ensure no interference with the business of the hotel, its employees and guests.
- All violators are subject to removal.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4020
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MEMORANDUM

TO: Members of the State Air Pollution Control Board

FROM: Cindy M. Berndt *Cindy M. Berndt*

DATE: November 6, 2020

SUBJECT: Minutes

Attached are the minutes from your meeting on September 17, 2020. Staff will seek your approval of the minutes at your next regular meeting.

If you have any questions, please contact me at (804) 698-4378 or cindy.berndt@deq.virginia.gov.

MINUTES
STATE AIR POLLUTION CONTROL BOARD MEETING

THURSDAY, SEPTEMBER 17, 2020

ELECTRONIC COMMUNICATION MEETING

Board Members Present:

Roy A. Hoagland, Chair
Richard D. Langford
Staci F. Rijal
Hope F. Cupit

Kajal B. Kapur, Vice-Chair
Gail Bush
Dr. Lornel G. Tompkins

Board Members Absent: None

Department of Environmental Quality:

David K. Paylor, Director
Debra A. Harris

Cindy M. Berndt

Attorney General's Office:

Gray O'Dwyer, Assistant Attorney General

These minutes summarize activities that took place at this Board meeting. The Board convened the meeting at 10:35 a.m. and adjourned the meeting at 1:10 p.m.

The Board convened the meeting electronically consistent with Governor Ralph Northam's Executive Order No. 51 (2020), Item 4-0.01 g of Chapter 1289 of the 2020 Acts of Assembly and the applicable provisions of § 2.2-3708.2 of the Freedom of Information Act. Further, the Board stated that a meeting was necessary for the Board to discharge its lawful purposes, duties, and responsibility; but impracticable or unsafe for the Board to assemble in a single location due to the declaration of a state of emergency for COVID-19.

Minute No. 1 - Review and Approval of Agenda - The Board, on a motion by Ms. Cupit and seconded by Ms. Kapur, unanimously approved the agenda as announced. (Vote was taken by roll call with all members voting aye.)

Minute No. 2 - June 18, 2020 Minutes - The Board, on a motion by Mr. Langford and seconded by Ms. Rijal, approved the minutes from the Board's meeting on June 18, 2020. (Vote was taken by roll call with all members voting aye.)

Minute No. 3 - Election of Officers - The Board, on a motion by Ms. Cupit and seconded by Ms. Rijal, unanimously elected Mr. Roy Hoagland to serve as Chair and Ms. Kajal Kapur to serve as Vice-Chair of the Board. (Vote was taken by roll call with all members voting aye.)

Minute No. 4 - Permits and Variances for Stationary Sources - Rev. E20 - Final Exempt Action - Ms. Karen Sabasteanski presented final exempt amendments to the Regulations for the Control and Abatement of Air Pollution and the Regulation for General Administration concerning locality particularly affected. Ms. Sabasteanski explained that Chapter 1110 of the 2020 Acts of Assembly amended § 10.1-1307.01 to add new

public participation requirements for permits and variances for (i) a new fossil fuel-fired generating facility with a capacity of 500 megawatts or more, (ii) a major modification to an existing source that is a fossil fuel-fired generating facility with a capacity of 500 megawatts or more, (iii) a new fossil fuel-fired compressor station facility used to transport natural gas, or (iv) a major modification to an existing source that is a fossil fuel-fired compressor station facility used to transport natural gas. The applicant must publish a notice at least 60 days prior to the close of the public comment period. The applicant must mail notice to local elected officials and the planning district commission; local public libraries and schools, and local property owners. Written comments must be accepted by the Board for at least 30 days after the public hearing.

Ms. Sabasteanski reviewed the following amendments to the regulations:

1. Add a definition of "locality particularly affected" where needed in order to be consistent with other new source review regulations and in order to implement the new requirements. [9VAC5-80-1110, 9VAC5-80-1410]
2. Add additional public notice and participation requirements for specific source types. Needed in order to implement the requirement of state law to address public participation for certain localities in greater detail. [9VAC5-80-1170, 9VAC5-80-1460, 9VAC5-80-1775, 9VAC5-80-2070, 9VAC5-170-140]

Based on the Board book material, staff presentation and Board discussion, the Board, on a motion by Mr. Langford and seconded by Ms. Bush, unanimously (i) adopted the amendments with an effective date consistent with the Administrative Process Act and (ii) affirmed that it would receive, consider, and response to petitions by any person at any time with respect to reconsideration or revision, as provided in § 2.2-4006 B of the Administrative Process Act. (Vote was taken by roll call with all members voting aye.)

Minute No. 5 - Federal Documents Incorporated by Reference - Rev. F20 - Final Exempt Action: Ms. Karen Sabasteanski presented amendments to the Regulations for the Control and Abatement of Air Pollution to incorporate newly promulgated federal New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and national emission standards for hazardous air pollutants for source categories (Maximum Achievable Control Technology, or MACT), Rules 5-5, 6-1, and 6-2, respectively, of the Board's regulations. Ms. Sabasteanski explained that the amendments are necessary for the Department to obtain authority from the U.S. Environmental Protection Agency (EPA) to enforce these standards. In addition, an outdated reference to a specific version of a federal code citation is being removed, and an internal reference to a federal standard in a regulation affecting a specific stationary source (landfills) is being updated.

Ms. Sabasteanski reviewed the following amendments to the regulations:

1. The regulation amendments update state regulations that incorporate by reference certain federal regulations to reflect the Code of Federal Regulations as published on July 1, 2020. The date of the Code of Federal Regulations book being incorporated by reference is being updated to the latest version.
2. Subpart OOOOa (Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015) and Subpart XXX (Municipal Solid Waste Landfills that Commenced Construction, Reconstruction, or Modification After July 17, 2014) of 40 CFR Part 60 are being added to the list of new source performance standards adopted by reference in order that they be implemented by the state.
3. A specific version of an emissions guideline relative to Article 43.1 of 9VAC5-40, Emission Standards for Municipal Solid Waste Landfills for Which Construction, Reconstruction, or Modification Was

Commenced on or Before July 17, 2014, was adopted by reference at 9VAC5-20-21 in order to create a transition between the 2016 and 2017 federal code books. Subsequently, federal issues with respect to this standard have been resolved, and there is no longer a need to cite a previous version of the standard. Additionally, the federal guidelines were amended by adding a new subdivision (see 9VAC5-40-5970 B 3 with respect to 40 CFR 60.38f); the state regulation implementing the federal regulation by reference must now be updated.

Based on the Board book material, staff presentation and Board discussion, the Board, on a motion by Ms. Rijal and seconded by Ms. Kapur, unanimously (i) adopted the amendments with an effective date consistent with the Administrative Process Act and (ii) affirmed that it would receive, consider, and respond to petitions by any person at any time with respect to reconsideration or revision, as provided in § 2.2-4006 B of the Administrative Process Act. (Vote was taken by roll call with all members voting aye.)

Minute No. 6 - Director's Report - The Board received updates from Mr. David Paylor on the budget, the environmental justice study and the Department's continued operations during the COVID-19 state of emergency.

Minute No. 7 - Division Director's Report - The Board received an update from Mr. Michael Dowd, Director of the Division of Air and Renewable Energy, on the U.S. Environmental Protection Agency's (EPA) periodic review of the national ambient air quality standard for ozone. Mr. Dowd also updated the Board on EPA's periodic review of the national ambient air quality standard for sulfur dioxide and the proposed nonattainment designation for a portion of Giles County.

Minute No. 8 - Public Engagement Committee Update - Mr. Roy Hoagland, reported to the Board that the Committee met on July 20. He reviewed the following 10 key topics that the Committee had prioritized based on the public comments received:

1. Provide earlier public notice of pending permit action, including proactive education
2. Provide longer formal public comment period on pending permit
3. Alter outreach practices to ensure notice to, and engagement of, vulnerable communities, in particular environmental justice communities
4. Build more sustainable, relational community engagement
5. Alter framework parameters of solicited public comment on permits so that it is not limited to technical parameters
6. Increase access to Department staff to provide public with clearer understanding of the technical aspects of a proposed facility and associated permit
7. Provide the public with the opportunity to address the Board, not the Department, on all regulations and on a controversial permit de novo
8. Keep Attorney General's Office advice to the Board public whenever possible
9. Have the Board receive from DEQ notice of pending permit applications and provide the Board the opportunity to elevate a permit to the Board
10. Develop and provide the Board with an inventory map of Virginia's vulnerable environmental justice communities

The Board and Department discussed resources available to the Committee and the status of agency efforts and agreed to have further discussions.

Mr. Hoagland advised the Board that the Committee's next meeting was scheduled for October 27, 2020.

Dr. Tompkins and Ms. Cupit were added to the Committee.

Minute No. 9 - High Priority Violations Report - The Board received a report on high priority violations for the third quarter of 2020.

Minute No. 10 - Public Forum - The Board received comment from Mary Finley-Brook and Freeda Cathcart. Ms. Finley-Brook expressed concerns with Department transparency, consideration of site suitability and protection of vulnerable populations. Ms. Cathcart suggested that the Board have additional committees, including a legislative and regulatory committee.

Minute No. 11 - Future Meetings - The Board confirmed December 3, 2020, as the date of their next regular meeting and October 27, 2020, as the date of the next Public Engagement Committee.

Cindy M. Berndt

COMMONWEALTH OF VIRGINIA
STATE AIR POLLUTION CONTROL BOARD MEETING
December 3, 2020

SUBJECT: Major New Source Review Permit for the Norfolk Naval Shipyard, Registration No. 60326 - Public Participation Report and Request for Board Action

SPEAKER: Michael G. Dowd
Director, Air and Renewable Energy Division
Department of Environmental Quality

Patrick Corbett
Office of Air Permit Programs
Department of Environmental Quality

INTRODUCTION

The Norfolk Naval Shipyard (NNSY) is located on the western banks of the Elizabeth River in Portsmouth, Virginia and specializes in repairing, overhauling and modernizing ships and submarines. Currently, the majority of NNSY's steam is provided by the adjacent Wheelabrator plant (Registration number 61018) and the necessary electricity by the grid. NNSY and Wheelabrator are considered a single stationary source as indicated in EPA's email dated October 1, 1999.

On May 14, 2019, NNSY submitted an application to construct and operate a combined heat and power plant (CHP) with auxiliary equipment that would provide the facility with its own source of steam and electricity. Upon startup of the CHP plant, NNSY will no longer receive steam from Wheelabrator and will produce the majority of its electricity. As this is a major modification, a Local Governing Body Certification form is required. DEQ received a completed form dated May 15, 2019. The application was deemed complete on July 9, 2020.

Staff analysis has shown that NNSY has met the requirements of the Prevention of Significant Deterioration (PSD) major new source review permitting regulations at 9VAC5 Chapter 80, Part II, Article 8, and that the proposed facility, operating in accordance with the conditions of the proposed permit (Attachment A), will be in compliance with all applicable ambient air quality standards.

PERMIT APPLICATION REVIEW

NNSY is proposing to construct and operate the following equipment as part of the CHP plant:

- Two dual fuel fired (natural gas as primary fuel with ultra-low sulfur diesel (ULSD) as backup fuel in times when natural gas is unavailable) combustion turbines, each with a heat recovery steam generator (HRSG) with natural gas fired duct burners
- Three dual fuel fired (natural gas as primary fuel and ULSD) boilers
- One ULSD fired black start emergency engine generator set with a belly tank
- One diesel fuel storage tank
- One pad mount distribution switch containing sulfur hexafluoride (SF₆).

The pollutants subject to Article 8 permitting from the emissions units are greenhouse gases (GHG), particulate matter having an aerodynamic diameter equal to or less than ten microns (PM₁₀), and particulate matter having an aerodynamic diameter equal to or less than 2.5 microns (PM_{2.5}). Nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur dioxide (SO₂) are subject to Article 6 (minor new source review permitting). NO_x from the

units will be controlled using dry low-NOx combustion and selective catalytic reduction (SCR). CO and VOC will be controlled by oxidation catalyst. SO₂ emissions are controlled by use of low sulfur fuels (natural gas and ULSD). The total emissions from the proposed project are shown in Table 1.

Table 1. Total emissions from proposed CHP plant

Pollutant	Emissions (tons/yr)
PM10	21.5
PM2.5	21.5
CO	35.2
NOx	29.4
VOC	12.4
SO ₂	6.0

Note: Toxic pollutants were exempt from regulation and are therefore not included in Table 1

DEPARTMENT ANALYSIS

Criteria Pollutants

Applicability of Article 8 review is evaluated on a pollutant-specific basis. A project at an existing major stationary source that has an increase in actual emissions of a pollutant over the significant thresholds in 9VAC5-80-1615C is subject to review for that pollutant. Pollutants exceeding the respective significant thresholds for the proposed CHP plant are PM10 and PM2.5. Article 6 applicability for a project at an existing stationary source is based on the increase in the uncontrolled emissions rate of the project. Nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur dioxide (SO₂) are subject to Article 6 (minor new source review permitting).

Emissions of pollutants subject to review are required to undergo a Best Available Control Technology (BACT) analysis and air quality analyses.

BACT

Pollutants subject to review from a proposed facility must undergo a BACT analysis. For the proposed CHP plant, the pollutants subject to BACT are NOx, CO, VOC, SO₂, GHG, PM10, and PM2.5.

A summary of the BACT analysis is presented in Table 2.

Table 2 – BACT for normal operation

Pollutant	Equipment / Fuel	BACT	Control	Compliance
PM10 and PM2.5	Turbine/HRSG - Natural Gas (NG) with or without duct burners	0.011 lb/MMBtu turbine/HRSG	Good combustion practices (GCP) and NG	Stack test, fuel monitoring, manufacturer specifications and maintenance
PM10 and PM2.5	Turbine/HRSG - ULSD	0.019 lb/MMBtu for each turbine/HRSG	GCP and ULSD	Stack test, fuel monitoring, manufacturer specifications and maintenance

Pollutant	Equipment / Fuel	BACT	Control	Compliance
PM10 and PM2.5	Boilers – NG	0.0078 lb/MMBtu	GCP	Stack test, Fuel monitoring, manufacturer specifications and maintenance
PM10 and PM2.5	Boilers-ULSD	0.018 lb/MMBtu	GCP	Stack test, maintenance, hours of operation
PM10 and PM2.5	Emergency generators – ULSD	1.1 lb/hr	GCP	Stack test, maintenance, hours of operation
CO ₂ e	Turbine/HRSG - NG with or without duct burners	117.1 lb/MMBtu	Energy efficient combustion practices and low GHG fuels	Fuel monitoring, CHP design, manufacturer specifications and maintenance
CO ₂ e	Turbine/HRSG - ULSD	163.6 lb/MMBtu	Energy efficient combustion practices and low GHG fuels	Fuel monitoring, CHP design, manufacturer specifications and maintenance
CO ₂ e	Boilers- NG	117.1 lb/MMBtu	Energy efficient combustion practices and low GHG fuels	Fuel monitoring, manufacturer specifications and maintenance
CO ₂ e	Boilers- ULSD	163.6 lb/MMBtu	Energy efficient combustion practices and low GHG fuels	Fuel monitoring, manufacturer specifications and maintenance
CO ₂ e	Emergency generators – ULSD	2,543 lb/hr	GCP	Stack test, maintenance, hours of operation
NOx	Turbine/HRSG - NG with or without duct burners	2 ppmvd @ 15% O ₂	DLN burners SCR	Stack test operational monitoring (e.g., ammonia injection, SoLoNOx mode, catalyst temperature)
NOx	Turbine/HRSG - ULSD	6 ppmvd @ 15% O ₂	DLN burners SCR	Stack test operational monitoring (e.g., ammonia injection, SoLoNOx mode, catalyst temperature)
NOx	Boilers- NG	0.7 lb/hr	Low NOx burners and flue gas recirculation	Stack test, maintenance, hours of operation
NOx	Boilers- ULSD	4.2 lb/hr	Low NOx burners and flue gas recirculation	Stack test, maintenance, hours of operation
NOx	Emergency generators - ULSD	26.3 lb/hr	GCP	Engine design, maintenance, hours of operation
CO	Turbine/HRSG - NG with or without duct burners	3 ppmvd @ 15% O ₂	Oxidation catalyst	Stack test, operational monitoring - (e.g., SoLoNOx mode, catalyst temperature)
CO	Turbine/HRSG - ULSD	5 ppmvd @ 15% O ₂	Oxidation catalyst	Stack test, operational monitoring - (e.g., SoLoNOx mode, catalyst temperature)
CO	Boilers- NG	1.3 lb/hr	GCP	Stack test, maintenance, hours of operation

Pollutant	Equipment / Fuel	BACT	Control	Compliance
CO	Boilers- ULSD	2.9 lb/hr	GCP	Stack test, maintenance, hours of operation
CO	Emergency generators - ULSD	4.7 lb/hr	GCP	Engine design, maintenance, hours of operation
VOC	Turbine/HRSG - NG with or without duct burners	5 ppmvd @ 15% O ₂	Oxidation catalyst	Stack test, operational monitoring - (e.g., SoLoNO _x mode, catalyst temperature)
VOC	Turbine/HRSG - ULSD	5 ppmvd @ 15% O ₂	Oxidation catalyst	Stack test, operational monitoring - (e.g., SoLoNO _x mode, catalyst temperature)
VOC	Boilers- NG	0.4 lb/hr	GCP	Stack test, maintenance, hours of operation
VOC	Boilers- ULSD	0.3 lb/hr	GCP	Stack test, maintenance, hours of operation
SO ₂	Turbine/HRSG - NG with or without duct burners	0.5 lb/hr	Clean fuel (NG)	Recordkeeping
SO ₂	Turbine/HRSG - ULSD	0.1 lb/hr	Clean fuel (ULSD)	Recordkeeping
SO ₂	Boilers- NG	0.2 lb/hr	GCP	Stack test, maintenance, hours of operation
SO ₂	Boilers-ULSD	0.2 lb/hr	GCP	Stack test, maintenance, hours of operation

Toxic Pollutants/Hazardous Air Pollutants (HAPs)

All affected emissions units except the storage tanks are in a source category subject to a standard promulgated pursuant to 40 CFR 63 (Subparts YYYY, ZZZZ, DDDDD). This means all affected emissions units except the 550,000 gallon storage tank are categorically exempt from the state toxics rule (9VAC5-80-1105(F)) and are not subject to Article 6 for toxic pollutant emissions. The emissions of toxic pollutants from the storage tanks are below the exemption levels; therefore, the project is exempt from toxic pollutant regulations. All emissions units must comply with the applicable Part 63 standards, which will be included in NNSY's Title V permit.

Stack Testing

The permit requires initial stack testing for NO_x, CO, PM10, PM2.5, opacity, and VOC from the turbines and boilers. Periodic stack testing will continue every two years for the turbines.

Monitoring

For proper operation of the SCR system, the permit requires monitoring of the ammonia injection rate, catalyst bed inlet gas temperature, SoLoNO_x mode, turbine load, and catalyst bed differential pressure. For the oxidation catalyst system, the permit requires monitoring of catalyst inlet temperature and differential pressure. NNSY must develop a monitoring plan for the turbine monitoring parameters.

Recordkeeping

The permit requires NNSY to keep records of all equipment and control device parametric monitoring results; results of fugitive leak inspections; the number of, type of, and emissions from venting events; calculations of monthly emissions from the facility; and duration of startup and

shutdown for each turbine. NNSY is further required by the permit to keep records of all stack testing results.

Air Quality Analyses

An air quality analysis via dispersion modeling was conducted to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants emitted above the significant threshold in Article 8: PM10 and PM2.5. For the impact of the project on ozone concentrations, a quantitative analysis was performed in accordance with current EPA guidance. Modeling was completed by NNSY and submitted to the Office of Air Quality Assessments for analysis. The modeling analysis was approved on April 29, 2020 and demonstrated compliance with the applicable NAAQSs.

PUBLIC PARTICIPATION ACTIVITIES

Applicant Informational Briefing

In accordance with 9 VAC 5-80-1775 C of the Regulations, the applicant held an informational briefing on August 1, 2019, at Major Hillard Library located at 824 Old George Washington Hwy N in Chesapeake, Virginia to provide the community with information about the project.

Public Hearing

In accordance with 9 VAC 5-80-1775 F, the public notice for the start of the public comment period for the draft PSD permit appeared in the *Virginian-Pilot* on July 17, 2020. The public notice contained notification of a public briefing to inform the public on the details of the application and DEQ's draft determination on August 17, 2020, as well as a public hearing on September 22, 2020. The public hearing had 58 attendees, 24 of which were DEQ employees or applicant representatives. Seven members of the public provided oral comment on the project. One commenter supported the project with six commenters providing general comments on the draft permit and general comments in opposition to the project.

Public Comment Period

The comment period for the draft permit ran from August 18, 2020 through October 7, 2020. During the public comment period, 80 written comments and 7 oral comments were received. The written comments included one from the Hampton Roads Regional Black Chamber of Commerce in support of the project and seven from advocacy groups opposed to the project (Center for Progressive Reform, Chesapeake Bay Foundation, Chesapeake Climate Action Network, Portsmouth NAACP, Virginia Interfaith Power and Light, Virginia Clinicians for Climate Action, and Virginia Conservation Network). The remaining comments were from citizens. Sixty-two commenters requested that the State Air Pollution Control Board make the final permit determination rather than DEQ.

Copies of DEQ's Summary of and Response to Comments (Attachment D), DEQ's changes to the engineering analysis (Attachment B), and NNSY's responses to comments (Attachment E) are attached.

Changes to the Draft Permit

No changes were made to the draft permit. The engineering analysis has been updated to reflect the public comment period and to correct typographical errors.

SUPPORTING DOCUMENTATION

Immediately following this agenda memo are the following documents:

- A. Draft Final Permit (clean copy)
- B. Draft Permit Engineering Analysis (with track changes)
- C. Air Quality Analyses Review
- D. Public Participation Report (including sampling of written comments received and the Summary and Response to Public Comments)
- E. NNSY Response to Public Comments

RECOMMENDATION

The Board approve the proposed permit with the changes to the engineering analysis.



Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

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Craig R. Nicol
Regional Director

**PREVENTION OF SIGNIFICANT DETERIORATION PERMIT
STATIONARY SOURCE PERMIT TO CONSTRUCT AND OPERATE**

This permit includes designated equipment subject to New Source Performance Standards (NSPS).

In compliance with the Federal Clean Air Act and the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution,

U.S. Navy Norfolk Naval Shipyard
Portsmouth, VA 23709-5000
Registration No.: 60326

is authorized to construct and operate

a combined heat and power (CHP) plant

located at

Norfolk Naval Shipyard, Portsmouth, Virginia 23709

in accordance with the Conditions of this permit.

Approved on {date}.

Craig R. Nicol
Regional Director, Department of Environmental Quality

Permit consists of 2222 pages.
Permit Conditions 1 to 67.

INTRODUCTION

This permit approval is based on the permit application dated May 14, 2019 and supplemental information dated May 30, 2019, June 7, 2019, June 24, 2019, October 3, 2019, October 30, 2019, November 12, 2019, December 9, 2019, January 14, 2020, February 4, 2020, February 7, 2020, February 14, 2020, February 25, 2020, February 26, 2020, February 27, 2020, March 17, 2020, April 17, 2020, April 21, 2020, April 22, 2020, June 11, 2020, June 19, 2020, June 26, 2020, June 30, 2020, and July 9, 2020. Any changes in the permit application specifications or any existing facilities which alter the impact of the facility on air quality may require a permit. Failure to obtain such a permit prior to construction may result in enforcement action. In addition, this facility may be subject to additional applicable requirements not listed in this permit.

Words or terms used in this permit shall have meanings as provided in 9VAC5-10-10 of the State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution. The regulatory reference or authority for each condition is listed in parentheses () after each condition.

Annual requirements to fulfill legal obligations to maintain current stationary source emissions data will necessitate a prompt response by the permittee to requests by the DEQ or the Board for information to include, as appropriate: process and production data; changes in control equipment; and operating schedules. Such requests for information from the DEQ will either be in writing or by personal contact.

The availability of information submitted to the DEQ or the Board will be governed by applicable provisions of the Freedom of Information Act, §§ 2.2-3700 through 2.2-3714 of the Code of Virginia, § 10.1-1314 (addressing information provided to the Board) of the Code of Virginia, and 9VAC5-170-60 of the State Air Pollution Control Board Regulations. Information provided to federal officials is subject to appropriate federal law and regulations governing confidentiality of such information.

Equipment List - Equipment at this facility covered by this permit consists of:

Equipment to be Constructed:

Reference No.	Equipment Description	Rated Capacity	Delegated Federal Requirements
CT-HRSG-1, CT-HRSG-2	Two Solar Taurus 70 dual fired combustion turbine generators with Cleaver Brooks heat recovery steam generators (HRSG) with duct burners. Each unit is equipped with an SCR and an oxidation catalyst.	93.4 MMBtu/hr (HHV) on NG for each CT 88.9 MMBtu/hr (HHV) on Fuel oil for each CT HRSG – 42.6 MMBtu/hr (HHV) (FAF - 96.7 MMBtu/hr (HHV)) each.	NSPS KKKK
B1-B3	Three Cleaver Brooks dual fired boilers	76.6 MMBtu/hr (HHV), each on NG 72.8 MMBtu/hr (HHV), each on Fuel Oil	NSPS Dc
GEN01	Emergency Engine Generator Set	2,220 HP	-

Reference No.	Equipment Description	Rated Capacity	Delegated Federal Requirements
T-1	ULSD Storage Tank	550,000 gallons	-
PS	One electric pad mount distribution switch with sulfur hexafluoride (SF ₆)	40 lbs of SF ₆	-

Specifications included in the above tables are for informational purposes only and do not form enforceable terms or conditions of the permit.

PROCESS REQUIREMENTS

- Emission Controls - Nitrogen oxide (NO_x) emissions from each of the combustion turbine-HRSGs (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall be controlled by a dry low NO_x combustion control technology (SoLoNO_x system for the combustion turbine and low NO_x burners for the HRSG) and a selective catalytic reduction (SCR) system. The dry low NO_x combustion control technology shall be in operation at all times the respective combustion turbine-HRSG is operating except during start-up and shutdown. No combustion turbine may operate below 50% load (MMBtu/hr heat input) when firing natural gas and 65% load (MMBtu/hr heat input) when firing ultra-low sulfur diesel (ULSD) except during startup and shutdown. Each dry low NO_x combustion control technology shall be installed and operated in accordance with manufacturer's specifications. Each SCR shall be provided with adequate access for inspection and shall be in operation when the respective combustion turbine - HRSG is operating, except during start-up and shutdown, as defined in Condition 5.
(9VAC5-80-1180 and 9VAC5-50-260)
- Emission Controls: Carbon monoxide (CO) and volatile organic compound (VOC) emissions from each of the combustion turbine-HRSGs (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall be controlled by an oxidation catalyst and good combustion practices. Each oxidation catalyst shall be provided with adequate access for inspection and shall be in operation when the respective combustion turbine-HRSG is operating, except during startup and shutdown as defined in Conditions 5.
(9VAC-80-1180 and 9VAC-50-260)
- Emission Controls - Particulate matter (PM₁₀ and PM_{2.5}) emissions from each of the combustion turbine - HRSGs (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall be controlled by good combustion practices, the use of natural gas, and the use of ULSD.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC 5-50-280)
- Emission Control - Greenhouse gas emissions as carbon dioxide equivalent (CO₂e) from the combustion turbine - HRSGs (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall be controlled by the use of natural gas, ULSD, and high efficiency design and operation of the combustion turbine - HRSGs.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)

5. Emissions Control - The permittee shall operate and maintain each combustion turbine - HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2), all air pollution control equipment, and all monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times, including during start-up, shutdown, and malfunction.
- a. For the purpose of this permit, startup is defined as the period beginning the first fuel feed and ending when the combustion turbine (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) reaches 50% load (MMBtu/hr heat input) when firing natural gas and 65% load (MMBtu/hr heat input) when firing ULSD.
 - b. For the purpose of this permit, shutdown is defined as the period beginning when the combustion turbine (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) falls and remains below 50% load (MMBtu/hr heat input) when firing natural gas and 65% (MMBtu/hr heat input) when firing ULSD for the purpose of ceasing operation and ends when fuel feeding stops.
 - c. During start-up and shutdown, the combustion turbine - HRSGs' SCR systems (including ammonia injection) and oxidation catalyst systems shall be operated in a manner to minimize emissions following the manufacturer's written protocol or best engineering practices for minimizing emissions. Written documentation shall be maintained explaining the sufficiency of the practices. If such practices are used in lieu of the manufacturer's protocol, the documentation shall justify why the practices are at least equivalent to manufacturer's protocols with respect to minimizing emissions.
 - d. Annual time in startup of each combustion turbine shall not exceed 10 hours per year. Annual hours of startup shall be calculated as the sum of each consecutive 12-month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
 - e. Annual time in shutdown of each combustion turbine shall not exceed 5 hours per year. Annual hours of shutdown shall be calculated as the sum of each consecutive 12-month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
 - f. Each combustion turbine shall operate in "SoLoNOx mode" at all times except for start-up and shutdown. Operation not in "SoLoNOx mode" shall not exceed an annual total of 15 hours per combustion turbine, calculated as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9VAC-80-1180, 9VAC5-50-260, 9VAC5-80-1985, 9VAC5-80-1705, and 9VAC 5-50-280)

6. Emission Controls - Emissions from each boiler (Ref. Nos. B1-B3) shall be controlled by low NO_x burners with flue gas recirculation. The low NO_x burners shall be installed and operated in accordance with manufacturer's specifications.
(9VAC5-80-1180 and 9VAC5-50-260)
7. Emission Controls – CO and VOC emissions from the boilers (Ref. Nos. B1-B3) shall be controlled by good combustion practices, proper operation and maintenance. The permittee shall have available good written operating procedures and a maintenance schedule for the boilers. These procedures shall be based on the manufacturer's recommendations and/or best engineering practices, at a minimum. All records required by this condition shall be kept on site and made available for inspection by the DEQ.
(9VAC5-80-1180 and 9VAC5-50-260)
8. Emission Controls - PM₁₀ and PM_{2.5} emissions from the boilers (Ref. Nos. B1 –B3) shall be controlled by good combustion practices and the use of natural gas and ULSD.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)
9. Emission Controls– Greenhouse gas emissions as CO₂e emissions from the boilers (Ref. Nos. B1-B3) shall be controlled by the use of natural gas fuel, use of ULSD, and high efficiency design and operation.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)
10. Emission Controls - Nitrogen oxides (NO_x) emissions from the engine-generator set (Ref. Nos. GEN01) shall be controlled by electronic fuel injection and turbocharged engine and aftercooler. The permittee shall maintain documentation that demonstrates the electronic fuel injection and turbocharged engine and aftercooler have been installed on the engine-generator set.
(9VAC5-80-1180 and 9VAC5-50-260)
11. Emission Controls - Visible emissions and particulate emissions (PM₁₀ and PM_{2.5}) and carbon monoxide (CO) emissions and volatile organic compound (VOC) emissions and nitrogen oxide (NO_x) emissions from the engine generator set (Ref. Nos. GEN01) shall be controlled by the use of good operating practices and performing appropriate maintenance in accordance with the manufacturer recommendations. In addition, the permittee may only change those settings that are permitted by the manufacturer and do not increase air emissions.
(9VAC5-80-1180, 9VAC5-50-260, 9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)
12. Emission Controls - Greenhouse gas emissions as CO₂e emissions from the emergency engine generator set (Ref. No. GEN01) shall be controlled by the use of ULSD and good combustion practices.

(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)

13. Emission Controls - Pad mount distribution switch - Greenhouse gas emissions from the pad mount distribution switch shall be controlled by an enclosed-pressure pad mount distribution switch, with a maximum annual leakage rate of 0.5 percent, and a low pressure detection system (with alarm). The low pressure detection system shall be in operation when the pad mount distribution switch is in use. The permittee shall develop, maintain, and implement a maintenance plan for the pad mount distribution switch that includes procedures for minimizing emissions and corrective action to be taken in the event of a low pressure alarm.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)
14. Monitoring Devices - Each SCR system shall be equipped with devices to continuously measure and record ammonia injection rate, catalyst bed differential pressure, and catalyst bed inlet gas temperature. Each monitoring device shall be installed, maintained, calibrated and operated in accordance with the approved procedures in Condition 17 that shall include, as a minimum, the manufacturer's written requirements or recommendations. Each monitoring device shall be provided with adequate access for inspection and shall be in operation when the corresponding SCR system is operating.
(9VAC5-80-1180 and 9VAC5-50-20 C)
15. Monitoring Devices - Each oxidation catalyst shall be equipped with a device to continuously measure and record the gas temperature at the catalyst bed inlet and the catalyst bed differential pressure. Each monitoring device shall be installed, maintained, calibrated and operated in accordance with the approved procedures in Condition 17 that shall include, at a minimum, manufacturer's written requirements or recommendations. Each monitoring device shall be provided with adequate access for inspection and shall be in operation when the oxidation catalyst is operating.
(9VAC5-80-1180 and 9VAC5-50-20 C)
16. Monitoring Devices - The engine-generator set (Ref. No. GEN01) shall be equipped with a non-resettable hour metering device to monitor the operating hours. The non-resettable hour meter used to continuously measure the hours of operation for the engine-generator set shall be observed by the owner with a frequency of not less than once each day the engine-generator set is operated. The owner shall keep a log of these observations.

The monitoring device shall be installed, maintained, calibrated (as appropriate) and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations. The monitoring device shall be provided with adequate access for inspection and shall be in operation when the engine-generator set is operating.

(9VAC5-80-1180 D and 9VAC5-80-1985)

17. Monitoring Plan - The permittee shall develop and operate in accordance with an approved monitoring plan for the monitoring devices identified in Conditions 14 and 15. The plan shall include ranges for each parameter. The range values shall be established during the initial performance tests required in Condition 50 and revalidated during the subsequent performance tests required in Condition 54. The monitoring plan shall be submitted for approval to the Tidewater Regional Office with the test results as required in Condition 50. (9VAC5-80-1180 and 9VAC5-50-20 C)

OPERATING LIMITATION

18. Fuel - The approved fuels for the combustion turbines (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) are natural gas with ULSD back-up and the approved fuel for the associated HRSGs' duct burners is natural gas. A change in the fuel shall be considered a change in the method of operation of the combustion turbine-HRSG and may require a new or amended permit. However, if a change in the fuel is not subject to new source review permitting requirements, this condition should not be construed to prohibit such a change. (9VAC5-80-1180 and 9VAC5-80-1985)
19. Fuel Throughput – Each combustion turbine-HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall consume no more than 644,058 gallons of ULSD per year, calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. (9VAC5-80-1180 and 9VAC5-80-1985)
20. Fuel Throughput – Each HRSG shall consume no more than 48,335,000 cubic feet of natural gas per year when operating independently of the combustion turbine (fresh air firing mode), calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. (9VAC5-80-1180 and 9VAC5-80-1985)
21. Fuel - The approved fuels for the boilers (Ref. Nos. B1-B3) are ULSD and natural gas. A change in the fuel shall be considered a change in the method of operation of the boilers and may require a new or amended permit. However, if a change in the fuel is not subject to new source review permitting requirements, this condition should not be construed to prohibit such a change. (9VAC5-80-1180 and 9VAC5-80-1985)
22. Fuel Throughput - The boilers (Ref. Nos. B1-B3) combined shall consume no more than 1,582,608 gallons of ULSD per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9VAC5-80-1180 and 9VAC5-80-1985)

23. Fuel - The approved fuel for the engine-generator set (Ref. Nos. GEN01) is ULSD. A change in the fuel shall be considered a change in the method of operation of the engine generator set and may require a new or amended permit. However, if a change in the fuel is not subject to new source review permitting requirements, this condition should not be construed to prohibit such a change.
(9VAC5-80-1180 and 9VAC5-80-1985)

24. Operating Hours – The engine-generator set (Ref. Nos. GEN01) shall not operate more than 500 hours per year, calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9VAC5-80-1180 and 9VAC5-80-1985)

25. Fuel - The ULSD for the combustion turbines, the boilers, and the emergency generator (Ref. Nos. CT-HRSG-1, CT-HRSG-2, B1-B3, and GEN01) shall meet the specifications below:

DIESEL FUEL which meets the ASTM D975 specification for Grades 1 or 2 diesel fuel:

Maximum sulfur content per shipment: 0.0015%

(9VAC5-80-1180, 9VAC5-50-260, and 9VAC5-80-1985)

26. Fuel Certification - The permittee shall obtain a certification from the fuel supplier with each shipment of diesel fuel. Each fuel supplier certification shall include the following:
- a. The name of the fuel supplier;
 - b. The date on which the diesel fuel was received;
 - c. The quantity of diesel fuel delivered in the shipment;
 - d. A statement that the diesel fuel complies with the American Society for Testing and Materials specifications (ASTM D975) for S15 diesel fuel oil; and
 - e. The sulfur content of the diesel fuel or a statement that the fuel is S15 ULSD.

Fuel sampling and analysis, independent of that used for certification, as may be periodically required or conducted by DEQ, may be used to determine compliance with the fuel specifications stipulated in Condition 25. Exceedance of these specifications may be considered credible evidence of the exceedance of emission limits.
(9VAC5-80-1180 and 9VAC5-80-1985)

27. Emergency Power Generation - The engine-generator set (Ref. Nos. GEN01) shall only be operated in the following modes:
- a. In situations that arises from sudden and reasonably unforeseeable events where the primary energy or power source is disrupted or disconnected due to conditions beyond the control of an owner or operator of a facility including:
 - i. A failure of the electrical grid;
 - ii. On-site disaster or equipment failure; or
 - iii. Public service emergencies such as flood, fire, natural disaster, or severe weather conditions.
 - b. For periodic maintenance, testing, and operational training.
(9VAC5-80-1180 and 9VAC5-80-1985)
28. Operation of the HRSG's duct burner – No HRSG's duct burner shall operate during the startup and shutdown of its respective combustion turbine.
(9VAC5-80-1180 and 9VAC5-80-1985)
29. Operating scenarios – Each combustion turbine-HRSG may only operate under the following operating scenarios:
- a. The combustion turbine-HRSG operating on natural gas with or without HRSG's duct burners providing supplemental firing;
 - b. The combustion turbine operating on ULSD without the HRSG's duct burners providing supplemental firing; and
 - c. Fresh air firing mode: HRSG's duct burners operating independently of the combustion turbine. This mode cannot coincide with the operation of any combustion turbine or boiler (Ref No B1-B3), except during periods of transitions, not to exceed 2 hours per occurrence, when boiler capacity is brought online to maintain steam load.
(9VAC5-80-1180 and 9VAC5-80-1985)
30. SF₆ Annual Throughput - After start-up, the total quantity of SF₆ gas added to the pad mount distribution switch shall not exceed 0.2 lbs of SF₆ per year, calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9VAC5-80-1985, 9VAC5-80-1705, and 9VAC5-50-280)

31. Requirements by Reference - NSPS - Except where this permit is more restrictive than the applicable requirement, the NSPS equipment as described in the equipment table in the Introduction of this permit shall be operated in compliance with the requirements of 40 CFR 60, Subparts Dc and KKKK.
 (9VAC5-50-400 and 9VAC5-50-410)

EMISSIONS LIMITS

32. Short-Term Emission Limits - Emissions from the operation of each combustion turbine - HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) with or without HRSG's duct firing while burning natural gas shall not exceed the limits specified below

PM10	0.011 lb/MMBtu	1.4 lb/hr
PM2.5	0.011 lb/MMBtu	1.4 lb/hr
CO _{2e} (9VAC5-80-1985, 9VAC5-80-1705, and 9VAC 5-50-280)	117.1 lb/MMBtu	15,923 lb/hr

33. Short-Term Emission Limits - Emissions from the operation of each combustion turbine - HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) with or without HRSG's duct firing while burning natural gas shall not exceed the limits specified below

SO ₂		0.5 lb/hr
NO _x	2 ppmvd@15%O ₂	0.7 lb/hr
CO	3 ppmvd@15%O ₂	0.9 lb/hr
VOC	5 ppmvd@15%O ₂	0.7 lb/hr

ppmvd = parts per million by volume on a dry gas basis, corrected to 15 percent O₂.
 Limits for NO_x, CO, and VOC do not apply during periods of start-up and shutdown.
 (9VAC5-80-1180 and 9VAC5-50-260)

34. Short-Term Emission Limits - Emissions from the operation of each combustion turbine - HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) while burning ULSD shall not exceed the limits specified below

PM10	0.019 lb/MMBtu	1.7 lb/hr
PM2.5	0.019 lb/MMBtu	1.7 lb/hr
CO _{2e} (9VAC5-80-1985, 9VAC5-80-1705, and 9VAC 5-50-280)	163.6 lb/MMBtu	14,542 lb/hr

35. Short-Term Emission Limits - Emissions from the operation of each combustion turbine - HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) while burning ULSD shall not exceed the limits specified below

SO ₂		0.1 lb/hr
NO _x	6 ppmvd@15%O ₂	1.9 lb/hr
CO	5 ppmvd@15%O ₂	0.7 lb/hr
VOC	5 ppmvd@15%O ₂	0.3 lb/hr

ppmvd = parts per million by volume on a dry gas basis, corrected to 15 percent O₂.
 Limits for NO_x, CO, and VOC do not apply during periods of start-up and shutdown.
 (9VAC5-80-1180 and 9VAC5-50-260)

36. Short-Term Emission Limits - Emissions from the operation of each HRSG in fresh air mode shall not exceed the limits specified below

PM10	0.008 lb/MMBtu	0.8 lb/hr
PM2.5	0.008 lb/MMBtu	0.8 lb/hr
CO _{2e} (9VAC5-80-1985, 9VAC5-80-1705, and 9VAC 5-50-280)	117.1 lb/MMBtu	11,320 lb/hr

37. Short-Term Emission Limits - Emissions from the operation of each HRSG in fresh air mode shall not exceed the limits specified below

SO ₂		0.3 lb/hr
NO _x	5.7 ppmvd@15%O ₂	1.5 lb/hr
CO	7 ppmvd@15%O ₂	1.4 lb/hr
VOC	7 ppmvd@15%O ₂	0.8 lb/hr

ppmvd = parts per million by volume on a dry gas basis, corrected to 15 percent O₂.
 (9VAC5-80-1180 and 9VAC5-50-260)

38. Annual Emission Limits - Emissions from the operation of each of the two combustion turbine - HRSGs (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) shall not exceed the limits specified below:

PM10	6.2 tons/yr
PM2.5	6.2 tons/yr
Sulfur Dioxide	2.0 tons/yr
Nitrogen Oxides (as NO ₂)	4.1 tons/yr
Carbon Monoxide	7.2 tons/yr
VOC	3.5 tons/yr
CO _{2e}	69,776 tons/yr

These emissions are derived from the estimated overall emission contribution from operating limits, including periods of startup and shutdown. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 1-5, 14, 15, 17-20, 25, 26, 29-37, 46, 50, 52, 54 and 57. (9VAC5-80-1180 and 9VAC5-80-1985)

39. Short Term Emission Limits - Emissions from the operation of each boiler on natural gas shall not exceed the limits specified below:

PM10	0.0078 lb/MMbtu	0.6 lb/hr
PM2.5	0.0078 lb/MMbtu	0.6 lb/hr
CO _{2e}	117.1 lb/MMBtu	8,969 lb/hr

(9VAC5-80-1985, 9VAC 5-80-1705, and 9VAC 5-50-280)

40. Short Term Emission Limits - Emissions from the operation of each boiler on natural gas shall not exceed the limits specified below:

Sulfur Dioxide	0.20 lb/hr
Nitrogen Oxides (as NO ₂)	0.7 lb/hr
Carbon Monoxide	1.3 lb/hr
VOC	0.4 lb/hr

(9VAC5-80-1180 and 9VAC5-50-260)

41. Short Term Emission Limits - Emissions from the operation of each boiler on ULSD shall not exceed the limits specified below:

PM10	0.018 lb/MMbtu	1.3 lb/hr
PM2.5	0.018 lb/MMbtu	1.3 lb/hr
CO ₂ e (9VAC5-80-1985, 9VAC 5-80-1705, and 9VAC 5-50-280)	163.6 lb/MMBtu	11,911 lb/hr

42. Short Term Emission Limits - Emissions from the operation of each boiler on ULSD shall not exceed the limits specified below:

Sulfur Dioxide	0.20 lb/hr
Nitrogen Oxides (as NO ₂)	4.2 lb/hr
Carbon Monoxide	2.9 lb/hr
VOC (9VAC5-80-1180 and 9VAC5-50-260)	0.3 lb/hr

43. Annual Emission Limits - Emissions from the operation of the three boilers (Ref. Nos. B1-B3) shall not exceed the limits specified below:

PM10	8.9 tons/yr
PM2.5	8.9 tons/yr
Sulfur Dioxide	2.0 tons/yr
Nitrogen Oxides (as NO ₂)	14.9 tons/yr
Carbon Monoxide	19.9 tons/yr
VOC	4.9 tons/yr
CO ₂ e	122,268 tons/yr

These emissions are derived from the estimated overall emission contribution from operating limits, including periods of startup and shutdown. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 6-9, 21, 22, 25, 26, 39-42, 47, 51, 53, 57, and 58.
 (9VAC5-80-1180 and 9VAC5-80-1985)

44. Emission Limits - Emissions from the operation of the engine-generator set (Ref. Nos. GEN01) shall not exceed the limits specified below:

PM10	1.10 lb/hr	0.3 tons/yr
PM2.5	1.10 lb/hr	0.3 tons/yr
CO ₂ e	2,543 lbs/hr	636 tons/yr

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 11, 12, 16, 23-27, 48, and 57. (9VAC5-80-1985, 9VAC 5-80-1705, and 9VAC 5-50-280)

45. Emission Limits - Emissions from the operation of the engine-generator set (Ref. Nos. GEN01) shall not exceed the limits specified below:

Nitrogen Oxides (as NO ₂)	26.3 lbs/hr	6.6 tons/yr
Carbon Monoxide	4.70 lbs/hr	1.2 tons/yr

These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 10, 11, 16, 23-27, 48, and 57. (9VAC5-80-1180 and 9VAC5-50-260)

46. Visible Emission Limit - Visible emissions from each combustion turbine-HRSG (Ref. Nos. CT-HRSG-1, CT-HRSG2) shall not exceed 10% opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 20% opacity as determined by the EPA Method 9 (reference 40 CFR 60, Appendix A). (9VAC5-50-80 and 9VAC5-50-280)

47. Visible Emission Limit - Visible emissions from each boiler (Ref. Nos. B1-B3) shall not exceed 10% opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 20% opacity as determined by the EPA Method 9 (reference 40 CFR 60, Appendix A). (9 VAC5-50-80 and 9VAC5-50-280)

48. Visible Emission Limit - Visible emissions from the emergency engine generator set (Ref. No. GEN1) shall not exceed 10% opacity except during one six-minute period in any one hour in which visible emissions shall not exceed 20% opacity as determined by the EPA Method 9 (reference 40 CFR 60, Appendix A). (9VAC5-50-80 and 9VAC5-50-280)

INITIAL COMPLIANCE DETERMINATION

49. Emissions Testing - The emissions units (Ref. Nos. CT-HRSG-1 and CT-HRSG-2, B1-B3, GEN1) shall be constructed so as to allow for emissions testing upon reasonable notice at any time, using appropriate methods. This includes constructing the facility/equipment such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and providing a stack or duct that is free from cyclonic flow. Sampling ports shall be provided when requested at the appropriate locations and safe sampling platforms and access shall be provided.
(9VAC5-50-30 F, 9VAC5-80-1180, and 9VAC5-80-1985)

50. Stack Test - Initial performance tests shall be conducted for NO_x, CO, VOC, PM₁₀, and PM_{2.5} from each combustion turbine-HRSG (Ref. Nos. CT-HRSG-1 and CT-HRSG-2) to determine compliance with the emission limits contained in Conditions 32,33,34,35,36, and 37. The tests shall be performed, reported, and demonstrate compliance within 60 days after achieving the maximum production rate at which the facility will be operated but in no event later than 180 days after start-up of the permitted facility. Tests shall be conducted and reported and data reduced as set forth in 9VAC5-50-30, and the test methods and procedures contained in each applicable section or subpart listed in 40CFR Part 51 Appendix M or 9VAC5-50-410. The performance test shall include a test method performance audit (PA), where applicable. The details of the tests are to be arranged with and approved by the Tidewater Regional Office. The permittee shall submit a test protocol at least 30 days prior to testing. Samples taken as required by this permit shall be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories. One copy of the test results shall be submitted to the Tidewater Regional Office within 60 days after achieving the maximum production rate at which the facility will be operated but in no event later than 180 days after start-up of the permitted facility and shall conform to the test report format enclosed with this permit.
(9VAC5-50-30, 9VAC5-80-1200, and 9VAC5-80-1675)

51. Stack Test - Initial performance tests shall be conducted for NO_x, CO, VOC, PM₁₀, and PM_{2.5} from the boilers (Ref. Nos. B1-B3) to determine compliance with the emission limits contained in Conditions 39, 40, 41, and 42. The tests shall be performed, reported, and demonstrate compliance within 60 days after achieving the maximum production rate at which the facility will be operated but in no event later than 180 days after start-up of the permitted facility. Tests shall be conducted and reported and data reduced as set forth in 9VAC5-50-30, and the test methods and procedures contained in each applicable section or subpart listed in 9VAC5-50-410. The performance test shall include a test method performance audit (PA), where applicable. The details of the tests are to be arranged with and approved by the Tidewater Regional Office. The permittee shall submit a test protocol at least 30 days prior to testing. Samples taken as required by this permit shall be analyzed in accordance with 1VAC30-45, Certification for Noncommercial Environmental Laboratories, or 1VAC30-46, Accreditation for Commercial Environmental Laboratories.

One copy of the test results shall be submitted to the Tidewater Regional Office within 60 days after achieving the maximum production rate at which the facility will be operated but in no event later than 180 days after start-up of the permitted facility and shall conform to the test report format enclosed with this permit.

(9VAC5-50-30, 9VAC5-80-1200, and 9VAC5-80-1675)

52. Visible Emissions Evaluation - Concurrently with the initial performance tests for PM10 and PM2.5 required in Condition 50, Visible Emission Evaluations (VEE) in accordance with 40 CFR Part 60, Appendix A, Method 9, shall be conducted by the permittee on each combustion turbine-HRSG (Ref. Nos CT-HRSG-1 and CT-HRSG-2). Each test shall consist of 30 sets of 24 consecutive observations (at 15 second intervals) to yield a six-minute average. The details of the tests are to be arranged with the Tidewater Regional Office. The permittee shall submit a test protocol at least 30 days prior to testing. The evaluation shall be performed, reported, and demonstrate compliance within 60 days after achieving the maximum production rate at which the unit will be operated but in no event later than 180 days after start-up of the permitted unit. Should conditions prevent concurrent opacity observations, the Tidewater Regional Office shall be notified in writing, within seven days, and visible emissions testing shall be rescheduled within 30 days. Rescheduled testing shall be conducted under the same conditions (as possible) as the initial performance tests. One copy of the test result shall be submitted to the Tidewater Regional Office within 60 days after test completion and shall conform to the test report format enclosed with this permit.

(9VAC5-50-30, 9VAC5-80-1180, and 9VAC5-80-1675)

53. Visible Emissions Evaluation - Concurrently with the initial performance tests for PM10 and PM2.5 required in Condition 51, Visible Emission Evaluations (VEE) in accordance with 40 CFR Part 60, Appendix A, Method 9, shall be conducted by the permittee on each of the boilers (Ref. Nos. B-1, B-3). Each test shall consist of 10 sets of 24 consecutive observations (at 15 second intervals) to yield a six-minute average. The details of the tests are to be arranged with the Tidewater Regional Office. The permittee shall submit a test protocol at least 30 days prior to testing. The evaluation shall be performed, reported, and demonstrate compliance within 60 days after achieving the maximum production rate at which the boilers will be operated but in no event later than 180 days after start-up of the boiler. Should conditions prevent concurrent opacity observations, the Tidewater Regional Office shall be notified in writing, within seven days, and visible emissions testing shall be rescheduled within 30 days. Rescheduled testing shall be conducted under the same conditions (as possible) as the initial performance tests. One copy of the test result shall be submitted to the Tidewater Regional Office within 60 days after test completion and shall conform to the test report format enclosed with this permit.

(9VAC5-50-30, 9VAC5-80-1180, and 9VAC5-80-1675)

CONTINUING COMPLIANCE DETERMINATION

54. Continuing Compliance – The permittee shall conduct additional performance tests for NOx, CO, VOC, PM10, and PM2.5 from the combustion turbine-HRSG (Ref. Nos CT-

HRS-1 and CT-HRS-2) to demonstrate compliance with the emission limits contained in Conditions 32,33,34,35,36, and 37 every 2 years (no more than 26 calendar months following the previous performance test). The details of the tests shall be arranged with the Tidewater Regional Office. The permittee shall submit a test protocol at least 30 days prior to testing. One copy of the test results shall be submitted to the Tidewater Regional Office within 60 days after test completion and shall conform to the test report format enclosed with this permit.

(9VAC5-50-30, 9VAC5-80-1180, and 9VAC5-80-1675)

55. Continuing Compliance – Upon request by DEQ, the permittee shall conduct additional performance tests to determine compliance with the emission limits contained in this permit. The details of the tests shall be arranged with the Tidewater Regional Office.
(9VAC5-50-30 G)

NOTIFICATIONS

56. Initial Notifications - The permittee shall furnish written notification to the Tidewater Regional Office of:
- a. The actual date on which construction of the CHP plant commenced within 30 days after such date.
 - b. The anticipated start-up date of the CHP plant postmarked not more than 60 days nor less than 30 days prior to such date.
 - c. The actual start-up date of the CHP plant within 15 days after such date.
 - d. The anticipated date of performance tests of the CHP plant postmarked at least 30 days prior to such date.

Copies of the written notification referenced in items a through d above are to be sent to:

Chief, Air Section
Enforcement & Compliance Assurance Division
Air, RCRA and Toxics Branch
US EPA Region 3
1650 Arch Street – 3ED21
Philadelphia, PA 19103

(9VAC5-50-50, 9VAC5-80-1180, and 9VAC5-80-1985)

RECORDS AND REPORTING

57. On Site Records - The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with the Tidewater Regional Office. These records shall include, but are not limited to:

- a. Monthly and annual individual and combined throughput of ULSD to the boilers (Ref. Nos. B1 – B3). Annual throughput shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- b. Monthly and annual consumption of ULSD from each combustion turbine (CT-HRSG-1 and CT-HRSG-2). Annual consumption shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- c. All fuel supplier certifications.
- d. The occurrence and duration of any startup, shutdown, or malfunction of the combustion turbines, the total annual hours of startup and shutdown, and any malfunction of the air pollution control equipment;
- e. Operation and control device monitoring plan and monitoring data and reports required in Conditions 17.
- f. Monthly and annual consumption of natural gas from each HRSG (in fresh air firing mode), calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- g. Annual hours of operation of the engine-generator set (Ref. No. GEN01), calculated monthly as the sum of each consecutive 12 month period. Compliance for the consecutive 12 month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- h. Engine information including make, model, serial number, model year, maximum engine power (bhp), and engine displacement for each engine-generator set.
- i. The manufacturer's written operating instructions or procedures developed by the owner/operator that are approved by the engine manufacturer for the engine-generator set (Ref. No. GEN01).
- j. Records of the reasons for operation for the engine-generator set (Ref. Nos. GEN01), including, but not limited to, the date, cause of the emergency, and the hours of operation.

- k. Results of all stack tests and visible emission evaluations.
- l. Records showing the pad mount distribution switch is operating in accordance with the manufacturer's specifications.
- m. Records of the total quantity of SF₆ gas added to the pad mount distribution switch to show compliance with Condition 30.
- n. Manufacturer's instructions for proper operation of equipment.
- o. Monthly and annual emissions calculations for NO_x, VOC, CO, PM₁₀, PM_{2.5}, CO_{2e}, and SO₂ from each emissions unit listed in the Equipment List using calculation methods approved by the Tidewater Regional Office to verify compliance with the ton/yr emissions limitations in Conditions 38, 43, 44, and 45.
- p. Records of each period of transition duration and reasons for the transition to show compliance with Condition 29.c.

These records shall be available for inspection by the DEQ and shall be current for the most recent five years.

(9VAC5-80-1180, 9VAC5-80-1985, and 9VAC5-50-50)

58. Semiannual Fuel Quality Reports – The permittee shall submit fuel quality reports to the Director, Tidewater Regional Office, postmarked no later than the 30th day following the end of each semiannual period ending June 30th and December 31st. If no shipments of ULSD were received during the semiannual period, the fuel quality report shall consist of the dates included in the semiannual period and a statement that no ULSD was received during the semiannual period. If ULSD was received during the reporting period, the report shall include:
- a. The dates included in the semiannual period.
 - b. A copy of all fuel supplier certifications for all shipments of ULSD received during the reporting period, indicating the supplier, volume of shipment, sulfur content (weight percent) and date the shipment was received.
 - c. A signed statement from the owner or operator of the facility that the fuel supplier certifications represent all of the ULSD received during the reporting period.

One copy of the semiannual fuel report shall be submitted to:

Chief, Air Section
Enforcement & Compliance Assurance Division
Air, RCRA and Toxics Branch

US EPA Region 3
1650 Arch Street – 3ED21
Philadelphia, PA 19103
(9VAC5-80-1180, 9VAC5-50-50, and 9VAC5-50-410)

GENERAL CONDITIONS

59. Permit Invalidation - This permit to construct the CHP plant shall become invalid, unless an extension is granted by the DEQ, if:
- a. A program of continuous construction is not commenced within 18 months from the date of this permit.
 - b. A program of construction is discontinued for a period of 18 months or more, or is not completed within a reasonable time, except for a DEQ approved period between phases of the phased construction of a new stationary source or project.
(9VAC5-80-1210 and 9VAC5-80-1985)
60. Permit Suspension/Revocation - This permit may be suspended or revoked if the permittee:
- a. Knowingly makes material misstatements in the permit application or any amendments to it;
 - b. Fails to comply with the conditions of this permit;
 - c. Fails to comply with any emission standards applicable to a permitted emissions unit;
 - d. Causes emissions from the stationary source which result in violations of, or interfere with the attainment and maintenance of, any ambient air quality standard; or
 - e. Fails to operate in conformance with any applicable control strategy, including any emission standards or emissions limitations, in the State Implementation Plan in effect at the time an application for this permit is submitted.
(9VAC5-80-1210 G and 9VAC5-80-1985F)
61. Right of Entry - The permittee shall allow authorized local, state, and federal representatives, upon the presentation of credentials:
- a. To enter upon the permittee's premises on which the facility is located or in which any records are required to be kept under the terms and conditions of this permit;
 - b. To have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit or the State Air Pollution Control Board Regulations;

c. To inspect at reasonable times any facility, equipment, or process subject to the terms and conditions of this permit or the State Air Pollution Control Board Regulations; and

d. To sample or test at reasonable times.

For purposes of this condition, the time for inspection shall be deemed reasonable during regular business hours or whenever the facility is in operation. Nothing contained herein shall make an inspection time unreasonable during an emergency.
(9VAC5-170-130 and 9VAC5-80-1180)

62. Maintenance/Operating Procedures - At all times, including periods of start-up, shutdown, and malfunction, the permittee shall, to the extent practicable, maintain and operate the affected source, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions.

Records of maintenance shall be maintained on site for a period of five years and shall be made available to DEQ personnel upon request.
(9VAC5-50-20 E and 9VAC5-80-1180 D)

63. Record of Malfunctions - The permittee shall maintain records of the occurrence and duration of any bypass, malfunction, shutdown or failure of the facility or its associated air pollution control equipment that results in excess emissions for more than one hour. Records shall include the date, time, duration, description (emission unit, pollutant affected, cause), corrective action, preventive measures taken and name of person generating the record.
(9VAC5-20-180 J and 9VAC5-80-1180 D)

64. Notification for Facility or Control Equipment Malfunction - The permittee shall furnish notification to the Tidewater Regional Office of malfunctions of the affected facility or related air pollution control equipment that may cause excess emissions for more than one hour. Such notification shall be made no later than four daytime business hours after the malfunction is discovered. The permittee shall provide a written statement giving all pertinent facts, including the estimated duration of the breakdown, within 14 days of discovery of the malfunction. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the permittee shall notify the Tidewater Regional Office.
(9VAC5-20-180 C and 9VAC5-80-1180)

65. Violation of Ambient Air Quality Standard - The permittee shall, upon request of the DEQ, reduce the level of operation or shut down a facility, as necessary to avoid violating any primary ambient air quality standard and shall not return to normal operation until such time as the ambient air quality standard will not be violated.
(9VAC5-20-180 I and 9VAC5-80-1180)

66. Change of Ownership - In the case of a transfer of ownership of a stationary source, the new owner shall abide by any current minor NSR permit issued to the previous owner. The new owner shall notify the Tidewater Regional Office of the change of ownership within 30 days of the transfer.
(9VAC5-80-1240 and 9VAC5-80-1985 E)

67. Permit Copy - The permittee shall keep a copy of this permit on the premises of the facility to which it applies.
(9VAC5-80-1180 and 9VAC5-80-1985 E)

SOURCE TESTING REPORT FORMAT

Report Cover

1. Plant name and location
2. Units tested at source (indicate Ref. No. used by source in permit or registration)
3. Test Dates.
4. Tester; name, address and report date

Certification

1. Signed by team leader/certified observer (include certification date)
2. Signed by responsible company official
3. *Signed by reviewer

Copy of approved test protocol

Summary

1. Reason for testing
2. Test dates
3. Identification of unit tested & the maximum rated capacity
4. *For each emission unit, a table showing:
 - a. Operating rate
 - b. Test Methods
 - c. Pollutants tested
 - d. Test results for each run and the run average
 - e. Pollutant standard or limit
5. Summarized process and control equipment data for each run and the average, as required by the test protocol
6. A statement that test was conducted in accordance with the test protocol or identification & discussion of deviations, including the likely impact on results
7. Any other important information

Source Operation

1. Description of process and control devices
2. Process and control equipment flow diagram
3. Sampling port location and dimensioned cross section Attached protocol includes: sketch of stack (elevation view) showing sampling port locations, upstream and downstream flow disturbances and their distances from ports; and a sketch of stack (plan view) showing sampling ports, ducts entering the stack and stack diameter or dimensions

Test Results

1. Detailed test results for each run
2. *Sample calculations
3. *Description of collected samples, to include audits when applicable

Appendix

1. *Raw production data
2. *Raw field data
3. *Laboratory reports
4. *Chain of custody records for lab samples
5. *Calibration procedures and results
6. Project participants and titles
7. Observers' names (industry and agency)
8. Related correspondence
9. Standard procedures

* Not applicable to visible emission evaluations

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

**Tidewater Regional Office
INTRA-AGENCY MEMORANDUM
Engineering Analysis**

Permit Writer	Mariama Ouedraogo
Air Permit Manager	Laura D. Corl
Memo To	Air Permit File
Date	Draft
Facility Name	US Navy-Norfolk Naval Shipyard
Registration Number	60326
Application No.	36
Date Fee Paid	05/21/2019
Amount (\$)	69,300
Distance to SNP (km)	>100
Distance to JRF (km)	>100
FLM Notification (Y/N)	Y
Application Fee Classification (Title V, Synthetic Minor, True Minor)	Title V
Permit Writer Signature	
Permit Manager Signature	

I. Introduction

Norfolk Naval Shipyard (NNSY) is located on the western banks of the Elizabeth River in Portsmouth, Virginia and specializes in repairing, overhauling and modernizing ships and submarines. Currently, the majority of NNSY's steam is provided by the adjacent Wheelabrator plant (Registration number 61018) and the necessary electricity by the grid. NNSY and Wheelabrator are considered a single stationary source as indicated in EPA's email dated October 1, 1999. NNSY currently has one minor NSR permit dated November 18, 2019 and one Title V permit last modified on May 12, 2015.

On May 14, 2019, NNSY submitted an application to construct and operate a combined heat and power plant (CHP) with auxiliary equipment that would provide the facility with its own source of steam and electricity. The proposed CHP plant will consist of two combustion turbines in combination with two heat recovery steam generators (HRSGs) with duct burners, three boilers, one black start emergency generator with a belly tank, one diesel fuel tank, one 2.4 MW steam turbine, two electric fire pumps, and one air - cooled condenser¹. The combustion turbines and the boilers are designed to primarily burn natural gas (NG) but are also designed to burn ultra-low sulfur diesel (ULSD) as backup fuel. Upon startup of the CHP plant, NNSY will no longer receive steam from Wheelabrator and will produce the majority of its electricity.

Additional information was received on May 30, 2019, June 7, 2019, June 24, 2019, October 3, 2019, October 30, 2019, November 12, 2019, December 9, 2019, January 14, 2020, February 4, 2020, February 7, 2020, February 14, 2020, February 25, 2020, February 26, 2020, February 27,

¹ The initial design contained a cooling tower that has since been replaced by an air-cooled condenser.

2020, March 17, 2020, April 17, 2020, April 21, 2020, April 22, 2020, June 11, 2020, June 19, 2020, June 26, 2020, June 30, 2020, and July 9, 2020.-

The NNSY facility is an existing stationary source. As this is a major modification, a Local Governing Body Certification form is required. DEQ received a completed form dated May 15, 2019. The City of Portsmouth has certified that the location and operation of the facility are consistent with all applicable ordinances adopted pursuant to Chapter 22 (§15.2-2200 et seq.) of Title 15.2 of the Code of Virginia (see copy of the Local Government Body Certification Form in the application). The facility is located on federal property, outside of any locality's zoning ordinances.

The federal Clean Air Act, the National Ambient Air Quality Standards (NAAQS), the State Air Pollution Control Law and the State Air Pollution Control Regulations were established and designed to protect the health and environment for all people. The air quality analysis (see Section VI) indicates emissions from the facility will not exceed any of the applicable ambient air quality standards as permitted. The air permit process used by DEQ and the requirements contained in the resulting draft permit are intended to ensure no disproportionately high or adverse air quality impact on any resident of Virginia.

The facility is in an area that is in attainment with all NAAQS, meaning that air monitoring has shown that, currently, the air meets the federal standards set for certain air pollutants to protect public health and welfare and is used to determine if any person is experiencing an adverse impact.

A screening report for the site was obtained through EPA's EJSCREEN utility. Reports were based on radii of 1, 2, and 5 miles around the proposed site. The demographic index in the 1-mile radius report is in the 95th percentile for Virginia. DEQ is treating the area as an environmental justice community. Environmental Justice is defined by the EPA as the fair treatment and meaningful involvement of all people regardless of race, color, faith, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA defines fair treatment to mean no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies. Executive Order 29 (issued by Governor Northam on January 22, 2019) uses the same definition and established the Virginia Council on Environmental Justice (VCEJ). DEQ has taken several actions in pursuit of the environmental justice principles of fair treatment and meaningful involvement.

As noted in Sections IV (BACT) and VI (Dispersion Modeling), the stationary source complies with all applicable requirements and ambient air quality standards. After imposition of the BACT control measures, the project's emissions have been minimized. Air quality modeling demonstrates that the air quality impact of the pollutants with permitted emissions greater than the respective rates deemed significant are all in accordance with the applicable NAAQS. Therefore, this project will not cause a disproportionately high and adverse impact on any resident of the local community or any resident of Virginia.

DEQ ensured notification regarding the proposed project was communicated beyond the minimum regulatory requirement of publication in a newspaper. Following the standard processing for each

PSD permit action, DEQ sends a letter noting receipt of the application and the results of the preliminary review (ILOD) to the applicant, EPA, and a mailing list maintained by DEQ. DEQ transmitted the letter to the responsible parties for Native American tribes in Virginia. DEQ also sent the source's notification of application and informational briefing for the public to these groups. In addition, DEQ informally reached out to several local environmental advocacy groups to communicate information about the source's briefing. At the briefing, the source answered questions from representatives of local environmental advocacy groups.

NNSY performed additional voluntary public involvement actions. NNSY held an additional meeting (virtual) open to anyone and provided a presentation and provided time for questions from the community. This meeting occurred on May 21, 2020 beginning at 5:30 PM, several months before the comment period on the draft permit began. NNSY reached out to local community groups and stakeholders regarding the project, published notices in the *Virginian-Pilot*, as well as publishing notice of the May community meeting on their website, LinkedIn, Twitter, Facebook, and Instagram accounts. On October 5, 2020, NNSY participated in a meeting with interested stakeholders organized by the Portsmouth NAACP to answer questions regarding the project. NNSY published the information covered in the May 21 and October 5 meetings on their website dedicated to this project.

Upon drafting the permit for public notice, DEQ published a notice for a public briefing, public comment period, and public hearing in the newspaper and circulated the notice to the above list of stakeholders as well a list of local organizations (Attachment A²). A public notice containing lay language was sent to schools, libraries, religious centers, universities, and state/local/federal government representatives within a two mile radius of the facility, other stakeholder groups, including the Chesapeake Bay Foundation, the Virginia Council on Environmental Justice, as well as any person or group signed up to receive notifications of Title V/PSD permit public notices. This notification was sent via email to 359 email addresses on July 28 and resent on August 3 and 7 to addresses that did not open the initial email. An email reminder was sent to all 359 addresses on August 13. A paper version of the lay language notice was mailed on August 8 to 47 constituents for which DEQ did not have email addresses. On August 5, an announcement was posted on the social media platform "Nextdoor" to members in neighborhoods within two miles of the facility. At that time there were 33 neighborhoods with a total of 8,393 "Nextdoor" members. DEQ posted a Twitter and Facebook announcement on August 5. DEQ held the public briefing prior to the beginning of the comment period to give information to interested citizens and answer their questions to help them develop meaningful comments on the project. Notifications were also sent out regarding the public hearing on September 22, 2020. An email was delivered on September 15, 2020 to 359 addresses. The notice was resent to non-openers on September 17. A "Nextdoor" announcement was posted on September 18 to 33 neighborhoods and 8,393 members.

No part of the permit decision can be finalized until DEQ has considered each of the comments received from the public on this permit action. Additional discussion of public participation is contained in Section X.

² Due to the large number of contacts discussed in this paragraph, the original Attachment A has not been updated.

II. Emission Unit(s) / Process Description(s)

NNSY is proposing to construct and operate a natural gas fired CHP plant that will have a nominal net generating capacity of 17.3 Megawatt (MW) at ISO conditions. The affected emissions units at the CHP plant will consist of the following:

- Two dual fuel fired (natural gas as primary fuel with ULSD as backup fuel in times when natural gas is unavailable) combustion turbines, each with a HRSG with natural gas fired duct burners. These units combine to operate in three different scenarios
- Three dual fuel fired (natural gas as primary fuel and ULSD) boilers
- One ULSD fired black start emergency engine generator set with a belly tank
- One diesel fuel storage tank
- One pad mount distribution switch containing sulfur hexafluoride (SF₆)

Combustion Turbine - HRSG

The proposed turbines are Solar Taurus 70 and their primary fuel will be natural gas (with ULSD as backup fuel in times when natural gas is unavailable). Each turbine has a maximum rated heat input of 93.4 MMBtu/hr³ and would potentially operate 8,760 hours per year. Each turbine serves a 7 MW generator. Each turbine's diesel fuel consumption will be limited to the equivalent of 1,000 hours of diesel fuel firing per year. Each turbine exhaust is routed to a HRSG to recover some of the heat from the turbine's exhaust to create steam for the facility or the steam turbine. The steam turbine, designed to produce up to 2.4 MW of electrical output at ISO conditions, will receive excess steam from the HRSGs. The steam turbine is not an emission unit as no pollutants are emitted from its operation.

Each HRSG has an associated duct burner that can be used to raise the temperature of the turbine exhaust gas for additional steam generation under certain operating conditions. The HRSGs' duct burners will be fired exclusively with natural gas. The proposed HRSGs are manufactured by Cleaver Brooks.

Each turbine – HRSG is the emissions unit and operates in three potential operating scenarios:

- Operating scenario 1: the turbines firing alone on either natural gas or ULSD, with the HRSGs operating using the turbine exhausts only;
- Operating scenario 2: the turbines and HRSGs' duct burners both firing on natural gas, with the duct burners providing supplemental firing up to 42.6 MMBtu/hr (HHV) maximum firing rate;
- Operating scenario 3: in cases when both the turbines and boilers are not in operation, the HRSGs' duct burners can operate independently of the turbines as backup in fresh-air firing mode using natural gas, with a maximum heat input of 96.7 MMBtu/hr (HHV). Each HRSG's fuel consumption will be limited to the equivalent of 500 hours per year of

³ This rating is for natural gas and is based on the higher heating value (HHV). The rating on ULSD is 88.9 MMBtu/hr (HHV).

operation in fresh-air firing mode.

The proposed turbines are equipped with Solar's dry low-NO_x (DLN) combustion system (known as SoLoNO_x), which limits the formation of NO_x by pre-mixing air and fuel prior to combustion. This system limits NO_x emissions when the turbine is operating at an ambient temperature of 0°F or greater and at a load equal to or greater than 50% on NG and a load equal to or greater than 65% on liquid fuel. This technology reduces NO_x emissions by operating a lean burn fuel ratio (fuel to air ratios of less than 1:1). The SoLoNO_x system does not operate during start-up or shutdown. SoLoNO_x efficiency is diminished at low loads (less than 50% of capacity on NG and less than 65% of capacity on liquid fuel). The proposed HRSG's duct burners are also low NO_x burners.

Due to the technical considerations for operating the SoLoNO_x system and the inability to operate the control systems during start-up and shutdown, there are three operating modes for the turbines:

- Steady state on natural gas (50% - 100% load).
- Steady state on ULSD (65% - 100% load).
- Start-up and Shutdown (SUSD)

Operations below 50% load on NG and 65% load on ULSD are not allowed except during SUSD.

NNSY is projecting that the turbines will experience 10 startup/shutdown events throughout the year with a total duration of approximately 15 hours. Each start up event is assumed to last 1 hour and each shutdown event is assumed to last 30 minutes.

Combustion emissions from the turbines and HRSGs' duct burners consist mainly of NO_x, CO, SO₂, VOC, PM, PM10, PM2.5, GHGs, and a small amount of hazardous air pollutants (HAPs).

Steam Boilers

The proposed CHP plant will include three identical dual fuel fired steam boilers manufactured by Cleaver Brooks with a maximum heat input of 76.6 MMBtu/hr⁴ each. Natural gas will be the primary fuel for the boilers and ULSD fuel will be used primarily during periods of gas curtailment, gas supply interruption, or periodic testing. The steam from the boilers will be used for facility needs such as heating buildings and not for power generation. The boilers are proposed to operate up to 8,760 hrs/yr on natural gas but ULSD has a fuel throughput limit the equivalent of each boiler operating up to 1,000 hours.

The proposed boilers are equipped with Low NO_x Burners (LNB) and flue gas recirculation (FGR) technologies. These technologies reduce NO_x by suppressing NO_x formation during the combustion process.

LNB⁵s limit NO_x formation by controlling both the stoichiometric and temperature profiles of the

⁴ The boiler ratings are 76.6 MMBtu/hr on NG and 72.8 MMBtu/hr on ULSD. Both of these values are based on the higher heating value (HHV).

⁵ EPA-453/R-94-023, Alternative Control Technologies Document NO_x Emissions from Utility Boilers, Emission Standards

combustion process in each burner flame envelope. This control is achieved with design features that regulate the aerodynamic distribution and mixing of the fuel and air, yielding one or more of the following conditions: reduced O₂ in the primary combustion zone, which limits fuel NO_x formation; reduced flame temperature, which limits thermal NO_x formation; and reduced residence time at peak temperature, which limits thermal NO_x formation.

FGR⁶ involves extracting a portion of the flue gas from the economizer section or air heater outlet and readmitting it to the furnace. It is a flame-quenching strategy in which the recirculated flue gas acts as a thermal diluent to reduce combustion temperatures. It also reduces excess air requirements, thereby reducing the concentration of O₂ in the combustion zone.

Combustion emissions from the boilers consist mainly of NO_x, CO, SO₂, VOC, PM, PM10, PM2.5, GHGs, and a small amount of hazardous air pollutants (HAPs).

ULSD Fired Emergency Engine Generator Set

The CHP plant will employ one emergency generator with an engine rated at 2,220 horsepower (HP). The engine generator set will be used as a black start generator in situations where the plant is shut down and needs to restart. The generator will only be used in emergency situations. It will be certified to applicable Tier 2 emissions standards with less than 500 hours of operation per year including no more than 100 hr/yr for maintenance and readiness testing. ULSD will be used in the engine. The ULSD fuel for the emergency generator will be stored in a 460 gallon belly tank that is internally associated with the engine enclosure.

Combustion emissions from the engine consist mainly of NO_x, CO, SO₂, VOC, PM, PM10, PM2.5, GHGs, and a small amount of hazardous air pollutants (HAPs).

Ancillary Equipment

In addition to the 460 gallon belly tank that stores ULSD fuel for the black start emergency generator, one new 550,000-gallon double-wall tank is proposed for the storage of ULSD for the boilers and turbines and one new aboveground storage tank is proposed for storage of aqueous ammonia for the SCR control system. Small amounts of VOCs and HAPs are emitted from the storage tanks (except from the aqueous ammonia tank). The aqueous ammonia tank is not considered an emissions unit because ammonia is not a regulated pollutant.

The proposed project will include several pad mount distribution switches. Most of the pad mount distribution switches are air-insulated with only one sulfur hexafluoride (SF₆) insulated pad-mount distribution switch holding 40 lbs of the greenhouse gas SF₆. SF₆ is used because other options normally have lower fault current capabilities making them not suitable for this specific pad mount distribution switch.

III. Regulatory Review

A. 9VAC5 Chapter 80, Part II, Article 6 – Minor New Source Review

The provisions of Article 6⁷ apply throughout Virginia to (i) the construction of any new stationary source, (ii) the construction of any project (which includes the affected emissions units), and (iii) the reduction of any stack outlet elevation at any stationary source.

The application is for a change that meets the definition of “project” contained in 9VAC5-80-1110(C). To be exempt from permitting, the regulations provide that a project must be exempt under both the provisions of 9VAC5-80-1105(B) through (D) as a group and the provisions of 9VAC5-80-1105 (E) and (F).

The facility proposes construction of affected emission units listed in 9VAC5-80-1105(B). The engine-generator set’s belly tank is listed at 9VAC5-80-1105(B)(4)(b).

The project has no other affected emissions units listed in 9VAC5-80-1105(B). In determining if a project is exempt under 9VAC5-80-1105(D), a calculation of the uncontrolled emission rate (UER) increase from the project is required. The project’s increase is the sum of the UER increases from each affected emissions unit not listed in 9VAC5-80-1105(B). An emissions unit’s increase is the difference between the new UER after the project (NUE) and the current UER (CUE) for that emissions unit and cannot be less than zero. All affected emissions units in this project are new; therefore, the CUE for each emissions unit is zero.

As shown in the summary table below, the project’s increase for all pollutants exceeds the respective permitting threshold. However, as discussed in section III.B, the project is subject to the provisions of PSD (9VAC5-80 Article 8) as a major modification occurred for Particulate Matter (PM10 and PM2.5); therefore, in accordance with 9VAC5-80-1100(H), the project is exempt from Article 6 for Particulate Matter. The project is subject to the permitting requirements of Article 6 for NO_x, CO, SO₂, and VOC.

Pollutants	CUE (TPY)	NUE (TPY)	UER (TPY)	Exemption (TPY)
SO ₂	0	496.4	496.4	10
CO	0	138.6	138.6	100
NO _x	0	268.0	268.0	10
VOC	0	15.6	15.6	10

As described in Section III.E, all the affected emissions units except the storage tanks are in a source category subject to a standard promulgated pursuant to 40 CFR 63 (Subparts YYYY, ZZZZ, DDDDD). None of the affected emissions units are subject to federal hazardous air pollutant new source review. Therefore, all the affected emissions units except the 550,000 gallon storage tank are exempt from the state toxics rule (9VAC5-80-1105(F)) and are not subject to Article 6 for toxic pollutant emissions.

⁷ Language is paraphrased from 9VAC5-80-1100.

As shown in Attachment C, the emissions from the storage tanks are below⁸ the exemption levels; therefore, the storage tanks are exempt from the state toxic rule (9VAC5-60 Article 5).

B. 9VAC5 Chapter 80, Part II, Article 8 and Article 9 – PSD Major New Source Review and Non-Attainment Major New Source Review

The City of Portsmouth is a PSD area for all pollutants as designated in 9VAC5-20-205. The facility is in the 250 TPY major stationary source category.

The facility is a PSD major source due to its relationship⁹ with Wheelabrator. As previously described, Wheelabrator provides steam to NNSY and the CHP plant is intended to replace the steam generated by Wheelabrator. A major modification for a PSD source is defined in 9VAC5-80-1615 as “any physical change in or change in the method of operation of a major stationary source that would result in a significant emissions increase of a regulated NSR pollutant, and a significant net emissions increase of that pollutant from the major stationary source.”

The addition of the CHP plant is considered a physical change that will increase actual emissions; therefore, it is a project under Article 8.

A project is a major modification for a regulated NSR pollutant if the project occurs at an existing major source and it satisfies the following:

1. the project causes a significant emissions increase (SEI); and
2. the project causes a significant net emissions increase (SNEI).

Step 1 (SEI) of determining if a major modification will occur is to sum all of the emission increases associated with the project for each pollutant. If the result for a pollutant is less than the significant emissions rate, then there is not a significant increase and a major modification has not occurred for that pollutant. For pollutants that exceed the significant emissions rate, another step is required to determine if a significant net emissions increase has occurred.

Step 2 (SNEI) involves summing all of the emission increases associated with the project, and summing all of the other creditable increases and decreases in actual emissions made at the facility during the contemporaneous time period. If the result is greater than the significant emission rate, then a major modification would occur and the project is subject to PSD permitting.

The procedure for calculating whether a SEI will occur depends on the type of emissions units being modified. Since this project involves only new emissions units, the facility has utilized the emissions test contained in 9VAC5-1605(G)(4). This test utilizes the baseline actual emissions (BAE) to future potential emissions test for each new unit. The BAE to future potential emissions test involves comparing the post-change potential emissions of the new emission units to the

⁸ This is based on the fact that all the toxics listed are VOCs and the VOC lb/hr and tpy emissions are below all the listed toxics exemption thresholds.

⁹ See email dated October 1, 1999

baseline actual emissions of these units.

For new units, the definition of BAE states “the baseline actual emissions for purposes of determining the emissions increase that will result from the initial construction and operation of such unit shall equal zero; and thereafter, for all other purposes, shall be the units’ PTE.” Since the project involves only new emissions units that have yet to be constructed, the BAE for each unit equals zero.

Based on the email dated May 30, 2019, there are no emissions units other than those listed in Section II associated with this project.

As shown in Attachment C and the summary table below, the project causes an SEI for PM10 and PM2.5. A calculation of the net emissions increase for these pollutants is required.

Step 1: SEI Pollutant Summary

Pollutants	Emissions Increase from project (TPY)	Significant Increase Level (TPY)	Significant Emissions Increase?
SO ₂	6.0	40	No
PM ¹⁰	21.5	25	No
PM10	21.5	15	Yes
PM2.5	21.5	10	Yes
CO	35.2	100	No
NO _x	29.4	40	No
VOC	12.4	40	No

NNSY is planning to commence construction of the CHP in May 2020 with operation planned for October 2022; therefore, the contemporaneous period extends from May 2015 to October 2022. There were 2 contemporaneous projects identified neither of which results in an emissions decrease.

As shown in the summary table below, the project causes a SNEI for PM10 and PM2.5, therefore, the project is a major modification subject to PSD permitting.

Step 2 – SNEI Pollutant Summary

Pollutants	Emissions Increase from Project (TPY)	Contemporaneous Increases (TPY)	Contemporaneous Decreases (TPY)	SNEI (TPY)	PSD Significant Emissions Rates (TPY)	Significant Net Emissions Increase?
PM10	21.5	0.1	-	21.6	15	Yes
PM2.5	21.5	0.1	-	21.6	10	Yes

¹⁰ The calculation of PM emissions for this project include the condensable fraction. The regulated pollutant PM is only the filterable fraction of particulate matter; therefore, this value overestimates the PM emissions.

Greenhouse Gases (9VAC5 Chapters 80 and 85)

As discussed previously in this section, the project is a major modification subject to PSD review. Therefore, greenhouse gases (GHG) is a pollutant that must be considered for regulation as a “regulated NSR pollutant”. GHG is subject to regulation for a major modification if the project causes an increase in CO₂ equivalents¹¹ (CO₂e) of at least 75,000 tons per year. The calculation for the increase caused by the project follows the SEI and SNEI calculations for other pollutants. First, the project must cause an emissions increase of 75,000 tons or more. Second, the project must cause a net emissions increase of at least 75,000 tons. Once GHG is determined subject to regulation, BACT applicability is reviewed using the “normal” process. Each emissions unit that experiences a net emissions increase for a regulated NSR pollutant (i.e., GHG on mass basis¹²) caused by a physical change or change in the method of operation must apply BACT for that pollutant.

The project causes a CO₂e emissions increase of more than 75,000 tons (SEI) and there are no contemporaneous decreases in CO₂e; therefore, GHG is subject to PSD review.

Pollutant	Project Increases (TPY)	Contemporaneous Increases (TPY)	Contemporaneous Decreases (TPY)	NEI (TPY)	Significant Value (TPY)	Subject to PSD Review?
CO ₂ e	262,459	-	-	262,459	75,000	Yes

C. 9VAC5 Chapter 50, Part II, Article 5 – NSPS

40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

This subpart applies to the 2,220 HP engine powering the emergency generator. The engine must meet the Tier 2 emissions standards in Table 1 of 40CFR 89.112, and the requirement to use ULSD with no more than 15 ppm sulfur content. NNSY will purchase a Tier 2 certified engine and only fire ULSD to comply with the requirements in this subpart.

Virginia has accepted delegation to enforce this federal regulation for any source subject to Title V permitting.

40 CFR Part 60 Subpart Dc - Standards of Performance for Small Industrial, Commercial, Institutional Steam Generating Units

This subpart applies to the boilers and requires them to meet PM and SO₂ standards. In accordance with §60.40c(e) the heat recovery steam generators are not considered affected facilities under this subpart.

¹¹ CO₂e is the emission rate of each GHG species multiplied by its respective global warming potential (GWP) from 40CFR Part 98.

¹² “Mass basis” is a phrase often used to distinguish between CO₂e used for “subject to regulation” and actual total GHG mass emitted. Based on global warming potentials, a facility could emit 10 tons of GHG (e.g., SF₆) and have a CO₂e rate of greater than 100,000 tons.

NNSY is subject to the SO₂ standard in §60.42c(d). The facility will meet this requirement by only burning ULSD and will demonstrate compliance with the sulfur content of the fuel oil by maintaining records of certified analysis (§60.44c(h)(1) and §60.48c(f)).

The boilers must meet the **20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity requirement in §60.43c(c)**. Natural gas and ULSD boilers are expected to meet this requirement. NNSY shall conduct an initial performance test as required under §60.8, and shall conduct subsequent performance tests as requested, to determine compliance with the standards. Method 9 of Appendix A-4 of this part shall be used for determining the opacity of stack emissions (§60.45c (a)(8)).

In accordance with §60.43c(e)(4), the boilers are **not subject to the PM limit in Section 60.43c**. They are also not subject to the monitoring requirements in §60.46c(a) and §60.46c(d) (§60.46c(e)) and are not required to operate a COMS if they follow the applicable procedures in §60.48c(f) (§60.47c(c)).

40 CFR Part 60 Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984

The proposed storage vessels at NNSY are 550,000 gallons and 460 gallons and store diesel fuel oil which has a maximum true vapor pressure of less than 3.5 kPa; therefore the storage vessels are not subject to Kb.

40 CFR Part 60 Subpart KKKK - Standards of Performance for Stationary Combustion Turbines

The turbine-HRSGs are subject to this subpart which regulates NO_x and SO₂. To be in compliance with this subpart, each turbine (including the HRSG when firing in combination with the turbine) must meet a NO_x limit of 25 ppm at 15% O₂ or 1.2 lb/MWh of useful output while firing NG and 74 ppm at 15% O₂ or 3.6 lb/MWh of useful output while firing ULSD (Table 1 of this subpart). To be in compliance with this subpart, each HRSG operating independent of the combustion turbine (fresh air firing mode) must meet a NO_x limit of 54 ppm at 15% O₂ or 0.86 lb/MWh of useful output (Table 1 of this subpart). The turbine-HRSGs are designed to meet the NO_x limits.

To be in compliance with this subpart, each turbine (including the HRSG when firing in combination with the turbine) at NNSY must not emit any gases which contain SO₂ in excess of 0.90 lb/MWh gross output or the turbines must not burn any fuel which contains total potential sulfur emissions in excess of 0.060 lb SO₂/MMBtu heat input (§60.4330(a)). NNSY will meet the 0.060 lb/MMBtu limit by firing natural gas and ULSD.

In accordance with §60.4340, NNSY must (a) perform annual performance tests in accordance with §60.4400 to demonstrate continuous compliance or (b) install, calibrate, maintain and operate continuous monitoring systems. NNSY elected to perform annual performance tests for NO_x in accordance with §60.4400 to demonstrate continuous compliance. If the NO_x emission result from the performance test is less than or equal to 75 percent of the NO_x emission limit for the turbine-

HRSG, NNSY may reduce the frequency of subsequent performance tests to once every 2 years (no more than 26 calendar months following the previous performance test). If the results of any subsequent performance test exceed 75 percent of the NO_x emission limit for the turbine, NNSY must resume annual performance tests. The permit limit is less than 75% of the NSPS NO_x limit; therefore, the testing frequency will be once every two years as long as the source is in compliance with the permit limit.

Combustion turbines regulated under this subpart are exempted from the requirements of NSPS GG. HRSG and duct burners regulated under this subpart are exempted from the requirements of NSPSs Da, Db, and Dc.

Virginia has accepted delegation to enforce this federal regulation.

40 CFR Part 60 Subpart TTTT - Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

The GHG standards in this subpart do not apply to the boilers or turbine-HRSGs because none of them has a base load rating greater than 250 MMBtu/hr or serves a generator or generators capable of selling greater than 25 MW of electricity to a utility power distribution system.

DEQ has not requested delegation to enforce this regulation.

D. 9VAC5 Chapter 60, Part II, Article 1 – NESHAPS

None of the CHP units are subject to a NESHAP.

Other units at the facility not part of this project are subject to the Asbestos NESHAP, Subpart M.

E. 9VAC5 Chapter 60, Part II, Article 2 – MACT

40 CFR Part 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for stationary reciprocating internal combustion engines (RICE)

NNSY is a major source of HAP and the engine rated at 2,220 HP powering the –emergency generator is subject to this subpart. However, there are no standards in this subpart for emergency engines with a rated capacity greater than 500 HP located at major sources of HAPs (§63.6600(c)).

Virginia has accepted delegation to enforce this federal regulation for any source subject to Title V permitting.

40 CFR Part 63 Subpart YYYY – National Emission Standard for Hazardous Air Pollutants for Stationary Combustion Turbines

The combustion turbines are subject to this subpart, are classified as new, and meet the definition of lean premix oil-fired stationary combustion turbine as contained in §63.6175 since each turbine will fire the equivalent of 1,000 hours of fuel oil per year for an aggregate total of 2,000 hours. This

subpart regulates HAP emissions from new lean premix oil-fired stationary combustion turbines that are located at major sources of HAP emissions. Where it is difficult to separately monitor emissions from the turbine and duct burner, NNSY may meet the required emission limitations with their duct burners in operation.

Each of the turbines must comply with the emission limitations and operating limitations in Table 1 and Table 2 of this subpart. The concentration of formaldehyde from the turbines must be limited to 91 ppbvd or less at 15% O₂ and since the turbines are each equipped with an oxidation catalyst, NNSY must maintain the 4-hour rolling average of the catalyst inlet temperature within the range suggested by the catalyst manufacturer.

In addition, NNSY must conduct initial performance tests or other initial compliance demonstrations in Table 4 of this subpart that apply and subsequent performance tests in Table 5 must be performed on an annual basis as specified in Table 3 of this subpart.

Virginia has accepted delegation to enforce this federal regulation.

40 CFR Part 63 Subpart DDDDD - National Emission Standard for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

The boilers are subject to this subpart and are classified as new affected sources in accordance with §63.7490. The pollutants regulated under this subpart are HCl (as a surrogate for acid gas HAP), PM (as a surrogate for non-mercury HAP metals), CO (as a surrogate for non-dioxin/furan organic HAP), mercury (Hg), and Dioxins/Furans.

The boilers are designed to burn natural gas as primary fuel and light liquid (distillate oil) as backup fuel at the equivalent of 1,000 hours per year for each boiler. The boilers are classified as “units designed to burn liquid fuel” and “units designed to burn light liquid fuel.” As such, they must not exceed the applicable emissions limits in Table 1 (Items 14 and 16) of this subpart except during startup and shutdown.

NNSY must conduct initial performance tests according to §63.7520 and Table 5 to this subpart and must conduct subsequent tests according to §63.7515.

Virginia has accepted delegation to enforce this federal regulation.

F. State Only Enforceable (SOE) Requirements (9VAC5-80-1120 F)

None required for this project.

G. 9VAC5 Chapter 40, Part II, Existing Sources - Emission Standards

The permit is more stringent than the Chapter 40 rules for similar units.

IV. **Best Available Control Technology Review (BACT)**

9VAC5-50-260 (Article 6)

BACT applicability is pollutant-by-pollutant based on the permitting applicability thresholds. Each affected emissions unit emitting a pollutant that is subject to Article 6 permitting shall apply Article 6 BACT for that pollutant (9VAC5-50-260(C)). BACT is applicable for NO_x, CO, SO₂, and VOC.

Combustion Turbine-HRSG

NO_x

NNSY proposes a SoLoNO_x/low NO_x burner system and SCR to control NO_x emissions when burning NG and ULSD at steady state for the turbine-HRSG combination.

An SCR reduces NO_x emissions by injecting ammonia (NH₃) into the exhaust gas upstream of a catalyst. The compounds NO_x, NH₃, and O₂ react on the catalyst surface to form N₂ and H₂O.

A review of permits recently issued in Virginia shows no comparable emission units. Permitted units are considerably larger than the affected emissions unit.

BACT for the turbine-HRSG at NNSY is considered the use of SoLoNO_x/low NO_x burners and SCR with the corresponding emissions limits of:

- 2 ppmvd @15%O₂ when firing NG with or without duct firing.
- 6 ppmvd @15%O₂ when firing ULSD
- 5.7 ppmvd @ 15%O₂ in fresh air firing mode

CO and VOC

NNSY proposes an oxidation catalyst system to control both CO and VOC emissions when burning NG and ULSD at steady state.

Oxidation catalyst systems are typically used on turbine-HRSGs to achieve a reduction in CO and VOC emissions. The oxidation catalyst system promotes the oxidation of CO and VOC to CO₂ and H₂O as the emission stream passes through the catalyst bed.

A review of permits recently issued in Virginia shows no comparable emission units. Permitted units are considerably larger than the affected emissions unit.

CO BACT for the turbine-HRSG at NNSY is considered the use of oxidation catalysts and good combustion practices with the corresponding emissions limits of:

- 3 ppmvd @15%O₂ when firing NG with or without duct firing.
- 5 ppmvd @15%O₂ when firing ULSD
- 7 ppmvd @ 15%O₂ when firing NG in fresh air firing mode

VOC BACT for the turbine-HRSG at NNSY is considered to be the use of oxidation catalysts and good combustion practices with the corresponding emissions limits of:

- 5 ppmvd @15%O₂ when firing NG with or without duct firing.
- 5 ppmvd @15%O₂ when firing ULSD
- 7 ppmvd @ 15%O₂ when firing NG in fresh air firing mode

SO₂

With a PTE of 2 tons/year (tpy) of SO₂ (for each turbine-HRSG), flue gas desulfurization is not considered cost effective. NNSY proposes to control SO₂ emissions by the use of natural gas and ULSD.

A review of permits recently issued in Virginia shows no comparable emission units. Permitted units are considerably larger than the affected emissions units.

BACT is considered the use of natural gas as primary fuel and ULSD as backup fuel. The corresponding emissions limits are:

- 0.46 lb/hr when firing NG with or without duct firing.
- 0.13 lb/hr when firing ULSD
- 0.33 lb/hr in fresh air firing mode

NO_x, CO, VOC

Startup/Shutdown (SUSD) operations are also subject to BACT. Catalyst systems need to operate above minimum temperatures to achieve the intended reactions for NO_x, CO, or VOC. Neither catalyst system will be at operating temperature during start-up and shutdown. NNSY proposes work practice standards and minimization of these operational scenarios as BACT for all pollutants. Work practice standards that minimize the number of SUSD events and require the permittee to operate and maintain the emissions units and associated control and monitoring devices in a manner to minimize emissions during these operational scenarios is considered BACT for all pollutants. SUSD events are limited to 10 events and 15 hours per year.

Three Boilers

NO_x

With a PTE of 5.0 tpy of NO_x (for each boiler), SCR is not considered cost effective. However, each boiler will be equipped with LNB and FGR to control NO_x emissions. This is considered BACT for these units. A review of permits recently issued in Virginia indicates that LNB and FGR are the controls used to control NO_x emissions from similar boilers and the emissions limits are consistent with those proposed by NNSY.

The corresponding emissions limits are:

- 0.7 lb/hr (based on 0.0097 lb/MMBtu) when firing NG
- 4.20 lb/hr (based on 0.057 lb/MMBtu) when firing ULSD

CO and VOC

With a PTE of 6.6 tpy of CO (for each boiler) and 1.6 tpy of VOC (for each boiler), an oxidation catalyst is not considered cost effective. NNSY proposes good combustion practices as BACT. This is considered BACT for these boilers. A review of permits recently issued in Virginia indicates that no similar sized boilers currently use oxidation catalysts as a control option and similar sized boilers use good combustion practices as BACT. The emissions limits are consistent with those proposed by NNSY.

The corresponding emissions limits for CO are:

- 1.3 lb/hr (based on 0.0175 lb/MMBtu) when firing NG
- 2.9 lb/hr (based on 0.039 lb/MMBtu) when firing ULSD

The corresponding emissions limits for VOC are:

- 0.4 lb/hr (based on 0.005 lb/MMBtu) when firing NG
- 0.3 lb/hr (based on 0.004 lb/MMBtu) when firing ULSD

SO₂

NNSY proposes to control SO₂ emissions by burning natural gas and ULSD with emissions limitation of 0.45 lb/hr on both NG and ULSD, which is considered BACT for these units.

Emergency engine

Add-on controls are considered infeasible due to the intermittent operation of the engine. However, the engine will meet the NSPS III requirements of certification to Tier 2 emissions standards. BACT is determined to be meeting Tier 2 emissions standards for NO_x, CO, and VOC. BACT for SO₂ is the use of ULSD. Because the Tier 2 emissions standards are weighted average numbers, the numerical BACT numbers that the engine has to meet are those from the manufacturer specification sheet at worst case load, which are almost always different from the Tier 2 numbers. Corresponding BACT limitations are 26.3 lb/hr for NO_x and 4.70 lb/hr for CO. VOC and SO₂ emissions are less than 0.5 tpy; therefore, no limits are included in the permit for these pollutants.

550,000 gallon Storage Tank

VOC emissions from the storage tank are estimated to be only 0.075 tpy total so no limits will be placed in the permit. The use of a fixed roof tank to hold diesel fuel is considered BACT for this type of unit.

9VAC5-50-280 and 9VAC5-80-1705 (PSD)

For a major modification, BACT applies to each emissions unit that is physically or operationally changed (i.e., modified) and experiences a net emissions increase for a pollutant subject to PSD review. This project triggered BACT for PM10, PM2.5, and GHG.

The determination of PSD-BACT usually involves a top-down method that includes the following five steps:

- Step 1 - Identify all possible available control technologies;
- Step 2 - Eliminate technically infeasible control options;
- Step 3 - Rank remaining control technologies by control effectiveness;
- Step 4 - Evaluate most effective controls and document results; and
- Step 5 - Select BACT.

Following the top down approach, all “available” control options are identified for PM10, PM2.5 and GHG emitted from the turbine-HRSGs, the boilers, and the engine, and GHG emitted from the pad mount distribution switch. The options that are technically infeasible are eliminated from further considerations and the remaining options are ranked by control effectiveness. The top option is then evaluated on the basis of the associated economic, energy, and environmental impacts. If the top option is eliminated based on any of these criteria, the next most stringent technology is evaluated. This process continues until a control option is identified as BACT.

Greenhouse Gases PSD BACT

Turbine -HRSG

Step 1: Identify all control technologies:

The permit application identified carbon capture and sequestration (CCS), efficient power generation/design, and fuel selection as potential control technologies for GHG. CCS consists of concentrating/capturing CO₂ from exhaust and transporting it to a location where it can be stored for extended periods of time, usually deep in the ground.

DEQ’s independent review of the RBLC database, recently issued permits, and EPA Guidance for Determining BACT for GHG concurs that CCS, efficient power generation/design, and fuel selection are available options for these units and no other control technologies were identified. CCS is being demonstrated on power plant projects and on other types of facilities around the world. Efficient power generation/design has been the most common BACT determination for natural gas turbine-HRSGs. Using low carbon fuels, such as natural gas instead of coal, can also reduce GHG. However, the clean fuel option should not fundamentally redefine the source. Options that are considered to fundamentally redefine the source include those that would require a permit applicant to switch to a fuel type other than a type of fuel an applicant proposes to use for its combustion process.

Step 2: Eliminate technically infeasible options

In their permit application, NNSY eliminated CCS from the identified control technologies as technically infeasible. According to NNSY, CCS is not technically feasible for small combustion units.

DEQ's independent review concurs that CCS is not technically feasible for small combustion units. Although CCS technology is available and has been demonstrated and operated successfully on some facilities, such as facilities emitting CO₂ in large amounts and industrial facilities with high-purity CO₂ streams, it is not applicable to small natural gas turbine-HRSGs that emit small amount of CO₂ (each proposed turbine-HRSG will emit less than 70,000 tpy of CO₂e) and produces a low purity CO₂ stream. No facility has been found in the GHG RBLC database that uses CCS to control CO₂ emissions.

Step 3 & 4: Rank & evaluate remaining control technologies by effectiveness

The remaining technologies are the use of low carbon fuel and efficient power generation. They will not be ranked since they can be applied together. NNSY is proposing both of these options to control the GHG from the turbine-HRSGs.

The use of low carbon fuels like natural gas instead of coal can reduce CO₂ emissions. Table C-1 to Subpart C of 40 CFR Part 98 (Default CO₂ Emission Factors and High Heat Values for Various Types of Fuel) lists a CO₂ emission factor for Bituminous coal of 93.28 kg CO₂/MMBtu and for #2 oil 73.96 kg CO₂/MMBtu and the factor for natural gas is 53.06 kg CO₂/MMBtu. The only fuels with a lower emission factor than natural gas are coke oven gas (46.85 kg/MMBtu), landfill gas, and other biomass gases (both at 52.07 kg/MMBtu). Those fuels, however, have a Btu content about half of natural gas per standard cubic foot so it may require the burning of twice as much of those gases to achieve the same heating value as natural gas, which will increase emissions of other pollutants. As noted in Step 1, replacing the proposed fuel type(s) fundamentally redefines the source and is not considered in the BACT analysis. Natural gas is proposed for use in the turbine-HRSG as the primary fuel. ULSD will only be used as a backup fuel and is limited to ensure that the natural gas is burned most of the times.

By capturing waste heat and converting it to useful energy, CHPs require less fuel to produce a given energy output than conventional energy sources and avoid transmission and distribution losses that occur when electricity travels over power lines, as they are usually built next to the facility they supply energy to; therefore, using CHP is an efficient way to generate energy.

There are no direct energy, environmental, and economic impacts associated with these controls.

Steps 5: Select BACT

BACT for the turbine - HRSG is determined to be efficient power generation, the use of natural gas as primary fuel (and fuel oil as backup fuel) and an emissions limit of 117.1 lb/MMBtu when firing natural gas and 163.6 lb/MMBtu when firing fuel oil at all times.

GHG emissions during SUSD operations are not expected to be greater than emissions at steady state.

A permit condition limiting the annual CO₂e emissions in tons per year will also be added to the permit to ensure that the total annual emissions do not increase as a result of deterioration of unit efficiency for example. Even though a decrease in efficiency over time would not cause an increase in short term emissions because of the input-based limit (lb/MMBtu), a decreased efficiency would require NNSY to either improve the unit efficiency or reduce the fuel consumption to stay in compliance with the annual limit.

A review of the RBLC database shows that for similar units with or without duct burners GHG emissions are controlled by high efficiency design and the primary use of natural gas resulting in emissions limits comparable to those proposed by NNSY.

Boilers

As described previously, CCS for control of the emissions of CO₂e from these smaller fuel-burning units is not technically feasible or available. BACT for these units will be the primarily use of natural gas, the limited use of ULSD, energy efficient design and operation, and a CO₂e limit of 163.6 lb/MMBtu when burning fuel oil and 117.1 lb/MMBtu when burning NG.

Emergency generator

Add-on CO₂ controls are not technically feasible for emergency generators so BACT for the emergency generator will be the use of good combustion practices, regularly scheduled maintenance and a CO₂e limit of 2,543 lb/hr.

Pad mount Distribution Switch

One of the proposed pad mount distribution switches contains SF₆, which is a GHG. There is a small potential for this sealed unit to release SF₆ from leaks. An alternative to the SF₆ would be to use oil or air-blast, which NNSY is already using for other switches at the facility. SF₆ type units have superior insulating and arc-quenching capabilities. Studies have shown that the leakage rate for SF₆ from this type of unit is between 0.2 and 2.5 percent over the lifetime of the unit. Therefore, BACT for the switch will be to minimize SF₆ leakage by using an enclosed-pressure switch with no more than a 0.5 percent annual leakage rate and a low pressure detection system with alarm.

PM10 and PM2.5 PSD BACT

Turbine -HRSG

Step 1 Identify all possible available control technologies

The permit application identified clean fuels, good combustion practices, cyclones, electrostatic precipitators, baghouses, and wet scrubbers as available control technologies for PM10 and PM2.5.

DEQ's independent review of the RBLC database concurs that the above mentioned controls are available options.

Step 2 Eliminate technically infeasible options;

NNSY eliminated add-on controls such as cyclones, electrostatic precipitators, baghouses, and wet scrubbers as infeasible options. DEQ's independent review concurs that add-on controls are not feasible for these units. Add-on controls (such as ESPs, scrubbers or baghouses) are not used for combustion turbines burning natural gas/ULSD because of the small size (<1 micron) and low concentration of the particles in the exhaust. In addition, most of the particulate emissions from these type of units are condensable, which means they are a gas when emitted from the stack, and add on controls have little or no effect.

Step 3 and 4: Rank and evaluate the technically feasible control technologies based upon emission reduction potential;

The remaining control options will not be ranked since they can and will be applied together. There are no direct energy, environmental, and economics impacts associated with these controls.

Step 5 Select BACT.

BACT for the turbine-HRSG is the use of ULSD and natural gas to minimize particulate from the carryover of inert material in the fuel and good combustion practices.

The corresponding BACT emissions limit is 0.011 lb/MMBtu (HHV) when burning NG with or without duct firing and 0.019 lb/MMBtu (HHV) when burning ULSD for both PM10 and PM2.5 for the turbine-HRSG (except in fresh air firing mode). These limits are more stringent than comparable units found in the RBLC database.

The corresponding BACT emissions limit is 0.008 lb/MMBtu (HHV) for both PM10 and PM2.5 in fresh air firing mode. There were no units in the RBLC database to compare with.

Boilers

Step 1 Identify all possible available control technologies

The permit application identified clean fuels, good combustion practices, cyclones, electrostatic precipitators, baghouses, and wet scrubbers as available control technologies for PM10 and PM2.5.

DEQ's independent review of the RBLC database concurs that the above mentioned controls are available options.

Step 2 Eliminate technically infeasible options;

NNSY eliminated add-on controls such as cyclones, electrostatic precipitators, baghouses, and wet scrubbers as infeasible options. DEQ's independent review concurs that add-on controls are not feasible for these units. As previously described add-on controls are not recommended for combustion units burning natural gas/ULSD.

Step 3 and 4: Rank and evaluate the technically feasible control technologies based upon emission reduction potential;

The remaining control options will not be ranked since they can and will be applied together. There are no direct energy, environmental, and economic impacts associated with these controls.

Step 5 Select BACT.

BACT for the boilers is the use of ULSD and natural gas to minimize particulate from the carryover of inert material in the fuel and good combustion practices. The corresponding BACT emissions limit is 0.0078 lb/MMBtu when burning NG and 0.018 lb/MMBtu when burning ULSD. These limits are comparable to similar units found in the RBLC database.

Emergency generator

Add-on controls are considered infeasible due to the intermittent operation of the engine. However, the engine will meet Tier 2 emissions standards and BACT for PM10 and PM2.5 is good work practice standard and combustion practices, and regularly scheduled maintenance.

V. Summary of Potential Emissions Increase

Pollutant	PTE Change (TPY)
SO ₂	6.0
PM10	21.5
PM2.5	21.5
CO	35.2
NO _x	29.4
VOC	12.4

VI. Dispersion Modeling

A. Criteria Pollutants

As stated in Section III, the criteria pollutants subject to the permit requirements of Article 8 (Prevention of Significant Deterioration) are PM10 and PM2.5. An air quality analysis via dispersion modeling was conducted to demonstrate compliance with the NAAQS. For the impact of the project on ambient ozone concentrations, a quantitative analysis was performed in accordance with current EPA guidance.

Modeling was completed by NNSY and submitted to the Office of Air Quality Assessments for analysis. The modeling analysis was approved on April 29, 2020. The modeling results for PM10 were less than the applicable SILs. Therefore, a full NAAQS and PSD increment analysis for this pollutant and averaging periods was not required. The modeling analysis for PM2.5 demonstrated compliance with the applicable NAAQS. The results are summarized below:

Class II Preliminary Modeling Analysis Results versus Significant Impact Levels (PM10)

Pollutant	Averaging Period	Maximum Predicted Concentration From Proposed Facility ($\mu\text{g}/\text{m}^3$)	Class II Significant Impact Level ($\mu\text{g}/\text{m}^3$)
PM10	24-hour	1.13	5
PM10	Annual	0.12	1

**NAAQS Modeling - Cumulative Impact Results (PM2.5)
 (Includes contribution from secondary PM2.5 formation)**

Pollutant	Averaging Period	Total Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Ambient Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQs ($\mu\text{g}/\text{m}^3$)
PM2.5	24-hour	0.71	13	13.71	35
PM2.5	Annual	0.11	6.7	6.81	12

See Attachment B for additional details regarding DEQ's approval of the modeling analysis contained in the applicant's April 2020 air dispersion modeling report.

B. Toxic Pollutants

Modeling is not required for a project that is exempt from the state toxics rule.

VII. Boilerplates and Boilerplate Deviations

None. Conditions were taken from the respective boilerplates (Skeleton, NG-DO, Diesel Engine) or previously issued permits as necessary.

VIII. Compliance Demonstration

For the turbine-HRSGs: NNSY is required to monitor specified parameters to ensure proper operations of the SCR and oxidation catalysts. A monitoring plan must be developed for the monitoring parameters, with the ranges to be developed during stack testing. NNSY must also perform initial and subsequent stack tests on each turbine-HRSG and keep records of the ULSD fuel throughput and hours of operations of each HRSG.

For the boilers: NNSY must also perform initial stack tests on each boiler and keep records of the ULSD fuel throughput.

For Emergency Engine: The engine must be equipped with a non-resettable hour meter. A log containing the reason for operation of the engine and the amount of time operated is required. Records of engine hours of operations is also required.

Compliance with the annual leakage rate in Conditions 13 and 30 will be based on work practice standards and record keeping since actual measurement of the emissions or leak rate are not feasible. NNSY is required to keep records of the amount of SF₆ added to the pad mount distribution switch.

IX. Title V Review – 9VAC5 Chapter 80 Part II Article 1 or Article 3

The facility is a Title V major source due to a potential to emit (PTE) greater than the applicable threshold (9VAC5-80-50C) for at least one regulated pollutant. A complete application for a significant modification to the Title V permit is due no later than 12 months after commencing operation.

X. Public Participation and Notifications

The applicant held an informational briefing on August 1, 2019 at Major Hillard Library located at 824 Old George Washington Hwy N, Chesapeake, VA 23323 to provide the community with information about the project.

Pursuant to 9VAC5-80-1775 (Article 8) of the Regulations, the proposed project is subject to a public comment period of at least 30 days, followed by a public hearing. The area surrounding the proposed NNSY does not include federally recognized tribal lands. However, DEQ will separately notified the identified state or federally recognized tribes of the public briefing and the opportunity to comment on the draft permit. Additionally, publication of the notice of public comment in a newspaper with local distribution will ensures that the local population will be able to access the notice. The notice of public comment appeared in the ~~XXX~~ Virginian-Pilot on ~~XXXX~~ July 17, 2020. An ~~information meeting~~ public briefing was held virtually on August 17, 2020 at 6:00 PM and public hearing was held virtually on ~~XXXX~~ September 22, 2020 at ~~XXX~~ 6:30 PM. The public hearing was followed by 15 more days of public comment. The comment period ran from August 18 until October 7, 2020, a total of 51 days of public comment.

XI. Other Considerations

None.

XII. Recommendations

Approval of the draft permit for public comment is recommended.

Attachments:

- Attachment A - List of stakeholders and local organizations contacted as part of Public Outreach
- Attachment B – DEQ Modeling Memo NNSY
- Attachment C – Calculations
- Attachment D – RBLC Search



MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY *Office of Air Quality Assessments*

1111 East Main Street, Richmond, VA 23219
22nd Floor

804/698-4000

To: Laura Corl, Air Permit Manager (TRO)

From: Office of Air Quality Assessments (AQA)

Date: April 29, 2020

Subject: PSD Air Quality Analyses – Norfolk Naval Shipyard Combined Heat and Power Plant

I. Project Background

The Norfolk Naval Shipyard (NNSY) owns and operates a full-service ship repair and overhaul facility for United States Navy ships and submarines in Portsmouth, Virginia. NNSY is proposing to construct a new natural gas and fuel oil fired combined heat and power plant (CHP) to provide electricity and process steam to its existing facility. The proposed plant will consist of the following equipment: two 7 megawatts (MW) dual-fuel (natural gas or ultra-low sulfur diesel [ULSD]) fired turbines, two natural gas-fired heat recovery steam generators (HRSG), three dual-fuel (natural gas or ULSD) fired boilers, one Tier 2 diesel-fired black start emergency generator with a 460-gallon belly tank, one 550,000-gallon diesel fuel tank, one air-cooled condenser, and a 2.1 MW steam turbine.

NNSY is a major stationary source under 9 VAC 5 Chapter 80, Article 8 (Prevention of Significant Deterioration (PSD)) of the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution. The proposed CHP has the potential to emit one or more regulated pollutant equal to or greater than their applicable PSD significant emission rate. In addition, the proposed CHP has the potential to emit greenhouse gas (GHG) emissions equal to or greater than 75,000 tons per year (TPY) carbon dioxide equivalent (CO₂e). The pollutants subject to PSD review are particulate matter having an aerodynamic diameter equal to or less than 10 microns (PM-10), particulate matter having an aerodynamic diameter equal to or less than 2.5 microns (PM-2.5), and greenhouse gases (GHGs). As a result, PSD regulations require an air quality analysis be performed that demonstrates that the projected air emissions from the

proposed facility will neither cause or significantly contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment. In addition, PSD regulations require that additional impact analyses for vegetation, soil, growth, and visibility be conducted.

An analysis of the project's impact on air quality and air quality related values (AQRVs) in any affected Class I area may also be required, contingent upon input from the Federal Land Managers (FLMs). The National Park Service (NPS), the United States Forest Service (USFS), and the United States Fish and Wildlife Service (FWS) each stated that an AQRV analysis was not required since the project is not expected to show any significant additional impacts to AQRVs. Therefore, only a Class I area analysis to assess compliance with the Class I PSD increments is required.

The following is a summary of the AQA's review of the required air quality analyses for the proposed CHP for both Class I and Class II PSD areas. The worst-case impacts from all operating loads, including startup and shutdown operations, are presented in this memorandum.

II. Modeling Methodology

The air quality modeling analysis conforms to 40 CFR Part 51, Appendix W - Guideline on Air Quality Models and was performed in accordance with approved modeling methodology. The air quality model used was the most recent version of the AERMOD modeling system (Version 19191). The AERMOD modeling system is the preferred EPA-approved regulatory model for near-field applications and is also contained in Appendix W of 40 CFR Part 51. AERMOD was also used as a preliminary screening model to determine the need for more detailed PSD increment modeling in the Class I area.

Additional details on the modeling methodology are available in the applicant's April 2020 air dispersion modeling report.

III. Modeling Results

A. Class II Area - Preliminary Modeling Analysis

A preliminary modeling analysis for criteria pollutants was conducted in accordance with PSD regulations to predict the maximum ambient air impacts. The preliminary analysis modeled emissions from the proposed facility only to determine whether the impacts were above the applicable significant impact levels (SILs). For those pollutants for which maximum predicted impacts were less than the SIL, no further analyses was required (i.e., predicted maximum impacts less than SILs are considered insignificant and of no further concern). For impacts predicted to be equal to or greater than the SIL, a more refined air quality modeling analysis (i.e., full impact or cumulative impact analysis) is required to assess compliance with the NAAQS and PSD increment.

Table 1 shows the maximum emissions across all load and fuel-burning scenarios that were modeled with the minimum exit velocity and temperature expected from any of the individual flues exhausted through the proposed facility's common, multi-flue stack. Table 2 below shows the maximum predicted ambient air concentrations.

Table 1
 Modeled Emission Rates

Model ID	Description	PM-10 Hourly Emission Rate (lb/hr)	PM-10 Annual Emission Rate (TPY)	PM-2.5 Hourly Emission Rate (lb/hr)	PM-2.5 Annual Emission Rate (TPY)
COMSTK	Common Turbine/Boiler Stack	7.4057	32.4369	7.4057	32.4369
BSTART1 ⁽¹⁾	Black Start Engine	4.4866E-02	0.1965	4.4866E-02	0.1965

⁽¹⁾Emission rates assume one hour of operation in a 24-hour period.

Table 2
 Class II Preliminary Modeling Analysis Results versus Significant Impact Levels

Pollutant	Averaging Period	Maximum Predicted Concentration From Proposed Facility (µg/m ³)	Class II Significant Impact Level (µg/m ³)
PM-10	24-hour	1.13	5
PM-10	Annual	0.12	1
PM-2.5	24-hour	1.00 ⁽¹⁾	1.2
PM-2.5	Annual	0.11 ⁽¹⁾	0.2

⁽¹⁾Includes the contribution from secondary PM-2.5 formation.

The modeling results for PM-10 (24-hour and annual averaging periods) were less than the applicable SILs. Therefore, a full NAAQS and PSD increment analysis for this pollutant and averaging periods was not required. In addition, the project's air quality impact, when added to existing background air quality, would not alter the current attainment status for this pollutant and averaging periods. Additionally, the proposed facility's increment consumption for PM-10 and its averaging periods is not expected to cause or contribute to any increment violation.

As shown in Table 1, the modeling results for PM-2.5 (24-hour and annual averaging periods) were less than the recommended SIL values contained in the U.S. Environmental

Protection Agency’s April 17, 2018 *Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*.

However, a full impact analysis was conducted for PM-2.5 (24-hour and annual averaging periods) because the provisions of the PM-2.5 SILs in 40 CFR 51.166(k)(2) and 52.21(k)(2) were vacated in January 2013 and the DEQ does not currently have state-specific SILs for the purpose of excluding a project from performing a full impact analysis.

B. Class II Area – Cumulative Impact Modeling Analysis

The cumulative impact analysis consisted of separate analyses to assess compliance with the NAAQS and the Class II PSD increment for PM-2.5 for the applicable averaging periods. It is important to note that the cumulative impact modeling results (both NAAQS and PSD increment) can sometimes be less than the “source only” modeling results in Table 2 of this memorandum. This is due to the fact that source only modeling uses the maximum concentration to determine significance, whereas the cumulative modeling results reflect the form of the air quality standard. For example, the following criteria must be met to attain the NAAQS:

- PM-2.5 (24-hour) - To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed the standard.
- PM-2.5 (annual) - To attain this standard, the 3-year average of the weighted annual mean PM-2.5 concentrations from single or multiple community-oriented monitors must not exceed the standard.

NAAQS Analysis

The NAAQS analysis included emissions from the proposed source and representative ambient background concentrations of PM-2.5. Emissions from existing nearby sources are represented by the monitored background concentration. The monitor is located in close proximity, approximately 3 miles north of the NNSY. The results of the analysis are presented in Table 3 and demonstrate compliance with the applicable NAAQS.

Table 3
 NAAQS Modeling - Cumulative Impact Results

Pollutant	Averaging Period	Total Modeled Concentration (µg/m ³)	Ambient Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	NAAQS (µg/m ³)
PM-2.5	24-hour	0.71 ⁽¹⁾	13	13.71	35
PM-2.5	Annual	0.11 ⁽¹⁾	6.7	6.81	12

⁽¹⁾Includes the contribution from secondary PM-2.5 formation.

PSD Increment Analysis

The 24-hour and annual PM-2.5 PSD increment analysis included emissions from the proposed source. Table 4 below presents the results of the analysis and shows that the 24-hour and annual PM-2.5 concentrations were below their applicable PSD increment.

Table 4
PSD Increment Modeling - Cumulative Impact Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Class II PSD Increment ($\mu\text{g}/\text{m}^3$)
PM-2.5	24-hour	1.08 ⁽¹⁾	9
PM-2.5	Annual	0.12 ⁽¹⁾	4

⁽¹⁾Includes the contribution from secondary PM-2.5 formation.

NAAQS and PSD Increment Analyses Conclusions

Based on DEQ's review of the NAAQS and PSD increment analyses, assuming DEQ's regional office processing the permit application approved all of the emission estimates and associated stack parameters for the modeled scenarios, the proposed CHP does not cause or significantly contribute to a predicted violation of any applicable NAAQS or Class II area PSD increment.

Toxics Analysis

The proposed CHP is not subject to the state toxics regulations at 9 VAC 5-60-300 et al. All potential sources of toxic air pollutants will be regulated by a National Emission Standard for Hazardous Air Pollutants (NESHAP). Therefore, a toxic pollutant modeling analysis was not conducted.

Additional Impact Analysis

In accordance with the PSD regulations, additional impact analyses were performed to assess the influence from the proposed facility on visibility, vegetation and soils, and air quality from secondary growth. These analyses are discussed below.

Visibility

Visibility in the area near the proposed facility will be protected by operational requirements, such as air pollution controls and stringent limits on visible emissions, which will be incorporated into its air permit.

Vegetation and Soils

An analysis to assess PM-10 and PM-2.5 impacts on vegetation and soils was conducted. The secondary NAAQS were used as the sensitive injury thresholds since there were no additional thresholds found in a literature review. The secondary NAAQS provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Table 5 shows the modeled PM-10 and PM-2.5 concentrations were below the respective secondary NAAQS. As a result, no adverse impacts on vegetation and soils are expected.

Table 5
Vegetation Sensitivity Impacts from the Proposed CHP

Pollutant	Averaging Period	Total Concentration* ($\mu\text{g}/\text{m}^3$)	Secondary NAAQS ($\mu\text{g}/\text{m}^3$)
PM-10	24-hour	23.13	150
PM-2.5	24-hour	13.71	35
PM-2.5	Annual	6.81	15

*Background concentration was included.

Growth

There will be some temporary jobs associated with construction activities and a few permanent jobs for the operation and maintenance of the CHP. It is expected the available construction force and individuals that already live in the area will fill those jobs. Therefore, it is anticipated that no new housing, commercial or industrial construction will be necessary to support the CHP. Further, the project will not result in any increase of production at the existing facility or require any significant increase in traffic activity.

Based on the growth expectations discussed above, no new significant emissions from secondary growth during the construction and operation phases of the CHP are anticipated.

C. Class I Area Modeling Analysis

The FLMs are provided reviewing authority of Class I areas that may be affected by emissions from a proposed source by the PSD regulations and are specifically charged with protecting the Air Quality Related Values (AQRV) within the Class I areas. The closest Class I area to the proposed facility is Swanquarter National Wildlife Refuge (SNWR). It is approximately 158 kilometer (km) from the proposed facility. The other Class I areas within 300 km of the proposed facility but located at a distance greater than 158 km are Shenandoah National Park and James River Face Wilderness Area. The NPS, the USFS, and the FWS each stated that an AQRV analysis was not required since the project is not expected to show any significant additional impacts to AQRVs.

An analysis to assess compliance with the Class I PSD increments for PM-10 and PM-2.5 was conducted. The emissions used in the Class I area modeling were the same as those used for the Class II area modeling. A preliminary modeling analysis for PM-10 and PM-2.5 was conducted to assess the maximum predicted ambient impacts at a distance of 50 km from the proposed facility. As shown in Table 6, the proposed facility's maximum predicted ambient impacts for PM-10 (24-hour and annual averaging periods) and PM-2.5 (24-hour and annual averaging periods) were less than the applicable Class I SILs. Therefore, the maximum predicted ambient impacts for the aforementioned pollutants and averaging periods are also expected to be less than the SILs at all Class I areas. SNWR is the nearest Class I area at 158 km downwind of the proposed facility. In addition, the nominal impacts at all Class I areas would not cause or contribute to any PSD increment violation.

Table 6
 Summary of Maximum Predicted Concentrations at 50 km from the
 Proposed CHP

Pollutant	Averaging Period	Maximum Predicted Concentration From Proposed Facility at 50 km ($\mu\text{g}/\text{m}^3$)	Class I Significant Impact Level ($\mu\text{g}/\text{m}^3$)
PM-10	24-hour	0.057	0.3
PM-10	Annual	0.004	0.2
PM-2.5	24-hour	0.073 ⁽¹⁾	0.27
PM-2.5	Annual	0.006 ⁽¹⁾	0.05

⁽¹⁾ Concentration includes the contribution from secondary PM-2.5 formation.

Summary of Class I Area Analysis

Based on DEQ's review of the Class I area modeling analyses, the proposed CHP does not cause or significantly contribute to a predicted violation of any applicable Class I area PSD increment.

D. Other Modeling Considerations

Ozone

An assessment to estimate the impact on ozone from the facility's NO_x and VOC emissions was conducted. The conservatively calculated impact was approximately 0.178 parts per billion (ppb) of ozone. The monitored ozone design value for the area is approximately 64 ppb for the period 2016 through 2018. This results in a total design value equal to 64.178 ppb which is well below the 8-hour ozone NAAQS of 70 ppb.

**US Navy – Norfolk Naval Shipyard
Registration Number 60326
Prevention of Significant Deterioration Application
Attachment D - Public Participation Report**

Summary of Public Participation

Public Notice Procedure

Before a Prevention of Significant Deterioration (PSD) permit can be issued, the draft PSD permit must undergo a public participation process. This process consists of 30 days of public comment, followed by a public hearing, followed by 15 more days of public comment.

The public notice for the start of the public comment period, the public briefing, and the public hearing for the draft PSD permit for Norfolk Naval Shipyard (NNSY) appeared in the *Virginian-Pilot* on July 17, 2020. The public notice was also specifically sent to the Environmental Protection Agency (EPA), each state or federally recognized Native American tribes in Virginia, each affected state (North Carolina) and each individual on DEQ's permit notification mailing list. The draft PSD permit and engineering analysis were posted to the Department of Environmental Quality (DEQ) public notice webpage for review. A public briefing to inform the public on the details of the application and DEQ's draft determination was held on August 17, 2020 beginning at 6:00 PM via electronic communication means utilizing GoToWebinar. The public comment period ran from August 18, 2020 through October 7, 2020. The public hearing was conducted on September 22, 2020 beginning at 6:30 PM.

Public Hearing

The public hearing was held via electronic communication means using GoToWebinar. The hearing was attended by 58 people including 24 people representing DEQ or the applicant. Seven people provided oral comment during the hearing.

Comments Received

A total of 87 comments were received, including seven oral comments presented at the public hearing. The remainder of the comments were either emails or email attachments to the DEQ contact provided in the notice. In the instance of a respondent submitting more than one comment during the public comment period, their comments were aggregated. There were no comments received from EPA, from any affected state, or from any state or federally recognized Native American tribes. DEQ has reviewed and considered all of the comments received. DEQ has grouped and summarized the comments and is providing this document to respond to the comments.

NNSY has provided additional information in response to public comment, which is contained in Attachment E of the Request for Board Action document.

Revised Draft PSD Permit

After consideration of each public comment, DEQ has responded to the public comments. DEQ did not make any changes to the draft PSD permit.

A summary of the comments received, grouped by topic, and DEQ's responses to those comments follows.

Summary of and Response to Public Comments

General Comments and Comments on the Draft PSD Permit

Comment

The majority of the general comments received were in general opposition to the draft PSD permit and the proposed Combined Heat and Power (CHP) plant. These comments maintain that DEQ should consider additional information. Specifically, the comments relate to (1) the source of natural gas, (2) impending sea level rise, (3) extreme weather events, (4) environmental impact of the natural gas, and (5) risk assessment for extreme events such as fire, explosion, gas leaks, diesel spills, or national security events. The comments also indicate general opposition to the CHP plant with requests for denial and/or State Air Pollution Control Board (SAPCB or Board) consideration of the draft PSD permit. Some comments addressed Navy leadership, water quality, the greenhouse gas (GHG) impact of the natural gas industry, the necessity of, or demand for, the CHP plant, and the need for renewable energy sources instead of fossil fuel combustion.

Response

The issues and information raised in these comments are generally outside the scope of DEQ's review for an air quality permit of this nature. The topics described above are beyond the purview of the Regulations for the Control and Abatement of Air Pollution [the Regulations] that are the authority for the draft PSD permit. Where these comments relate to air quality, the majority were general in nature and did not suggest any specific improvements to the draft PSD permit, nor did the comments address any of the analyses contained in DEQ's engineering analysis document. However, NNSY has voluntarily provided responses to many of the comments.

To the extent any commenter referred to emissions from accidents and disasters, the regulations and the draft PSD permit already provide for mandatory notification to DEQ within 4 business hours of discovery and follow-up written reports must also be submitted to DEQ. The requirements of 40CFR Part 68 are not part of the new source review program but are included in NNSY's Title V permit.

The draft PSD permit requirements are designed to ensure protection of public health and the environment in accordance with the state and federal ambient air quality standards and regulations.

Comment

Some commenters expressed support for the CHP plant activity, the economic impact on the local economy, and DEQ's processing of the application.

Response

DEQ appreciates all commenters' involvement in the public participation process.

Comment

One comment stated the equipment list, comprising the equipment in the proposed project, in the draft PSD permit is unenforceable and must be made enforceable. Commenter believes the draft PSD permit would not prevent NNSY from changing or replacing the equipment in a way that increased the rated

capacity. The commenter asserts the only way to make sure the emissions standards are being met is by verifying the rated capacity of the equipment.

Response

The equipment list may be used during inspections to verify different equipment has not been installed or added to the facility inappropriately. The permittee is not allowed to change, add, or replace the equipment (i.e., construct a project) without evaluating permitting applicability. Once a permittee decides to change or replace an emission unit, they are required to demonstrate to DEQ that the activity does not trigger permitting. If the project needed a new permit but did not receive one, the permittee may be found in violation and would potentially be subject to corrective action, including monetary penalties. Also, if the applicant constructs the project such that the equipment list specifications are materially exceeded, DEQ may conclude that the source has constructed the project without a permit (i.e. they constructed a different project than the one for which they were permitted).

Conditions 14, 15, 16, 17, and 58 contain monitoring and reporting requirements. In addition, Condition 57 requires the permittee to keep onsite records that must be available for inspection at any time.

Comment

Comments stated the draft PSD permit requires no continuous emissions monitoring or reporting of emissions from the two turbines or three boilers. One comment also requested annual stack testing for the emergency engine. The commenter states that because records are only to be maintained "On Site" by the applicant there is no way for DEQ or the public to consistently ensure compliance with the Permit limits.

Response

The draft PSD permit contains numerous monitoring requirements related to the operation of both the turbines and their respective control devices. The monitoring provisions include the requirement to continuously monitor and record critical process parameters associated with the turbine and the add-on control equipment. Conditions 14, 15, and 17 delineate these requirements. The values of these parameters are determined during the stack testing required in Conditions 50. These values are re-evaluated and adjusted if necessary to ensure continuous compliance during the biennial testing required in Condition 54. This compliance paradigm (emission limits supported by operating limits, control equipment requirements, parametric monitoring, stack test requirements and associated recordkeeping) has been in use by EPA and States for many years and is an effective and proven method to develop enforceable permits.

The draft PSD permit's annual emission limits are based on operating limitations in the permit for the various operational scenarios. NNSY is required to demonstrate compliance by staying within the stack test verified ranges for the continuous parametric monitoring as well as staying below the annual operating limitations.

As noted in the draft engineering analysis, the emergency engine must demonstrate compliance with the NSPS IIII and MACT ZZZZ. Those certification requirements and the draft PSD permit's maintenance and operation requirements for the emergency engine ensures compliance with the emissions limitations from the emergency engine (Condition 11). Operation of the emergency engine is limited to 500 hours per year and will normally run much less than that; the additional emissions and cost for stack testing is not warranted.

The records that the permittee is required to keep in Condition 57 must be available for inspection by DEQ inspectors. NNSY is also subject to the Title V permit program, which does require additional reporting to DEQ to further document compliance with all applicable requirements. In addition, DEQ requires annual emission statements for all major sources such as NNSY. These emissions statements contain detailed operating and emission data for each calendar year and are available for public review via the Freedom of Information Act.

Comment

Comments stated the draft PSD permit uses many undefined terms, such as “good combustion practices,” “high efficiency design and operation”, “good air pollution control practices”, “best engineering practices”, and “proper operation and maintenance.” Absent clear definitions in the Permit, the terms are effectively unenforceable. Each of the terms should be clearly defined so as to make them enforceable.

Response

These terms are usually the same terms used in the Regulations and will be specific to each emissions unit (not just emission unit type), particular operating situation, and manufacturer recommendations. Importantly, the numeric emission limits in the permit must be met regardless of the terms used in this condition. Performance tests demonstrating compliance with the emissions limitations in the permit are also required, and the compliant operating ranges for the control device and process monitoring parameters will be identified during those tests. Broader language in the permit conditions allows DEQ to require that the procedures update as best practices improve over time. The terms in these conditions also facilitate inspections because the inspector can check what the facility is doing against the manufacturer data or current best practices. DEQ may ensure the unit is not only operating as it was during the performance test but potentially reduce emissions beyond present limits through future improvements to best practices.

Comment

Commenters indicated DEQ should have required ultra-low NO_x burners as was required for another permit (Registration Number 52404) as part of the best available control technology (BACT) analysis for the three boilers.

Response

The term “ultra-low NO_x” and “low NO_x” are not terms defined by the Regulations, but are often used by manufacturers and other sources. For the purposes of this permit, the emissions limitation is the BACT consideration. For comparison, the burner performance in the draft PSD permit for NNSY is 0.0097 lb/MMBtu¹ versus 0.011 lb/MMBtu in the referenced permit. The referenced boiler is 66 MMBtu/hr and has a higher pound per hour emission limitation than NNSY’s larger 76 MMBtu/hr boilers. Utilizing the suggested BACT emissions limitation from the referenced permit would likely result in increased emissions as compared to the more stringent requirements of the current draft PSD permit for the NNSY facility.

¹ Abbreviation stands for pound per million British thermal units.

Comment

Many comments stated that the Navy did not consider alternative energy sources sufficiently before deciding on fossil fuel. Alternatives suggested by commenters range from solar panels with diesel fuel back-up or solar panels alone. Commenters also suggested micro grids based on solar (with battery backup) could be the most resilient form of energy in areas prone to flooding and hurricanes. Commenters stated that DEQ should require an alternatives analysis to justify the need for a new fossil fuel-fired power plant rather than an existing or renewable source of energy. Commenters said that DEQ should ensure the applicant has considered alternative sources of electricity prior to issuing a permit for the new plant due to text in the Energy Policy of the Commonwealth and the Virginia Clean Economy Act.

Response

The proposed CHP plant is consistent with the goals of the Energy Policy of the Commonwealth and the Virginia Clean Economy Act. Projects such as a CHP plant promote energy efficiency and increase the independence of energy supply. Energy efficiency programs include facilities like the one at NNSY that combine the production of heat and power by capturing heat used in electricity generation². The regulations lay out the requirements that must be met by the applicant and do not provide any authority for denial of an application that meets the requirements of the regulations.

In accordance with the U.S. Supreme Court's 2014 decision in UARG v. EPA³, DEQ's authority to regulate GHG emissions from any facility under the PSD permitting program is limited by law and regulation to determining and applying BACT. In determining BACT, including for GHG, for a PSD permit, DEQ analyzes the engineering design of the facility as proposed. This is because DEQ/EPA have long recognized as a central tenant of the air pollution permitting program that permitting authorities do not have the ability to redesign the basic business purpose of a facility. Therefore, as a general matter and in this specific case, DEQ does not require the substitution of renewable energy generation for fossil-fuel energy generation. Solar power and battery back-up does not utilize the same or similar raw materials to make energy. It is noted that the facility, as permitted, is designed to operate continuously (8760 hours/year) whereas power from renewable energy sources (such as solar) is generally not continuously available.

DEQ's evaluation for the purpose of this permit is limited to the emissions from the proposed facility as opposed to the emissions from part or all of the natural gas supply chain, natural gas pipelines, the natural gas industry as a whole, fracked natural gas or any other source of emissions outside the facility boundary. It should be noted that this position was confirmed by a recent court decision regarding a similar determination for the Greensville Power Station. Additionally, the definition of "stationary source" also requires activities to be under common control. The pipeline supplying natural gas is not under control of NNSY. As commenters and NNSY note, the pipeline may be shut down during emergencies, ceasing supply of natural gas needed by the CHP plant. This lack of control over the natural gas pipeline supply is one reason NNSY needs to have diesel fuel as a back-up and a second reason the natural supply emissions are not part of NNSY.

² §56-576 of the Code of Virginia

³ Utility Air Regulatory Group v. Environmental Protection Agency, 573 U.S. 302 (2014)

DEQ is taking steps to address GHG emissions from the natural gas industry (pipelines, compressor stations, etc.) via other regulatory mechanisms. This includes the recently established methane workgroup to develop recommendations for addressing emissions from natural gas infrastructure as well as other programs described in Appendix A of this document.

Comments regarding “redefining the source” are not relevant to PSD permits, which follow EPA’s top-down methodology to determine BACT. The Regulations are clear that DEQ’s responsibility is to review the proposed affected emissions unit(s) that are in the application and ensure they are designed to meet BACT. The BACT standard itself is applied to each affected emissions unit. As all the commenters note, a solar installation is an alternative to a turbine, not a control technology applied to a turbine.

NNSY provided estimates for land usage of solar panels using the National Renewable Energy Lab’s guideline of approximately 7 acres per megawatt. The footprint of the CHP is approximately 2 acres for 17 MW generating capacity. An equivalent solar installation would take up approximately 114 acres and does not include the cost or land used for storage of an equivalent amount of battery capacity for back-up. A solar application for this project is not reasonable. NNSY also supplied information regarding infeasibility of siting solar panels on the nearby landfill due to monitoring and landfill cap maintenance issues. NNSY has stated that a solar installation, with or without battery back-up, is not feasible for this project and DEQ agrees.

BACT is defined as an emissions limitation. For NNSY’s turbines, DEQ’s BACT determinations for all pollutants are the most stringent emission limitation for each affected emissions unit that DEQ could find. No commenter submitted information contradicting that fact.

As commenters note, replacing the turbines, or even supplementing the proposed turbines with renewable energy is an “alternative” to the turbines, not a control technology that is applied to turbines. In their alternatives requests, commenters also noted the need for fossil fuel backup, stating in some comments that the solar panels could be backed up by diesel-fired turbines. This would require NNSY to build the proposed plant in addition to a solar or renewable energy plant. Even if fossil fuel backup was not needed for electricity production, the main goal of the project is to produce steam for use at NNSY. The proposed alternatives did not address this aspect (steam production) of the project except to state the higher polluting Wheelabrator facility could continue to produce steam.

Comment

Commenters stated the draft PSD permit sets no emissions limits and requires no monitoring or reporting for the hazardous/toxic air pollutants that would be emitted by the CHP plant. Multiple comments state that the HAPs emissions at the facility are underestimated because of a calculation error. Comments also state that formaldehyde must be limited to 91 ppbv. Commenters indicated the applicant stated NESHAPs apply and DEQ stated that no NESHAPs apply.

Response

Hazardous air pollutants (HAPs) are not regulated NSR pollutants under PSD unless part of a larger pollutant grouping (e.g., formaldehyde is part of VOC); therefore, specific emission rates of HAPs are not a subject of the PSD program.

As noted in the draft engineering analysis, part of the publically-available documentation for this draft PSD permit, the proposed units are exempt from state toxics review. That document lays out the applicability analysis demonstrating the project is exempt from review. As such no toxic pollutant emissions limitations are required in the permit. There was indeed a HAP calculation error in the column cited; however, the calculation error does not impact or alter the regulatory applicability review or resulting permit. No comments address the review contained in the draft engineering analysis.

HAP emissions will be limited through compliance with federal requirements applicable to the source described in the draft engineering analysis even though these requirements are not incorporated into the draft PSD permit. Emissions units exempted from state toxics review still have to meet the requirements of the applicable 40CFR Part 63 rules (MACTs) as they are two separate programs. MACT requirements are federal rules and are enforceable by DEQ and EPA regardless of inclusion in any permit. The units will have to comply with all applicable federal emissions limits, testing, monitoring, and reporting. For example, NNSY is required by 40CFR63 Subpart YYYY (MACT YYYY) to demonstrate compliance with the federal formaldehyde limit of 91 ppbv⁴ even though it's not included in the permit. NNSY supplied manufacturer documentation showing that the turbines are capable of meeting the formaldehyde limit even without considering any control by the oxidation catalyst. Oxidation catalysts remove approximately 50% of volatile HAPs such as formaldehyde. In addition, NNSY must conduct initial performance tests shown in Table 4 of MACT YYYY and subsequent performance tests in Table 5 must be performed on an annual basis as specified in Table 3 of MACT YYYY. Due to the different regulations and purposes of the programs, DEQ does not include limits such as the MACT YYYY formaldehyde limit in a new source review permit but does ensure an affected emissions unit will be able to meet the requirement. The applicable MACT requirements will be included in the facility's Title V permit. The Title V permit program has its own public participation requirements that apply to Title V permits in addition to the public participation associated with this draft PSD permit.

NNSY also voluntarily provided additional information including modeling analyses for multiple HAPs that demonstrate a negligible effect on air quality (0.1% of the significant ambient air concentration).

The permit application and the draft engineering analysis do not conflict with regard to the applicability of NESHAPs. National Emissions Standard for Hazardous Air Pollutants (NESHAP) is used to describe both rules in 40CFR Parts 61 and 63. The terms NESHAP and MACT (Maximum Achievable Control Technology) are often used interchangeably when they refer to 40CFR Part 63 with only the term NESHAP used when referring to 40CFR Part 61. For clarity of discussion DEQ attempts to always refer to Part 61 rules as NESHAPs and Part 63 rules as MACTs. The application refers to 40CFR Part 63 when citing 9VAC5-60-300 C.4 whereas the draft engineering analysis refers to 40CFR Part 61 when using "NESHAP." This review is contained in the original engineering analysis in Sections III.D and III.E.

⁴ Parts per billion volume dry basis.

Comment

Based on the millions of dollars of proposed investment to this site, the creation of only 17 permanent jobs is inadequate, particularly given the VOC and HAP exposures during work at a plant run on gas and diesel located in a polluted environment.

Response

Worker health and safety is outside the scope of DEQ's permit review, but concerns can be addressed by contacting the federal Occupational Safety and Health Administration and Virginia's Department of Labor and Industry. Additional discussion regarding the economic considerations of the project are contained in the site suitability response.

Comment

DEQ has a practice of telling the public that their comments must be constrained to technical information, but site suitability and other broader considerations are required for the Air Board to make a full assessment in accordance with their responsibilities.

Response

This is not a comment on the draft PSD permit.

DEQ regrets any misunderstanding of statements that may have been made during past permit actions. To be clear, DEQ does not have a practice of attempting to limit or actually limiting comments to only those that are technical. DEQ could not find such a statement in this action and commenters did not assert that such a statement was made during this permit action.

DEQ works diligently to engage with the public and provide tools to communicate information that is helpful in the permit review process. Specific comments about any part of the applicable regulation(s) and their application to the project at hand are examples of comments on the draft PSD permit.

Additionally, DEQ is responsive to questions from the public during the public comment period. Each public notice contains a direct line to a permitting contact that can answer questions about the process and provide technical information. There are several tools available to submit a comment which are described in the public notices and DEQ staff are ready to assist with that process.

For this action, DEQ responded to several questions regarding air pollution generally as well as specific questions regarding this proposed CHP project. It is important to note that DEQ responds to questions within our regulatory bounds.

Comment

The NNSY seems to have an expired air permit as noted in the application.

Response

This is not a comment on this draft PSD permit. This draft PSD permit is a preconstruction permit under PSD. The Title V permit program (Title V) is a federal operating permit program designed to house all applicable requirements for a major source⁵. The regulations implementing Title V provide for expiration of a Title V permit every 5 years; however, the program regulations understand there may be times when

⁵ This term is defined in the Title V regulations.

a permit cannot be issued within that timeframe and provides for extension of the previous permit beyond the expiration date. For example, the Title V regulations provide that issuance of a Title V permit should not interfere with the issuance of preconstruction permits such as this draft PSD permit. NNSY is a major source under Title V and continues to be subject to an active Title V permit until the Title permit can be renewed. This does not excuse NNSY from complying with all applicable rules in the interim.

Comment

The draft PSD permit is not clear in terms of the relationship between this CHP plant and the Wheelabrator waste to energy facility in Portsmouth. Would there be a reduction of air emissions, or of jobs, from this nearby facility? Some commenters suggested NNSY should be required to continue to purchase steam from the Wheelabrator facility.

Response

This is not a comment on the draft PSD permit.

While the relevant relationship between the two plants is captured in the draft engineering analysis, the following is provided as additional information. Wheelabrator currently supplies steam to NNSY and the two facilities are currently considered a single stationary source at this time. The steam purchasing agreement is ending in 2022 and the installation of the CHP plant will replace the steam generated by Wheelabrator. Wheelabrator also sells electricity to the grid for general use as an independent power producer (IPP). When the CHP plant is operational, there may be no interaction or relationship between the Wheelabrator facility and NNSY. Nothing in this permit action or the regulations requires Wheelabrator to cease operation; Wheelabrator may continue to operate as an IPP and/or find another use for the steam generated but the Wheelabrator equipment is not the subject of this draft PSD permit.

As noted elsewhere in this document, CHP plants are recognized as energy efficiency projects. The draft engineering analysis explained that a CHP plant is more efficient because of its additional creation of steam from remaining heat in the exhaust gas that would be otherwise lost. The steam currently used by NNSY that is created at Wheelabrator by the combustion of municipal solid waste has a higher emissions rate; therefore, the CHP plant will reduce emissions for each pound of steam created because of the cleaner natural gas fuel. This comparison does not consider the additional reductions in emissions expected from the more efficient electrical generation by the CHP plant versus purchasing electricity from the grid.

The following represents the total annual emissions limits for the waste-to-energy boilers at Wheelabrator from Title V permit last issued in 2013. The table does not include the potential emissions from burning coal, which the Wheelabrator facility is permitted to do.

<i>Pollutant</i>	<i>Tons per Year</i>
<i>CO</i>	<i>1,472</i>
<i>NOx</i>	<i>2,132</i>
<i>PM</i>	<i>196</i>
<i>SO₂</i>	<i>3,656</i>
<i>VOC</i>	<i>196</i>
<i>HF</i>	<i>28.4</i>
<i>HCl</i>	<i>2,400</i>

Comment

It is unclear why the applicant did not need a New Source Performance Standards (NSPS) review, since this is a new gas plant. The Prevention of Significant Deterioration (PSD) permit does not seem like the correct standards for a new facility. Please explain.

Response

This is not a comment on the draft PSD permit. The following is a very basic description of the New Source Performance Standards (NSPS) and PSD programs. NSPS are rules, not a permit program, promulgated by EPA that apply to certain new equipment at a stationary source regardless of any preconstruction permit in effect. For each NSPS, EPA must follow a set process in proposing and promulgating (or finalizing) these rules that is laid out in regulations in 40CFR Part 60 that are derived from Section 111 of the Clean Air Act. EPA periodically reviews these rules and makes changes based on that review. Any new requirements do not apply retroactively until equipment is newly installed or modified. The PSD permit program applies to new major stationary sources or projects at major stationary sources. If a project is permitted under the PSD program, the emissions units in that project are subject to very specific requirements of review to ensure that air quality does not deteriorate beyond certain statutory and regulatory limits. The PSD permit review includes considering any NSPS requirements applicable to emissions units in the project. There is no requirement for a PSD permit to contain the requirements from the NSPS. For this draft PSD permit, the engineering analysis contains the information regarding applicable NSPS in Section III.C.

Comment

Start-up and shutdown (SU/SD) of the turbines should be defined by catalyst bed temperature not turbine load.

Response

Commenter's statement regarding defining SU/SD only by control device temperature is not correct. While the control device effectiveness is, in part, determined by catalyst temperature, a turbine's efficient operation is based on load. For these turbines, load is the main factor in the operation of the SoLoNOx system and therefore in defining start-up and shutdown. Conditions 5, 14, 15, and 17 address the issue of monitoring temperatures during operation of the turbines, including start-up and shutdown.

Comment

Condition 5f references "SoLoNOx." While Condition 1 states that this is a "dry low NOx combustion control technology", it is a proprietary technology specific to Solar Turbines. Solar does not provide sufficient detail about how this technology works. It should be defined in the permit.

Response

This suggestion is covered in the permit. The manufacturer designs the turbines and the combustion technology is proprietary as the commenter notes. DEQ reviews the application and has determined emissions limitations that the affected emissions units must meet. The draft PSD permit covers the compliance demonstration with regard to the turbines, including on-going performance testing. SoLoNOx mode is monitored and conditions in the permit require NNSY to track SoLoNOx mode operation and operate in accordance with manufacturer's specifications. There is no need or requirement to describe how SoLoNOx works within the permit.

Comment

Commenter questions the SF₆ leak rate, how the low pressure alarm works, and indicates that using plans is inappropriate.

Response

BACT is defined as an emissions limitation. The permit contains an emissions limitation and the BACT analysis provided the information used to make the BACT determination. The comment does not address any part of the BACT analysis. The SF₆ leak rate is limited by the amount of SF₆ that may be added to the device (Condition 30). Development and operation in accordance with a plan is enforceable and is often utilized when actions may be well-defined but improved on based on experience.

Comment

Commenter asked how the HRSG fresh-air firing mode will be tracked and if natural gas is the fuel used by the duct burners.

Response

DEQ understands this as a question rather than an actionable comment. The permit states the approved fuel for the heat recovery steam generator's (HRSG) duct burners is natural gas; no other fuel is listed. There is a record keeping requirement (Condition 57) regarding Condition 29.c that addresses the various firing modes.

Comment

PM10 and PM2.5 emissions should be lower because of impaction of particles on the catalyst beds.

Response

BACT is an emissions limitation; the commenter has not provided any other emissions limitations that are, or may be, more stringent for DEQ to consider. Particulate emissions from natural gas combustion is mostly condensable particulate, which is a gas at stack temperatures. The commenter notes that impaction (of the filterable portion) "should" reduce particulate emissions. BACT must be achievable at all times and does not consider theoretical reductions that cannot be quantified.

Comment

One commenter discussed SO₂ and VOC limitations for the turbines and the NO_x, CO, and VOC limits for the HRSGs in the permit. These comments asked how the limits were derived and wondered if the limits should be lower.

Response

Commenter asks questions or makes suggestions but does not provide any information on which DEQ can rely to make a determination related to this draft PSD permit. The derivation of the emission limits in question were documented in the application and the engineering analysis.

Comment

Commenters requested cumulative risk assessments and cumulative health impacts analyses.

Response

The State Air Pollution Control Law and implementing regulations do not provide authority to require applicants conduct a cumulative risk or health assessment as part of the application for a PSD permit.

The Federal Clean Air Act requires that EPA establish and update National Ambient Air Quality Standards designed to protect human health and welfare. DEQ developed the proposed permit for NNSY to ensure compliance with these health based standards. Risk was addressed by requiring the applicant to demonstrate compliance with both acute (short-term) and chronic (annual) air quality standards. The NAAQS are based on air quality criteria established to accurately reflect the latest scientific knowledge useful in indicating the nature and extent of identifiable effects on public health or welfare that may be expected from the presence of the pollutant in ambient air. The EPA Administrator promulgates and periodically reviews, at five-year intervals, primary (health-based) and secondary (welfare-based) NAAQS for such pollutants. Based on periodic reviews of the air quality criteria and standards, the Administrator can make revisions in the criteria and standards and promulgate any new standards as may be appropriate. The Clean Air Act also requires that an independent scientific review committee advise the EPA Administrator as part of this NAAQS review process, a function performed by the Clean Air Scientific Advisory Committee (CASAC).

Key components of the NAAQS review are the Integrated Science Assessment (ISA) and the Risk/Exposure Assessment (REA). The ISA is a comprehensive review, synthesis, and evaluation of the most policy-relevant science, including key science judgments that are important to inform the development of the risk and exposure assessments, as well as other aspects of the NAAQS review. The REA draws upon information and conclusions presented in the ISA to develop quantitative characterizations of exposures and associated risks to human health or the environment associated with recent air quality conditions and with air quality estimated to just meet the current or alternative standard(s) under consideration. This assessment includes a characterization of the uncertainties associated with such estimates. Additional information on EPA's process for reviewing the NAAQS is available at <https://www.epa.gov/criteria-air-pollutants/process-reviewing-national-ambient-air-quality-standards>.

Commenters make general correlations between air pollution and impacts; however, no commenters implicated this CHP plant except to note that "no increase" is acceptable.

Air quality in the area has been steadily improving over the last twenty years. Many factors have gone into those improvements, including DEQ's implementation of the new source review permit programs requiring strict emissions limitations pursuant to the BACT standard. The following table provides the great strides achieved in the Tidewater area air quality since the early 2000s. Virginia continues to work to reduce pollution through additional activities such as the VW Settlement fund, implementing carbon trading through the Regional Greenhouse Gas Initiative (RGGI) required in the Clean Energy and Community Flood Preparedness Act, the Virginia Clean Economy Act, and proper implementation of the air pollution control regulations.

<i>Pollutant</i>	<i>Averaging Time</i>	<i>Early 2000s⁶</i>	<i>2019</i>
<i>PM2.5 (ug/m³)</i>	<i>24-hour</i>	<i>28 – 30</i>	<i>14 - 15</i>
<i>PM2.5 (ug/m³)</i>	<i>annual</i>	<i>12.7 – 13.3</i>	<i>6.3-6.8</i>
<i>Ozone (ppb)</i>	<i>8-hour average</i>	<i>82-88</i>	<i>58-62</i>
<i>NO₂ (ppb)</i>	<i>1-hour average</i>	<i>56</i>	<i>26-39</i>
<i>CO (ppm)</i>	<i>8-hour average</i>	<i>2.1-3.7</i>	<i>0.5-1.0</i>
<i>SO₂ (ppb)</i>	<i>1-hour average</i>	<i>66</i>	<i>5-9</i>

NNSY voluntarily provided a toxicological assessment of the CHP plant’s emissions and the interaction of several issues commenters noted, such as nearby Superfund sites. This assessment indicates the CHP plant’s emissions will have no effect on residents in the area and will not exacerbate any current impacts in the area. This document can be found in Attachment E to the Request for Board Action.

Environmental Justice

Comment

Commenters indicate DEQ has improperly used EJSCREEN.

Response

From DEQ’s draft engineering analysis: “A screening report for the site was obtained through EPA’s EJSCREEN utility. Reports were based on radii of 1, 2, and 5 miles around the proposed site. The demographic index in the 1-mile radius report is in the 95th percentile for Virginia. DEQ is treating the area as an environmental justice community.” DEQ utilized the clear results from EJSCREEN to determine the area is an EJ Community and proceeded accordingly. Commenters appear to state the community is an EJ community: DEQ agrees and stated so in the original draft engineering analysis.

NNSY submitted an additional analysis that confirms the status of the local community as an environmental justice community.

Commenters did provide information obtained via EJSCREEN to indicate an overburdened population for PM2.5 and ozone. The specific references to the air quality for PM2.5 and ozone as greater than the 90th percentile actually referenced the EJ Index for each metric. An EJ Index is the product of three variables: the value of the environmental indicator, the difference between the minority and low income data for the area versus the national average, and the population of the area. These values are then ranked to achieve a percentile for the area. EJSCREEN lists the PM2.5 and ozone concentrations, the environmental indicator not the EJ Index, for the area at or below the 26th percentile in Virginia. This means the area residents breathe air that is cleaner than almost three quarters or 75% of Virginians. These percentiles are supplemented by the American Lung Association “State of the Air” report referenced by some commenters, which gives the area’s air quality a “B” for ozone and an “A” for particulate matter. EPA does make clear that EJSCREEN is a screening utility to determine whether or not additional scrutiny is warranted. DEQ has used it for this purpose.

⁶ Data from 2002 except for ozone (2003) and NO₂ (2002).

Comment

Commenters indicate that DEQ's environmental justice review and implementation was lacking in several areas. Commenters indicate that the project managers did not engage with the community, the community meetings were not during times to maximize participation, and DEQ's outreach was inadequate because only 5 non-governmental organizations (NGOs) were contacted; commenters felt that the burden for communication was passed to these NGOs. Commenters suggested a "full environmental justice assessment" must be completed. Commenters noted several pieces of statutory text covering EJ, including the Virginia Environmental Justice Act (VEJA) and DEQ's statutory policy statement.

Response

DEQ is committed to environmental justice and enhancing public participation in the permitting processes. To the extent commenters are stressing the need to take additional action to promote environmental justice, DEQ agrees and continues to work to improve the processes of the Department as a whole.

In accordance with § 2.2-235 of the Code of Virginia, "It is the policy of the Commonwealth to promote environmental justice and ensure that it is carried out throughout the Commonwealth, with a focus on environmental justice communities and fenceline communities."

As noted in the draft engineering analysis, DEQ determined the area around the site contained environmental justice communities. DEQ then conducted a two-step analysis based on the definition of environmental justice: the "fair treatment and meaningful involvement of every person, regardless of race, color, national origin, income, faith, or disability, regarding the development, implementation, or enforcement of any environmental law, regulations, or policy." The primary components of the two-step analysis were enhanced outreach (step 1) to provide the opportunity for meaningful community involvement and an air quality analysis (step 2) to assess fair treatment.

The Clean Air Act lays out the process and requirements for the determination of protective air quality for the United States. The National Ambient Air Quality Standards (NAAQS) are set by EPA after reviewing the available scientific information on the health impacts for each criteria pollutant. EPA then follows a regulatory process to promulgate (or make final) the NAAQS, accepting comments and any accompanying information from any member of the public. The resulting final NAAQS is protective of all people, including any sensitive groups, as required and promulgated pursuant to the Clean Air Act. Each NAAQS is then reviewed and changed/revalidated every 5 years, following the same process of scientific review, using up-to-date information, and the regulatory process including public participation. Part of EPA's recent NAAQS reviews has included environmental justice reviews to ensure the fair treatment and meaningful involvement for all people in accordance with President Clinton's EO12898. The Clean Air Act then requires each State to have a program to ensure that increases in activities occur while maintaining the air quality below the NAAQS. Part of that program is the preconstruction major new source review permitting programs such as the Prevention of Significant Deterioration (PSD) permit program, which is the program pursuant to which this draft PSD permit was developed. In order for a source to obtain approval for construction of an activity, the PSD program requires a review of the pollutants emitted in significant amounts and ensure they are compliant with the NAAQS. If the metrics are met, meaning the impact of the project will not worsen air quality beyond the NAAQS, there is no

adverse air quality impact from the project and the PSD permit is issued.⁷ The NAAQS are established according to the best science to ensure that no one breathes unhealthy air. They are designed to protect the health of sensitive populations with an adequate margin of safety, the NAAQS “inherently take certain environmental justice factors into account as part of the standard-setting process.”⁸

Commenters specifically mentioned the 2009 Integrated Science Assessment and the finding of a link between short-term PM2.5 exposures and cardiovascular effects. Comments noted other published scientific articles published in various journals. This is exactly the type of scientific review and data that EPA considers in a NAAQS review. Almost all referenced documents predate the last NAAQS update for PM2.5 and ozone. Specifically, the most recent PM2.5 NAAQS was promulgated by EPA in 2013 with the NAAQS for ozone updated in 2015. The NAAQS for both pollutants have recently been reviewed with EPA publishing a proposed finding. The comment periods for both NAAQS actions have closed. Many commenters on this action state that “any increase” in air pollution is unacceptable but, as described above, the Clean Air Act is predicated on allowing economic activity to occur in the United States while maintaining a level of air quality deemed protective through a scientific and public process. EPA follows a regulatory process whereby all available scientific information is reviewed, weighed, and then subject to public review and comment.

DEQ’s Environmental Justice analysis also assessed cumulative air quality impacts. The air quality analysis assessed the impacts from the proposed project and worst-case background ambient air concentrations. The air quality analysis additionally considered the worst-case short term emissions from the proposed project. This information is set forth in Section VI of the draft engineering analysis as well as responses to other comments in this document. It should be further noted that computer model based air quality analyses have generally proven to over-estimate ambient air concentrations when compared against actual monitored ambient air concentrations.

Commenters referenced the “federal NESHAP regulations” regarding risk assessment. Assuming commenters are referring to the residual risk remaining after implementation of a 40CFR63 rule (MACT), the Clean Air Act places the requirement to review that remaining risk on EPA as part of a regulatory process, not as part of a PSD permit. In fact, hazardous air pollutants (a Clean Air Act defined list updated by EPA) are not regulated NSR pollutants. EPA has recently completed the risk review for many affected sources, including combustion turbines. The risk review found no unacceptable risk from combustion turbines after compliance with 40CFR63 Subpart YYYYY.

Some commenters referenced the NAACP’s report entitled “Fumes Across the Fenceline,” describing a disproportionate amount of oil and gas development facilities near minority communities. This CHP plant is not gas development, it is a small end-user of already processed natural gas. Emissions from drilling/fracking, processing of the collected gas, and fugitive emissions from the report’s well-field facilities are not comparable to NNSY’s CHP plant post-combustion and control device stack emissions. Also of note, the NAACP report looks at communities in areas that are not in compliance with the NAAQS for ozone, which is not the case in Portsmouth where the American Lung Association gave the Norfolk/Hampton/Virginia Beach area no less than a grade of B for ozone and an A for particulate

⁷ The Clean Air Act also provides for increased activities for areas that do not meet the NAAQS; referred to as nonattainment areas. That program requires different levels of review to ensure that the project results in a reduction in emissions; however, a nonattainment new source review permit may still be issued if the area will continue to be nonattainment after the project.

⁸ EPA, *Plant EJ 2014 Legal Tools*

matter. Separately, emissions from natural gas production and transmission is the subject of on-going work by DEQ to reduce emissions from that sector.

Regarding outreach, the draft engineering analysis noted the application was received on May 14, 2019. On June 11, 2019, DEQ responded to the application with the initial letter of determination. This was sent to the source, EPA, the PSD/Title V mailing list, localities, and all state or federally recognized Native America tribes in Virginia. This letter triggers the source's information notice and briefing, which was published in the Virginian-Pilot on June 26, 2019. DEQ again forwarded the notice of the briefing to the above list as well as reaching out to several local environmental groups. The briefing was on August 1, 2019 beginning at 6:00 PM where NNSY responded to questions from interested parties.

The draft engineering analysis noted the additional public outreach being performed for this action prior to the public notice publication on July 17, 2020. The engineering analysis noted that the notice was sent to the same list of people as the initial outreach in 2019. Attachment A to the analysis also noted the five groups DEQ had already identified.

While not captured in the draft engineering analysis, multiple additional communication tools were used to reach as wide a local audience as possible for the public briefing to provide information on the project, the comment period, and how to submit meaningful comments. The notification of the public briefing, public comment period, and public hearing was published on July 17. A public notice containing lay language was sent to schools, libraries, religious centers, universities, and state/local/federal government representatives within a two mile radius of the facility, other stakeholder groups, including the Chesapeake Bay Foundation, the Virginia Council on Environmental Justice, as well as any person or group signed up to receive notifications of Title V/PSD permit public notices. This notification was sent via email to 359 email addresses on July 28 and resent on August 3 and 7 to non-openers. The email was resent to the 359 addresses on August 13. A paper version of the lay language notice was mailed on August 8 to 47 constituents for which we did not have email addresses. On August 5, an announcement was posted on the social media platform "Nextdoor" to members in neighborhoods within two miles of the facility. At that time there were 33 neighborhoods with a total of 8,393 "Nextdoor" members. DEQ posted a Twitter and Facebook announcement on August 5.

Fifty-two people registered for the briefing including DEQ, project personnel, media, environmental groups, interested people, and local citizens.

Notifications were also sent out regarding the public hearing on September 22, 2020. An email was delivered on September 15, 2020 to 359 addresses. The notice was resent to non-openers on September 17. A Nextdoor announcement was posted on September 18 to 33 neighborhoods and 8,393 members.

In addition to the notification and source briefing described in the draft engineering analysis, NNSY took additional voluntary steps to reach out to stakeholders. NNSY held a meeting (virtual) open to anyone and provided a presentation and provided time for questions from the community. This meeting occurred on May 21, 2020 beginning at 5:30 PM, several months before the comment period on the draft PSD permit began. NNSY reached out to local community groups and stakeholders regarding the project, published notices in the Virginian-Pilot, as well as publishing notice of the May community meeting on their website, LinkedIn, Twitter, Facebook, and Instagram accounts. As questions came to DEQ regarding the NNSY Environmental Assessment, NNSY quickly uploaded the content to their website to

ensure it was widely available. On October 5, 2020, NNSY participated in a meeting with interested stakeholders organized by the Portsmouth NAACP to answer questions regarding the project. NNSY published the information covered in the May 21 and October 5 meetings on their website dedicated to this project.

In addition to the efforts described above, DEQ recognizes the particular expertise of various local organizations that know a community to help facilitate the dissemination of information. Local groups have systems to notify people that go beyond DEQ's ability. Using these multi-pathway notifications helps to reach the widest possible audience with the resources available. DEQ strives to provide an atmosphere of inclusivity, both through the use of briefings to explain the project and regulatory process and by ensuring a permitting contact is available to answer any questions. DEQ continues to work on improving the processes used for outreach and notifications and is looking forward to implementing suggestions from the recent environmental justice report DEQ commissioned to review agency practices.

There is significant work that goes into reviewing and promulgating NAAQS on top of the review to ensure each and every project is compliant with the air pollution regulations. This includes in-depth technical reviews for air dispersion modeling and best available control technology review. As reflected in the materials developed for the draft PSD permit and as described throughout this document, agency staff have engaged in a thorough and rigorous process that is consistent with applicable laws and regulations to develop the draft PSD permit for this project.

Site Suitability

Comment

Commenters stated that the Board must consider site suitability in accordance with the 4 factors contained in Section 10.1-1307 E of the Air Pollution Control Law of Virginia.

Response

NNSY is an existing stationary source on federal property, operating as an industrial facility since 1767. The project covered by this permit is the proposed CHP plant to make steam and power for NNSY. For steam production and energy security, NNSY has stated the CHP plant must be located on site or in close proximity to NNSY. Activities within 0.5 miles of the CHP plant are generally also commercial/industrial. The nearest neighborhood or residential area is located at least 0.7 miles away.

In accordance with Section 10.1-1307 E of the Air Pollution Control Law of Virginia, consideration has been given to the following facts and circumstances relevant to the reasonableness of the activity involved and the regulations and draft PSD permit proposed to control it:

1. The character and degree of injury to, or interference with safety, health, or the reasonable use of property which is caused or threatened to be caused:

The activities regulated in this permit have been evaluated consistent with 9VAC5-50-260 (Best Available Control Technology for NO_x, SO₂, VOC, and CO) and 9 VAC 5-50-280 (Best Available Control Technology for PM₁₀ and PM_{2.5}) and have been determined to meet these standards. Please see Section IV of the Engineering Analysis for a description of the Best Available Control Technology (BACT) included in the permit. Please refer to Section III.A of the Engineering Analysis, and responses in this document, for more information on the applicability of the State's Toxics Rule to the proposed project.

The proposed project is a major modification according to 9VAC5-80-1615(C) of the Virginia PSD regulations having an increase in actual emissions greater than the significant emission rates for PM10 and PM2.5. For the project, air quality modeling was conducted to predict the maximum ambient impacts of PM10 and PM2.5 emitted by the proposed source.

Modeling analysis for the Class II areas (all other areas not designated as Class I areas) predicted that the maximum ambient air impacts for PM10 and PM2.5 were both below the significance levels, or the levels at which the project's emissions would have an inconsequential impact on the air quality in the proposed area. DEQ, however, performed an additional step in the analysis by examining the existing air quality in the Norfolk area. This step was performed to ensure that there was an adequate buffer between the existing ambient air concentrations and the air quality standards, necessary to accommodate the relatively small increase from the proposed CHP. The result of this analysis illustrates continued compliance with the applicable air quality standards.

In summary, results of modeling conducted for emissions from the proposed facility show compliance with the health-based NAAQS and other applicable air quality criteria. Accordingly, approval of the proposed permit is not expected to cause injury to, or interference with safety, health, or reasonable use of property.

Information on the DEQ modeling analysis is available in Attachment B - Modeling Memo. Additional details are also provided in responses to specific modeling comments later in this document.

This project is not expected to require or cause increases in residential, commercial or industrial activities near the plant. Therefore, secondary impacts on emissions from these types of activities are not anticipated.

While emissions of other pollutants were below the 'significant' threshold, where emissions are considered to have no measurable impact on air quality, NNSY voluntarily submitted additional modeling analysis confirming the de minimis nature of the emissions.

2. The social and economic value of the activity involved:

The social and economic value of the facility submitting the application has been evaluated relative to local zoning requirements. The local government has deemed this activity consistent with local ordinances as the facility is located on federal property. A copy of the signed Local Governing Body Certification Form is included in the file.

The proposed CHP plant will provide steam and power to the NNSY. The CHP will generate process steam and electricity using clean-burning natural gas with ultra-low sulfur diesel used as a back-up fuel. Construction of this clean-burning, efficient CHP plant replaces steam currently generated by the adjacent Wheelabrator facility, which is permitted to burn coal, refuse derived fuel, and solid waste. This project will make steam from lower polluting fuels. NNSY also currently buys electricity from the PJM grid, which may be produced by fuels such as coal. EPA notes in their CHP Benefits page (<https://www.epa.gov/chp/chp-benefits>) a CHP can increase efficiency over a standard power plant and steam boiler set-up by approximately 50% (51% to 75% efficiency). NNSY has supplied information indicating that approximately 51,000 tons per year of CO₂ will be saved with this project in electricity

production alone based on the region's generation mix. This reduction does not include the line loss from transmitting electricity, which averages 4.8%. Increases in efficiency mean a decrease in fuel combusted, which translates to overall lower emissions produced in generating the needed steam and electricity.

Comments were received on both sides of the value spectrum. Specific comments centered around 17 permanent jobs not being enough and a solar installation would create more jobs. These comments do not claim a negative economic impact but hope for additional economic growth. Comments in favor noted the 200 construction jobs, \$30 million dollars in spending, of which \$11 million will go to small, minority owned businesses. NNSY employs more people than the 17 permanent jobs expected from this proposed CHP and NNSY noted that the Navy's goal of energy security for its bases is important to the sustainability of the overall operations. NNSY also noted that additional cost savings from this project will enable upgrades to the waste water treatment plant and other energy efficiency projects aimed at reducing lost steam.

Some commenters noted there are Superfund sites in the area and the potential for flooding. These commenters suggested that these issues make the site not suitable for the proposed CHP plant. NNSY provided information demonstrating that the flood risk is abated through their construction plans, including the site elevation where the proposed CHP plant is being built. Emissions from this CHP plant are very low and there is no expectation that the proposed CHP plant will exacerbate any impacts associated with the Superfund site remediation if the CHP plant is built and operated in compliance with this draft PSD permit. The Superfund program works to clean the polluted sites without increasing impacts to local residents. The actions taken by DEQ and EPA to remediate these sites can be found on this website (<https://www.epa.gov/superfund>).

3. The suitability of the activity to the area in which it is located:

Consistent with §10.1-1307 E. of the State Air Pollution Control Law, DEQ has considered the facts and circumstances relevant to the reasonableness of the activity involved and the permit proposed to control it. A CHP plant must be located in the vicinity of the steam's use or excessive losses will occur, negating the efficiency gains of such a design. As a federal facility interested in energy security, locating the CHP plant on the secured federal property minimizes efficiency losses and maximizes security of the steam and electricity source. Land use in the immediate vicinity (<0.5 miles) is commercial/industrial in nature, with the Shipyard in operation since the 18th century. Operation of the CHP plant as designed and permitted is suitable to the area. The activities controlled by this permit are deemed suitable as follows:

a. Air Quality characteristics and performance requirements defined by the State Air Pollution Control Board (SAPCB) regulations: This permit is written consistently with existing applicable regulations controlling air pollution. The proposed project is a source of toxic air pollutant emissions that has been determined to be exempt from that regulation. The emissions for PM10 and PM2.5 associated with this permit have likewise been modeled and have been shown through modeling to not cause or contribute to a violation of the ambient air quality standards or allowable increments within any Class I or Class II areas. All other pollutants' emission rates are below the respective significant thresholds.

b. Anticipated impact of odor on surrounding communities or violation of the SAPCB Odor Rule: No violation of odor requirements is anticipated as a result of the proposed project.

4. The scientific and economic practicality of reducing or eliminating the discharge resulting from the

activity:

The Minor New Source Review program, as well as the PSD and Non-Attainment Major New Source Review programs, require consideration of levels of control technology that are written into regulation to define the level of scientific and economic practicality for reducing or eliminating emissions. By properly implementing the Regulations while developing the proposed permit, DEQ has addressed the scientific and economic practicality of reducing or eliminating emissions associated with this project. In addition to that review, NNSY agreed to install and operate selective catalytic reduction and oxidation catalyst in order to further reduce emissions of nitrogen oxides, carbon monoxide, VOC, and volatile hazardous air pollutants such as formaldehyde. While these technologies are installed on combustion turbines at power plants, those power plants are often close to 100 times larger than the NNSY CHP (recently ~1,600 MW versus NNSY's ~17 MW), making the economics of installation significantly different.

The permit requires numerous pollution control strategies that will result in reduction of emissions from the combustion turbines and associated support (ancillary) equipment. These include technologies such as the use of fuels with low sulfur and carbon content, good combustion practices (GCPs) following manufacturer's recommendations as they are updated, high combustion efficiency through use of the proposed CHP design, and clean-burning "low-NOx" burners, as well as "add-on" air pollution controls (SCR for NOx removal and an Oxidation Catalyst for CO, VOC, and volatile toxic pollutant control). GCPs include controlled fuel/air mixing, adequate temperature, and gas residence time, among other practices. Other measures have been included in the draft PSD permit, such as a requirement to use ultra-low sulfur diesel oil (no more than 0.0015% sulfur content by weight) in case of loss of natural gas and in emergency equipment. Requirements are included that minimize equipment leaks in the circuit breaker. Feasibility of obtaining further emission reductions for PM10 and PM2.5 was reviewed through the rigorous "top-down" BACT requirements of PSD review. No additional controls were found to be technically and economically feasible.

In summary, the NNSY facility is an already operating stationary source on federal property and has been in operation since 1767 in one form or another. The site operates several industrial activities already in a commercial/industrial area. The closest residential neighborhoods to the CHP plant are approximately 0.7 miles, with the area between being other commercial/industrial properties. The area is in attainment (i.e., is meeting all air quality standards) for all criteria pollutants. This activity, the proposed CHP plant, must be sited at NNSY to deliver the efficiency and security that is an integral part of the proposed activity. As discussed in this response as well as other responses to comments and the original draft engineering analysis, this proposed CHP constructed and operated in compliance with the application and the draft PSD permit will not create any air pollution issues with respect to attainment status. Consistent with the provisions of the draft PSD permit, NNSY has mitigated the emissions to the greatest extent within the bounds of scientific and economic practicality.

Based on this review of the proposed activity and the permit proposed to control it, the site is suitable for the CHP.

Cumulative NAAQS Modeling

Comment

Commenters questioned why cumulative modeling was conducted for only particulate matter and ozone.

Response:

Air quality modeling is required in support of a Prevention of Significant Deterioration (PSD) permit when proposed emissions of a pollutant exceed the applicable Significant Emission Rate (SER). Emissions of PM-10 and PM-2.5 exceed the SER and were evaluated accordingly. The impact on ozone was calculated by DEQ for informational purposes but the evaluation was not mandatory under PSD regulations.

Background Air Quality Data and Ambient Air Monitoring

Comment

Several commenters stated concerns about the use of an air quality monitor positioned approximately 3 miles north-northeast of the NNSY. Commenters suggested that there is a need for source-specific monitoring.

Commenters questioned the averaging period (i.e., timeframe) of the air quality measurements used in the analysis.

Commenters expressed concern that nearby sources were not accounted for in the analysis.

Response:

Cumulative NAAQS modeling requires the use of background concentrations from ambient monitoring data. These data are combined with the modeled impact from the proposed facility to determine the total air quality impact. Background air quality represents contributions from natural sources, other unidentified sources near the project that are not modeled, and regional transport contributions from more distant sources (domestic and international). The monitor used in this analysis is located approximately 3 miles north of the NNSY and is considered representative of current air quality in the region. The downwind location also captures the impacts of nearby sources contributing to air pollution.

DEQ uses its existing statewide monitoring network to develop background ambient air concentrations for modeling. These data conform to the same quality assurance and other requirements as those networks established for Prevention of Significant Deterioration (PSD) permitting purposes. Accordingly, the air quality monitoring data has sufficient completeness and undergoes appropriate data validation procedures. Pursuant to 40 CFR Part 58, Ambient Air Quality Surveillance, the monitoring network operated by Virginia is subject to an annual monitoring plan and periodic network

assessment to determine adequacy. EPA has determined that this existing network satisfies the requirements of 40 CFR Part 58.

Monitoring sites, in part, are selected based on the review of EPA-recommended criteria such as emissions data and population density. The monitor location for this project is considered representative based on these criteria due to its close proximity to the project site.

The following table provides a comparison of the most recent air quality data for the Norfolk, Virginia area to the NAAQS. The timeframe for the monitoring, or averaging period, varies by pollutant and is specified in the table.

2017-2019 Background Ambient Air Concentrations for Norfolk, Virginia Area

Pollutant	Averaging Period	Concentration	National Ambient Air Quality Standards (NAAQS)	Percentage of NAAQS
PM2.5	24-hour	14 µg/m ³	35 µg/m ³	40%
PM2.5	Annual	6.9 µg/m ³	12.0 µg/m ³	58%
PM10	24-hour	20 µg/m ³	150 µg/m ³	13%
Carbon Monoxide (CO)	1-hour	1.7 ppm	35 ppm	5%
Carbon Monoxide (CO)	8-hour	1.0 ppm	9 ppm	11%
Sulfur Dioxide (SO ₂)	1-hour	5 ppb	75 ppb	7%
Nitrogen Dioxide (NO ₂)	1-hour	39 ppb	100 ppb	39%
Nitrogen Dioxide (NO ₂)	Annual	0.008 ppm	0.053 ppm	15%
Ozone (O ₃)	8-hour	0.062 ppm	0.070 ppm	89%

µg/m³ = micrograms per cubic meter
 ppm = parts per million
 ppb = parts per billion

The ozone concentration is the highest design value (i.e., value used for NAAQS compliance) for the entire Hampton Roads Metropolitan Statistical Area (MSA). Preliminary ozone data for the region for the period 2018-2020 shows additional improvement (58 ppb). The COVID-19 pandemic has resulted in many drivers staying off the road and that has had an effect on Virginia's low ozone readings; however, the low levels of pollution experienced this year are certainly in line with the long-term trend of lower ozone concentrations.

The background air quality, as illustrated in the table below, would have to be much higher than the selected monitored concentrations in order for a predicted NAAQS violation to occur.

<i>Pollutant</i>	<i>Avg. Period</i>	<i>NNSY Impact ($\mu\text{g}/\text{m}^3$)</i>	<i>Ambient Background Used in Analysis ($\mu\text{g}/\text{m}^3$)</i>	<i>Ambient Background to Cause NAAQS Exceedance ($\mu\text{g}/\text{m}^3$)</i>	<i>2017-2019 Statewide Virginia Maximum Monitored Concentration ($\mu\text{g}/\text{m}^3$)</i>	<i>NAAQS ($\mu\text{g}/\text{m}^3$)</i>	<i>% Increase in Background Concentration for NAAQS Violation</i>
PM2.5	24-hour	0.7	14	34.3	21	35	145%
PM2.5	Annual	0.1	6.9	11.9	7.7	12	72%
PM10	24-hour	1.1	20	148.9	27	150	645%

The variability across the entire statewide network for these pollutants further suggests that source-specific monitoring would not yield a different conclusion than NAAQS compliance.

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Lowest Concentration</i>	<i>Highest Concentration</i>	<i>Variability</i>
PM2.5	24-hour	13 $\mu\text{g}/\text{m}^3$	21 $\mu\text{g}/\text{m}^3$	8 $\mu\text{g}/\text{m}^3$
PM2.5	Annual	6.3 $\mu\text{g}/\text{m}^3$	7.7 $\mu\text{g}/\text{m}^3$	1.4 $\mu\text{g}/\text{m}^3$
PM10	24-hour	17 $\mu\text{g}/\text{m}^3$	27 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$

Finally, the particulate matter impact associated with this individual project is generally considered as statistically insignificant using commonly accepted scientific and mathematical theory. The impact would also fall below the concentration that would typically be associated with contributing to a NAAQS violation.

All of these factors combine to support the conclusion of compliance with the applicable particulate matter NAAQS.

Chesapeake Bay Impacts and the Bay TMDL

Comment

Commenters requested that DEQ evaluate the impacts of the proposed CHP on the nitrogen load to the Chesapeake Bay watershed in the context of Total Maximum Daily Load (TMDL) goals.

Commenters stated that NNSY is a federal entity and has a role in the effort to restore and protect the Chesapeake Bay watershed as stated in the 2009 Executive Order from President Obama. Commenters also referenced Virginia as a signatory to the 2014 Chesapeake Bay Watershed Agreement and its commitment to achieving the goals of the Chesapeake Bay TMDL.

Commenters expressed concern there were no mitigation requirements to offset the impacts from the nitrogen oxide emissions on the Chesapeake Bay watershed.

Response:

There are no specific authorities set forth in the State Air Pollution Control law or the State Air Pollution Control regulations regarding the evaluation of impacts from air emissions sources as they may relate to compliance with the Chesapeake Bay TMDL. As noted above and in response to comments elsewhere in this document, the draft PSD permit complies with air quality laws and regulations, including air quality standards, designed to ensure protection of human health and the environment.

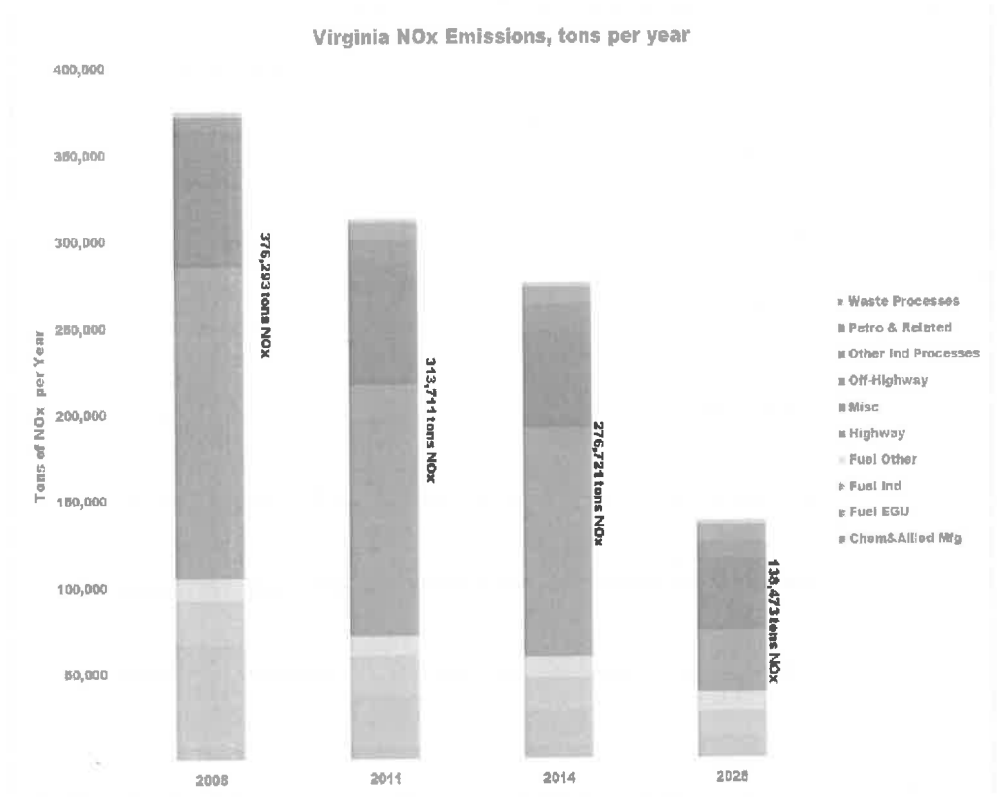
The Chesapeake Bay Program (CBP) Modeling Workgroup uses state-of-science modeling approaches that provide the foundation for the TMDL. The CBP Modeling Workgroup established the science that is accepted by all signatories to the TMDL.

The Chesapeake Bay Program has established protocols to effectively translate increases of oxidized nitrogen emissions (NO_x) from air sources throughout the Chesapeake Bay watershed to estimated nitrogen loads delivered to the tidal Bay. The latest accepted CBP modeling platform, the Phase 6 Model, has atmospheric deposition of nitrogen as one of the major nitrogen land use inputs in the watershed and as a direct load to the tidal Bay. In the case of estimated NO_x increases from the proposed compressor station, it is possible to estimate what effect that this change in emissions (29.4 TPY of NO_x) has on deposition loads to the watershed and tidal Bay. The impact is assessed using information from the Phase 6 model.

The latest guidance from the CBP states that oxidized nitrogen emissions from Virginia to the entire watershed, including direct deposition to tidal water, are estimated by applying the statewide emission percentage of 3.36%. The additional nitrogen loading from the CHP is estimated at 404 kilograms per year, assuming a conservative in-stack ratio of NO₂/NO_x of 0.10 for the CHP (i.e., NO_x emissions are 90% NO and 10% NO₂). This calculation does not take into account any potential emission reductions resulting from the decrease in electric and steam demands from existing sources of air pollution.

DEQ remains committed to protecting the Chesapeake Bay. The Chesapeake Bay TMDL included a review of air pollution sources and determined that specific requirements for individual sources of air pollution are unnecessary since Clean Air Act regulations and programs will achieve significant decreases in air deposition of nitrogen by 2020 and beyond. EPA and DEQ trust that there is reasonable assurance that those reductions will occur. The Bay TMDL reflects the expected decreases in nitrogen deposition and the federal two-year milestones will track the progress of Clean Air Act regulations and programs.

Virginia has achieved substantial reductions of NO_x air emissions in recent years and this trend is anticipated to continue. The graph below illustrates the projected NO_x emissions trend.



APPENDIX A VIRGINIA GREENHOUSE GAS MITIGATION ACTIONS

Carbon Trading Rule – Starting with Governor McAuliffe and continuing with Governor Northam, the Commonwealth has developed and then redeveloped a power sector carbon trading rule that will allow Virginia to link to the Regional Greenhouse Gas Initiative (RGGI). The original regulation has now been replaced with a regulation authorized by the 2020 General Assembly Session through the Clean Energy and Community Flood Preparedness Act. Virginia will now become a fully participating state in RGGI and auction allowances to raise revenue for shoreline resiliency and low income energy efficiency programs. The program begins in Virginia on January 1, 2021.

2018 Grid Transformation and Security Act – As part of the comprehensive Grid Transformation and Security Act of 2018 (GTSA), legislation from the 2018 General Assembly session that Governor Northam supported and signed, a significant commitment and investment in clean renewable energy generation and energy efficiency has established to be implemented over the next ten years. First there is a commitment to up to 5,000 megawatts of renewable energy to be implemented by the state’s publically regulated utilities. In addition, these utilities will invest about \$1 billion dollars in energy efficiency projects. These commitments have now been included in the updated 2018 Virginia Energy Plan and are being incorporated into the regulated utilities Integrated Resource Plans (IRP).

2020 Virginia Clean Economy Act (VCEA) – The VCEA will transform the Virginia power generation sector to all clean and renewable generation by 2050. The following are the main highlights of the VCEA.

- **Establishes renewable portfolio standards.** The Act requires Dominion Energy Virginia to be 100 percent carbon-free by 2045 and Appalachian Power to be 100 percent carbon-free by 2050. It requires nearly all coal-fired plants to close by the end of 2024.
- **Establishes energy efficiency standards.** The Act declares energy efficiency pilot programs to be “in the public interest.” It creates a new program to reduce the energy burden for low-income customers, and it requires the Department of Social Services and the Department of Housing and Community Development to convene stakeholders to develop recommendations to implement this program. The Act sets an energy efficiency resource standard, requiring third party review of whether energy companies meet savings goals.
- **Advances offshore wind.** The Act provides that 5,200 megawatts of offshore wind generation is “in the public interest.” It requires Dominion Energy Virginia to prioritize hiring local workers from historically disadvantaged communities, to work with the Commonwealth to advance apprenticeship and job training, and to include an environmental and fisheries mitigation plan.
- **Advances solar and distributed generation.** The Act establishes that 16,100 megawatts of solar and onshore wind is “in the public interest.” The law expands net metering, making it easier for rooftop solar to advance across Virginia. The new law requires Virginia’s largest utilities to construct or acquire more than 3,100 megawatts of energy storage capacity.

Virginia Volkswagen Mitigation Fund – Through the Volkswagen defeat device settlement, Virginia was awarded \$93 million for emissions mitigation projects. As of now, the DEQ has allocated most of the mitigation funds to the following projects designed to jump start the electrification of Virginia’s transportation sector.

- **Public EV Charging Network** - In August 2018, DEQ awarded a contract to EVgo to develop a statewide public electric vehicle (EV) charging network to accelerate EV adoption. To date, 30 charging sites have been deployed statewide under this contract.
- **Electric Public Transit Buses** - \$14 million of the Trust has been allocated to replace older diesel public transit buses with all-electric transit buses. During the fiscal year 2020 grant cycle, \$9 million of VW Trust funds were awarded to Alexandria, Blacksburg, and Hampton Roads for the replacement of old diesel public transit buses with all-electric buses. The first electric buses have been deployed in Hampton Roads. The remaining \$5 million will be made available for all-electric public transit buses through future awards.
- **Clean School Bus Program** – \$20 million in VW Trust funds has been dedicated to accelerate the deployment of zero emission school buses across Virginia. This funding allocation will prioritize electric school buses with a set aside for propane school buses if battery electric technology is not technically feasible at the time. Funding will be awarded to school districts through two competitive requests for applications of \$10 million each in the spring and fall of 2021.
- **Port Equipment Electrification Project** - \$14 million from the Trust has been allocated to the Port of Virginia (POV) for a \$24,150,000 port equipment electrification project. POV will replace two diesel ship-to-shore cranes with all-electric at the Norfolk International Terminal and begin the process of replacing more than 160 diesel yard tractors operating at its five terminals, beginning with the Richmond Marine Terminal. POV will contribute \$10,150,000 to the project.
- **Clean Air Communities Program** - DEQ is now accepting applications to fund all-electric projects through the Clean Air Communities Program (CACP). Through a competitive application process, DEQ will award \$20 million to government entities for all-electric projects that will eliminate harmful air pollutants and mitigate climate change.

Renewable Permitting – DEQ has developed regulations for the construction and operation of renewable energy projects of 150 MW or less, and has, as of October 23, 2020, issued at least 51 permits for more than 2,231 MW of solar and wind power.

TCI – Virginia has officially joined the Transportation and Climate Initiative to work collaboratively with Northeast and Mid-Atlantic states on reducing carbon pollution from the transportation sector. The transportation sector is the largest emitter of greenhouse gases in Virginia.

Workgroup for Methane Leakage from Natural Gas Infrastructure – At the direction of the Governor, DEQ has established an ad hoc work group to advise and assist DEQ in the development of a framework for limiting methane leakage from natural gas infrastructure. The group will support DEQ in its collection and evaluation of data to inform any future regulation development process.

IDENTIFICATION OF ENVIRONMENTAL JUSTICE COMMUNITY

US NAVY Norfolk Naval Shipyard

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1. SUMMARY

The U.S. Navy has applied to the Virginia Department of Environmental Quality for a Prevention of Significant Deterioration ("PSD") air permit for a proposed new combined heat and power plant (the "Project") at the Norfolk Naval Shipyard ("NNSY") in Portsmouth, Virginia. This report assesses, under several scenarios, whether there are environmental justice communities in the vicinity of the Project.

This assessment is conducted by applying criteria from the Virginia Environmental Justice Act ("VEJA"). These criteria were applied to areas within a radius of 1, 2 and 5 miles of the Project.

2. EJ IDENTIFICATION ANALYSIS

Data relevant to identifying EJ communities in the vicinity of the Project were obtained using the EPA EJSCREEN program. Three types of reports (EJSCREEN Standard, 2013-2017 ACS Reports, and 2010 Census Reports) were created with radii ("buffers") of 1, 2 and 5 miles from the project site. The coordinates for the center of the areas are set to the main stack location for the combined heat and power facility.

- UTM Projection 18N: 384,280 m Easting; 4,074,500 m Northing
- Latitude/Longitude: 36.809275, -76.29731).

EJSCREEN is a mapping and screening tool for EJ that is built on publicly available datasets. Various criteria can be applied to EJSCREEN, or it can be run using EPA default thresholds and demographic indicators. Under the EPA default thresholds, EPA identifies the 80th percentile as a threshold where higher review may be appropriate. EPA color codes areas in the 80-90% range as yellow, 90-95% as orange, and >95% as red; these areas have indicator or index values well above the mean or median for a given indicator or index.

Virginia has more specific criteria for an "environmental justice community" as discussed in Section 2.1.

2.1 VEJA Criteria

Under VEJA, an "environmental justice community" means any low-income community or community of color.

2.1.1 Existence of a Community of Color

VEJA defines "community of color" and "population of color" as follows:

"Community of color" means any geographically distinct area where the population of color, expressed as a percentage of the total population of such area, is higher than the population of color in the Commonwealth expressed as a percentage of the total population of the Commonwealth. However, if a community of color is composed primarily of one of the groups listed in the definition of "population of color," the percentage population of such group in the Commonwealth shall be used instead of the percentage population of color in the Commonwealth.

"Population of color" means a population of individuals who identify as belonging to one or more of the following groups: Black, African American, Asian, Pacific Islander, Native American, other non-white race, mixed race, Hispanic, Latino, or linguistically isolated.

Data for the area surrounding NNSY are provided in Table 2-1.

Table 2-1. Determination of the Presence of a Community of Color

Site Buffer		% Minority ¹	% Commonwealth ²	Community of Color?
1 Mile	Total	87%	37%	Yes
	Black	76%	20%	Yes
2 Miles	Total	70%	37%	Yes
	Black	62%	20%	Yes
5 Miles	Total	63%	37%	Yes
	Black	53%	20%	Yes

¹Values come from 2013-2017 ACS Report generated for each buffer using EJSCREEN.

²Values for total minority population come from EJSCREEN Standard Report, values for Black population come from U.S Census Bureau QuickFacts: Virginia.

Based on the VEJA criteria and the data in Table 2-1, the community surrounding the project site is a "community of color" for all site buffers examined (1, 2 and 5 miles).

- The percentage of the population within Virginia that is considered minority is 37%. The area surrounding the site exceeds the state average at each of the three distances, with values ranging from 63% to 87%.
- Because the community of color is predominantly Black, VEJA specifies that the determination be made by comparing Black population rather than community of color population. The area surrounding the site exceeds the state average of 20% at each of the three distances, with values ranging from 53% to 76%.

While not specifically defined under VEJA, a related consideration is potential language barriers in a community of color. EJSCREEN defines a related term, linguistically isolated, as follows:

"Linguistically isolated" means a household in which all members age 14 years and over speak a non-English language and also speak English less than "very well" (have difficulty with English) is linguistically isolated.

Table 2-2 provides data regarding individuals who speak English less than very well and the presence of linguistically isolated households within a 1, 2 and 5-mile buffer of the project site.

Table 2-2. Identification of Linguistically Isolated Households

Metric	Site Buffer		
	1 Mile	2 Miles	5 Miles
Over Age 5 Speak English Less than Very Well ¹			
Individuals (#)	5	493	4,207
Individuals (%)	0.2%	1.5%	2.0%
Linguistically Isolated			
Total Linguistically Isolated Households ¹	1	93	959
Linguistically Isolated Households (%) ¹	0.1%	0.7%	1.1%
State Percentile (Linguistically Isolated Population) ²	52	54	57
Speak Spanish ¹ (%)	95%	80%	64%
Speak Other Indo-European Languages ¹ (%)	0%	6%	15%
Speak Asian-Pacific Island Languages ¹ (%)	5%	13%	20%
Speak Other Languages ¹ (%)	0%	0%	1%

¹Data comes from 2013-2017 ACS Report generated for each buffer using EJSSCREEN.

²Data comes from Standard Report generated using EJSSCREEN at each buffer level.

Table 2-2 shows that a small fraction of individuals over age 5 speak English less than very well. Similarly, the number of linguistically isolated households is small. Linguistically isolated households surrounding the project site are predominantly Spanish speaking, with the addition of some Indo-European and Asian-Pacific Island language speaking households when extending further from the site.

2.1.2 Existence of a Low-Income Community

VEJA defines “low-income community” and “low income” as follows:

“Low-income community” means any census block group in which 30 percent or more of the population is composed of people with low-income.

“Low-income” means having an annual household income equal to or less than the greater of (i) an amount equal to 80 percent of the median income of the area in which the household is located, as reported by the Department of Housing and Urban Development, and (ii) 200 percent of the Federal Poverty Level.

Median family income (MFI) data reported by the Department of Housing and Urban Development (HUD) was obtained for FY 2020¹.

- Portsmouth City, the community closest to the project site, falls under the Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area when calculating MFI calculations.
- The MFI for this area was found to be \$82,500, 80 percent of which is \$66,000.
- The Federal Poverty Level for 2020 is set dependent on household size. A household size of 4 was selected to maintain relative consistency with MFI data from HUD, putting the Federal Poverty Level at \$26,200². 200% of the Federal Poverty Level would thus be \$52,400.
- Therefore, as a metric for in the areas surrounding the site, \$66,000 should be set as the threshold below which "low-income" is defined.

Appendix B contains calculation methodologies for MFI, provided by HUD, for the Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area. A table outlining the Federal Poverty Level across different household sizes is also included in Appendix B.

To compare to the Federal Poverty Level of 200%, EJSCREEN is used to obtain low income information around the project site. Results from EJSCREEN for determining the presence of a low-income community are shown in Table 2-3. Because EJSCREEN uses 200% of the Federal Poverty Level as its criteria for a "low-income household", which is less than 80% of the MFI, the percentage that is low-income under VEJA would be higher than the percentage shown in Table 2-3.

Table 2-3. Determination of the Presence of a Low-Income Community, FPL Definition

Site Buffer	% Low-Income ¹	"Low-Income Community" Threshold ²	Low-Income Community?
1 Mile	73%	30%	Yes
2 Miles	50%	30%	Yes
5 Miles	40%	30%	Yes

¹Data comes from Standard Report generated using EJSCREEN at each buffer.

²Based on the definition of "low-income community" in the VA Environmental Justice Act.

To compare to the MFI data, census block group data for household income (based on 2013-2017 ACS 5-year data) was additionally examined using ArcGIS outside of EJSCREEN. To determine which households are less than the MFI, all households in each block group with an annual household income between "less than \$10,000" and \$59,999 are included. The next grouping in the dataset covers from \$60,000 to \$75,000, with 80% of the MFI 40% of the way between \$60,000 and \$75,000. To estimate the number of households less than \$66,000, 50% of the households in the \$60,000 to \$75,000 bracket were included.³

¹ MFI provided by U.S. Department of Housing and Urban Development, FY 2020 Income Limits Documentation System, Portsmouth City, Virginia. <https://www.huduser.gov/portal/datasets/il/il2020/2020MedCalc.odn>. Refer to Appendix B for more detailed MFI calculation methodologies, provided by HUD.

² FPL provided by U.S. Department of Health and Human Services ASPE, 2020 Poverty Guidelines. <https://aspe.hhs.gov/2020-poverty-guidelines>.

³ The distribution of household incomes within the \$60,000 to \$75,000 bracket is unknown and may vary within each census block. A reasonable inference is that the distribution may be weighted more heavily towards the lower value, such that the median value may be less than the average. To approximate a distribution of this type, this analysis assumes that the median value is \$66,000, and thus half of the households in this bracket are included in the calculation.

At each radius of 1, 2 and 5 miles, the percent of each block group's area contained within the radius was calculated (because the radius splits some census block groups at the edges). Next, the approximate number of reported households within each radius was calculated, proportionate to the area of the block group contained within the radius; this approach presumes that the households within each block group are spatially evenly distributed. A similar calculation was carried out for the number of households within each radius that were found to be low-income. Comparing these two values, an approximate percentage of low-income households within each radius was derived, as shown in Table 2-4. Figure B-1 in Appendix B presents this analysis visually.

Table 2-4. Determination of the Presence of a Low-Income Community, MFI Definition

Site Buffer	% Low-Income ¹	"Low-Income Community" Threshold ²	Low-Income Community?
1 Mile	81%	30%	Yes
2 Miles	73%	30%	Yes
5 Miles	63%	30%	Yes

¹Data comes from Census data for household income, based on 2013-2017 ACS Reports, compared against a 2020 VEJA-defined household "low-income" threshold of \$66,000 for the surrounding area.

²Based on the definition of "low-income community" in the VA Environmental Justice Act.

As expected, when using the higher low-income threshold of \$66,000, the percentage of households surrounding the site that are considered low-income increased at all radii.

Regardless of the calculation method used, the community surrounding the project site is a "low-income community" for all site buffers examined (1, 2 and 5 miles).

2.2 Sensitive Receptors

2.2.1 Existence of Sensitive Receptors

2.2.1.1 Population Age

Although not specified in VEJA, EPA has identified sensitive receptors, which include groups within the population whose health may be impacted to a greater extent as a result of changes in air quality due to their age, as part of its EJSCREEN. These sensitive receptors include infants, young children, and the elderly. The percentages of the population over the age of 64, and under the age of 5, in the community surrounding the Project are shown in Tables 2-5 and 2-6, respectively.

Table 2-5. Identification of Sensitive Groups, Over Age 64

Site Buffer	Population Under Age of 5 Years ¹ (%)	State Population Under Age of 5 Years ¹ (%)	Over State Average?	Percentile in State if Over Average ¹
1 Mile	7%	6%	Yes	63
2 Miles	8%	6%	Yes	76
5 Miles	7%	6%	Yes	67

¹Data comes from Standard Report generated using EJSCREEN at each buffer.

Table 2-6. Identification of Sensitive Groups, Under Age 5

Site Buffer	Population Over Age of 64 Years ¹ (%)	State Population Over Age of 64 Years ¹ (%)	Over State Average?	Percentile in State if Over ¹
1 Mile	8%	14%	No	--
2 Miles	10%	14%	No	--
5 Miles	13%	14%	No	--

¹Data comes from Standard Report generated using EJSCREEN at each buffer.

Within all buffers examined, the percent of the population over the age of 64 years is less than the state average (14%), with the greatest percentage being 13% at a 5-mile buffer. The percentage of the population under the age of 5 years did slightly exceed the state average (6%) within all buffers; however, the percentile for this metric never exceeded 80% when compared across the state. EPA technical guidance identifies the 80th percentile as the threshold where higher review may be appropriate.

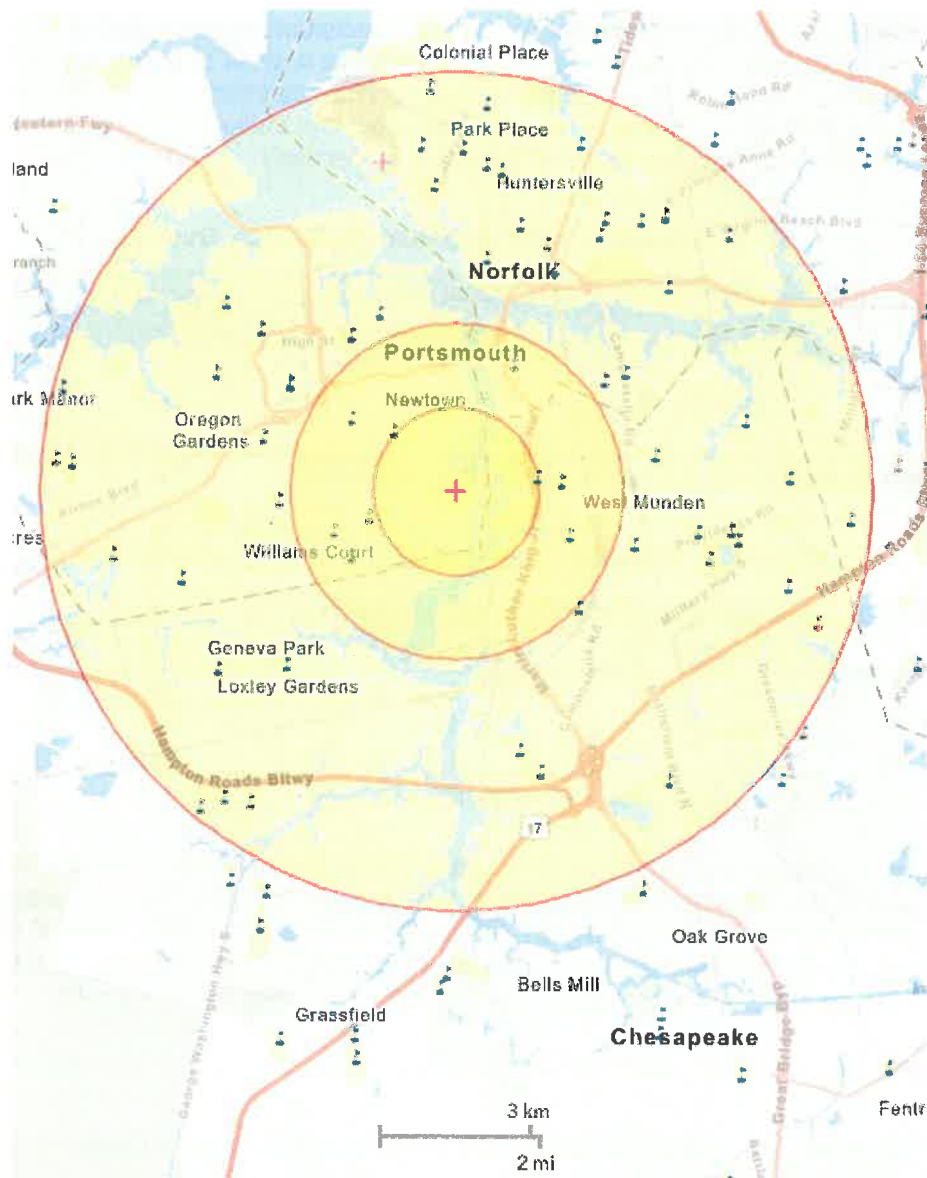
2.2.1.2 Schools

Data for K-12 schools in the surrounding area was obtained from the National Center for Education Statistics. This is the default database embedded within EJSCREEN to display nearby schools.

Geocodes for public schools are based on data reported in the NCES Common Core of Data (CCD), an annual collection of administrative data about enrollment, staffing, and program participation for schools, local education agencies (LEAs), and state education agencies (SEAs). SEAs report these data to the U.S. Department of Education in a series of file submissions throughout the year. Additional information about the CCD collection and data resources for public schools is available at <https://nces.ed.gov/ccd/ccddata.asp>.

There is one (1) school (Rena B. Wright Primary School) that was found within a 1-mile buffer of the main stack location using the EJSCREEN mapping tool. The number of schools increases to nine (9) within a 2-mile radius, or sixty-seven (67) within a 5-mile radius, as shown in Figure 2-1.

Figure 2-1. Presence of Schools in the Surrounding Area



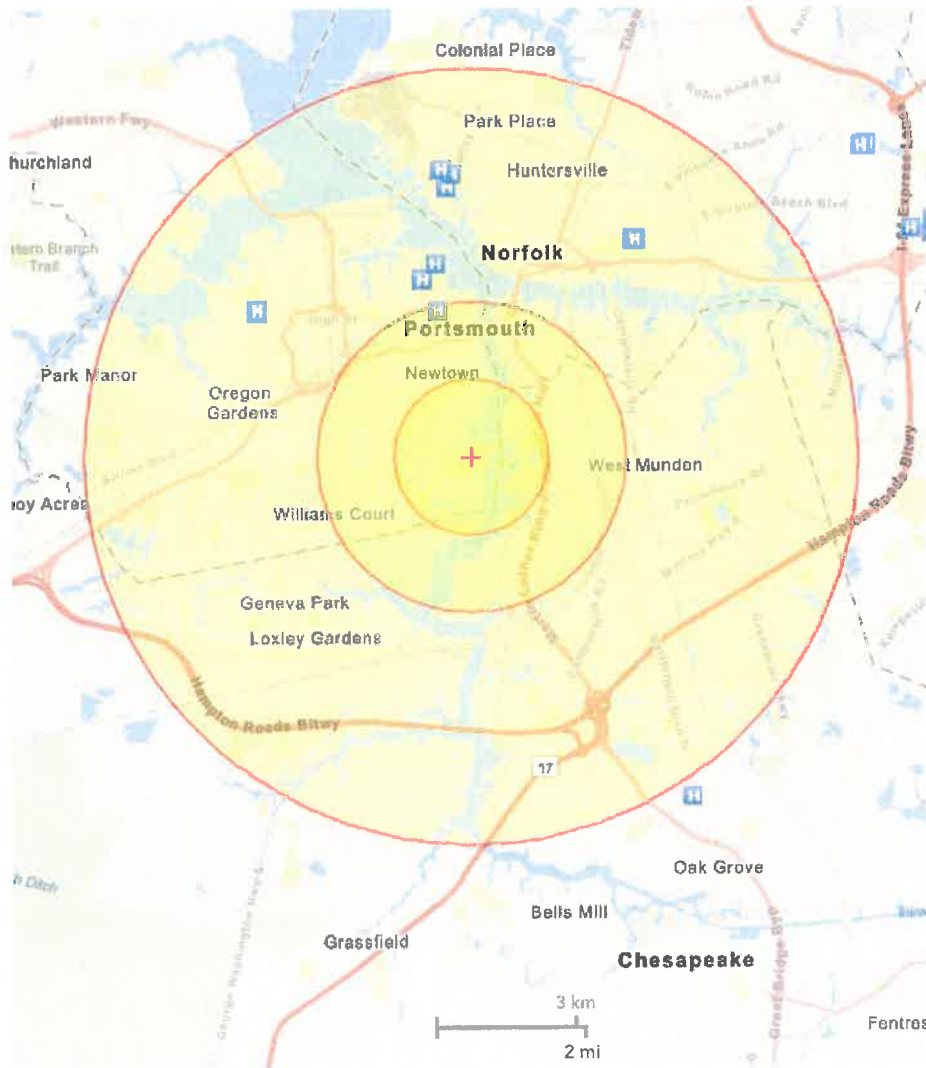
2.2.1.3 Hospitals

Data for hospitals in the surrounding area was obtained from the EPA's NEPAassist Mapping Tool embedded within EJSCREEN. Hospital data within this tool is compiled from the USGS Geographic Names Information System (GNIS).

NEPAassist is a tool that facilitates the environmental review process and project planning in relation to environmental considerations. The web-based application draws environmental data dynamically from EPA Geographic Information System databases and web services and provides immediate screening of environmental assessment indicators for a user-defined area of interest.

There are no hospitals within the 1-mile buffer. One (1) hospital, Portsmouth Health Center, lies within the 2-mile radius of the project site to the North. There are ten (10) hospitals, in total, within a 5-mile radius of the site, as shown in Figure 2-2.

Figure 2-2. Presence of Hospitals in the Surrounding Area



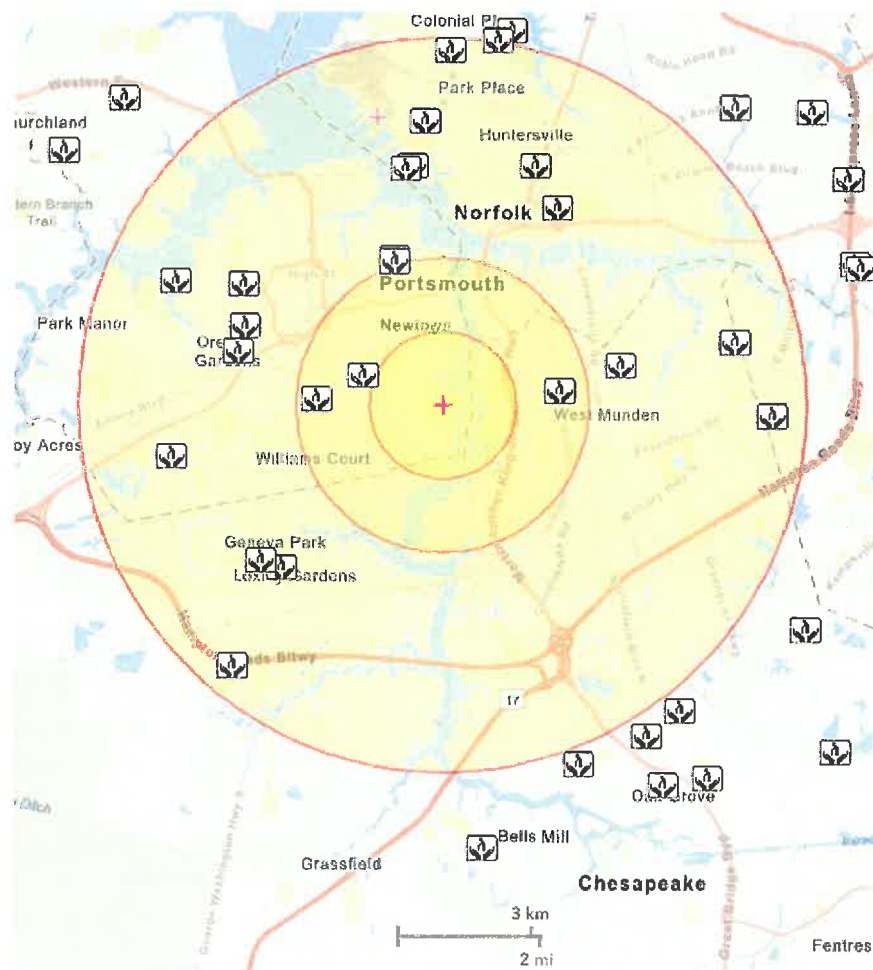
2.2.1.4 Senior Living Facilities

Data for senior living facilities was obtained from the Department of Homeland Security Homeland Infrastructure Foundation-Level Data (HIFLD), who maintain a map of nursing homes within the US.

The Nursing Home / Assisted Care feature class/shapefile contains facilities that house elderly adults. This feature class's/shapefile's attribution contains physical and demographic information for facilities in the continental United States and some of its territories. The purpose of this feature class/shapefile is to provide accurate locations for high concentrations of elderly adults in the event of a disaster. The attribution within this feature class/shapefile was populated via open source methodologies of authoritative sources.

There are no senior living facilities within a 1-mile radius of the site. However, there are three (3) senior living facilities within a 2-mile radius, increasing to twenty-three (23) total within a 5-mile radius, as shown in Figure 2-3.

Figure 2-3. Presence of Senior Living Facilities in the Surrounding Area



2.3 Sites of Cultural Significance

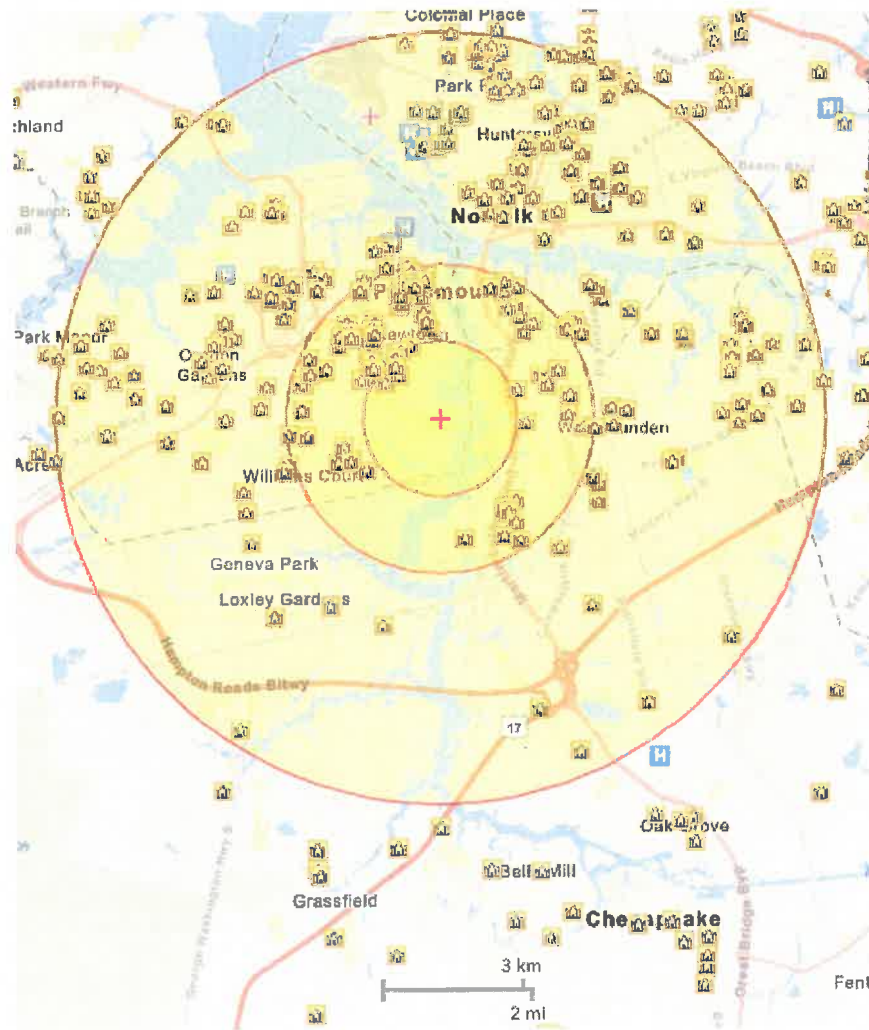
2.3.1 Existence of Sites of Cultural Significance

2.3.1.1 Places of Worship

Data for places of worship in the surrounding area was obtained from the EPA's NEPAAssist Mapping Tool embedded within EJSCREEN. Place of worship data within this tool is compiled from the USGS Geographic Names Information System (GNIS).

Five (5) places of worship were found within a 1-mile radius using the EJSCREEN mapping tool; this number increases to ninety-two (92) within a 2-mile radius of the site, the largest presence being to the northwest in the Newtown/Portsmouth region. In total, there are two hundred seventy-three (273) places of worship within a 5-mile radius of the site. A site map showing places of worship within each of the three radii is shown in Figure 2-4.

Figure 2-4. Presence of Places of Worship in the Surrounding Area



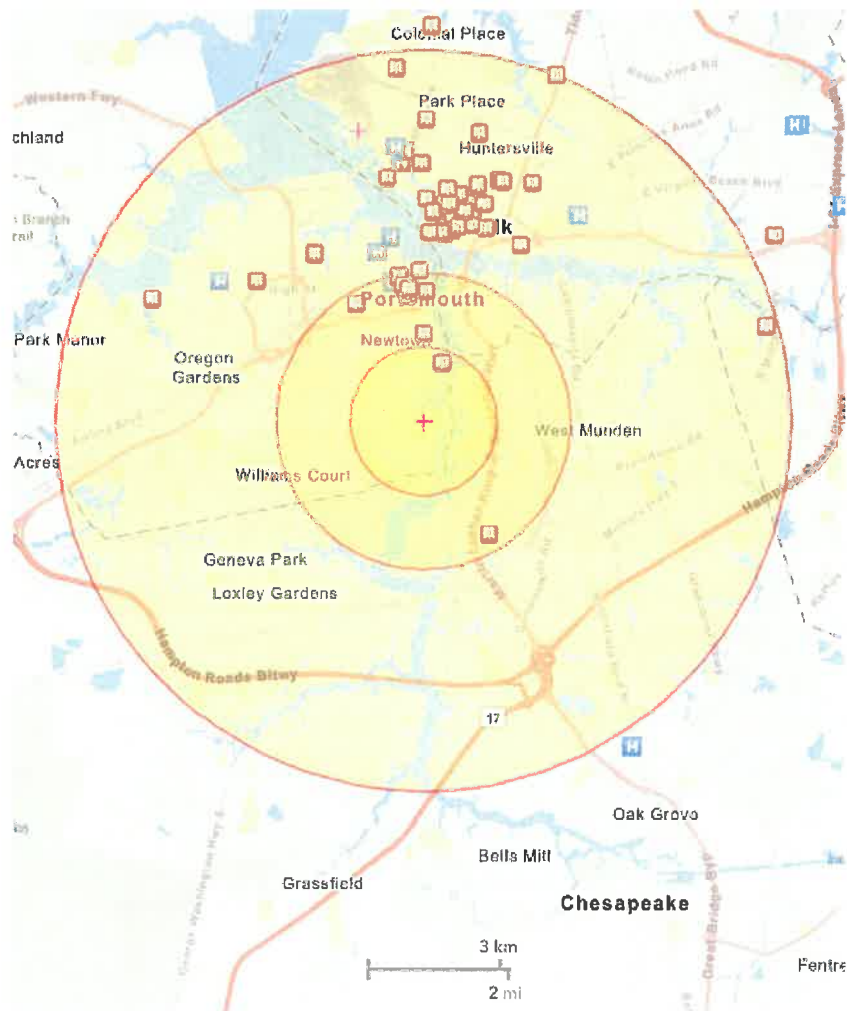
2.3.1.2 Sites of Historical Significance

Data for historical sites in the surrounding area was obtained from the EPA's NEPAAssist Mapping Tool. Historic sites data within this tool is compiled from the National Register of Historic Places, maintained by the U.S. National Park Service.

The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

There is one (1) site of historical significance within 1-mile of the project site (Norfolk Naval Shipyard Drydock No. 1). Within a 2-mile radius of the site, there are eleven (11) sites of historical significance, as well as forty-nine (49) total sites within a 5-mile radius, as shown in Figure 2-5. These sites are concentrated in downtown Portsmouth and Norfolk, to the North of the project site.

Figure 2-5. Presence of Historic Sites in the Surrounding Areas



APPENDIX A. EJSCREEN REPORTS



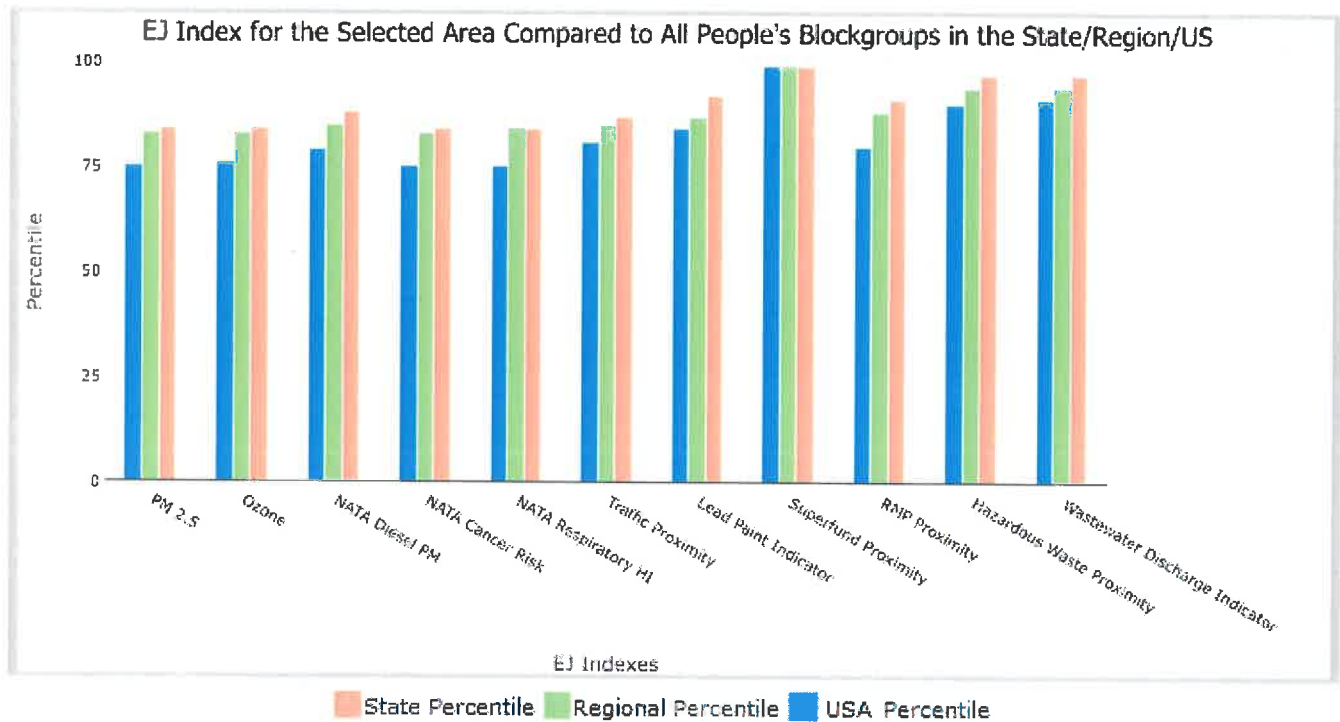
1 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 2,169

Input Area (sq. miles): 3.14

Main Stack Location

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	84	83	75
EJ Index for Ozone	84	83	76
EJ Index for NATA* Diesel PM	88	85	79
EJ Index for NATA* Air Toxics Cancer Risk	84	83	75
EJ Index for NATA* Respiratory Hazard Index	84	84	75
EJ Index for Traffic Proximity and Volume	87	85	81
EJ Index for Lead Paint Indicator	92	87	84
EJ Index for Superfund Proximity	99	99	99
EJ Index for RMP Proximity	91	88	80
EJ Index for Hazardous Waste Proximity	97	94	90
EJ Index for Wastewater Discharge Indicator	97	94	91



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

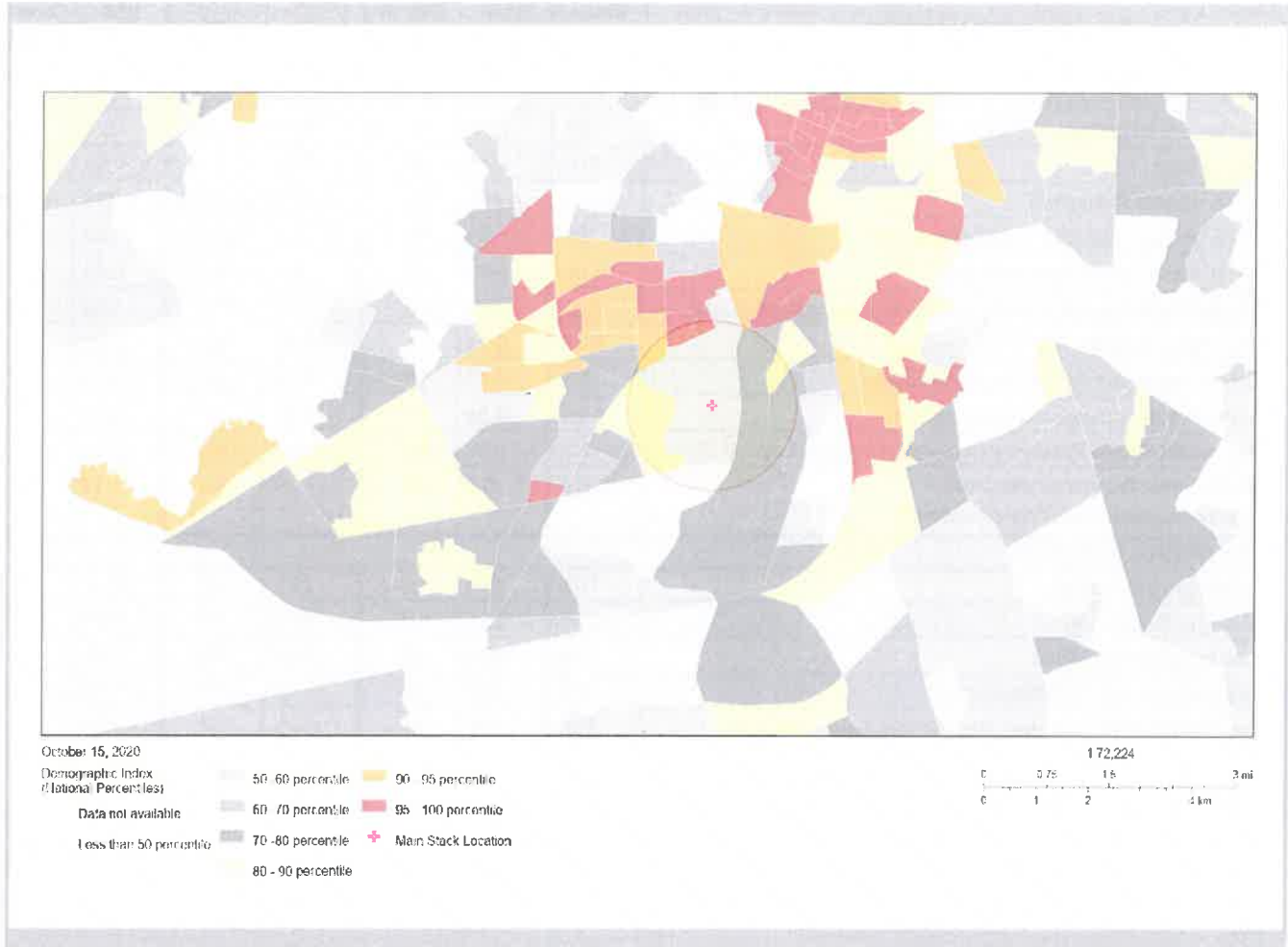


1 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 2,169

Input Area (sq. miles): 3.14

Main Stack Location



Sites reporting to EPA	
Superfund NPL	3
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	1

EJSCREEN Report (Version 2019)



1 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 2,169

Input Area (sq. miles): 3.14

Main Stack Location

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	7.34	7.79	18	8.64	8	8.3	23
Ozone (ppb)	40.8	42.5	24	44.9	7	43	32
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.573	0.425	78	0.477	60-70th	0.479	70-80th
NATA* Cancer Risk (lifetime risk per million)	29	31	34	31	<50th	32	<50th
NATA* Respiratory Hazard Index	0.39	0.41	41	0.4	<50th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	620	570	75	640	72	750	72
Lead Paint Indicator (% Pre-1960 Housing)	0.27	0.21	71	0.36	49	0.28	59
Superfund Proximity (site count/km distance)	4.6	0.11	99	0.15	99	0.13	99
RMP Proximity (facility count/km distance)	0.86	0.38	87	0.62	77	0.74	73
Hazardous Waste Proximity (facility count/km distance)	4.2	0.66	98	1.3	93	4	88
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.018	0.8	93	30	80	14	82
Demographic Indicators							
Demographic Index	70%	32%	96	30%	93	36%	89
Minority Population	85%	37%	94	32%	90	39%	86
Low Income Population	73%	26%	97	28%	96	33%	95
Linguistically Isolated Population	0%	3%	52	3%	55	4%	45
Population With Less Than High School Education	26%	11%	92	11%	92	13%	86
Population Under 5 years of age	7%	6%	63	6%	66	6%	62
Population over 64 years of age	8%	14%	24	16%	16	15%	19

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.



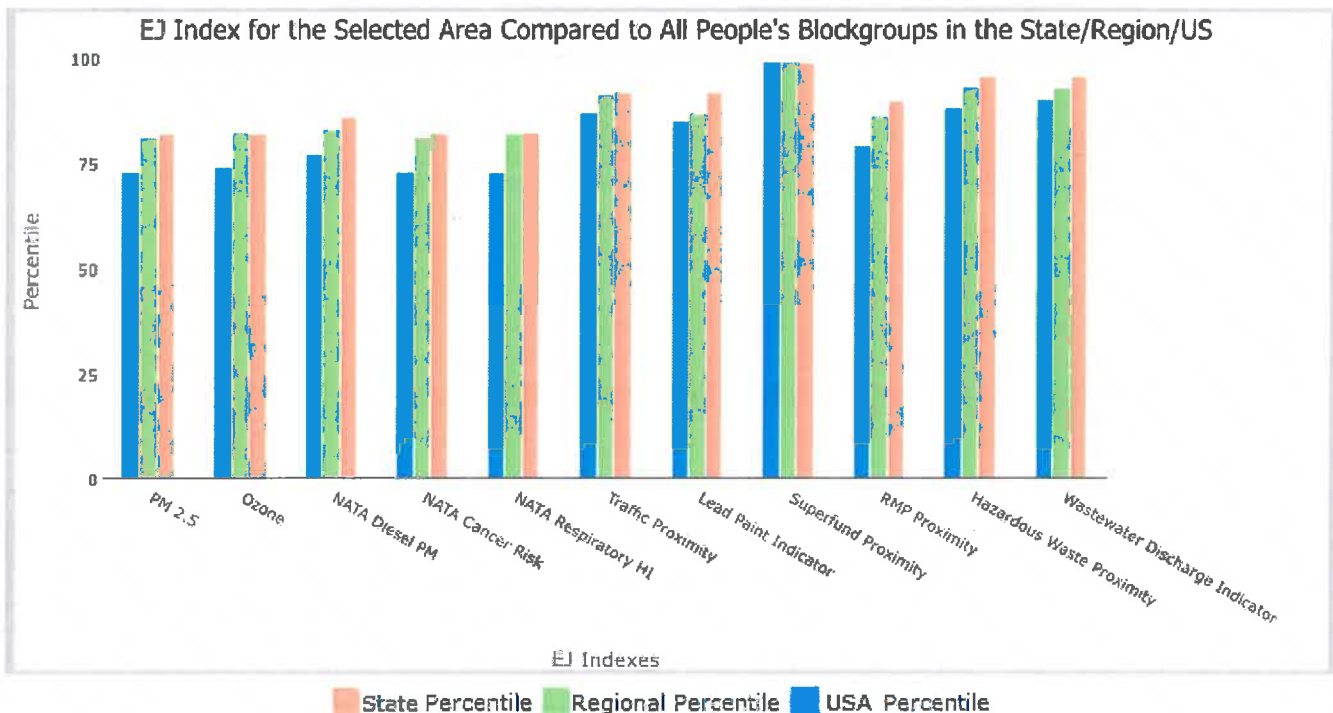
2 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 36,616

Input Area (sq. miles): 12.56

Main Stack Location

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	82	81	73
EJ Index for Ozone	82	82	74
EJ Index for NATA* Diesel PM	86	83	77
EJ Index for NATA* Air Toxics Cancer Risk	82	81	73
EJ Index for NATA* Respiratory Hazard Index	82	82	73
EJ Index for Traffic Proximity and Volume	92	91	87
EJ Index for Lead Paint Indicator	92	87	85
EJ Index for Superfund Proximity	99	99	99
EJ Index for RMP Proximity	90	86	79
EJ Index for Hazardous Waste Proximity	96	93	88
EJ Index for Wastewater Discharge Indicator	96	93	90



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

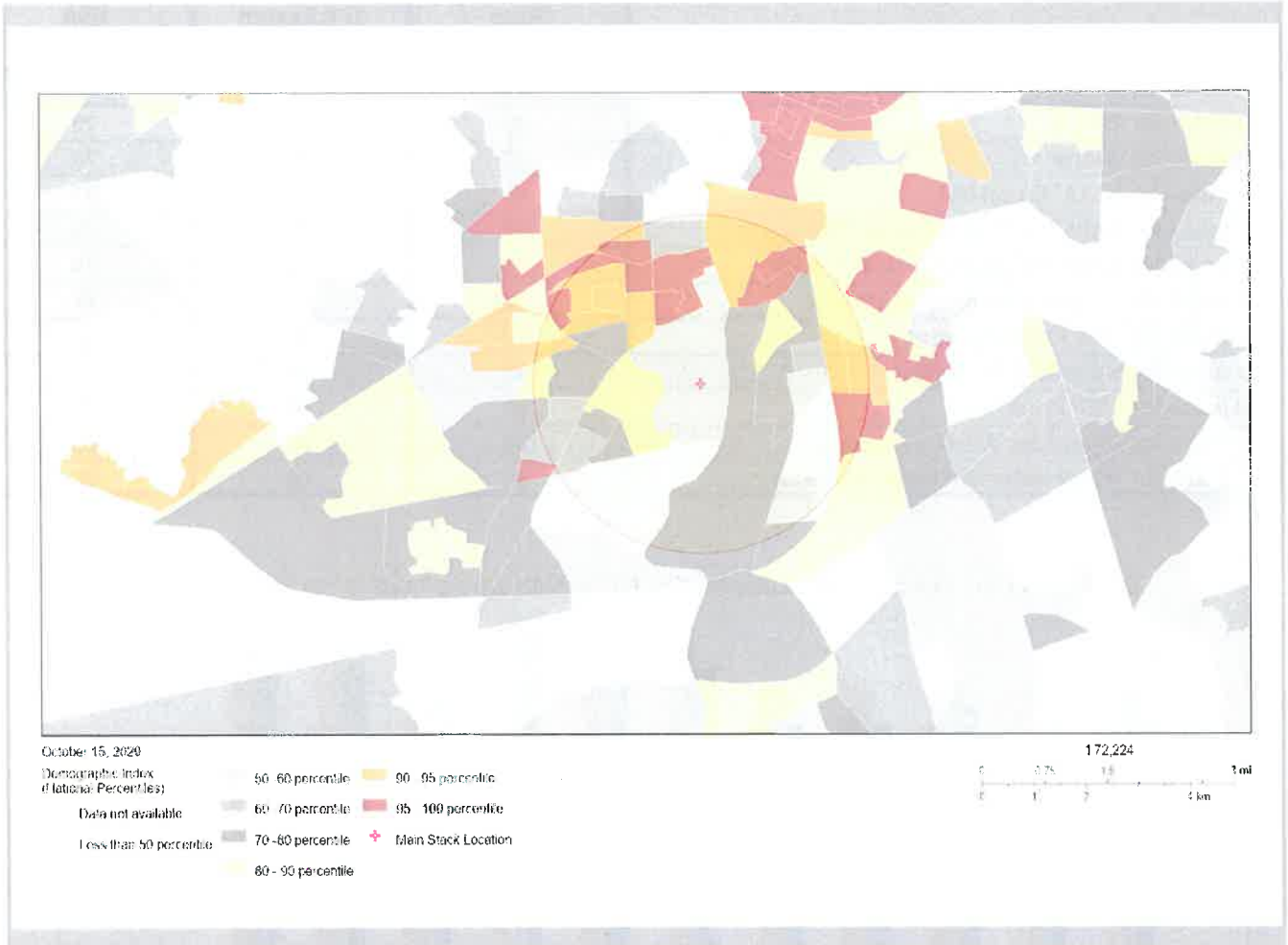


2 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 36,616

Input Area (sq. miles): 12.56

Main Stack Location



Sites reporting to EPA	
Superfund NPL	5
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	5

EJSCREEN Report (Version 2019)



2 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 36,616

Input Area (sq. miles): 12.56

Main Stack Location

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	7.33	7.79	17	8.64	8	8.3	23
Ozone (ppb)	40.8	42.5	24	44.9	7	43	32
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.51	0.425	71	0.477	60-70th	0.479	60-70th
NATA* Cancer Risk (lifetime risk per million)	29	31	39	31	<50th	32	<50th
NATA* Respiratory Hazard Index	0.4	0.41	44	0.4	50-60th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	1200	570	87	640	86	750	84
Lead Paint Indicator (% Pre-1960 Housing)	0.52	0.21	89	0.36	71	0.28	77
Superfund Proximity (site count/km distance)	2.4	0.11	99	0.15	99	0.13	99
RMP Proximity (facility count/km distance)	0.93	0.38	88	0.62	79	0.74	74
Hazardous Waste Proximity (facility count/km distance)	3.5	0.66	97	1.3	90	4	86
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.0095	0.8	91	30	76	14	79
Demographic Indicators							
Demographic Index	60%	32%	90	30%	88	36%	82
Minority Population	71%	37%	86	32%	84	39%	79
Low Income Population	50%	26%	88	28%	86	33%	78
Linguistically Isolated Population	1%	3%	54	3%	57	4%	46
Population With Less Than High School Education	20%	11%	83	11%	85	13%	78
Population Under 5 years of age	8%	6%	76	6%	79	6%	75
Population over 64 years of age	10%	14%	37	16%	28	15%	33

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.



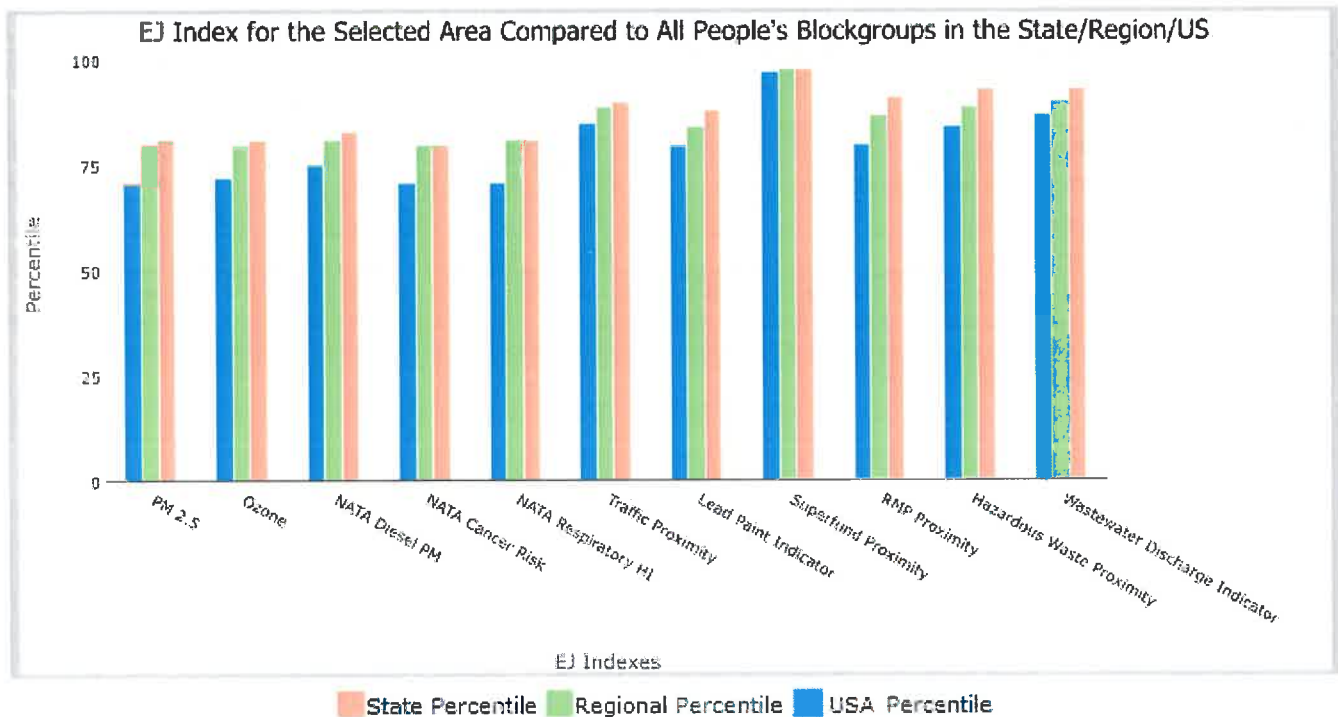
5 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 234,987

Input Area (sq. miles): 78.53

Main Stack Location (The study area contains 2 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	81	80	71
EJ Index for Ozone	81	80	72
EJ Index for NATA* Diesel PM	83	81	75
EJ Index for NATA* Air Toxics Cancer Risk	80	80	71
EJ Index for NATA* Respiratory Hazard Index	81	81	71
EJ Index for Traffic Proximity and Volume	90	89	85
EJ Index for Lead Paint Indicator	88	84	80
EJ Index for Superfund Proximity	98	98	97
EJ Index for RMP Proximity	91	87	80
EJ Index for Hazardous Waste Proximity	93	89	84
EJ Index for Wastewater Discharge Indicator	93	90	87



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

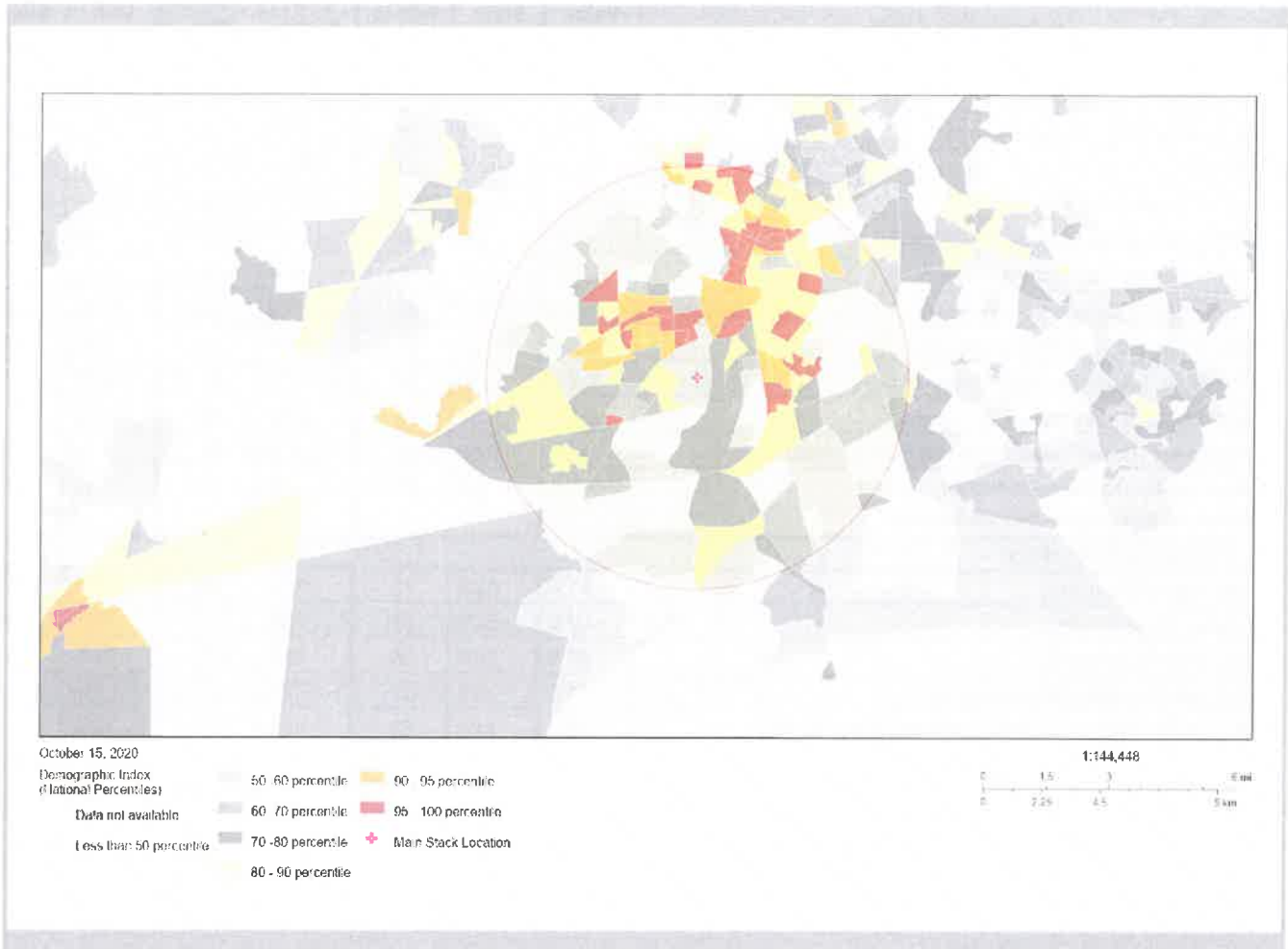


5 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 234,987

Input Area (sq. miles): 78.53

Main Stack Location (The study area contains 2 blockgroup(s) with zero population.)



Sites reporting to EPA	
Superfund NPL	5
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	18

EJSCREEN Report (Version 2019)



5 miles Ring Centered at 36.808863,-76.296280, VIRGINIA, EPA Region 3

Approximate Population: 234,987

Input Area (sq. miles): 78.53

Main Stack Location (The study area contains 2 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	7.32	7.79	16	8.64	8	8.3	23
Ozone (ppb)	40.9	42.5	26	44.9	8	43	33
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.481	0.425	67	0.477	50-60th	0.479	60-70th
NATA* Cancer Risk (lifetime risk per million)	29	31	35	31	<50th	32	<50th
NATA* Respiratory Hazard Index	0.39	0.41	40	0.4	<50th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	1000	570	85	640	83	750	82
Lead Paint Indicator (% Pre-1960 Housing)	0.37	0.21	81	0.36	60	0.28	68
Superfund Proximity (site count/km distance)	0.78	0.11	98	0.15	97	0.13	97
RMP Proximity (facility count/km distance)	0.89	0.38	88	0.62	78	0.74	73
Hazardous Waste Proximity (facility count/km distance)	2.4	0.66	94	1.3	84	4	80
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.0054	0.8	89	30	72	14	76
Demographic Indicators							
Demographic Index	51%	32%	83	30%	82	36%	74
Minority Population	62%	37%	81	32%	81	39%	74
Low Income Population	40%	26%	76	28%	75	33%	66
Linguistically Isolated Population	1%	3%	57	3%	60	4%	49
Population With Less Than High School Education	14%	11%	69	11%	72	13%	65
Population Under 5 years of age	7%	6%	67	6%	70	6%	66
Population over 64 years of age	13%	14%	47	16%	38	15%	45

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

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Location: User-specified point center at 36.809275, -76.297310

Ring (buffer): 1-miles radius

Description: Main Stack Location

Summary		Census 2010
Population		2,068
Population Density (per sq. mile)		832
Minority Population		1,846
% Minority		89%
Households		827
Housing Units		913
Land Area (sq. miles)		2.49
% Land Area		80%
Water Area (sq. miles)		0.64
% Water Area		20%

Population by Race	Number	Percent
Total	2,068	-----
Population Reporting One Race	2,012	97%
White	230	11%
Black	1,749	85%
American Indian	7	0%
Asian	9	0%
Pacific Islander	2	0%
Some Other Race	15	1%
Population Reporting Two or More Races	56	3%
Total Hispanic Population	50	2%
Total Non-Hispanic Population	2,018	98%
White Alone	222	11%
Black Alone	1,737	84%
American Indian Alone	7	0%
Non-Hispanic Asian Alone	8	0%
Pacific Islander Alone	2	0%
Other Race Alone	1	0%
Two or More Races Alone	40	2%

Population by Sex	Number	Percent
Male	967	47%
Female	1,101	53%

Population by Age	Number	Percent
Age 0-4	202	10%
Age 0-17	580	28%
Age 18+	1,488	72%
Age 65+	238	11%

Households by Tenure	Number	Percent
Total	827	
Owner Occupied	264	32%
Renter Occupied	563	68%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 2-miles radius
 Description: Main Stack Location

Summary	Census 2010
Population	35,648
Population Density (per sq. mile)	3,230
Minority Population	25,615
% Minority	72%
Households	13,243
Housing Units	14,804
Land Area (sq. miles)	11.04
% Land Area	88%
Water Area (sq. miles)	1.55
% Water Area	12%

Population by Race	Number	Percent
Total	35,648	-----
Population Reporting One Race	34,704	97%
White	10,497	29%
Black	23,147	65%
American Indian	154	0%
Asian	281	1%
Pacific Islander	32	0%
Some Other Race	593	2%
Population Reporting Two or More Races	944	3%
Total Hispanic Population	1,518	4%
Total Non-Hispanic Population	34,130	96%
White Alone	10,033	28%
Black Alone	22,852	64%
American Indian Alone	132	0%
Non-Hispanic Asian Alone	274	1%
Pacific Islander Alone	31	0%
Other Race Alone	52	0%
Two or More Races Alone	757	2%

Population by Sex	Number	Percent
Male	17,029	48%
Female	18,619	52%

Population by Age	Number	Percent
Age 0-4	3,088	9%
Age 0-17	9,801	27%
Age 18+	25,847	73%
Age 65+	3,658	10%

Households by Tenure	Number	Percent
Total	13,243	
Owner Occupied	6,349	48%
Renter Occupied	6,894	52%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
 Source: U.S. Census Bureau, Census 2010 Summary File 1.



Location: User-specified point center at 36.809275, -76.297310

Ring (buffer): 5-miles radius

Description:

Summary	Census 2010
Population	245,428
Population Density (per sq. mile)	3,574
Minority Population	149,982
% Minority	61%
Households	86,891
Housing Units	94,442
Land Area (sq. miles)	68.66
% Land Area	88%
Water Area (sq. miles)	9.47
% Water Area	12%

Population by Race	Number	Percent
Total	245,428	-----
Population Reporting One Race	238,568	97%
White	100,228	41%
Black	128,910	53%
American Indian	1,101	0%
Asian	4,193	2%
Pacific Islander	253	0%
Some Other Race	3,883	2%
Population Reporting Two or More Races	6,860	3%
Total Hispanic Population	11,582	5%
Total Non-Hispanic Population	233,846	95%
White Alone	95,446	39%
Black Alone	127,114	52%
American Indian Alone	910	0%
Non-Hispanic Asian Alone	4,089	2%
Pacific Islander Alone	216	0%
Other Race Alone	371	0%
Two or More Races Alone	5,701	2%

Population by Sex	Number	Percent
Male	124,077	51%
Female	121,351	49%

Population by Age	Number	Percent
Age 0-4	17,205	7%
Age 0-17	55,507	23%
Age 18+	189,921	77%
Age 65+	26,795	11%

Households by Tenure	Number	Percent
Total	86,891	
Owner Occupied	46,803	54%
Renter Occupied	40,089	46%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.

Source: U.S. Census Bureau, Census 2010 Summary File 1.



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 1-miles radius
 Description: Main Stack Location

Summary of ACS Estimates		2013 - 2017		
Population				2,497
Population Density (per sq. mile)				999
Minority Population				2,167
% Minority				87%
Households				794
Housing Units				896
Housing Units Built Before 1950				185
Per Capita Income				19,798
Land Area (sq. miles) (Source: SF1)				2.50
% Land Area				81%
Water Area (sq. miles) (Source: SF1)				0.60
% Water Area				19%
		2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Race				
Total		2,497	100%	419
Population Reporting One Race		2,400	96%	803
White		420	17%	232
Black		1,897	76%	278
American Indian		18	1%	53
Asian		25	1%	70
Pacific Islander		4	0%	58
Some Other Race		35	1%	112
Population Reporting Two or More Races		97	4%	78
Total Hispanic Population		149	6%	161
Total Non-Hispanic Population		2,348		
White Alone		330	13%	232
Black Alone		1,890	76%	278
American Indian Alone		18	1%	53
Non-Hispanic Asian Alone		25	1%	70
Pacific Islander Alone		4	0%	58
Other Race Alone		1	0%	30
Two or More Races Alone		81	3%	56
Population by Sex				
Male		1,302	52%	252
Female		1,195	48%	353
Population by Age				
Age 0-4		159	6%	132
Age 0-17		578	23%	160
Age 18+		1,919	77%	203
Age 65+		215	9%	65

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 1-miles radius
 Description: Main Stack Location

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	1,319	100%	217
Less than 9th Grade	75	6%	95
9th - 12th Grade, No Diploma	254	19%	78
High School Graduate	438	33%	113
Some College, No Degree	423	32%	98
Associate Degree	78	6%	57
Bachelor's Degree or more	129	10%	81
Population Age 5+ Years by Ability to Speak English			
Total	2,339	100%	410
Speak only English	2,121	91%	337
Non-English at Home ¹⁺²⁺³⁺⁴	217	9%	144
¹ Speak English "very well"	213	9%	101
² Speak English "well"	2	0%	55
³ Speak English "not well"	3	0%	72
⁴ Speak English "not at all"	0	0%	56
³⁺⁴ Speak English "less than well"	3	0%	91
²⁺³⁺⁴ Speak English "less than very well"	5	0%	93
Linguistically Isolated Households*			
Total	1	100%	40
Speak Spanish	1	95%	37
Speak Other Indo-European Languages	0	0%	12
Speak Asian-Pacific Island Languages	0	5%	19
Speak Other Languages	0	0%	12
Households by Household Income			
Household Income Base	794	100%	133
< \$15,000	190	24%	57
\$15,000 - \$25,000	189	24%	116
\$25,000 - \$50,000	219	28%	89
\$50,000 - \$75,000	129	16%	48
\$75,000 +	66	8%	80
Occupied Housing Units by Tenure			
Total	794	100%	133
Owner Occupied	209	26%	68
Renter Occupied	585	74%	139
Employed Population Age 16+ Years			
Total	1,989	100%	320
In Labor Force	1,334	67%	320
Civilian Unemployed in Labor Force	104	5%	58
Not In Labor Force	654	33%	141

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of anyrace.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS)

*Households in which no one 14 and over speaks English "very well" or speaks English only.



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 1-miles radius
 Description: Main Stack Location

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	3,583	100%	579
English	3,304	92%	545
Spanish	176	5%	110
French	10	0%	13
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	29	1%	57
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	3	0%	13
Chinese	0	0%	12
Japanese	N/A	N/A	N/A
Korean	0	0%	12
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	0	0%	12
Other Asian	36	1%	90
Tagalog	26	1%	26
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	0	0%	12
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	0	0%	12
Total Non-English	280	8%	795

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
 N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017.
 *Population by Language Spoken at Home is available at the census tract summary level and up.



Location: User-specified point center at 36.809275, -76.297310
Ring (buffer): 2-miles radius
Description: Main Stack Location

Summary of ACS Estimates		2013 - 2017
Population		36,412
Population Density (per sq. mile)		3,289
Minority Population		25,635
% Minority		70%
Households		13,084
Housing Units		15,317
Housing Units Built Before 1950		5,128
Per Capita Income		19,618
Land Area (sq. miles) (Source: SF1)		11.07
% Land Area		88%
Water Area (sq. miles) (Source: SF1)		1.51
% Water Area		12%

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	36,412	100%	538
Population Reporting One Race	35,302	97%	1,356
White	11,401	31%	415
Black	22,658	62%	499
American Indian	91	0%	57
Asian	443	1%	106
Pacific Islander	32	0%	58
Some Other Race	677	2%	221
Population Reporting Two or More Races	1,110	3%	175
Total Hispanic Population	1,319	4%	243
Total Non-Hispanic Population	35,093		
White Alone	10,777	30%	415
Black Alone	22,511	62%	499
American Indian Alone	91	0%	57
Non-Hispanic Asian Alone	443	1%	106
Pacific Islander Alone	32	0%	58
Other Race Alone	227	1%	202
Two or More Races Alone	1,011	3%	139
Population by Sex			
Male	17,238	47%	297
Female	19,174	53%	433
Population by Age			
Age 0-4	2,991	8%	182
Age 0-17	9,988	27%	243
Age 18+	26,424	73%	263
Age 65+	3,818	10%	115

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
 N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 2-miles radius
 Description: Main Stack Location

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	22,554	100%	314
Less than 9th Grade	1,320	6%	95
9th - 12th Grade, No Diploma	3,161	14%	134
High School Graduate	7,418	33%	184
Some College, No Degree	7,776	34%	186
Associate Degree	1,813	8%	129
Bachelor's Degree or more	2,878	13%	133
Population Age 5+ Years by Ability to Speak English			
Total	33,421	100%	489
Speak only English	31,612	95%	403
Non-English at Home ¹⁺²⁺³⁺⁴	1,809	5%	144
¹ Speak English "very well"	1,316	4%	108
² Speak English "well"	213	1%	55
³ Speak English "not well"	213	1%	120
⁴ Speak English "not at all"	67	0%	56
³⁺⁴ Speak English "less than well"	280	1%	120
²⁺³⁺⁴ Speak English "less than very well"	493	1%	128
Linguistically Isolated Households*			
Total	93	100%	65
Speak Spanish	75	80%	64
Speak Other Indo-European Languages	6	6%	12
Speak Asian-Pacific Island Languages	12	13%	19
Speak Other Languages	0	0%	12
Households by Household Income			
Household Income Base	13,084	100%	153
< \$15,000	2,272	17%	120
\$15,000 - \$25,000	2,041	16%	130
\$25,000 - \$50,000	3,688	28%	124
\$50,000 - \$75,000	2,493	19%	115
\$75,000 +	2,591	20%	97
Occupied Housing Units by Tenure			
Total	13,084	100%	153
Owner Occupied	5,839	45%	103
Renter Occupied	7,245	55%	142
Employed Population Age 16+ Years			
Total	27,360	100%	420
In Labor Force	17,425	64%	328
Civilian Unemployed in Labor Force	1,547	6%	111
Not In Labor Force	9,935	36%	198

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS)

*Households in which no one 14 and over speaks English "very well" or speaks English only.



Location: User-specified point center at 36.809275, -76.297310
 Ring (buffer): 2-miles radius
 Description: Main Stack Location

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	33,435	100%	579
English	31,598	95%	545
Spanish	1,044	3%	161
French	82	0%	85
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	38	0%	57
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	140	0%	103
Chinese	6	0%	49
Japanese	N/A	N/A	N/A
Korean	56	0%	52
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	12	0%	24
Other Asian	111	0%	90
Tagalog	139	0%	83
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	29	0%	55
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	179	1%	125
Total Non-English	1,836	5%	795

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
 N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017.
 *Population by Language Spoken at Home is available at the census tract summary level and up.



Location: User-specified point center at 36.809275, -76.297310

Ring (buffer): 5-miles radius

Description:

Summary of ACS Estimates		2013 - 2017
Population		232,114
Population Density (per sq. mile)		3,416
Minority Population		145,247
% Minority		63%
Households		87,723
Housing Units		97,255
Housing Units Built Before 1950		21,960
Per Capita Income		24,323
Land Area (sq. miles) (Source: SF1)		67.95
% Land Area		87%
Water Area (sq. miles) (Source: SF1)		10.10
% Water Area		13%

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	232,114	100%	733
Population Reporting One Race	224,170	97%	2,051
White	93,025	40%	556
Black	122,050	53%	749
American Indian	632	0%	70
Asian	4,672	2%	257
Pacific Islander	146	0%	61
Some Other Race	3,645	2%	358
Population Reporting Two or More Races	7,945	3%	291
Total Hispanic Population	11,653	5%	392
Total Non-Hispanic Population	220,462		
White Alone	86,868	37%	540
Black Alone	120,578	52%	749
American Indian Alone	602	0%	70
Non-Hispanic Asian Alone	4,544	2%	257
Pacific Islander Alone	136	0%	61
Other Race Alone	1,054	0%	358
Two or More Races Alone	6,680	3%	263
Population by Sex			
Male	111,112	48%	602
Female	121,003	52%	434
Population by Age			
Age 0-4	16,831	7%	192
Age 0-17	54,982	24%	350
Age 18+	177,132	76%	512
Age 65+	29,021	13%	201

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017.



Location: User-specified point center at 36.809275, -76.297310

Ring (buffer): 5-miles radius

Description:

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	150,045	100%	481
Less than 9th Grade	5,542	4%	95
9th - 12th Grade, No Diploma	15,723	10%	198
High School Graduate	42,585	28%	249
Some College, No Degree	51,505	34%	294
Associate Degree	12,355	8%	213
Bachelor's Degree or more	34,689	23%	357
Population Age 5+ Years by Ability to Speak English			
Total	215,283	100%	671
Speak only English	200,572	93%	592
Non-English at Home ¹⁺²⁺³⁺⁴	14,712	7%	379
¹ Speak English "very well"	10,505	5%	288
² Speak English "well"	2,308	1%	114
³ Speak English "not well"	1,456	1%	125
⁴ Speak English "not at all"	443	0%	218
³⁺⁴ Speak English "less than well"	1,899	1%	222
²⁺³⁺⁴ Speak English "less than very well"	4,207	2%	248
Linguistically Isolated Households*			
Total	959	100%	103
Speak Spanish	617	64%	102
Speak Other Indo-European Languages	146	15%	65
Speak Asian-Pacific Island Languages	189	20%	57
Speak Other Languages	7	1%	16
Households by Household Income			
Household Income Base	87,723	100%	224
< \$15,000	13,762	16%	209
\$15,000 - \$25,000	10,762	12%	183
\$25,000 - \$50,000	21,317	24%	180
\$50,000 - \$75,000	16,304	19%	169
\$75,000 +	25,578	29%	245
Occupied Housing Units by Tenure			
Total	87,723	100%	224
Owner Occupied	43,861	50%	212
Renter Occupied	43,863	50%	217
Employed Population Age 16+ Years			
Total	182,436	100%	673
In Labor Force	118,279	65%	515
Civilian Unemployed in Labor Force	9,199	5%	164
Not In Labor Force	64,157	35%	463

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of anyrace.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS)

*Households in which no one 14 and over speaks English "very well" or speaks English only.



Location: User-specified point center at 36.809275, -76.297310

Ring (buffer): 5-miles radius

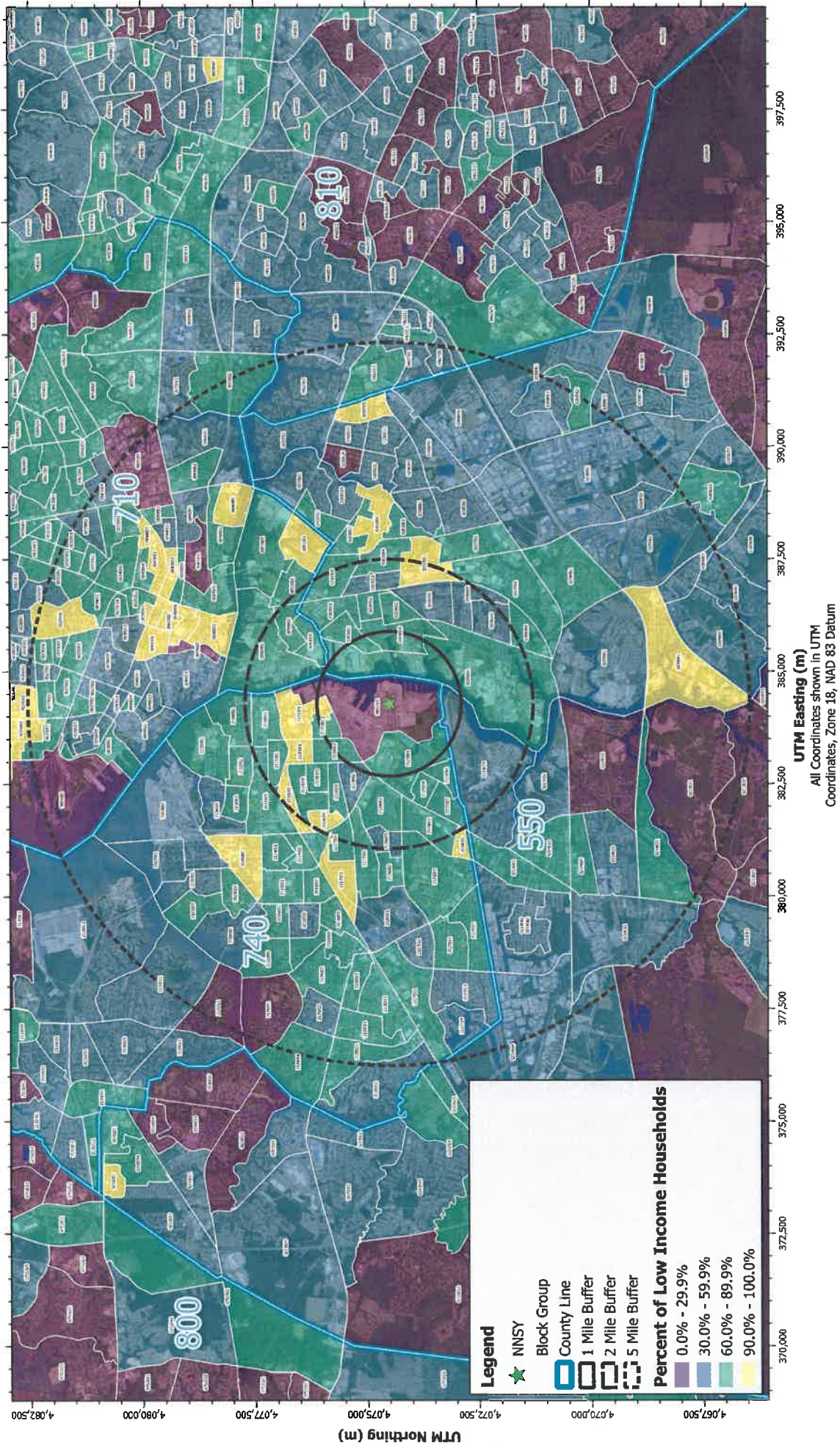
Description:

	2013 - 2017 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	216,058	100%	701
English	201,235	93%	728
Spanish	7,487	3%	388
French	718	0%	238
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	726	0%	143
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	971	0%	289
Chinese	409	0%	107
Japanese	N/A	N/A	N/A
Korean	205	0%	62
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	481	0%	128
Other Asian	525	0%	108
Tagalog	1,546	1%	183
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	285	0%	112
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	966	0%	207
Total Non-English	14,823	7%	1,011

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
 N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2013 - 2017.
 *Population by Language Spoken at Home is available at the census tract summary level and up.

APPENDIX B. LOW-INCOME DATA

Figure B-1 - Percent of Block Group Households Defined As Low Income
 Norfolk Naval Shipyard, Portsmouth, VA



Federal Poverty Level 2020

Source: U.S. Department of Health and Human Services, ASPE

The following figures are the 2020 HHS poverty guidelines which will be published in the Federal Register

2020 POVERTY GUIDELINES FOR THE 48 CONTIGUOUS STATES AND THE DISTRICT OF COLUMBIA

Search in table for:

PERSONS IN FAMILY/HOUSEHOLD	POVERTY GUIDELINE
1	\$12,760
2	\$17,240
3	\$21,720
4	\$26,200
5	\$30,680
6	\$35,160
7	\$39,640
8	\$44,120

For families/households with more than 8 persons, add \$4,460 for each additional person

Median Family Income, Portsmouth City

Source: U.S. Department of Housing and Urban Development, FY 2020 Income Limits Documentation System



FY 2020 MEDIAN FAMILY INCOME DOCUMENTATION SYSTEM

[HUD.gov](#) [HUD User Home](#) [Data Sets](#) [Fair Market Rents](#) [Section 8 Income Limits](#) [MSP Income Limits](#) [HUD LIHTC Database](#)

Median Family Income Calculation Methodology

Estimates of median family income for metropolitan and non-metropolitan areas are developed as follows:

All information presented here applies to the Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area which Portsmouth City is a part of.

1. A special tabulation of Median Family Income (MFI) estimates from the 2013-2017 5-year ACS was prepared by the U.S. Census Bureau and used by HUD as the basis for calculating HUD's FY2020 MFIs. Estimates of MFI from this tabulation are used if they are determined to be statistically reliable. For FY2020, the test for reliability is whether the margin of error for the estimate is less than 50% of the estimate itself and whether the ACS estimate is based on at least 100 survey cases.

Note: HUD began using the count indicator in assessing statistical reliability beginning with the FY 2020 Fair Market Rent estimates. HUD does not receive the exact number of survey cases in this special tabulation, but rather a categorical variable known as the count indicator, indicating a range of cases. An estimate based on at least 100 cases corresponds to a count indicator of 4 or higher.

If an area does not have a reliable 2013-2017 5-year estimate, HUD checks whether the area has had minimally reliable estimates in any of the past 3 years (a minimally reliable estimate is an estimate where the margin of error for the estimate is less than 50% of the estimate itself). If so, the FY2020 MFI is the average of the inflated ACS estimates. In order to use as much local data as possible, HUD averages the minimally reliable estimates from the last three 5-year ACS estimates.

If an area has not had a minimally reliable estimate in the past 3 years, HUD checks whether the area has had minimally reliable estimates in any of the past 2 years. If so, the FY2020 MFI is the average of the inflated ACS estimates. In order to use as much local data as possible, HUD averages the minimally reliable estimates from the last two 5-year ACS estimates.

If an area has not had a minimally reliable estimate in the past two years, the estimate from the next larger encompassing geography is used. For example, sub-areas of metropolitan areas would be assigned the MFI estimate of the entire metropolitan area and for non-metropolitan counties, the estimate from all non-metropolitan portions of the State (state non-metropolitan).

2. If there is a statistically reliable 2017 1-year ACS estimate of median family income available, HUD replaces the 5-year data with the 1-year data. For FY2020, the special tabulation of 2017 1-year ACS MFI estimates provided to HUD by the U.S. Census Bureau for the Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area was statistically reliable.
3. Once the appropriate 2017 ACS data has been selected, an inflation factor based on the CBO projection of the national CPI for FY2020 is calculated to inflate the estimate from 2017 to April, 2020 (or mid FY2020). Note: The CPI projection used in this calculation is from the CBO's January 2020 release of its [10-Year Economic Projections](#).

MFI Step by Step Calculation

1. The following are the 2017 American Community Survey 5-year median income estimate, margin of error, and sample size category for Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area:

Area	ACS ₂₀₁₇ 5-Year Median Income	ACS ₂₀₁₇ 5-Year Margin of Error	Ratio	Sample Size Category	Result
Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area	\$74,673	\$728	$\frac{\$728}{\$74,673}$ = 0.01	6	0.01 >= .5 and 6.0 >= 4 Reliable Estimate

2. Since there is a 1-year 2017 ACS estimate available, the margin of error of the estimate and the sample size category are checked for reliability:

Area	ACS ₂₀₁₇ 1-Year Median Income	ACS ₂₀₁₇ 1-Year Margin of Error	Ratio	Sample Size Category	Result
Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area	\$77,729	\$1,653	$\frac{\$1,653}{\$77,729}$ = 0.021	6	0.021 <= .5 and 6.0 >= 4 Use ACS₂₀₁₇ 1- Year Median Income

3. The calculation of the CPI Inflation Factor is as follows:

Area	FY2020 CPI	2017 Annual CPI	CPI Inflation Factor
Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area	260.3	245.12	$(260.3 / 245.12)$ = 1.06193

4. The FY 2020 median family income is estimated as follows:

Area	ACS ₂₀₁₇ 1-Year Estimate	CPI Inflation Factor	FY 2020 Area MFI Estimate
Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area	\$77,729	1.06193	$(\$77,729 * 1.06193)$ = \$82,543

5. In keeping with HUD policy, the median family income estimate is rounded to the nearest \$100:

Area	Unrounded FY 2020 MFI Estimate	Rounded FY 2020 MFI Estimate
Virginia Beach-Norfolk-Newport News, VA-NC HUD Metro FMR Area	\$82,543	\$82,500

NOTE: Due to differences in the computing platforms used to generate the official FY 2020 MFI estimates, and this web system, the calculated value shown may differ slightly from the official published value because of rounding.

U.S. Navy Norfolk Naval Shipyard
Registration Number: 60326
Prevention of Significant Deterioration Draft Permit: Response to Public Comments

General Comments

- 1) Several commenters stated that they were concerned that the project will be detrimental to the peace and health of the community as well as the natural beauty of the land.

The Combined Heat and Power (CHP) plant will not materially change the local landscape as it will be constructed on an existing industrial site located on shipyard property. Site suitability and an assessment of potential health impacts are evaluated and discussed in more detail in later responses to comments.

- 2) There has been no clear identification of fuel source in terms of the supply pipeline; the draft permit does not address construction of a lateral pipeline bringing fuel from a main pipeline to the project location--these additional ecological harms require attention in the draft permit, or the environmental impacts are improperly segmented and harm appears to be falsely diminished.

This permit governs the air emissions associated with the CHP plant. The construction of the fuel source pipeline will be governed by the applicable state and federal regulations and not be regulated through this permit. The Environmental Conservation Measures from which this project evolved was analyzed in an Environmental Assessment (EA) which is posted at <https://www.navsea.navy.mil/Home/Shipyards/Norfolk/ESPC/>. The EA discusses the need for other projects including the supply pipeline. The pipeline will go through a separate regulatory process.

- 3) The evaluation of this project should include consideration of risks of fire, explosion, gas leak, diesel spill, etc. There is discussion in project documents of storage of fuel on site, which creates vulnerability in the face of terrorist attacks, of great concern given the flammable and explosive nature of surrounding infrastructure, and the importance of this Navy facility in global supply chains.

The air permitting regulations do not require risk assessments of the sort proposed by the commenters and nothing indicates that such an unprecedented step is warranted here. Other risks are covered by comprehensive state and federal regulations, as well as Navy procedures and protocols. The plant is designed and constructed in accordance with Navy building codes and will be on a secured Military installation. Norfolk Naval Shipyard (NNSY) will comply with all applicable regulations to promote safe operation of the CHP plant and related facilities.

- 4) Several commenters asked for clarification of the relationship between the CHP plant and the Wheelabrator waste-to-energy facility in Portsmouth.

NNSY currently purchases steam from a neighboring plant burning refuse-derived fuel (RDF). This facility is known as the Wheelabrator waste-to-energy facility, which NNSY neither owns

nor operates. NNSY also purchases additional electricity from the power grid. With the addition of the proposed facility, NNSY will no longer purchase steam from Wheelabrator and significantly decrease our purchase of electricity from outside sources. The steam (from RDF combustion) will be replaced by natural gas combustion at the proposed CHP plant. The electricity (from commercial power plants) will be offset by natural gas combustion at the proposed CHP plant.

- 5) Several comments relate to concerns about the leadership of the NNSY being in flux, a lack of attention to detail by the Navy, and a lack of trust between the communities near NNSY and those in command of the facility.

The recent change in NNSY's leadership has no impact on either this project or the Navy's long term energy goals. The construction of the CHP plant supports the Navy's long-term vision to proactively transition to cleaner energy sources and decrease our environmental footprint. Many Navy organizations have been involved in the development of Environmental Conservation Measures which gave rise to this project, including Navy Facilities Engineering Command and Naval Sea Systems Command.

- 6) Some comments suggested the need to reduce NOx emissions from power plants to protect the health of the Chesapeake Bay.

The draft permit complies with air quality laws and regulations designed to ensure protection of human health and the environment. The draft permit requires dry low NOx combustion control technology (SoLoNOx system for the combustion turbine and low NOx burners for the HRSG) and Selective Catalytic Reduction ("SCR") to significantly control NOx emissions.

Moreover, when setting the Chesapeake Bay Total Maximum Daily Load for nitrogen deposition, a review of air pollution sources was conducted. That review concluded that additional specific requirements for individual sources of air pollutants are unnecessary because Clean Air Act requirements will significantly decrease air deposition of nitrogen by 2020 and beyond¹. The draft permit includes measures to address NOx emissions, consistent with these programs. Virginia has achieved substantial reductions of NOx air emissions in recent years and this trend is expected to continue irrespective of this permit.

- 7) Several commenters stated that NNSY already is a Superfund site and is surrounded by non-Federal Superfund Sites.

While not directly related to the air permitting process, the Navy (NNSY) does have sites associated with CERCLA (or the Superfund Program) within its fence line and associated annexes. The Navy has and will continue to follow the clean-up protocol agreed to in the Federal Facility's Agreement which are in accordance with CERCLA cleanup standards. To this end, the Navy has dedicated significant time and funds to the cleanup of these sites (in partnership with the EPA and DEQ) and remains committed to minimize our environmental footprint at all our installations and surrounding sites.

¹ DEQ Response to Public Comments at 25-26, Atlantic Coast Pipeline Buckingham Compressor Station, Reg. No. 21599, Art. 6 Draft Permit (Oct. 24, 2018).

Environmental Justice

1) General Environmental Justice Comments

Several commenters have suggested that DEQ must complete an environmental justice assessment before the permit is approved.

The Navy agrees that an environmental justice assessment must be conducted as part of the consideration of its air permit. DEQ has conducted a proper assessment. With these responses to comments, the Navy submits additional information validating DEQ's analysis.² The Navy also commissioned two reports. The first verifies DEQ's finding that environmental justice communities are present near the CHP plant.³ The second is a Public Health Assessment prepared by an independent consulting firm, Green Toxicology, LLC, which demonstrates that public health in neighborhoods near the Shipyard is not currently being compromised by the quality of outdoor air; and if the proposed facility were to be built and operating, outdoor air would remain safe.⁴

2) General Health Impacts

Commenters express concern that the project will negatively impact local residents with pre-existing respiratory conditions due to prior mercury, asbestos, and lead poisoning exposures, as well as exposure to other pollutants. They argue that additional exposures would render the health-compromised community further susceptible to COVID-19.

Environmental exposures to mercury and/or lead are not known to harm respiratory health; and the CHP plant will not emit asbestos. Impacts to ambient air from the proposed CHP plant would also not increase neighbors' susceptibility to COVID-19.

The air modeling and Public Health Assessment demonstrate that the incremental impacts to ambient air from the proposed CHP plant atmospheric emissions (including emissions of mercury and lead) will be well within health-based standards and guidelines that have been established, by law, with adequate margins of safety for potentially vulnerable populations. *See Public Health Assessment.; see also infra Responses 3-4.*

3) Health Impacts from Criteria Pollutants

Some commenters contend that vulnerable communities will be impacted by air pollution from the CHP plant, specifically PM₁₀ and PM_{2.5}, SO₂, NO_x, CO, and VOC (as an ozone precursor).

For the CHP plant air permit, potential adverse impacts from emissions of PM₁₀ and PM_{2.5}, and NO_x and VOC (as ozone precursors) have been evaluated in detail. In addition, potential adverse impacts from these and other pollutants, plus SO₂, and CO, have been analyzed and are

² See responses below.

³ Trinity Consultants, *Identification of Environmental Justice Communities* (attached as Ex.1).

⁴ ("Public Health Assessment") (attached as Ex. 2).

presented in the attached Public Health Assessment. These analyses demonstrate that no adverse health impacts are expected from any CHP plant-related pollutants; and that the quality of both current and predicted future ambient air in neighborhoods surrounding the Shipyard is good.

The Navy conducted analyses, including air dispersion modeling, of ambient concentrations based on emissions from the CHP plant, including background concentrations. DEQ has reviewed, replicated, and approved this modeling. The results were compared to the National Ambient Air Quality Standards (“NAAQS”), which are highly protective, health-based standards.⁵ NAAQS themselves are based in part on quantitative risk assessments. The NAAQS are based on conservative interpretations of epidemiological studies that associate measures of ambient air pollution with incidence of morbidity and/or mortality. Each individual NAAQS undergoes thorough, scientific, peer-review and public comment prior to its being promulgated. The standards are based only on protection of public health, without regard to cost; and they explicitly factor in vulnerabilities associated with sensitive sub-populations, including environmental justice communities. For this permit, the modeling demonstrates that the CHP plant will not adversely affect air quality in any surrounding community, including environmental justice communities.

As discussed below, NAAQS (and Virginia’s Significant Ambient Air Concentrations (SAACs), with regard to potentially hazardous air pollutants) are the appropriate vehicles to assess the potential impacts of air emissions. Compliance with the NAAQS has traditionally been the tool used to evaluate the potential for health impacts from concentrations of criteria pollutants in the ambient air, specifically including potential impacts on sensitive environmental justice populations in state and federal regulatory proceedings and related appeals. As health-based standards, NAAQS have been expressly accepted for this purpose in Virginia policy.⁶

- a) The Fundamental Purpose of NAAQS is Protection of Human Health and the Environment

NAAQS are health-based standards that are designed to protect sensitive populations at the local level and only after a comprehensive, science-driven process that includes substantial peer review and public participation. EPA sets NAAQS after extensive review of the latest scientific studies, including studies of the most sensitive populations such as people with asthma or

⁵ Many commenters have cited the United States Court of Appeals for the Fourth Circuit’s decision in *Friends of Buckingham v State Air Pollution Control Bd.*, 947 F.3d 68 (4th Cir. 2020) as support for their comments. But the commenters are reading too much into the decision. The core holding of the case was that the Board had failed to adequately explain the basis for its decision; the Court did not prescribe a precise methodology that must be followed when conducting an environmental justice analysis, including analysis of potential health impacts. For example, while the *Friends of Buckingham* decision appeared to criticize the Board for “falling back on the NAAQS” in the evaluation of potential health impacts, the Board had not made any written findings explaining why it was relying on the NAAQS and why the NAAQS are persuasive in the context of public health. *See* 947 F.3d at 90. Thus, the Court had no record on which to determine whether reliance on the NAAQS was arbitrary and capricious. Here, the Board should make specific findings that the NAAQS and SAACs are protective of public health, including the health of vulnerable populations such as asthmatics, with an explanation as to why reliance on the NAAQS and SAACs is appropriate, and may cite to the Public Health Assessment (Ex, 2) to substantiate such findings.

⁶ *See* 2018 Virginia Energy Plan at 58 (directing DEQ to continue to use health-based standards in permitting), available at <https://www.governor.virginia.gov/media/governorvirginiagov/secretary-of-commerce-and-trade/2018-Virginia-Energy-Plan.pdf> (last accessed October 16, 2020).

coronary artery disease.

The Clean Air Act requires EPA to set NAAQS with an “adequate margin of safety.”⁷ While NAAQS are national standards, they are applied on the local level to protect everyone. This is illustrated by EPA eliminating the option of using spatial averaging to assess compliance with the PM_{2.5} NAAQS when it recognized the averaging technique obscured locally higher concentrations in areas with larger populations of minorities or with lower socioeconomic status.⁸

EPA establishes the primary NAAQS to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly, wherever they may reside.⁹ Congress “emphasize[d] that among those persons whose health should be protected by the ambient standard are particularly sensitive citizens such as bronchial asthmatics and emphysematics who in the normal course of daily activity are exposed to the ambient environment.”¹⁰ The standard is to be set at “... the maximum permissible ambient air level...which will protect the health of any [sensitive] group of the population,” and that for this purpose “reference should be made to a representative sample of persons comprising the sensitive group rather than to a single person in such a group.”¹¹

NAAQS are based on the best available science. The Clean Air Act directs EPA to set NAAQS based on criteria that “accurately reflect the latest scientific knowledge.”¹² The primary NAAQS must be set “at a level that avoids unacceptable risks to public health, including the health of at-risk populations.”¹³ The standards take into consideration that risks from exposure to a pollutant may be influenced by intrinsic factors such as pre-existing disease, genetic factors, life stage, or extrinsic factors such as sociodemographic status, which may be present alone or in combination. For instance, subsets of the population may be at increased risk due to socioeconomic status and also have a pre-existing condition. EPA sets NAAQS to be protective explicitly and specifically for these sub-populations.

⁷ 42 U.S.C. §§ 7408(a); 7409(b).

⁸ 78 Fed. Reg. 3086, 3126-27 (Jan. 15, 2013).

⁹ See *id.* § 7409(d), § 7408.

¹⁰ S. Rep. No. 91:1196 at 10, reprinted in 1 S. Comm. on Pub. Works, 93d Cong., *A Legislative History of the Clean Air Act Amendments of 1970*, at 410 (1974).

¹¹ *Id.*

¹² 42 U.S.C. §§ 7408(a)(2), 7409(b)(1)-(2).

¹³ Health and Env'tl. Impacts Div., Office of Air Quality Planning and Standards, EPA, EPA-452/R-16-005, *Integrated Review Plan for the National Ambient Air Quality Standards for Particulate Matter 6-1 to 6-2* (2016), available at <https://www.epa.gov/naaqs/particulate-matter-pm-standards-planning-documents-current-review> (“IRP”). For example, when reducing the level of the annual PM_{2.5} NAAQS from 15 µg/m³ to 12 µg/m³ in 2013, EPA was “mindful” that the Act required the standard be set “at a level that reduces risk sufficiently so as to protect public health, including the health of at-risk populations, with an adequate margin of safety.” 78 Fed. Reg. 3086, 3161 (Jan. 15, 2013). EPA rejected 13 µg/m³ because it “would not appropriately take into account the more limited evidence of effects in some at-risk populations (e.g., low birth weight).” *Id.* at 3162. EPA decision was based in part on quantitative health risk and exposure assessments. IRP at 4-1 to 4-5. EPA recently proposed to retain the current PM_{2.5} NAAQS after reviewing thousands of studies, identifying populations at increased risk of pollution-related health effects, and considering analyses by agency experts and input from the Clean Air Act Scientific Advisory Committee. <https://www.epa.gov/pm-pollution/national-ambient-air-quality-standards-naaqs-pm>.

b) NAAQS Are Widely Accepted for Environmental Justice

The 2018 Energy Plan directs DEQ to apply health-based standards, such as NAAQS, when evaluating environmental justice: “DEQ’s existing obligations to ensure that all regulated entities comply with health-based standards will continue in all permitting activities to reduce public health burdens on all populations.”¹⁴ Thus, it is the policy of Virginia to use the health-based NAAQS to ensure that environmental justice communities do not bear disproportionate health burdens from energy facilities.

The use of NAAQS for this purpose is consistent with EPA’s long-term policy. EPA and the Environmental Appeals Board (“EAB”), in its role of adjudicating permit appeals, have long accepted that compliance with NAAQS demonstrates no negative impacts on environmental justice communities. The EAB has found that NAAQS are “the most reliable source of scientific information on which to base decisions” because of the “rigor of review” in setting them.¹⁵

The EAB recognizes that it is inherently reasonable and appropriate to use NAAQS to determine whether environmental justice communities are protected. The following are examples where EAB has upheld agencies’ use of NAAQS for that purpose:

- *In re Pio Pico Energy Ctr.*, 16 E.A.D. 56 (EAB 2013) (“NAAQS are standards designed to protect public health, including the health of ‘sensitive’ populations such as asthmatics, children, and the elderly, with an adequate margin of safety, and to protect public welfare, including protection against visibility impairment and damage to animals, crops, vegetation, and buildings. Because NAAQS are health-based standards, the Agency often uses compliance with the NAAQS in the context of environmental justice as an indicator that Agency action will not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations residing near a proposed facility.”) (citing *In re Avenal Power*, 15 E.A.D. 384, 399 (EAB 2011); *In re Shell Offshore*, 13 E.A.D. at 404-05 (EAB 2007); *In re Knauf Fiber Glass, GmbH*, 9 E.A.D. 1, 16-17 (EAB 2000); *In re Ash Grove Cement Co.*, 7 E.A.D. 387, 417-18 (EAB 1997)).
- *In re Sutter Power Plant*, 8 E.A.D. 680, 692 (EAB 1999) (describing NAAQS as the “bellwether of health protection”).
- *In re Energy Answers Arecibo, LLC*, 16 E.A.D. 294, 326 (EAB 2014) (NAAQS are appropriate to use in environmental justice analysis because they “are designed to protect public health with an adequate margin of safety, including sensitive populations such as children, the elderly, and asthmatics.”).
- *In re Shell Gulf of Mex. Inc.*, 15 E.A.D. at 156 (“In the context of an environmental justice analysis, compliance with the NAAQS is emblematic of achieving a level of public health protection that, based on the level of protection afforded by a primary NAAQS, demonstrates that minority or low-income populations will not experience

¹⁴ 2018 Energy Plan at 58.

¹⁵ *In re Shell Gulf of Mex. Inc.*, 15 E.A.D. 103, 156 (EAB 2010) (citing 75 Fed. Reg. 6474, 6478 (Feb. 9, 2010)).

disproportionately high and adverse human health or environmental effects due to exposure to relevant criteria pollutants.”).

Courts have also upheld use of the NAAQS as reasonable when evaluating environmental justice impacts.¹⁶

c) Concentrations are Well Below NAAQS

The air analysis shows that the CHP plant will not cause or contribute to an exceedance of the PM₁₀, PM_{2.5}, or the ozone NAAQS anywhere. Since NAAQS are set to protect even the most sensitive populations with an adequate margin of safety, modeled concentrations below the NAAQS further support that environmental justice communities are protected.¹⁷

For criteria pollutants, EPA and DEQ have adopted screening levels that are considered to be *de minimis*, known as Significant Impact Levels (“SILs”).¹⁸ If modeling demonstrates that a source will contribute less than the SIL, emissions from the source are deemed to have *de minimis* impacts. Accordingly, SILs have been used to show no adverse impact on an Environmental Justice community.¹⁹ As shown in the table below, the highest offsite modeled concentrations for both PM₁₀ and PM_{2.5} are well below the SILs.

Pollutant	Averaging Period	Modeled Concentration (µg/m ³)	SIL (µg/m ³)
PM ₁₀	24-Hour	1.13	5
	Annual	0.12	1
PM _{2.5}	24-Hour	1.00	1.2
	Annual	0.11	0.2 ²⁰

Moreover, the CHP plant’s PM_{2.5} emissions may not even be detectable offsite. EPA determined that an annual PM_{2.5} concentration of 0.2 µg/m³ and a 24-hour concentration of 1.5 µg/m³ are “indistinguishable from the inherent variability in the measured atmosphere and may be observed even in the absence of the increased emissions from a new or modified source.”²¹ The modeled

¹⁶ See, e.g., *Coalition for Healthy Ports v. U.S. Coast Guard*, 2015 WL 7460018, *25 n.33 (S.D.N.Y. Nov. 24, 2015).

¹⁷ See *In re Energy Answers Arecibo, LLC*, 16 E.A.D. at 329 (agreeing that where modeled concentrations are far below the NAAQS, emissions do not pose a disproportionate or adverse impact); *In re Ecoelectrica, L.P.*, 7 E.A.D. 56, 68-69 (EAB 1997) (same).

¹⁸ 40 C.F.R. §51.165(b)(2); 9 VAC 5-80-1715.B.1.

¹⁹ See, e.g., *In re Prairie State Generating Co.*, 13 E.A.D. 1, 124 (EAB 2006); *In re AES Puerto Rico*, 8 E.A.D. 324, 350-51 (EAB 1999); *In re Heritage Power LLC*, 2000 WL 34440871 (N.Y. State Bd. Elec. Generation Siting and Env't. 2000).

²⁰ The annual PM_{2.5} SIL promulgated in 9 VAC 5-80-1715 is 0.3 µg/m³. In 2018, EPA recommended decreasing it to 0.2 µg/m³, which is the SIL used in this discussion. Memorandum from Peter Tsirigotis, Dir., Office of Air Quality Planning & Standards, EPA, to Regional Air Div. Dirs., Regions 1-10, Attachment at 10-11 (Apr. 17, 2018) (“Tsirigotis Memo”) available at https://www.epa.gov/sites/production/files/2018-04/documents/sils_policy_guidance_document_final_signed_4-17-18.pdf. EPA also recommended a SIL for the 8-hour ozone NAAQS of 1 ppb. *Id.* As shown in the modeling report, ozone formation resulting from the CHP is expected to be well below the SIL at 0.178 ppb.

²¹ Tsirigotis Memo at 11.

impacts from the CHP plant are below those levels.

Although the PM_{2.5} maximum modeled concentrations are below the SIL, the Navy evaluated the potential cumulative impact on the community with the addition of the CHP plant. As shown in the table below, the total concentrations are well below the NAAQS, including the most recent alternative standard levels considered by EPA (8-10 µg/m³ for the annual standard and 30 µg/m³ for 24-hour standard).²²

Pollutant	Averaging Period	Facility Impact (µg/m ³) ²³	Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	NAAQS (µg/m ³)	% of NAAQS (%)
PM _{2.5}	24-Hour	0.71	13.00	13.71	35	39%
	Annual	0.11	6.70	6.81	12	57%

In short, the Navy used national standards that regulatory agencies employ specifically to assess and protect against potential health impacts in all populations, including sensitive populations. These analyses, which DEQ has approved, demonstrate that no environmental justice community bears a disproportionate share of any environmental impacts from emissions from the CHP plant. More broadly, relying on the NAAQS, the underlying toxicological evidence, and the Virginia SAACs, the Public Health Assessment corroborates this finding.

4) Health Impacts from Toxic Air Pollutants

Some commenters contend that a more extensive assessment is needed to ensure that vulnerable communities are not harmed by toxic air pollutants, specifically mentioning formaldehyde, nickel, and phosphorous.

Although the CHP plant is exempt from Virginia’s “state toxics rule”²⁴ because it is subject to various National Emission Standards for Hazardous Air Pollutants NESHAPs,²⁵ the Navy commissioned modeling of the formaldehyde, nickel, and phosphorous (and, in the Public Health Assessment, all other potentially toxic air pollutants). Absent the NESHAPs exemption, those three toxics would have exceeded the emission exemption rates and been subject to the state toxics rule. The results of this modeling are presented below in relation to the state air toxics rule, and they demonstrate that commenters’ concerns about toxic emissions are misplaced.²⁶ The results demonstrate that the CHP plant’s emissions of formaldehyde, nickel, and phosphorous will not threaten the health of any surrounding community, including the

²² EPA-452/R-20-002, “Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter” (January 2020).

²³ Facility impact includes the modeled concentration plus the potential secondary emissions (NOx and SO₂) impacts.

²⁴ 9 VAC 5-60-300, et seq.

²⁵ Per 9 VAC 5-60-300.C.4, sources subject to federal CAA §112 standards are exempt from the state toxics rule. For example, the three boilers are subject to 40 C.F.R. Part 63, Subpart DDDD.

²⁶ The results for the annual averaging period are for the worst-case year over the 5 year modeled period, consistent with VDEQ Requirements for toxics analyses conducted in comparison to the SAAC. As shown in the Public Health Assessment prepared by Green Toxicology, LLC, annual impacts from a public health perspective will likely be lower as they are based on long-term average annual concentrations to simulate lifetime exposures.

environmental justice community. The concentrations associated with the CHP plant for all three are *hundreds* of times below the state’s health-based standards.

The state toxics rule includes both emission exemption rates (i.e., thresholds below which no additional analysis is necessary) and SAACs. The exemption rates and SAACs are based on published Threshold Limit Values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH) to protect the health of working men and women. The TLVs are based solely on health factors without considering economic or technical feasibility.²⁷ They represent an exposure level that “does not create an unreasonable risk of disease or injury.”²⁸ Moreover, DEQ designs its SAACs to be a fraction of the health-based TLVs, in order to protect public health with an ample margin of safety.

Pollutant	Avg. Period	Model Impact (ug/m3)	SAAC (ug/m3)	% of SAAC (%)
Formaldehyde	1-Hour	4.65E-02	62.5	0.07%
	Annual	2.05E-03	2.4	0.09%
Phosphorous	1-Hour	6.18E-03	5	0.12%
	Annual	2.17E-04	0.2	0.11%
Nickel	1-Hour	5.56E-02	50	0.11%
	Annual	1.96E-03	2	0.10%

The modeling also shows that offsite concentrations are well below any risk-based concentrations (“RBCs”), which are widely accepted standards set to protect sensitive populations and to provide margins of safety to account for uncertainty.²⁹

The Public Health Assessment confirms these conclusions, and analyzed all relevant air toxics.³⁰

²⁷ <https://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations/overview>

²⁸ *Id.*

²⁹ The formaldehyde inhalation cancer RBC of 0.22 µg/m³ corresponds to an excess lifetime cancer risk of 1 x 10⁻⁶; the inhalation non-cancer chronic RBC for formaldehyde of 10 µg/m³ corresponds to a hazard quotient of 1. EPA, *Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites* (May 2020); available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>. The formaldehyde inhalation acute REL of 55 µg/m³ and chronic REL of 9 µg/m³ correspond to a hazard quotient of 1; the nickel and nickel compound (excluding nickel oxides) inhalation acute REL of 0.2 µg/m³ and chronic REL of 0.014 µg/m³ correspond to a hazard quotient of 1. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (“OEHHA”), *Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary* (2019); available at: <https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary>.

³⁰ The modeling results presented in the Public Health Assessment (Ex. 2) are slightly different than those shown in this comment response. This is an acceptable difference because the goals of the two analyses vary. The modeling for the permit application and thus the corrected calculations, were conducted as a standard state air toxics analysis, where DEQ expects the maximum annual impact. In the Public Health Assessment the modeling was conducted as a health risk assessment, where guidelines require the use of the average annual impact. For example with regards to the differences in the modeling numbers, the annual SAAC for formaldehyde is 2.4 micrograms per cubic meter. We calculate a **maximum** annual impact of 0.06% of that SAAC. The public health assessment uses a

Taken together, the available air quality data, models, and comparisons with health-based guidelines (and underlying toxicological evidence) indicate that public health in neighborhoods near the Shipyard is not currently being compromised by the quality of outdoor air; and if the proposed facility were to be built and operating, outdoor air would remain safe.³¹

Thus, no group, including the environmental justice community, should suffer any appreciable health risks from air toxic emissions from this plant.

5) Risk Assessment

Commenters request a “comprehensive” risk assessment of potential health and safety impacts before the permit is issued, including risks of fires, explosions, gas leaks, and spills.

The air permitting regulations do not require risk assessments of the sort that are proposed by commenters, and nothing indicates that such an unprecedented step is warranted here. The CHP plant’s air emissions are addressed above. The other risks are covered by comprehensive state and federal regulations, as well as Navy procedures and protocols. The plant is designed and constructed in accordance with Navy building codes and will be on a secured Military site with 24 hour on-site security and fire departments.

NNSY will comply with all applicable regulations to promote safe operation of the CHP plant and related facilities.

The request for a comprehensive risk assessment addressing potential non-air impacts from the CHP plant is beyond the scope of the air permitting proceeding. Such impacts were considered in the Navy’s Environmental Assessment for the project, which included but was not limited to potential impacts from the CHP plant.³² Among other things, the Environmental Assessment demonstrated:

- No significant short-term, long-term, direct or indirect impacts to water resources from the CHP Plant and Industrial Wastewater Treatment Plant construction or operational activities.
- No significant short- or long-term impacts anticipated from hazardous materials and waste. The handling of hazardous materials and wastes would continue to be conducted in accordance with Federal & State regulations & NNSY’s standard operating procedures & permit VA1170024813.

health risk approach which is based on an **average** annual concentration (the average over the 5 year modeling period). When doing that, you get a slightly lower impact (0.04% of the SAAC).

³¹ Public Health Assessment, Ex. 2, page 8.

³² See Environmental Assessment for Implementation of Energy Conservation Measures at Norfolk Naval Shipyard, Portsmouth, Virginia (“Environmental Assessment”), September 2019, attached as Ex. 3.

- No significant direct or indirect impacts to biological resources.³³

Moreover, requiring a risk assessment as commenters request for this permit would establish a precedent for DEQ and for the Board that could have broad and unintended consequences in future permitting proceedings. The Board issues air permits pursuant to regulations authorized by Va. Code § 10.1-1308, which grants the Board “the power to promulgate regulations, including emergency regulations, abating, controlling and prohibiting *air pollution* throughout or in any part of the Commonwealth.” Va. Code § 10.1-1308.A (emphasis added). Even if requiring some form of risk assessment could be justified in extraordinary circumstances, those circumstances do not exist here. Commenters have not submitted sufficient information for DEQ or the Board to justify departing from their statutory focus on impacts from air emissions, especially given the broader analyses already conducted in the Environmental Assessment under the National Environmental Policy Act.

6) Hot Spot Analysis

Commenters suggest that a “hot spot” assessment is necessary because of potential cumulative exposure risks from air toxics.

As with risk assessments, the regulations do not provide for “hot spot” analyses, and in any event, CHP plant’s level of impacts does not warrant such an analysis here. As demonstrated by the air modeling results discussed above for air toxics, and the Public Health Assessment, the environmental justice communities at issue are not in fact “hot spots.”³⁴ Likewise, the 276-page Environmental Assessment found nothing that would warrant a hot spot analysis.³⁵

With development of the CHP plant, the Navy and the NNSY are moving to a cleaner, more efficient source of steam (away from reliance on the nearby Wheelabrator facility that commenters have criticized). The Navy will also be reducing its reliance on outside sources of electricity via use of a combined heat and power plant. These represent benefits to the communities surrounding NNSY rather than burdens. Among other benefits, EPA describes the environmental benefits of combined heat and power systems as follows:

CHP systems offer considerable environmental benefits when compared with purchased electricity and thermal energy produced on site. By capturing and utilizing heat that would otherwise be wasted from the production of electricity, CHP systems require less fuel to produce the same amount of energy. Because less fuel is combusted, greenhouse gas emissions, such as carbon dioxide (CO₂), as well as other air pollutants like nitrogen oxides (NO_x) and sulfur dioxide (SO₂), are reduced.³⁶

³³ [Environmental Assessment](#) at ES 3-4. While some commenters criticize certain aspects of the Environmental Assessment and while the Environmental Assessment was not conducted by DEQ for this air permit, it does provide additional support for the conclusion that commenters’ concerns are unfounded.

³⁴ See *supra* Response 4.

³⁵ See *supra* n.28.

³⁶ <https://www.epa.gov/chp/chp-benefits> (last accessed Oct. 16, 2020).

7) **Mitigation Strategies**

Some commenters have suggested that DEQ has not considered mitigation efforts to reduce negative environmental effects on the surrounding communities. Particularly, commenters note that the addition of the new power plant would compound existing emissions pollution from the Wheelabrator plant. While commenters concede that current emission levels are “acceptable,” they advocate for prophylactic mitigating measures as a condition for permit approval.

“Mitigation” is not a requirement under the air regulations, but the draft air permit in fact lessens burdens associated with the CHP plant, NNSY, and local industrial activity. The emissions limits in the draft permit are as stringent as for any similar source, and commenters have identified no lower limits for similar sources anywhere. The draft permit requires advanced pollution controls meeting Best Available Control Technology (“BACT”). The controls that the Navy has agreed to install include selective catalytic reduction (“SCR”) and an oxidation catalyst system.

SCR and the oxidation catalyst will greatly reduce emissions of NO_x, CO, and VOC (including VOC HAP such as formaldehyde), further reducing the impacts on the local community as shown by the air dispersion modeling.

As noted above, the CHP plant is part of a larger project to make NNSY more energy resilient, while producing cleaner and more fuel-efficient steam and electricity. NNSY must get its steam and electric power from some energy source or sources. With the CHP plant, the Navy is choosing a source of steam that is cleaner and more fuel efficient than its current source of steam, Wheelabrator. In addition, the CHP plant reduces NNSY’s reliance on outside sources of electricity. Thus, NNSY will be a more efficient consumer of energy after the project, because CHP plant requires less fuel to produce a given energy output and avoids transmission and distribution losses that occur when electricity travels over power lines. These represent environmental benefits to the surrounding communities rather than burdens.

The CHP plant is also part of a plan that includes replacing the Navy’s existing, 40-year old, Industrial Wastewater Treatment Plant, adding battery energy storage, and implementing a microgrid. Those parts of the project are beyond the scope of this air permit, but they are benefits to the local community through improved reliability and efficiency at the shipyard, and enhanced worker safety.

8) **Disproportionate Impacts**

A few commenters have suggested that DEQ has not extensively considered the disproportionate impacts that the proposed combined plant, sited near the existing Wheelabrator facility would exert on surrounding communities. Commenters have noted that the surrounding communities, with its significant minority population burdened by adverse health outcomes, would bear a greater environmental burden than other communities.

Environmental justice communities exist in the vicinity of the CHP plant, but no environmental justice community—indeed, no community—would bear a disproportionate share of any

negative environmental consequences from the CHP plant. Their ambient air is, and would remain, safe.

As shown above, the air modeling analyses demonstrate that any air-related impacts are far below regulatory, health-based thresholds at the nearest sensitive receptors. By law, those standards must be set at levels providing adequate margins of safety for vulnerable populations such as asthmatics. Further, there is no evidence that the CHP plant will impose other environmental burdens (e.g., water, cultural, visual, biological, or hazardous materials and waste) on environmental justice communities, and the Environmental Assessment provides additional confirmation that such burdens will not exacerbate existing conditions. By minimizing and mitigating the impacts of the CHP plant, the draft air permit avoids imposing any disproportionate burdens on the environmental justice communities.

With no appreciable adverse impacts on anyone, the “fair treatment” requirement of the Virginia Environmental Justice Act is satisfied because “no group of people bears a disproportionate share of any negative environmental consequence.”

9) Site Suitability

DEQ failed to explain how the project meets the siting criteria of Va. Code § 10.1-1307.E., particularly in light of existing health impacts, environmental injustices and social stressors.

Virginia Code § 10.1-1307.E requires the Air Board to consider: (1) the character and degree of injury to, or interference with, safety, health or reasonable use of property; (2) the social and economic value to the activity involved; (3) the suitability of the activity to the area in which it is located; and (4) the scientific and economic practicality of reducing or eliminating the discharge resulting from such activity. Collectively, these provisions make up the “site suitability” analysis. The Air Board has previously evaluated environmental justice considerations as part of the site suitability analysis.

The project is located at the Norfolk Naval Shipyard (NNSY), an extraordinarily long-standing, active facility. The City of Portsmouth has certified that the location and operation of the facility are consistent with all applicable ordinances. The shipyard is composed of several noncontiguous areas totaling 1,275 acres. The project is not accessible to the public, as the NNSY is limited to Navy access. The CHP plant site is not used for residential or recreational purposes. Thus, the project meets all local requirements, and is compatible with the surrounding land use.

The project is expected to directly boost the local economy by approximately \$37.38 million, including \$29.7 million in local subcontracting and \$7.7million in ancillary revenue. Local businesses within 1/4 mile of the plant will be used to supply materials for the project. Also, during the construction phase of the project, over 210 local construction tradesmen will be employed. Following construction, 17 full time employees will be hired to operate the plant. However, operation of this plant will provide energy resilience to the entire shipyard and the Navy ships while in overhaul. Currently NNSY has a workforce of over 10,000 civilian

employees with additional Navy and contractor personnel. NNSY hosted a Diverse Supplier Virtual Information meeting on August 20, 2020 and plans to continue to work with community leaders to ensure that local subcontracting opportunities for the construction of the project are communicated to Small, Women-owned, and Minority-owned Businesses.

Regarding impacts to the environment, there are no significant short-term, long-term, direct or indirect impacts to water, cultural, visual or biological resources during construction and operation. The permit includes significant controls to minimize, to the maximum extent possible, the emissions. Specific details regarding the evaluation of emissions from the plant and the applicable controls are included elsewhere in these responses.

In addition to the stringent air emission limits and required controls to achieve those limits, this project is beneficial to the environment because it supports the Navy's efforts to reduce its environmental footprint and rely on cleaner fuels. Energy reliability, resiliency and efficiencies are priorities for the Navy. The Navy was looking for a cleaner, more reliable, more efficient solution for steam and electricity. After a feasibility study, the CHP system was identified as the cleanest, most effective option. CHP is promoted by EPA as a more energy efficient and reduced emissions alternative to conventional energy generation methods.³⁷ The Navy conducted an environmental assessment, pursuant to the National Environmental Policy Act, to assess the impacts of the project, and determined that the project will not have any significant environmental impacts on the surrounding community or environment.

The Navy estimates that the CHP plant will reduce the NNSY's energy consumption because of the efficiency of the CHP plant.

With respect to environmental justice, DEQ conducted EJSCREEN at radii of 1, 2 and 5 miles around the proposed facility which demonstrated that the surrounding community is an environmental justice community, and Trinity Consultants has prepared an additional report, *Identification of Environmental Justice Communities*, verifying DEQ's conclusion.³⁸ On that basis, additional analyses were undertaken to assess whether the project would cause a disproportionate negative impact on that community. As reflected in the responses provided here, it does not.

10) **EJSCREEN**

EJSCREEN was improperly used. It is a screening tool and does not supplant an actual assessment.

As indicated in the comments, EJSCREEN is a screening tool. It is appropriate to use this tool to assess and identify whether an environmental justice community could be impacted by the

³⁷ CHP systems have shown multiple benefits to reduce air pollution and water usage associated with electric power generation. An onsite CHP avoids transmission and distribution losses that occur when electricity travels over power lines. CHP requires less fuel to produce a given energy output. CHP is promoted by the Environmental Protection Agency (EPA). See <https://www.epa.gov/chp> (last accessed Oct. 21, 2020).

³⁸ Attached as Exhibit 1.

project. In some instances, further assessment of the local communities beyond the EJSCREEN analysis may be necessary to properly characterize the neighboring communities, but that is not the case for this project.

As part of the air permitting process, DEQ used the EJSCREEN to determine that an environmental justice community is present. On that basis, DEQ assessed whether the emissions from this facility would disproportionately impact the environmental justice community, and concluded that it would not. DEQ also made heightened community engagement efforts. More details regarding both of those aspects of the environmental justice review are provided elsewhere in these responses.

On July 1, 2020, Virginia's Environmental Justice Act ("VEJA") became effective. Va. Code 2.2-234 *et seq.* VEJA includes Virginia-specific definitions relating to environmental justice and requires the Commonwealth to consider specific criteria.

The Navy must comply with EO 12898: Federal Actions To Address Environmental Justice In Minority Populations And Low Income Populations and EO 13045: Protection Of Children From Environmental Health Risks And Safety Risks. Consistent with EO 12898 and EO 13045, the Navy's policy is to identify and address any disproportionately high and adverse human health or environmental effects of its actions on minority and low-income populations and children. Because DEQ is obligated to assess environmental justice affects using VEJA the Navy undertook an assessment that considered the VEJA criteria in determining whether any environmental justice communities are present in the vicinity of the project. Like the DEQ assessment, the Navy assessment similarly concluded that there is an environmental justice community in the vicinity of the project. Again, further analysis assessing whether an environmental justice community would be disproportionately impacted by the CHP plant was then undertaken. That assessment concluded that there would not be a disproportionate adverse impact.

The Navy also assessed environmental justice impacts as part of its National Environmental Policy Act (NEPA) review for the project. 42 USC § 4321 *et seq.* The NEPA review was triggered because the proposed CHP plant at the NNSY is a federal project undertaken by the U.S. Navy. NEPA requires an environmental analysis of major federal actions that have the potential to significantly affect the quality of the human environment. 42 USC § 4332. Specifically, NEPA requires that a federal official responsible for the proposed federal action analyzes the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, and alternatives to the proposed action. 42 USC § 4332 (2) (C). The Navy's assessment of environmental justice in its EA was not applied by DEQ, rather DEQ conducted its own site suitability and environmental justice analysis.

The DEQ air permitting process is a completely separate process, and the site suitability and environmental justice analysis that applies in the air permitting context is found in the Virginia Air Pollution Control Law, Va. Code § 10.1-1300 *et seq.*, and applicable implementing regulations, described above. The 4th Circuit Court of Appeals, prior to the adoption of VEJA,

interpreted this provision as a requirement to undertake an environmental justice analysis. *Friends of Buckingham v. State Air Pollution Control Bd.*, 947 F.3d 68 (4th Cir. 2020).

Accordingly, DEQ conducted its own EJSCREEN. The Navy also conducted its own environmental justice analysis using the criteria from VEJA. DEQ and the Navy each then conducted more detailed assessments to determine whether the project would cause any disproportionate adverse impact on the identified environmental justice community. As discussed in other responses, those analyses demonstrated that there would not be any disproportionate adverse impact on any community.

11) **Community Outreach**

- a) *Community outreach did not satisfy environmental justice requirements. There was not significant and proper effort to outreach to the communities that are at-risk and sensitive to pollution. The outreach that has been done lacks non-technical language that can be understood by a typical resident.*

In addition to the applicable air regulatory requirements, VEJA requires that the Commonwealth promote environmental justice, which is defined to include meaningful involvement by all people in Virginia permitting and regulatory decisions. Meaningful involvement is defined by VEJA as “the requirements that (i) affected and vulnerable community residents have access and opportunities to participate in the full cycle of the decision-making process about a proposed activity that will affect their environment or health and (ii) decision makers will seek out and consider such participation, allowing the views and perspectives of community residents to shape and influence the decision.” Va. Code § 2.2-234. VEJA became effective on July 1, 2020. Additionally, in another Code provision effective July 1, 2020, DEQ is charged to “further environmental justice and enhance public participation in the regulatory and permitting processes.” Va. Code § 10.1-1183. No regulations or guidance has been developed yet to implement these provisions, although the Air Pollution Control Board initiated that process at its September 2020 Board meeting.

Nonetheless, significant efforts were undertaken to engage the community regarding this project. Notices of the various public participation opportunities were published in the local newspaper, and posted on the DEQ website, the Norfolk Naval Shipyard website, as well as on the Facebook, Twitter, Instagram and LinkedIn pages of each entity. DEQ also distributed notices to residents within a two-mile radius of the Norfolk Naval Shipyard through NextDoor and Constant Contact. This resulted in contacts being sent out to over 8,000 residents. Schools, libraries, religious centers, universities, the Chesapeake Bay Foundation, non-governmental organizations and stakeholders also received direct notices about these opportunities.

In addition to the efforts made by DEQ, the applicant engaged a consultant to help develop and implement a coordinated community outreach effort. Due to COVID-19 restrictions, this outreach was conducted by telephone, email and virtual meetings. Through these initial contacts, communications were then extended to private citizens, additional civic and community organizations, economic development agencies, business owners and several individuals who represent Portsmouth’s African American communities. As a result of this process, nearly 200

direct communications were made to representatives of 71 organizations and 98 individual stakeholders, including 9 civic associations and 2 churches in neighborhoods within the vicinity of the project.

Based on feedback received through these contacts, and in addition to the August 1, 2019 information session the Navy hosted in accordance with the Virginia air permitting regulations, the Navy also held a virtual public information session on May 21, 2020 and a Diverse Supplier Virtual Information meeting on August 20, 2020. The purpose of this meeting was to provide information to Small, Women-Owned and Minority-Owned businesses about the available supplier opportunities. In accordance with the Navy fact sheet, a total of 110 business representatives registered for the event, with 41 attending.

Following the September 22, 2020 public hearing on the draft air permit, the Navy has continued to reach out and engage with community members to answer questions about the project and provide additional information. This outreach includes coordinating with the NAACP and other local community organizations. The Navy hosted a technical information session for environmental groups, coordinated through the Virginia office of the NAACP, on October 5, 2020. This was an opportunity to explain the project in greater detail and answer more detailed technical questions. The Navy remains willing to conduct community meetings about the project to keep citizens informed of project development and implementation.

DEQ held a public briefing and question and answer session on August 17, 2020, prior to the start of the public comment period, to explain the permitting process and be available to answer any questions about that process and to explain the technical details associated with the permit.

b) The outreach strategies adopted by the Virginia Department of Transportation should have been followed here.

The Navy cannot comment on what strategies will be adopted by VDEQ. DEQ and the Navy employed many of the public outreach recommendations referenced in the commenter's provided link. Some of the recommendations were not feasible due to COVID-19 restrictions. While those recommendations were not options under COVID-19 conditions, a number of other efforts were made to engage the local community.

As described in greater detail above, a number of virtual meetings and direct contacts were made. Extensive use of social media was also employed. Additionally, recordings of all of the public meetings were made available on the DEQ website so that those unable to attend the virtual meetings could hear the discussion and obtain the information. Efforts were made by the applicant to engage community associations, a minority community action agency, religious organizations, minority business associations, Chambers of Commerce, business and trade organizations. Representatives of impacted communities were identified and asked to serve as a liaison to share project information.

Community Engagement

- 1) *There were comments regarding the adequacy of the community outreach to citizens in the surrounding areas of the proposed plant, including concerns that meetings were not conducted during times to maximize participation and dialogue.*

The Virginia air permitting requirements require the following public participation process for PSD permits (9 VAC 5-80-1775):

1. Public notice of the proposed source. [Published in the local paper and posted on the DEQ and NNSY websites].
2. A public informational briefing. [Held August 1, 2019 at Major Hillard Library in Chesapeake].
3. A public comment period of 45 days. [Public comment period of 51 days took place August 18, 2020 – October 7, 2020].
4. A public hearing, during the public comment period, so that comments may be received verbally as well as in writing. [Public hearing held September 22, 2020].
5. Notice of the public comment period and public hearing provided directly to local air pollution control agencies, Native American Indian tribes, the chief elected official and chief administrative officer of the city where the source would be located, any other locality particularly affected, and the planning district commission. [Completed].

All of these requirements were met. In addition, the Navy held a public information session on May 21, 2020 and DEQ held an optional public briefing and question and answer session on August 17, 2020, prior to the start of the public comment period pursuant to 9 VAC 5-80-1775.J. All of the meetings occurring in 2020 took place virtually, and in the evening.

The community engagement here was not limited to compliance with the applicable regulations. Rather than providing notice of these public participation opportunities solely through newspaper publication (the notice required by the regulation), notice was posted on the DEQ website, the Norfolk Naval Shipyard website, as well as on the Facebook, Twitter, Instagram and LinkedIn pages of each entity. DEQ also distributed notice to residents within a two-mile radius of the Norfolk Naval Shipyard through NextDoor and Constant Contact. This resulted in contacts being sent out to over 8,000 residents. Schools, libraries, religious centers, universities, the Chesapeake Bay Foundation, non-governmental organizations and environmental stakeholders also received direct notices about these opportunities.

Extensive public outreach efforts were made not only by DEQ, but also by the applicant, as described in more detail above.

- 2) *There were comments raising concerns that DEQ's outreach for the Informational Briefing was inadequate because contact was made with only 5 organizations, referencing Attachment A to the Draft Engineering Analysis.*

[Attachment A](#) from DEQ's website provides a list of community organizations that received direct notification of the August 2019 information briefing. However, as reflected in the text of the draft Engineering Analysis, notifications were also sent to Native American tribes in Virginia and to several local environmental advocacy groups and interested stakeholders to communicate information about the source's briefing. The list at Attachment A reflects members of the community that had previously registered through DEQ's website to receive information regarding air permitting actions in the Hampton Roads area. DEQ made direct contact with them, and Attachment A reflects confirmation that such notice was provided. However, Attachment A does not reflect the full scope of public participation opportunities associated with this permit, nor does it reflect the other public notification efforts made. As noted in the above response, notice was also provided through the local newspaper, the DEQ and Norfolk Naval Shipyard websites, and various social media platforms, in addition to direct communications made by DEQ and the Navy outside of the list reflected on Attachment A. The Navy anticipates DEQ will update Attachment A to more accurately reflect that these contacts about the informational briefing were made to entities that had registered on DEQ's website asking for notification of air permitting applications.

3 Mile Monitoring Station

- 1) *Some commenters raised concerns regarding reliance on an ambient monitor located three miles from the NNSY for assessing the impact of the project on the local community.*

As the commenters acknowledge, the ambient air background monitor selected for this project is roughly 3 miles north of NNSY, in Norfolk. Because the Norfolk monitor is in a highly industrialized area, particulate concentrations are expected to be higher than those in the immediate vicinity of the NNSY. Thus, the choice of this monitor is appropriately conservative. Moreover, measurements of air quality at this monitor fall well within health-based limits, being far smaller than the NAAQS for particulate matter and other criteria pollutants.

The monitor is only one piece of the ambient air impact analysis. For new projects that have not yet been built (and thus cannot yet be assessed by monitoring), it is coupled with results from air dispersion modeling which is used to conservatively estimate the potential impacts from proposed sources. Air dispersion modeling is required as part of the PSD permitting process to ensure that the pollutant concentrations in the immediate vicinity of the project are below the NAAQS and PSD increments. The modeling predicts concentrations at receptors in the immediate area of the project. The background concentration as measured at the monitor is added to the modeled concentrations to predict the cumulative impact of the project and existing sources on the area to ensure air pollution will remain below the NAAQS. As shown in the application and confirmed by DEQ, emissions from the CHP plant will not cause or contribute to an exceedance of the NAAQS or PSD increment.

Sea Level and Flooding

- 1) Several commenters raised questions about whether there were any risks to the project, and specifically to any pipeline associated with the project, as a result of sea level rise or flooding events.

The NNSY is situated approximately 10 feet above mean sea level (MSL). In addition, the CHP plant building will be built on concrete piles with the floor elevation built to either the 500-year flood elevation or 4 feet above the 100-year flood elevation, whichever is higher. See Navy's EA, attached as Exhibit 3.

Although beyond the scope of this permit, the Navy has been undertaking additional projects to protect the NNSY from potential flooding, including repair and modernization of dry dock and flood wall improvements. *Id.*

- 2) Some commenters suggested that a more thorough risk assessment should be conducted, including threats of hurricanes, sea level rise, terrorist attack, accidents, and how people can be evacuated and/or protected from each risk.

Such a risk assessment is outside the scope of the Virginia air permitting process. The Transportation Security Administration within the Department of Homeland Security (DHS) administers pipeline security and monitors terrorist attacks and similar grid accidents. Similarly, the Federal Emergency Management Agency, also within the DHS, is tasked with improving the nation's capability to prepare for, protect against, respond to, recover from, and mitigate natural disasters such as hurricanes and flooding.

Moreover, pipelines located underground are more resilient to the effect of hurricanes than overhead powerlines. The proposed project will be equipped with emergency power generation and will have access to back up fuel for use during times when natural gas is not available due to an emergency. The overarching goal of the proposed CHP project is to provide energy security in times of grid failure. As noted above, the CHP plant building will be constructed above the 500-year flood plain and will be located on a secured military site with flood wall and other constructions to protect it against the threat of sea level rise and flooding.

See also Response to Risk Assessments comment above.

- 3) Some commenters asked whether pipelines can continue to operate during floods to transmit fuel to the proposed power plant, and whether this raises a concern about the reliability of the energy source.

Pipelines can continue to operate during floods. Additionally, the project includes a plan for back up fuel for use during times when natural gas is not provided due to an emergency. The project is designed to increase the reliability of the Navy's steam and electricity source.

FOSSIL FUELS/CLIMATE CHANGE

- 1) Multiple commenters expressed concern about constructing a plant using fossil fuels, and their impacts on greenhouse gases (“GHG”) and climate change.

With this project, NNSY is moving to a more reliable and more energy efficient solution for its energy needs. The project is designed to reduce the shipyard’s energy consumption by 31%. Combined heat and power plants have many benefits, including climate benefits, as EPA has long recognized. *See, e.g.,* <https://www.epa.gov/chp>. In addition, the CHP plant minimizes NNSY’s reliance on outside sources of electricity by generation of electricity on-site using equipment that can be fired by two fuel sources. Thus, NNSY will be a more efficient consumer of energy after the project. As discussed in responses below, alternatives such as solar or wind are not feasible for NNSY’s energy needs.

Although the CHP plant will emit GHG, the associated reduction in energy consumption resulting from the efficiency improvements should result in a net decrease in regional GHG emissions. For example, NNSY estimates that its electricity demand will decrease by approximately 130,000,000 kWh a year as a result of the project. Using EPA’s 2020 version of Emissions & Generation Resource Integrated Database (eGRID), that decreased electrical demand equates to a GHG emissions reduction of over 51,000 tons of CO₂ based on the current fuel mix in the region and transmission line loss of 4.88%. The region-specific eGrid factor takes into account the different methods (natural gas, nuclear, fuel oil, coal, etc.) used to produce electricity, and creates an average emission factor to calculate emissions.

- 2) One commenter stated that the assessment of the environmental impact of natural gas was incomplete in the draft permit leading to an incorrect finding of positive climate repercussions because of the figures used for potency of methane and CO₂.

The environmental impact assessment for the air permit appropriately focused on the emissions units being permitted, which will emit very little methane since it is destroyed through the combustion process. Additionally, the global warming potentials in the application and draft permit are consistent with accepted regulatory standards. They are calculated based on data provided in 40 C.F.R. Part 98 Subpart A, Table A-1, which lists a global warming potential of 25 for methane and 298 for nitrous oxide.

- 3) One commenter stated that recent research suggests growing economic risk for new gas plants in the PJM, and urges federal funds to be invested wisely.

This project is funded through energy cost savings, at no cost to the federal taxpayer. *See also* Responses to Comments about alternatives.

- 4) One commenter objected to the CHP for being a fossil fuel-producing site.

The plant is not a fossil fuel-producing site.

ALTERNATIVES/RENEWABLE ENERGY SOURCES

- 1) Several commenters advocated for consideration of alternatives to the proposed CHP plant, including renewable sources such as solar, wind, and battery storage.*

Alternatives to the CHP were considered and ruled out as not feasible to meet the needs and purpose of the project. The primary purpose of the CHP system is to meet the Energy Security Requirements and Goals of the Department of Navy Energy Security Framework through Resiliency, Reliability, and Efficiency. The best, most efficient, and cost-effective way to meet these goals for NNSY is a natural gas-fueled CHP plant.

During the feasibility study phase of the Energy Conservation project, the Navy investigated 14 Energy Conservation Measures (ECMs) including improvements such as energy-related industrial process improvements, boiler and chiller upgrades, compressed air system upgrades, water conservation, building and HVAC controls, insulation, lighting, etc.

The Navy has a high demand for steam and electric resiliency. To provide the same level of electrical resiliency of the CHP plant, a solar plus battery system would be required to provide all the shipyard's average load, ~25MW, for an extended utility outage of approximately 15 days. According to the National Energy Renewable Lab ("NREL"), the average acreage required per MWac is 7.9 acres. Therefore, 25MW of solar would require approximately 200 acres, which is unavailable anywhere close to NNSY, and at ~\$2/MW, would cost ~\$50 million. Additionally, to match the current CHP design, for battery storage to provide power to the shipyard, 24 hrs/day for 15 days, would require 600MWh of storage, on approximately 89 acres, at an estimated cost of \$3B.

Irrespective of the exorbitant cost, solar PV and battery storage would still not be able to provide the steam that is critical to NNSY operations. The CHP solution with all the emissions controls is the cleanest solution that can be developed in the available footprint to meet all the Navy's electrical and thermal energy needs with present technology.

The Navy did investigate installing over 10 MW of solar PV at various sites throughout the shipyard and at St. Julien's Creek Annex. Ultimately, these proved unfeasible because the primary location for most of the PV was atop the closed landfill at Paradise Creek that was still undergoing monitoring and cap maintenance. This did not allow for the placement of solar panels on the site.

Roof-mounted solar was also deemed infeasible because NNSY is undergoing transition as part of the Navy's Shipyard Infrastructure Optimization Program (SIOP), a 20-year, \$21 billion program dedicated to refurbishing the nation's four public shipyards by modernizing equipment, improving workflow and upgrading dry docks and facilities. Because of uncertainty of facility repurposing or demolition of buildings, the Navy elected not to proceed with roof-mounted PV systems.

BACT

- 1) *Many commenters asserted that the draft permit was not requiring best available control technology ("BACT"), and that a proper analysis was not conducted.*

The draft permit imposes BACT and a proper analysis was conducted.

A major source BACT analysis is required for any pollutant that exceeds PSD permitting thresholds, and the requirements are set forth in 9 VAC 5-80-1705 and defined in 9 VAC 5-80-1615. A minor source BACT analysis is required per 9 VAC 5-50-260.C and 9 VAC 5-60-320 for any pollutant that triggers Article 6 minor new source review (NSR). A BACT analysis ensures that emissions of pollutants triggered for analysis achieve the maximum degree of reduction when taking into account energy, environmental, and economic impacts of achieving the reduction. It is important to note that BACT is an emission limit, not the application of a technology. This analysis determined that the proposed low/ultralow NOx burners on the boilers, and Selective Catalytic Reduction ("SCR") and Oxidation Catalyst on the turbines would achieve the appropriate BACT limits.

EPA provides data on all historically permitted BACT determinations through the RACT/BACT/LAER Clearinghouse ("RBLC"). The facility used RBLC data in order to determine if its implemented BACT is in line with those of similarly permitted units across the country. Reviewing this database shows that the emission limits proposed in this permit are in line with those of similarly permitted units from RBLC. Additionally, a review of RBLC shows that the 9 ppm NOx/0.0097 lb/MMBtu standard proposed for the reduction of NOx at the boilers is in line with the lowest BACT limits found in the RBLC database. This includes emission reductions typically achieved through Ultra-Low NOx Burners.

Moreover, to the extent that commenters are claiming that the "re-defining the source" doctrine cannot be considered, they are incorrect. The concern was raised in the context of GHG emissions, which are subject to Article 8 PSD permitting, and the *Friends of Buckingham* decision did not address an Article 8 permit. The *Friends of Buckingham* decision involved an Article 6 (minor source) permit, and Virginia's Article 6 regulations. The Court found that the Board had failed to explain why the doctrine was consistent with the Article 6 regulations. Conversely, as has been upheld on numerous occasions under federal law and in Virginia, the Clean Air Act does not require consideration of alternatives that would redefine the source to satisfy the BACT requirement for PSD sources.³⁹ In any event, alternatives such as solar and wind cannot be BACT because they are not available technologies to meet the need and purpose of the project.

³⁹ See, e.g., *Sierra Club v. EPA*, 499 F.3d 653 (7th Cir. 2007) (upholding EPA's redefinition of the source doctrine); *Va. Chapter of the Sierra Club v. Va. State Air Pollution Control Bd.*, CL16-3770 (Richmond City Cir. Ct. July 28, 2017) (for Greensville Generating Station, Board was authorized to decline to consider solar as an alternative to natural gas-fired duct burner because solar would "redefine the source").

2) One commenter advocated for additional onsite monitoring of air pollution.

The existing monitoring network, which is operated and validated by VDEQ, has been deemed sufficient to characterize the air quality in the region. In the case of new projects (or modifications to existing facilities) air dispersion modeling is used to estimate the potential impacts from the new emissions sources. That prediction is then combined with the closest and/or most representative background monitor to make sure that no new project will cause impacts in excess of the standards. New projects cannot be permitted if shown to cause or contribute to any value in excess of the NAAQS. Since in this case the combined impacts (existing monitor + new modeled impacts) are all substantially below the NAAQS (and the Virginia SAACs), there is no justification for additional ambient air monitoring. Further, the air quality operating permit includes conditions and testing requirements to ensure that all of the limits and thus conclusions from the air modeling are met.

Virginia Clean Economy Act

1) Several commenters suggested that approval of this project would be counter to the Virginia Clean Economy Act and Governor Northam's Executive Order 43, because it delays Virginia's transition to renewable energy. To reduce GHG emissions, energy efficiency and clean fuels must be considered first.

The Virginia Clean Economy Act applies to investor-owned electric utilities, and requires them to be 100% carbon free by 2050, with a goal of transitioning the electric grid to 100% clean energy. Executive Order 43 tasks the Department of Mines, Minerals and Energy, in consultation with the Secretary of Commerce and Trade, the Secretary of Natural Resources and the Director of the Department of Environmental Quality to develop a plan to transition the electric grid to energy sources such as wind, solar and energy efficiency programs. Accordingly, neither the Act nor the Executive Order apply to this project.

The Navy's goals with this project are consistent with the Act and the Executive Order. The Navy is seeking to reduce its environmental footprint, and this project was evaluated with that goal in mind. As described above, renewable options were considered for this project but were determined to be infeasible. The CHP plant solution with all of its emissions controls is the cleanest solution that can be developed in the available footprint to meet all the Navy's electrical and thermal energy needs with present technology.

Specific details regarding the evaluation of emissions from the plant and the applicable controls are included elsewhere in these responses.

Expired Air Permit

1) Is it correct that the NNSY is currently operating under an expired air permit? How is that possible?

NNSY has air emission sources that are governed by Virginia Department of Environmental Quality Title V Permit No. TRO-60326, which expired October 31, 2017. In April of 2017,

NNSY timely filed its Title V permit renewal application. In accordance with DEQ Regulation 9VAC5-80-80, by filing a timely and complete application for permit renewal, NNSY is authorized to continue operating under the existing Title V permit and the permit does not expire until final action is taken by the Board (DEQ) on the Title V permit renewal application.

New Source Performance Standards

- 1) *It is unclear why the applicant did not need a New Source Performance Standards (NSPS) review, since this is a new gas plant. NSPS permitting is a more lengthy and more complex process than the Prevention of Significant Deterioration (PSD) permit and we request the applicant comply with standards for a new facility.*

Contrary to the comment, there is no such thing as NSPS permitting. EPA establishes NSPS for source categories as whole, not for an individual source. CAA § 111. Once established by EPA following the requirements of the Clean Air Act, each source is required to comply with any applicable NSPS. The PSD permitting program requires sources to comply with the NSPS as the floor, but generally results in sources having to meet more stringent standards as is the case here. For example, NSPS KKKK requires the combustion turbines to meet a NO_x standard of 25 ppm at 15% oxygen when firing natural gas as compared to the proposed permit limit of 2 ppm at 15% oxygen.

Additionally, a complete NSPS applicability determination was included within the permit application. Each boiler must comply with NSPS, Subpart Dc. Each combustion turbine must comply with NSPS, Subpart KKKK. The emergency engine must comply with NSPS, Subpart III. The DEQ Engineering Analysis agreed with the contents and conclusions as outlined in the application. NNSY understands that it must comply with the applicable requirements within each applicable NSPS subpart.

Calculation Errors

- 1) *Commenters identified a calculation error for the HAP that underestimated project emissions, including emissions of formaldehyde, nickel, and phosphorous.*

NNSY acknowledges that there was an error in the HAP project-wide emissions. As submitted, the total HAP emission rates only included maximum potential emission rates from one combustion turbine/duct burner, three boilers, and one black-start emergency generator: emissions from the second combustion turbine/duct burner were inadvertently omitted. A revised summary table is provided (Ex. 4).

The addition of the second turbine and duct burner results increases the total HAP emissions by 0.23 tons per year (tpy), from 2.07 tpy to 2.3 tpy. Formaldehyde (the HAP with the highest emission rate from turbine operation) emissions will increase from 0.2 tpy to 0.3 tpy for the project. The increase in emissions does not subject the facility to any additional regulations, trigger any other requirements, or require any changes to the draft permit. It is worth noting that the emission rates for the combustion turbines and duct burners do not account for the oxidation catalyst, which will likely reduce emission rates of various organic compounds below what was assumed in the air dispersion modeling.

Formaldehyde Limit

- 1) *Commenters raised concerns that the draft permit did not include limits on formaldehyde emissions from the combustion turbines.*

Although not included in the draft permit, the combustion turbines are subject to a formaldehyde limit of 91 ppbvd at 15% oxygen since they are subject to 40 C.F.R. Part 63, Subpart YYYY-National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines. As DEQ indicates in the Engineering Analysis, all emission units at the facility (except storage tanks) are subject to a federal CAA §112 NESHAP and therefore are exempt from the state toxics regulation.⁴⁰ Additionally, hazardous air pollutants such as formaldehyde are expressly exempt from PSD permitting by CAA §112(b)(6).

Thus, the CHP plant will be required to comply with a formaldehyde limit of 91 ppbvd at 15% O₂ on the combustion turbines regardless of whether the limit is included in the draft permit. NNSY will be required to conduct emissions testing for formaldehyde to show compliance with this limit, including annual performance testing to show continued compliance. Additionally, the facility will be required to maintain oxidation catalyst operating temperatures within the proper ranges to ensure optimal reduction efficiency of emissions.

Technical Deficiencies in the Draft Permit

- 1) *One commenter expressed concerns that the equipment specification listed in the draft permit were unenforceable.*

It is typical that the Equipment List table only list the equipment but not provide any enforceable conditions in regard to the listed equipment. The permit conditions which exist after the table provide the enforceable conditions as they apply to the list of equipment. The enforceable conditions that follow the equipment list were developed with emission control requirements, operating limits and emissions limits that apply to each piece of equipment (or emission source) as listed in the initial Equipment List table. If any piece of equipment is proposed to be changed, a permit modification may be required as provided within the VA DEQ regulations.

- 2) *One commenter raised concerns that the draft permit did not require continuous emission monitoring systems (CEMS) to consistently ensure compliance with the permit limits.*

The proposed draft permit requires initial testing, within 60 days of achieving maximum production and not later than 180 days of startup, while burning natural gas and ultra-low sulfur diesel (ULSD) fuel for PM₁₀, PM_{2.5}, NO_x, CO and VOC. This testing while burning each fuel is required for the turbine/duct burner HRSGs and the boilers. Recurring testing must be conducted for the above operating scenarios for the turbine/duct burner HRSGs every 2 years.

In addition to this testing, additional emission limits and additional testing are required for some of the same pollutants and additional pollutants as required by (1) Part 60 NSPS Subpart KKKK for Stationary Combustion Turbines, (2) Part 63 NESHAP Subpart YYYY for Stationary

⁴⁰ 9 VAC 5-60-300.C.4 (exempting sources subject to CAA §112 standards from the state toxics rule).

Combustion Turbines, and (3) Part 63 Subpart DDDDD for Industrial, Commercial and Institutional Boilers and Process Heaters.

As demonstrated above, there is an immense amount of testing for the CHP plant. Considering the extremely low ambient pollutant impacts from the above emission sources as demonstrated in the application (and re-confirmed in this document) and confirmed in the DEQ review and the stringent emission limitations as required by the above permit and the NSPS and NESHAP requirements, there is ample testing, monitoring, recordkeeping and reporting to demonstrate compliance with the permit requirements.

Table B-1a. Potential Emissions Summary

Pollutant	Turbine + Duct Burner (tpy)	SU/SD (tpy)	Turbines (tpy)	Duct Burners (tpy)	Boiler Diesel Storage Tank (tpy)	Emergency Generator		Total Post Project Plant PTE (tpy)
						Diesel Storage Tank (tpy)	Electrical Switch (tpy)	
CO	8.12	6.33	19.86	1.16	0.00	0.00	0.00	35.2
NOx	7.96	0.26	14.91	6.58	0.00	0.00	0.00	29.4
PM ¹	12.30	0.03	8.90	0.27	0.00	0.00	0.00	21.5
PM ₁₀	12.30	0.03	8.90	0.27	0.00	0.00	0.00	21.5
PM _{2.5}	12.30	0.03	8.90	0.27	0.00	0.00	0.00	21.5
SO ₂	4.04	0.01	1.95	0.01	0.00	0.00	0.00	6.0
VOC	6.17	0.92	4.89	0.39	0.07	1.54E-04	0.00	12.4
CO _{2e}	139,246.5	305.6	122,268.4	635.6	0.0	0.0	2.4	262,458.5
Total HAP	0.47		1.83	0.01	0.00	0.00	0.00	2.3
Single HAP ²	0.21		1.60	0.00	0.00	0.00	0.00	1.8

1. Emissions are estimated as total particulate emissions (filterable + condensable).

2. Hexane is the single HAP with the greatest facility emissions.

Table B-2. Facility Wide Potential HAP/TAP Emissions Summary

Pollutant	Annual HAPs/TAPs							Facility-Wide PTE, not otherwise subject to a MACT Standrd (tpy)	Annual Exemption Threshold	Exempt?
	HAP (Yes/No)	Turbines (tpy)	Duct Burners (tpy)	Boilers (tpy)	Generators (tpy)	Tanks (tpy)	Facility-Wide PTE (tpy)			
1,3-Butadiene	Yes	1.69E-03	0.00E+00	0.00E+00	-	-	1.69E-03	0.00E+00	3.19	Yes
2-Methylnaphthalene	Yes	0.00E+00	7.92E-06	2.14E-05	-	-	2.93E-05	7.92E-06	--	Yes
3-Methylchloranthrene	Yes	0.00E+00	5.94E-07	1.60E-06	-	-	2.20E-06	5.94E-07	--	Yes
7,12-Dimethylbenz(a)anthracene	Yes	0.00E+00	5.28E-06	1.43E-05	-	-	1.95E-05	5.28E-06	--	Yes
Acenaphthene	Yes	0.00E+00	5.94E-07	0.00E+00	1.82E-05	-	1.88E-05	1.88E-05	--	Yes
Acenaphthylene	Yes	0.00E+00	5.94E-07	2.01E-05	3.59E-05	-	5.66E-05	3.65E-05	--	Yes
Acetaldehyde	Yes	2.52E-02	0.00E+00	0.00E+00	9.79E-05	-	2.53E-02	9.79E-05	26.1	Yes
Acrolein	Yes	4.03E-03	0.00E+00	0.00E+00	3.06E-05	-	4.06E-03	3.06E-05	0.03335	Yes
Anthracene	No	0.00E+00	7.92E-07	3.11E-06	4.78E-06	-	8.68E-06	5.57E-06	--	Yes
Antimony	Yes	0.00E+00	0.00E+00	4.15E-03	-	-	4.15E-03	0.00E+00	0.0725	Yes
Arsenic	Yes	9.78E-04	6.60E-05	1.22E-03	-	-	2.27E-03	6.60E-05	0.029	Yes
Barium	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Benz(a)anthracene	Yes	0.00E+00	5.94E-07	4.78E-06	2.42E-06	-	7.79E-06	3.01E-06	--	Yes
Benzene	Yes	1.24E-02	6.93E-04	2.04E-03	3.01E-03	1.65E-03	1.98E-02	5.36E-03	4.64	Yes
Benzo(a)pyrene	Yes	0.00E+00	3.96E-07	1.07E-06	9.98E-07	-	2.46E-06	1.39E-06	--	Yes
Benzo(b)fluoranthene	Yes	0.00E+00	5.94E-07	1.60E-06	-	-	2.20E-06	5.94E-07	--	Yes
Benzo(b,k)fluoroanthene	Yes	0.00E+00	0.00E+00	0.00E+00	4.31E-06	-	4.31E-06	4.31E-06	--	Yes
Benzo(g,h,i)perylene	Yes	0.00E+00	3.96E-07	2.86E-06	2.16E-06	-	5.41E-06	2.56E-06	--	Yes
Benzo(k)fluoranthene	Yes	0.00E+00	5.94E-07	2.78E-06	8.47E-07	-	4.22E-06	1.44E-06	--	Yes
Beryllium	Yes	2.76E-05	3.96E-06	3.27E-05	-	-	6.42E-05	3.96E-06	0.00029	Yes
Butane	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Cadmium	Yes	4.27E-04	3.63E-04	1.30E-03	-	-	2.09E-03	3.63E-04	0.00725	Yes
Chromium	Yes	9.78E-04	4.62E-04	1.92E-03	-	-	3.36E-03	4.62E-04	0.0725	Yes
Chromium VI	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	0.00725	Yes
Chromium-Other compds	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	0.0725	Yes
Chrysene	Yes	0.00E+00	5.94E-07	3.49E-06	5.94E-06	-	1.00E-05	6.54E-06	--	Yes
Cobalt	Yes	0.00E+00	2.77E-05	4.84E-03	-	-	4.87E-03	2.77E-05	0.00725	Yes
Copper	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Dibenzo(a,h)anthracene	Yes	0.00E+00	3.96E-07	2.39E-06	1.34E-06	-	4.13E-06	1.74E-06	--	Yes
Dichlorobenzene	No	0.00E+00	3.96E-04	1.07E-03	-	-	1.47E-03	3.96E-04	65.395	Yes
Ethane	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Ethylbenzene	No	2.02E-02	0.00E+00	5.03E-05	-	3.90E-04	2.06E-02	3.90E-04	62.93	Yes
Fluoranthene	Yes	0.00E+00	9.90E-07	6.50E-06	1.57E-05	-	2.32E-05	1.66E-05	--	Yes
Fluorene	Yes	0.00E+00	9.24E-07	6.03E-06	4.97E-05	-	5.67E-05	5.07E-05	--	Yes
Fluoride	Yes	0.00E+00	0.00E+00	2.95E-02	-	-	2.95E-02	0.00E+00	--	Yes
Formaldehyde	Yes	1.89E-01	2.47E-02	9.30E-02	3.07E-04	-	3.07E-01	2.50E-02	0.174	Yes
Hexane	Yes	0.00E+00	4.29E-04	1.60E+00	-	4.57E-04	1.61E+00	8.86E-04	25.52	Yes
Indeno(1,2,3-cd)pyrene	Yes	0.00E+00	5.94E-07	3.30E-06	1.61E-06	-	5.50E-06	2.20E-06	--	Yes
Lead	Yes	1.24E-03	1.65E-04	0.00E+00	-	-	1.41E-03	1.65E-04	0.02175	Yes
Manganese	Yes	7.02E-02	1.25E-04	2.71E-03	-	-	7.31E-02	1.25E-04	0.725	Yes
Mercury	Yes	1.07E-04	8.58E-05	3.21E-04	-	-	5.14E-04	8.58E-05	0.00725	Yes
1,1,1-Trichloroethane	Yes	0.00E+00	0.00E+00	1.87E-04	-	-	1.87E-04	0.00E+00	100	Yes
Molybdenum	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Naphthalene	Yes	3.93E-03	2.01E-04	1.44E-03	5.05E-04	-	6.07E-03	7.06E-04	7.54	Yes
Nickel	Yes	4.09E-04	6.93E-04	6.87E-02	-	-	6.98E-02	6.93E-04	0.145	Yes
Total PAH	Yes	4.94E-03	2.30E-04	0.00E+00	-	-	5.17E-03	2.30E-04	--	Yes
Pentane	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Phenanthrene	Yes	0.00E+00	0.00E+00	2.35E-05	1.59E-04	-	1.82E-04	1.59E-04	--	Yes
Phosphorus	No	0.00E+00	0.00E+00	7.49E-03	-	-	7.49E-03	0.00E+00	0.0145	Yes
Polycyclic Organic Matter	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Propane	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Propylene	No	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Propylene Oxide	Yes	1.83E-02	0.00E+00	0.00E+00	-	-	1.83E-02	0.00E+00	6.96	Yes
Pyrene	Yes	0.00E+00	1.65E-06	7.82E-06	1.44E-05	-	2.39E-05	1.61E-05	--	Yes
Selenium	Yes	2.22E-03	7.92E-06	5.62E-04	-	-	2.79E-03	7.92E-06	0.029	Yes
Sulfuric Acid	No	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Toluene	Yes	8.19E-02	1.12E-03	7.94E-03	1.09E-03	1.88E-03	9.39E-02	4.10E-03	54.665	Yes
Vanadium	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Xylene, o-	Yes	0.00E+00	0.00E+00	8.63E-05	-	-	8.63E-05	0.00E+00	62.93	Yes
Xylene	No	0.00E+00	0.00E+00	0.00E+00	7.50E-04	4.56E-03	5.31E-03	5.31E-03	62.93	Yes
Zinc	Yes	0.00E+00	0.00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	--	Yes
Total HAP		4.38E-01	2.98E-02	1.83E+00	6.11E-03	8.94E-03	2.32E+00			
Maximum Single HAP¹		1.89E-01	2.47E-02	1.60E+00	3.01E-03	4.56E-03	1.61E+00			

*Note emergency generator diesel fuel tank HAP emissions are extremely conservative estimates

Table B-2. Facility Wide Potential HAP/TAP Emissions Summary

Hourly HAPs/TAPs										
Pollutant	HAP (Yes/No)	Turbines (lb/hr)	Duct Burners (lb/hr)	Boilers (lb/hr)	Generators (lb/hr)	Tanks (lb/hr)	Facility- Wide PTE (lb/hr)	Facility-Wide PTE, not otherwise subject to a MACT Standrd (lb/hr)	Hourly Exemption Threshold	Exempt?
2-Methylnaphthalene	Yes	0.00E+00	2.04E-06	5.52E-06			7.56E-06	2.04E-06	--	Yes
3-Methylchloranthrene	Yes	0.00E+00	1.53E-07	4.14E-07			5.67E-07	1.53E-07	--	Yes
7,12-Dimethylbenz(a)anthracene	Yes	0.00E+00	1.36E-06	3.68E-06			5.04E-06	1.36E-06	--	Yes
Acenaphthene	Yes	0.00E+00	1.53E-07	0.00E+00	7.27E-05		7.27E-05	7.29E-05	--	Yes
Acenaphthylene	Yes	0.00E+00	1.53E-07	3.38E-05	1.43E-04		1.77E-04	1.44E-04	--	Yes
Acetaldehyde	Yes	7.47E-03	0.00E+00	0.00E+00	3.92E-04		7.86E-03	3.92E-04	8.91	Yes
Acrolein	Yes	1.20E-03	0.00E+00	0.00E+00	1.22E-04		1.32E-03	1.22E-04	0.02277	Yes
Anthracene	No	0.00E+00	2.04E-07	1.93E-06	1.91E-05		2.12E-05	1.93E-05	--	Yes
Antimony	Yes	0.00E+00	0.00E+00	8.31E-03			8.31E-03	0.00E+00	0.033	Yes
Arsenic	Yes	1.96E-03	1.70E-05	2.09E-03			4.06E-03	1.70E-05	--	Yes
Barium	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Benz(a)anthracene	Yes	0.00E+00	1.53E-07	6.35E-06	9.67E-06		1.62E-05	9.82E-06	--	Yes
Benzene	Yes	9.78E-03	1.79E-04	4.83E-04	1.21E-02	3.77E-04	2.29E-02	1.26E-02	--	Yes
Benzo(a)pyrene	Yes	0.00E+00	1.02E-07	2.76E-07	3.99E-06		4.37E-06	4.10E-06	--	Yes
Benzo(b)fluoranthene	Yes	0.00E+00	1.53E-07	4.14E-07			5.67E-07	1.53E-07	--	Yes
Benzo(b,k)fluoranthene	Yes	0.00E+00	0.00E+00	0.00E+00	1.72E-05		1.72E-05	1.72E-05	--	Yes
Benzo(g,h,i)perylene	Yes	0.00E+00	1.02E-07	3.58E-06	8.64E-06		1.23E-05	8.74E-06	--	Yes
Benzo(k)fluoranthene	Yes	0.00E+00	1.53E-07	2.34E-06	3.39E-06		5.88E-06	3.54E-06	--	Yes
Beryllium	Yes	5.51E-05	1.02E-06	4.40E-05			1.00E-04	1.02E-06	0.000132	Yes
Butane	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Cadmium	Yes	8.53E-04	9.37E-05	6.30E-04			1.58E-03	9.37E-05	--	Yes
Chromium	Yes	1.96E-03	1.19E-04	1.34E-03			3.41E-03	1.19E-04	--	Yes
Chromium VI	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	0.0033	Yes
Chromium-Other compds	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	0.033	Yes
Chrysene	Yes	0.00E+00	1.53E-07	3.77E-06	2.38E-05		2.77E-05	2.39E-05	--	Yes
Cobalt	Yes	0.00E+00	7.16E-06	9.53E-03			9.53E-03	7.16E-06	--	Yes
Copper	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Dibenzo(a,h)anthracene	Yes	0.00E+00	1.02E-07	2.64E-06	5.38E-06		8.12E-06	5.48E-06	--	Yes
Dichlorobenzene	No	0.00E+00	1.02E-04	2.76E-04			3.78E-04	1.02E-04	--	Yes
Ethane	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Ethylbenzene	No	5.98E-03	0.00E+00	1.01E-04		8.91E-05	6.17E-03	8.91E-05	17.919	Yes
Fluoranthene	Yes	0.00E+00	2.56E-07	7.66E-06	6.26E-05		7.05E-05	6.29E-05	--	Yes
Fluorene	Yes	0.00E+00	2.39E-07	7.07E-06	1.99E-04		2.06E-04	1.99E-04	--	Yes
Fluoride	Yes	0.00E+00	0.00E+00	5.90E-02			5.90E-02	0.00E+00	--	Yes
Formaldehyde	Yes	4.98E-02	6.39E-03	5.22E-02	1.23E-03		1.10E-01	7.61E-03	0.0825	Yes
Hexane	Yes	0.00E+00	1.11E-04	4.14E-01		1.04E-04	4.14E-01	2.15E-04	11.616	Yes
Indeno(1,2,3-cd)pyrene	Yes	0.00E+00	1.53E-07	3.39E-06	6.43E-06		9.97E-06	6.59E-06	--	Yes
Lead	Yes	2.49E-03	4.26E-05	0.00E+00			2.53E-03	4.26E-05	--	Yes
Manganese	Yes	1.40E-01	3.24E-05	4.75E-03			1.45E-01	3.24E-05	--	Yes
Mercury	Yes	2.13E-04	2.21E-05	1.79E-04			4.14E-04	2.21E-05	--	Yes
Methyl chloroform (1,1,1 trichloroethane)	Yes	0.00E+00	0.00E+00	3.73E-04			3.73E-04	0.00E+00	22.8	Yes
Molybdenum	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Naphthalene	Yes	6.22E-03	5.20E-05	1.79E-03	2.02E-03		1.01E-02	2.07E-03	2.607	Yes
Nickel	Yes	8.18E-04	1.79E-04	1.34E-01			1.35E-01	1.79E-04	0.066	Yes
Total PAH	Yes	7.11E-03	5.95E-05	0.00E+00			7.17E-03	5.95E-05	--	Yes
Pentane	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Phenanthrene	Yes	0.00E+00	0.00E+00	1.66E-05	6.34E-04		6.51E-04	6.34E-04	--	Yes
Phosphorus	No	0.00E+00	0.00E+00	1.50E-02			1.50E-02	0.00E+00	0.0066	Yes
Polycyclic Organic Matter	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Propane	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Propylene	No	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Propylene Oxide	Yes	5.42E-03	0.00E+00	0.00E+00			5.42E-03	0.00E+00	3.168	Yes
Pyrene	Yes	0.00E+00	4.26E-07	6.73E-06	5.77E-05		6.48E-05	5.81E-05	--	Yes
Selenium	Yes	4.44E-03	2.04E-06	1.08E-03			5.53E-03	2.04E-06	--	Yes
Sulfuric Acid	No	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Toluene	Yes	2.43E-02	2.90E-04	9.81E-03	4.37E-03	4.30E-04	3.92E-02	5.09E-03	18.645	Yes
Vanadium	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Xylene, o-	Yes	0.00E+00	0.00E+00	1.73E-04			1.73E-04	0.00E+00	21.483	Yes
Xylene	No	0.00E+00	0.00E+00	0.00E+00	3.00E-03	1.04E-03	4.04E-03	4.04E-03	21.483	Yes
Zinc	Yes	0.00E+00	0.00E+00	0.00E+00			0.00E+00	0.00E+00	--	Yes
Total HAP		2.73E-01	7.70E-03	7.15E-01	2.45E-02	2.04E-03	1.02E+00			
Maximum Single HAP¹		1.40E-01	6.39E-03	4.14E-01	1.21E-02	1.04E-03	4.14E-01			

¹ During the review of the HAP emissions summary calculations, it was determined that the lb/hr emissions from the storage tank were not converted correctly from the tpy values. The lb/hr values for the storage tank have been corrected above.

**Public Health Assessment of Expected Emissions
from the Proposed Combined Heat and Power Plant
at the US Navy–Norfolk Naval Shipyard**

Laura C. Green, Ph.D., D.A.B.T. and Edmund A.C. Crouch, Ph.D.
October 26, 2020

Introduction and overview

This report addresses the question, “What are the expected effects on public health from emissions from the proposed combined heat and power plant at the US Navy–Norfolk Naval Shipyard?” With regard to environmental justice, we note that residential communities near the Norfolk Naval Shipyard contain relatively high proportions of African Americans and individuals and families of low socioeconomic status (<https://www.census.gov/>). As such, it is particularly important to determine whether emissions from the proposed power plant at the Shipyard would or would not be expected to harm public health.


Note that our focus herein is not on whether under-represented minorities and others of low socioeconomic status do or do not suffer health inequities: surely they do. Our focus is instead on whether these health inequities would be exacerbated by environmental impacts from the proposed facility.

Three issues are of particular importance. First, because African Americans as a group tend to suffer asthma at increased rates (Daya and Barnes, 2019), rates of asthma in Portsmouth would be expected to be elevated.¹ It is thus important to determine whether emissions from the proposed plant would exacerbate the symptoms of this disease.

Second, some children and others in Portsmouth would be expected to have higher than average body burdens of lead (Pb; Virginia Department of Health, 2018). Thus, an examination of whether the proposed plant would add to this burden is warranted.

Third, given the considerable amount of industrial activity in the area, an examination of the current quality of ambient air, with regard to potentially toxic air pollutants, is of interest. Herein, then, we report on “background” concentrations of potential carcinogens and other chemicals in neighborhood air, and combine these with predicted incremental contributions from the proposed facility, in order to determine whether current and/or future air quality

¹ Recent data indeed show that rates of hospitalizations due to asthma are somewhat higher in Portsmouth City than in Virginia as a whole, and three times higher in African Americans than in whites (Community Indicators Dashboard, Greater Hampton Roads, <http://www.ghrconnects.org/indicators/index/dashboard?module=indicators&controller=index&action=dashboard&id=197706693290379227&card=0&localeId=2995>).

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would be unhealthful. We also focus on carbon monoxide, since this pollutant, if present at high concentrations in inhaled air, can provoke symptoms of angina in people who have various cardiovascular diseases; and both the prevalence and the severity of these diseases tend to be elevated in African American-groups (Mensah et al., 2005).

As explained below, relevant measurements, models, and health-based guidelines show that current air quality in Portsmouth is in fact good, and that it would remain so were the proposed combined heat and power plant to be built and operating. Thus, the scientific evidence indicates that emissions from the proposed plant would not compromise the health of the environmental justice communities in the vicinity.

Determinants of asthma prevalence and symptom-triggers

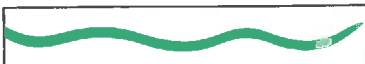
As explained by Daya and Barnes (2019):

In the United States, childhood asthma prevalence is approximately twice as high in African Americans compared with European Americans, and African American children are more than 10 times more likely to die of asthma than whites (<https://minorityhealth.hhs.gov>). Individuals of African ancestry have greater asthma morbidity and mortality both within (Moorman et al., 2007) and outside the United States (Pearce et al., 2007), and asthma prevalence is high in African countries and countries with populations of African ancestry (Pearce et al., 2007; Adeloje et al., 2013), supporting a role for genetics.

Symptoms of asthma may be provoked by various antigens (substances that provoke allergic responses), including the biological chemicals found in, for example, dust mites, cat dander, pollens, and molds. Respiratory viruses are also important triggers for airway inflammation and symptoms in children and other people with asthma (Hussain et al., 2018; Martorano et al., 2018; Priante et al, 2018).

In Portsmouth, Norfolk, and the surrounding Hampton Roads area, the temperate climate and influence of the ocean generate high levels of airborne pollens and molds, which provoke symptoms of both asthma and other allergies (<https://allergydocs.net/treating-allergies-and-asthma-in-hampton-roads/>).

The proposed combined heat and power plant would not emit antigens, but it would emit some combustion gases that, if present at sufficiently high concentrations in inhaled air, can provoke symptoms of asthma. As a matter of environmental justice, then, it is important to determine whether the incremental impacts of these gases, combined with existing airborne concentrations, would or would not provoke asthmatic symptoms.

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In particular, some people with asthma are very sensitive to the broncho-constrictive effects of high concentrations of sulfur dioxide (SO₂; Sheppard, 1988). To protect exercising asthmatics (the most sensitive group, so everyone else is also protected) from risks posed by this pollutant, the U.S. EPA limits the legally permissible concentration of this chemical in outdoor air (based on its primary national ambient air quality standard, NAAQS) to essentially no more than 75 parts per billion by volume (which equals about 196 micrograms of SO₂ per cubic meter of air), as a one-hour average.²

Of course, SO₂ is already present in ambient air in Portsmouth (as it is essentially everywhere). Current concentrations of SO₂ in ambient air at the nearest monitor are quite small — no more than about 5 micrograms per cubic meter (averaged over one-hour).³

Using a series of worst case assumptions — such as assuming that the combined heat and power plant would operate at its maximum capacity,⁴ and that it would be operating under unfavorable meteorological conditions that would minimize dispersion — our estimates (based on air dispersion modeling using AERMOD with the same inputs as used by Trinity Consultants, 2020) found that the proposed plant could add no more than 0.74 micrograms per cubic meter of SO₂ to outdoor air at the residential area location most highly affected by the proposed facility, during the worst-case hour of the entire year (that is, when dispersion in the atmosphere is at its minimum). By definition, impacts during all other hours of the year, and at all other neighborhood locations, would be smaller still.

In other words, if the proposed facility were built and operating, concentrations of SO₂ in outdoor air would change from at most 5 micrograms per cubic meter to, at most, 5.74 micrograms per cubic meter, while the health-based limit for allowable concentrations of SO₂ in ambient air is, as noted above, 196 micrograms per cubic meter.

Accordingly, regardless of whether the proposed facility is or is not permitted, concentrations of SO₂ in neighborhood air are, and would remain, acceptably small, and not harmful to children or others with asthma.


Another pollutant of potentially similar concern for people with asthma is nitrogen dioxide (NO₂; Brown, 2015).⁵ The health-based NAAQS for NO₂ in outdoor air is 188 micrograms per

² Compliance with this NAAQS is measured as the 3-year average of the 99th percentile of 1-hour daily maximum-readings.

³ This value is the latest available 3-year average of the 99th percentile of 1-hour daily maximum-readings at the nearest ambient air quality monitor, in Norfolk at 2nd and Woodis Ave., 3.2 miles north of the proposed plant location (Virginia Department of Environmental Quality, 2019).

⁴ For this pollutant, the highest 1-hour impact occurs when the two turbines and two duct burners are running on natural gas, and the diesel-powered emergency generator is being tested.

⁵ Gas-fired cooking stoves are a source of NO₂; and it is recommended that such appliances not be used inside asthmatics' homes (Breyse et al., 2010).

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cubic meter of air (equivalent to 100 parts per billion, ppb, by volume) as a one-hour average.⁶ Based on measurements at the nearest ambient air monitor (in Norfolk), current concentrations of NO₂ in Portsmouth are no more than about 75 micrograms per cubic meter (39 ppb), again as a one-hour average.⁷

For NO₂, the worst-case corresponds to simultaneous operations of the two turbines and two boilers (all running on diesel fuel, at full power), and the diesel powered, black start, emergency generator, also at full power. This is, of course, a quite unlikely scenario. Routine testing of the emergency generator would take place once per month, for less than one hour,⁸ with perhaps another 5 to 10 hours per year for troubleshooting, for a total of no more than 22 hours per year.⁹ The combined operations of the turbines, boilers, black start generator, and background from all other sources, could add up to a worst-case 1-hour concentration of 138 micrograms per cubic meter of NO₂ in the most highly affected part of any residential neighborhood surrounding the Shipyard.¹⁰ Thus, concentrations of NO₂ in neighborhood air would remain well within health-based limits.

The combined heat and power plant would also emit fine particulate matter (PM_{2.5}); and some forms of particulate matter exacerbate asthma. In particular, traffic-related air pollution appears to trigger asthma; and levels on the order of 300 micrograms per cubic meter of diesel engine exhaust particles (DEEP) provoke airway inflammation in volunteers who have been examined in controlled studies (Carlsten et al., 2016). In contrast to DEEP, particles from combustion of natural gas are primarily incompletely combusted hydrocarbons (U.S. EPA, AP-42, 1995); and the predicted PM_{2.5} impacts from the proposed facility are on the order of 1 microgram or less per cubic meter of air — at the worst-case location (Trinity Consultants, 2020). Concentrations of this type, and magnitude, of particulate matter are neither known nor reasonably expected to provoke asthma.


⁶ See footnote 3; the same formula is used for SO₂ and NO₂, except that, *per* the relevant regulation, the 98th percentile is used to determine compliance with the NAAQS.

⁷ This is 3-year average of the 98th percentile of 1-hour daily maximum-readings at the Norfolk monitor.

⁸ The relevant code requires that emergency generators be tested to at least 30% load for 30 minutes each month.

⁹ Private communication, Jim Bishop, Director — Advanced Technology Solutions, Ameresco, October 18, 2020.

¹⁰ This result was obtained using the AERMOD modeling described above, incorporating the EPA ARM2 estimate of conversion of NO_x to NO₂, with 5 years (2014–2018 inclusive) of meteorological data and hourly NO₂ measurements at the Norfolk monitor, and assuming that the generator would be tested or troubleshot only during the hours of 8 a.m. to 5 p.m.

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Carbon monoxide: background concentrations and predicted impacts from the CHP plant

The NAAQS for carbon monoxide (CO) — 10,300 micrograms per cubic meter (9 parts per million, ppm) as an 8-hour average, and 40,000 micrograms per cubic meter (35 parts per million, ppm) as a 1-hour average — are health-based limits designed to protect people with ischemic heart disease who may experience symptoms of angina at and above threshold concentrations of CO in inhaled air (Anderson et al., 1973). Based on measurements at the ambient air monitor in Norfolk in 2019, current concentrations of CO in Portsmouth are no more than about 1,720 micrograms per cubic meter (1.5 parts per million, ppm), as a 1-hour average, and 1,370 micrograms per cubic meter (1.2 parts per million, ppm) as an 8-hour average.

During worst-case operations¹¹, during the worst-case hour with regard to atmospheric conditions, the proposed plant could add up to 40 micrograms per cubic meter of CO at the worst-case residential location; so that the total concentration of CO in outdoor air during that hour would be less than 1,760 micrograms per cubic meter, and during any 8-hour period, less than 1,410 micrograms per cubic meter.


Thus, regardless of whether the proposed facility is or is not permitted, CO concentrations in neighborhood air are, and would remain, acceptably small, and not harmful to people with ischemic heart disease or otherwise unusually susceptible to the adverse effects of inhaled CO.

Determinants of people’s body burdens of lead

Lead (Pb) is a ubiquitous metal that occurs (i) naturally and (ii) because of contamination from (primarily) past uses of Pb and Pb-based compounds in diverse products — such as leaded gasoline, pigments and paints, pesticides, solder for food cans, drinking water distribution pipes, and other materials.

The developing brains of fetuses and young children can be harmed by cumulative exposures to moderate and even relatively low exposures Pb: and although our exposures to Pb are much smaller than they were decades ago (Tompsett & Anderson, 1935; Bolger et al., 1991; Tsoi et al., 2016), older (that is, pre-1970), poorly maintained residential units in Portsmouth may still expose children and others to Pb-containing dusts. It is thus of interest to determine whether atmospheric emissions of Pb from the proposed combined heat and power plant could materially affect people’s Pb exposures.

¹¹ For this purpose, the worst-case operation corresponds to both turbines and two boilers running on diesel, together with the diesel-powered generator, all at full power.

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The National Ambient Air Quality Standard (NAAQS) for Pb (determined as a rolling three-month average concentration) is 0.15 micrograms per cubic meter. The maximum predicted incremental impact from the proposed combined heat and power plant, at the worst-case off-site location, would be 0.000004 micrograms per cubic meter. Thus, the proposed plant would not materially affect people’s exposures to Pb.

Current, and predicted future, quality of ambient air in Portsmouth

The many industrial, commercial, and transportation activities in Portsmouth emit pollutants to ambient air; and it is important to examine the effects of those emissions on air quality. To do so, we compiled and evaluated data provided by U.S. EPA in its latest National Air Toxics Assessment (2014 NATA; U.S. EPA, 2018). The NATA estimates average concentrations of 175 potentially hazardous air pollutants (HAPs) in each census tract in the U.S., using a combination of measurements at ambient air monitors and dispersion modeling applied to the emissions from all large enough sources in a comprehensive emissions database maintained by U.S. EPA. Emission source characteristics are supplied by each of the states, using the information obtained during their air permitting procedures. The effects of various smaller sources, along with collectively large sources that do not require air permits (notably, fossil fuel-powered motor vehicles) are taken into account by incorporating area averages of their emissions.

For the ten census tracts surrounding the census tract encompassing the Norfolk Naval Shipyard (which is census tract 51740980100, see <https://www.census.gov/geographies/reference-maps/2010/geo/2010-census-tract-maps.html>) — that is tracts 51740980100, 51740212300, 51740212400, 51740211900, 51740212100, 51740212000, 51550020500, 51550020300, 51550020400, 51550020600, and 51710005000 — we extracted the NATA estimated concentrations of the 175 federally-designated HAPs, and then compared these with the annual Virginia Significant Ambient Air Concentrations (SAACs). According to Virginia DEQ, “The SAAC is the concentration of a toxic pollutant in the ambient air that, if exceeded, may have an adverse effect to human health.”

In each case for which Virginia has derived a SAAC (141 cases), the highest NATA-estimated concentration in any of the ten census tracts is less than the annual SAAC. In other words, despite the presence of myriad sources of pollution, both local and regional, air quality in the neighborhoods surrounding the Shipyard is good.

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Next, we determine whether air quality would remain good were the plant to be built and operating. Adding the estimated annual average contribution of the plant to the highest (among the ten census tracts) background levels of HAPs (for all HAPs known to be emitted by the plant), all resulting concentrations also remained below the SAACs.

We performed a similar exercise for expected short-term maximum impacts, and compared these with the short-term SAACs, for which the averaging time is one hour, rather than one year. U.S. EPA’s NATA does not provide estimates for maximum hourly values for background air-quality; but we can estimate these using a modeling “rule of thumb,” which holds that one hour maxima can be estimated to be 10 times higher than annual maxima (U.S. EPA, 2016).

Our results are shown in the two tables provided below. Therein, we tabulate:


- i. current ambient air concentrations of each of these potentially toxic pollutants (again, as estimated by U.S. EPA in NATA for the long-term; and as estimated using the rule of thumb for the short-term);
- ii. predicted maximum incremental concentrations of these pollutants due to the proposed facility;
- iii. predicted future concentrations (that is, background concentrations plus maximum facility impacts) in neighborhood air;
- iv. corresponding SAAC values; and
- v. future neighborhood air concentration (again, as a worst-case) as a percentage of the respective SAACs.

The chemicals are listed in descending order relative to the last of these metrics — that is, the percentage of each current and predicted future concentration relative to its respective SAAC.

Thus, in Table 1, formaldehyde is listed first, with current background ambient air concentrations estimated to comprise at most (that is, in the highest of the ten census tracts considered herein) 56.40% of the SAAC; the facility-estimated incremental impact being at most another 0.04% of the SAAC over the long term; so that the estimated future ambient air concentration would be at most 56.44% of the annual SAAC.

Similarly, in Table 2, formaldehyde is again listed first, with current, estimated, 1-hour maximum background ambient air concentrations estimated to comprise at most (that is, in the highest of the ten census tracts considered herein) 21.66% of the 1-hour SAAC; the facility-estimated, short-term, incremental impact being at most another 0.14 % of the 1-hour SAAC; so that the estimated future ambient air concentration over any 1-hour period, at any off-site location, would be at most 21.79% of the 1-hour SAAC.

As shown in both tables, outdoor air in the neighborhoods surrounding the Shipyard currently contains only small concentrations of potentially hazardous air pollutants (relative to all respective, health-based SAACs); and the incremental impacts from the proposed combined heat and power plant, even at their maxima, would range from none to negligible.

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Conclusions

Taken together, the available air quality data, models, and comparisons with health-based guidelines (and underlying toxicological evidence) indicate that public health in neighborhoods near the Shipyard is not currently being compromised by the quality of outdoor air; and if the proposed facility were to be built and operating, outdoor air would remain safe.




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Table 1. Estimated annual average concentrations of chemicals and chemical-mixtures in ambient air in neighborhoods surrounding the Norfolk Naval Shipyard, and maximum, long-term, incremental impacts from emissions from the proposed power plant, expressed as fractions of the annual Virginia Significant Ambient Air Concentrations (SAACs).


Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) Annual	Current Ambient Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Formaldehyde	2.4	56.40%	0.04%	56.44%
Mercury compounds	0.1	12.01%	<0.01%	12.01%
Acrolein	0.46	5.90%	<0.01%	5.90%
Hexane	352	1.11%	<0.01%	1.11%
Carbon tetrachloride	62	0.88%	--	0.88%
Lead compounds	0.3	0.76%	<0.01%	0.76%
Nickel compounds	0.2	0.76%	0.10%	0.85%
Benzene	64	0.74%	<0.01%	0.74%
Methyl chloride	206	0.70%	--	0.70%
Phosphorus	0.2	0.52%	0.01%	0.53%
Dibenzofuran	0.003	0.52%	--	0.52%
Beryllium compounds	0.004	0.33%	<0.01%	0.33%
Acetaldehyde	360	0.31%	<0.01%	0.31%
Methanol	524	0.27%	--	0.27%
Xylenes (mixed isomers)	868	0.23%	<0.01%	0.23%
4,4'-methylenediphenyl diisocyanate	0.102	0.20%	--	0.20%
Toluene	754	0.18%	<0.01%	0.18%
Chloroform	98	0.13%	--	0.13%
1,3-butadiene	44	0.09%	<0.01%	0.09%
Hexachlorobenzene	0.004	0.08%	--	0.08%
Methyl bromide	38	0.07%	--	0.07%
Chromium VI	0.1	0.07%	<0.01%	0.08%

		
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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) Annual	Current Ambient Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{g}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Methylene chloride	348	0.07%	--	0.07%
2,2,4-trimethylpentane	700	0.06%	--	0.06%
Selenium compounds	0.4	0.06%	<0.01%	0.06%
Cobalt compounds	0.1	0.05%	0.01%	0.07%
Cadmium compounds	0.1	0.05%	<0.01%	0.05%
Arsenic compounds (inorganic including arsine)	0.4	0.04%	<0.01%	0.04%
Phenol	38	0.04%	--	0.04%
2,4-toluene diisocyanate	0.072	0.04%	--	0.04%
Naphthalene	104	0.03%	<0.01%	0.03%
Cyanide compounds	10	0.02%	--	0.02%
Ethylbenzene	868	0.02%	<0.01%	0.02%
2,4-D, salts and esters	20	0.02%	--	0.02%
Cresol_cresylic acid (mixed isomers)	44	0.01%	--	0.01%
Acrylamide	0.06	0.01%	--	0.01%
4-nitrophenol	2	<0.01%	--	<0.01%
Manganese compounds	10	<0.01%	<0.01%	<0.01%
Trichloroethylene	538	<0.01%	--	<0.01%
Methyl isobutyl ketone	410	<0.01%	--	<0.01%
Acrylonitrile	8.6	<0.01%	--	<0.01%
Tetrachloroethylene	678	<0.01%	--	<0.01%
Bis(2-ethylhexyl)phthalate	10	<0.01%	--	<0.01%
1,1,1-trichloroethane	3820	<0.01%	<0.01%	<0.01%
Ethylene oxide	3.6	<0.01%	--	<0.01%
1,1,2,2-tetrachloroethane	13.8	<0.01%	--	<0.01%
Acetonitrile	134	<0.01%	--	<0.01%
Hexamethylene diisocyanate	0.068	<0.01%	--	<0.01%

		
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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) Annual	Current Ambient Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Ethylene dibromide	0.692	<0.01%	--	<0.01%
Catechol	46	<0.01%	--	<0.01%
Acrylic acid	11.8	<0.01%	--	<0.01%
Biphenyl	2.6	<0.01%	--	<0.01%
Vinyl chloride	26	<0.01%	--	<0.01%
Benzyl chloride	10.4	<0.01%	--	<0.01%
Hydroquinone	4	<0.01%	--	<0.01%
Dibutylphthalate	10	<0.01%	--	<0.01%
Dimethyl sulfate	1.04	<0.01%	--	<0.01%
Methyl tert-butyl ether	360	<0.01%	--	<0.01%
Antimony compounds	1	<0.01%	<0.01%	<0.01%
Allyl chloride	6	<0.01%	--	<0.01%
Triethylamine	82	<0.01%	--	<0.01%
Captan	10	<0.01%	--	<0.01%
Chlorobenzene	92	<0.01%	--	<0.01%
Cumene	492	<0.01%	--	<0.01%
Ethylene dichloride (1,2-dichloroethane)	80	<0.01%	--	<0.01%
Vinyl acetate	70	<0.01%	--	<0.01%
Dimethyl phthalate	10	<0.01%	--	<0.01%
Ethyl acrylate	40	<0.01%	--	<0.01%
2-chloroacetophenone	0.64	<0.01%	--	<0.01%
Pentachlorophenol	1	<0.01%	--	<0.01%
Diethanolamine	26	<0.01%	--	<0.01%
Carbaryl	10	<0.01%	--	<0.01%
Carbon disulfide	62	<0.01%	--	<0.01%
2,4,6-trichlorophenol	0.62	<0.01%	--	<0.01%
1,4-dichlorobenzene	902	<0.01%	<0.01%	<0.01%

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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) Annual	Current Ambient Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Acetophenone	98.28	<0.01%	--	<0.01%
Methyl methacrylate	820	<0.01%	--	<0.01%
Bromoform	10.4	<0.01%	--	<0.01%
1,4-dioxane	180	<0.01%	--	<0.01%
Carbonyl sulfide	24.6	<0.01%	--	<0.01%
2,4-dinitrotoluene	3	<0.01%	--	<0.01%
Styrene	426	<0.01%	--	<0.01%
Chlorine	3	<0.01%	--	<0.01%
1,1,2-trichloroethane	110	<0.01%	--	<0.01%
Vinylidene chloride	40	<0.01%	--	<0.01%
Acetamide	64	<0.01%	--	<0.01%
Propylene dichloride	694	<0.01%	--	<0.01%
Propylene oxide	96	<0.01%	<0.01%	<0.01%
Polychlorinated biphenyls (Aroclors)	1	<0.01%	--	<0.01%
N,N-dimethylaniline	50	<0.01%	--	<0.01%
4,6-dinitro- <i>o</i> -cresol (including salts)	0.4	<0.01%	--	<0.01%
Hexachlorocyclopentadiene	0.22	<0.01%	--	<0.01%
Pentachloronitrobenzene	1	<0.01%	--	<0.01%
Ethylidene dichloride	1620	<0.01%	--	<0.01%
Hexachlorobutadiene	0.42	<0.01%	--	<0.01%
Nitrobenzene	10	<0.01%	--	<0.01%
1,2-epoxybutane	41.2	<0.01%	--	<0.01%
Epichlorohydrin	15.2	<0.01%	--	<0.01%
Chloroprene	72	<0.01%	--	<0.01%
Ethyl chloride	5280	<0.01%	--	<0.01%
O-toluidine	17.6	<0.01%	--	<0.01%

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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) Annual	Current Ambient Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
2-nitropropane	72	<0.01%	--	<0.01%

Notes:

1. Chemicals and chemical-mixtures are tabulated here if (i) ambient air concentrations have been estimated by U.S. EPA (2018) in the Agency's 2014 National Ambient Air Toxics Assessment, and (ii) Virginia has established a Significant Ambient Air Concentration (SAAC).
2. -- indicates that the chemical or mixture is not known to be emitted by the power plant.
3. For generic metal compounds, the lowest SAAC has been used where more than one is listed. For example, all chromium emissions are treated as chromium IV compounds; mercury emissions are treated as vapors.
4. All incremental impacts are modeled using a series of worst-case assumptions in terms of CHP plant operations, meteorological conditions, and off-site locations. By definition, more realistic assumptions would result in estimated ambient air impacts that are smaller still.

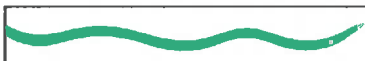

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Table 2. Estimated maximum, 1-hour average, concentrations of chemicals and chemical-mixtures in ambient air in neighborhoods surrounding the Norfolk Naval Shipyard, and maximum, 1-hour average, incremental impacts from emissions from the proposed power plant, expressed as fractions of the 1-hour Virginia Significant Ambient Air Concentrations (SAACs).

Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) 1-hour	Estimated Current Ambient 1-hour Maximum Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Formaldehyde	62.5	21.66%	0.14%	21.79%
Mercury compounds	2.5	4.80%	<0.01%	4.81%
Acrolein	17.25	1.57%	0.03%	1.60%
Hydrochloric acid	187.5	1.28%	--	1.28%
Ethylene glycol	3175	0.52%	--	0.52%
Hexane	8800	0.44%	<0.01%	0.44%
Hydrogen fluoride	65	0.40%	--	0.40%
Carbon tetrachloride	1550	0.35%	--	0.35%
Lead compounds	7.5	0.30%	0.01%	0.32%
Nickel compounds	5	0.30%	1.11%	1.41%
Benzene	1600	0.29%	0.03%	0.32%
Methyl chloride	5175	0.28%	--	0.28%
Phosphorus	5	0.21%	0.12%	0.33%
Dibenzofuran	0.075	0.21%	--	0.21%
Methanol	8200	0.17%	--	0.17%
Acetaldehyde	6750	0.17%	<0.01%	0.17%
Beryllium compounds	0.1	0.13%	0.04%	0.17%
Xylenes (mixed isomers)	16275	0.12%	<0.01%	0.12%
Toluene	14125	0.10%	<0.01%	0.10%
4,4'-methylenediphenyl diisocyanate	2.55	0.08%	--	0.08%
Chloroform	2450	0.05%	--	0.05%
1,3-butadiene	1100	0.04%	<0.01%	0.04%
Hexachlorobenzene	0.1	0.03%	--	0.03%

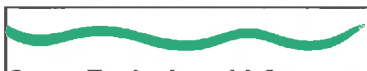
Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) 1-hour	Estimated Current Ambient 1-hour Maximum Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Methyl bromide	950	0.03%	--	0.03%
Chromium VI	2.5	0.03%	0.06%	0.08%
Methylene chloride	8700	0.03%	--	0.03%
2,2,4-trimethylpentane	17500	0.02%	--	0.02%
Selenium compounds	10	0.02%	0.02%	0.05%
Cobalt compounds	2.5	0.02%	0.16%	0.18%
Cadmium compounds	2.5	0.02%	0.03%	0.05%
Arsenic compounds (inorganic including arsine)	10	0.02%	0.02%	0.03%
Phenol	950	0.02%	--	0.02%
Naphthalene	1975	0.01%	<0.01%	0.02%
Ethylbenzene	13575	0.01%	<0.01%	0.01%
Cyanide compounds	250	<0.01%	--	<0.01%
2,4-toluene diisocyanate	3.5	<0.01%	--	<0.01%
2,4-d, salts and esters	500	<0.01%	--	<0.01%
Cresol_cresylic acid (mixed isomers)	1100	<0.01%	--	<0.01%
Acrylamide	1.5	<0.01%	--	<0.01%
4-nitrophenol	50	<0.01%	--	<0.01%
Methyl isobutyl ketone	7675	<0.01%	--	<0.01%
Methylhydrazine	9.5	<0.01%	--	<0.01%
Manganese compounds	250	<0.01%	0.02%	0.03%
Acrylonitrile	215	<0.01%	--	<0.01%
1,1,1-trichloroethane	61500	<0.01%	<0.01%	<0.01%
Bis(2-ethylhexyl)phthalate	250	<0.01%	--	<0.01%
Trichloroethylene	26750	<0.01%	--	<0.01%
Acetonitrile	2525	<0.01%	--	<0.01%
Ethylene oxide	90	<0.01%	--	<0.01%

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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) 1-hour	Estimated Current Ambient 1-hour Maximum Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
1,1,2,2-tetrachloroethane	345	<0.01%	--	<0.01%
Hexamethylene diisocyanate	1.7	<0.01%	--	<0.01%
Tetrachloroethylene	33925	<0.01%	--	<0.01%
Catechol	1150	<0.01%	--	<0.01%
Ethylene dibromide	25	<0.01%	--	<0.01%
Acrylic acid	295	<0.01%	--	<0.01%
Biphenyl	65	<0.01%	--	<0.01%
Vinyl chloride	650	<0.01%	--	<0.01%
Benzyl chloride	260	<0.01%	--	<0.01%
Hydroquinone	100	<0.01%	--	<0.01%
Dibutylphthalate	250	<0.01%	--	<0.01%
Dimethyl sulfate	26	<0.01%	--	<0.01%
Methyl tert-butyl ether	9000	<0.01%	--	<0.01%
Antimony compounds	25	<0.01%	0.01%	0.01%
Triethylamine	1550	<0.01%	--	<0.01%
Allyl chloride	150	<0.01%	--	<0.01%
Isophorone	700	<0.01%	--	<0.01%
Captan	250	<0.01%	--	<0.01%
Chlorobenzene	2300	<0.01%	--	<0.01%
Cumene	12300	<0.01%	--	<0.01%
Ethylene dichloride	2000	<0.01%	--	<0.01%
Vinyl acetate	1750	<0.01%	--	<0.01%
Dimethyl phthalate	250	<0.01%	--	<0.01%
2-chloroacetophenone	16	<0.01%	--	<0.01%
Pentachlorophenol	25	<0.01%	--	<0.01%
Diethanolamine	650	<0.01%	--	<0.01%
Carbaryl	250	<0.01%	--	<0.01%

		
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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) 1-hour	Estimated Current Ambient 1-hour Maximum Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Carbon disulfide	1550	<0.01%	--	<0.01%
1,4-dichlorobenzene	16525	<0.01%	<0.01%	<0.01%
2,4,6-trichlorophenol	15.5	<0.01%	--	<0.01%
Ethyl acrylate	1525	<0.01%	--	<0.01%
Acetophenone	2457	<0.01%	--	<0.01%
Methyl methacrylate	20500	<0.01%	--	<0.01%
Bromoform	260	<0.01%	--	<0.01%
1,4-dioxane	4500	<0.01%	--	<0.01%
Carbonyl sulfide	615	<0.01%	--	<0.01%
2,4-dinitrotoluene	75	<0.01%	--	<0.01%
Styrene	10650	<0.01%	--	<0.01%
Chlorine	72.5	<0.01%	--	<0.01%
1,1,2-trichloroethane	2750	<0.01%	--	<0.01%
Propylene dichloride	12700	<0.01%	--	<0.01%
Acetamide	1600	<0.01%	--	<0.01%
Propylene oxide	2400	<0.01%	<0.01%	<0.01%
Polychlorinated biphenyls	25	<0.01%	--	<0.01%
N,N-dimethylaniline	1250	<0.01%	--	<0.01%
Vinylidene chloride	1975	<0.01%	--	<0.01%
Ethylidene dichloride	25250	<0.01%	--	<0.01%
4,6-dinitro-o-cresol (including salts)	10	<0.01%	--	<0.01%
1,2,4-trichlorobenzene	925	<0.01%	--	<0.01%
Hexachlorocyclopentadiene	5.5	<0.01%	--	<0.01%
Pentachloronitrobenzene	25	<0.01%	--	<0.01%
Hexachlorobutadiene	10.5	<0.01%	--	<0.01%
Nitrobenzene	250	<0.01%	--	<0.01%
1,2-epoxybutane	1030	<0.01%	--	<0.01%

		
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Chemical compound or mixture	Significant Ambient Air Concentration (SAAC) 1-hour	Estimated Current Ambient 1-hour Maximum Air Concentration	Incremental Impact from the Proposed Power Plant	Predicted Future Ambient Air Concentration (current + increment)
	MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)	AS A FRACTION OF EACH CORRESPONDING SAAC		
Epichlorohydrin	380	<0.01%	--	<0.01%
Chloroprene	1800	<0.01%	--	<0.01%
Ethyl chloride	132000	<0.01%	--	<0.01%
o-toluidine	440	<0.01%	--	<0.01%
2-nitropropane	1800	<0.01%	--	<0.01%

Notes:

1. Chemicals and chemical-mixtures are tabulated here if (i) ambient air concentrations have been estimated by U.S. EPA (2018) in the Agency's 2014 National Ambient Air Toxics Assessment, and (ii) Virginia has established a Significant Ambient Air Concentration (SAAC).
2. The estimated current 1-hour maximum air concentrations are assumed to be 10 times the averages estimated in the 2014 National Ambient air Toxics Assessment.
3. -- indicates that the chemical or mixture is not known to be emitted by the power plant.
4. For generic metal compounds, the lowest SAAC has been used where more than one is listed. For example, all chromium emissions are treated as chromium VI compounds; mercury emissions are treated as vapors.
5. All incremental impacts are modeled using a series of worst-case assumptions in terms of CHP plant operations, meteorological conditions, and off-site locations. By definition, more realistic assumptions would result in estimated ambient air impacts that are smaller still.


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U.S. Navy Norfolk Naval Shipyard - List of Commenters

-  beth kraydetus (henrico)
-  charles k and ann d (arlington)
-  cheyenne russo (big stone gap)
-  diane korte (churchville)
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-  herschell emery (midlo)
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-  jessica sims (richmond)
-  kelsey crane (richmond)
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-  natalie pien (leesburg)
-  ronald smith (burke)
-  shelley cross (arlington)
-  steven carter lovejoy (richmond)
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-  Jorge De Cecco (CA)
-  joseph getty (IL)
-  lisa scharin (SC)
-  Mark Giese (WI)
-  paul kazyak (MD)
-  pete alexander (MD)
-  ron kistler (KY)
-  theresa kardos (NY)
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Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

(no subject)

1 message

Andrews, James C CIV USN NAVFAC MIDLANT NOR (USA) <james.c.andrews@navy.mil> Wed, Oct 7, 2020 at 1:07 PM
To: "mariama.ouedraogo@deq.virginia.gov" <mariama.ouedraogo@deq.virginia.gov>

Hello,

I am James Andrews and I am submitting this public comment as a resident of Chesapeake, who has lived in the Tidewater community for over twenty years. I served in the Navy for twenty-four years and worked at NNSY as a Contract Specialist for two years. I currently work for the Department of the Navy as a Government Purchase Card Supervisor and I would like to express my support for the plan to construct the Combined Heat and Power (CHP) plant to make the Shipyard more energy secure and resilient. Given the positive impact the facility will bring to the local environment and economy, it seems clear to me that the benefits will surely outweigh any difficulties anticipated.

It brought me additional comfort to learn an environmental assessment found there would be no significant impacts to our air or water. Additionally, the construction team's commitments to staying compliant in properly maintaining and exceeding standards for clean water, clean air and waste management in addition to using the best available emissions control technology once the CHP is in place was assuring as well.

Thank you for the opportunity to express my support for this project. I hope that DEQ approves the permit to help bring the Shipyard's mission-critical energy infrastructure into the 21st century.

Sincerely,

James C. Andrews

Agency Program Coordinator

NAVFAC MIDLANT Acquisitions

9324 Virginia Ave

Norfolk, VA 23511

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10/7/2020

Commonwealth of Virginia Mail - (no subject)

2



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

1 message

Freeda Cathcart <contactfreeda@gmail.com>
To: mariama.ouedraogo@deq.virginia.gov

Wed, Oct 7, 2020 at 5:47 PM

Freeda Cathcart, 2516 Sweetbrier Ave SW, Roanoke, VA 24015, 540-598-7231

Permit Name: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number: US Navy–Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

I'm opposed to the construction of the gas-powered plant at the Norfolk Naval Shipyard and request that the project be elevated to a public hearing in front of the Air Board.

It's encouraging that some state agencies like VDOT are updating their policies to include Environmental Justice Guidelines. Until the Air Board updates their policies it's imperative to elevate permit issuances like this one for the Norfolk Naval Shipyard to a public hearing.

There was not adequate community notice for this permitting process. Plus according to local sources, there is a lack of trust between the communities near NNSY and those in command of the facility, for this reason even greater effort must be made to communicate the specifics of this project to impacted populations, and to hear and address their concerns.

As a taxpayer and energy investor it's important federal funds should be invested wisely and recent research shows growing economic risk for new gas plants in the PJM. Consider the following:

There have been many articles in financial journals documenting the demise of the gas industry before the pandemic including the following:

November 25, 2019 Oil Price: Why The Latest Shale Bust Is Different

December 11, 2019 New York Times Natural Gas Boom Fizzles as a U.S. Glut Sinks Profits

January 19, 2020 World Oil: America is awash with natural gas, and it's about to get worse

February 5, 2020 CME Group Natural Gas: The Bust Within the Boom

After the pandemic:

April 30, 2019 CNBC News: Energy demand, hit by coronavirus crisis, is set to see record drop this year, IEA says

May 11, 2020 New York Times: Natural Gas Exports Slow as Pandemic Reduces Global Demand

May 22, 2020 Financial Times Boom to bust in the US shale heartlands

It would be a shame to compromise people's health and the environment for a project that puts a greater financial burden for producing energy. Surely we can do better and the Air Pollution Control Board has the

10/8/2020 Commonwealth of Virginia Mail - Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Co...
responsibility to evaluate this permit after hearing from the public.

Sincerely,
Freedra Cathcart



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

Norfolk Naval Shipyard CHP Support

1 message

Jasmine Duncan <jrob30@gmail.com> .
To: mariama.ouedraogo@deq.virginia.gov

Wed, Oct 7, 2020 at 3:55 PM

Dear VDEQ,

I am writing to express my support for the new Norfolk Naval Shipyard's new Combined Heat and Power Plant (CHP) and the economic, environmental, and energy security opportunities it will bring to the Tidewater region.

As a realtor, I am fully aware how projects like this contribute to the livelihood of a community. The estimated \$37+ million dollars this project will bring to the community translates to jobs for our workforce, and revenue for our supporting industries, all of which contributes to our community members' ability to support their families, local businesses, and community growth.

The Shipyard's environmental assessment showed that there will be no short- or long-term detriment to the environment or health of the local community. Once completed, the active plant will ultimately reduce greenhouse gases as the CHP plant will allow the Navy to operate independently of energy produced from waste and the local grid.

Upgrading to CHP and the shipyard's other planned energy conservation measures will allow the shipyard to avoid shutdowns, delays in maintaining and repairing ships, and in the long-term, save money on excess repair costs and maintenance. I hope you will consider all of these benefits and grant the permit for construction of the CHP.

Jasmine Duncan
757-816-8916
131 Rochdale Lane
Suffolk, VA 23434



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

US Navy–Norfolk Naval Shipyard

1 message

Finley-Brook, Mary <mbrook@richmond.edu>

Wed, Oct 7, 2020 at 4:58 PM

To: "mariama.ouedraogo@deq.virginia.gov" <mariama.ouedraogo@deq.virginia.gov>

Cc: Queen Shabazz <qshabazz@vaejc.org>

Permit Name: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number: US Navy–Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

To: mariama.ouedraogo@deq.virginia.gov

From: Mary Finley-Brook, PhD

Associate Professor of Geography and Environmental Studies, University of Richmond

#211 Richmond Way

Richmond VA, 23173

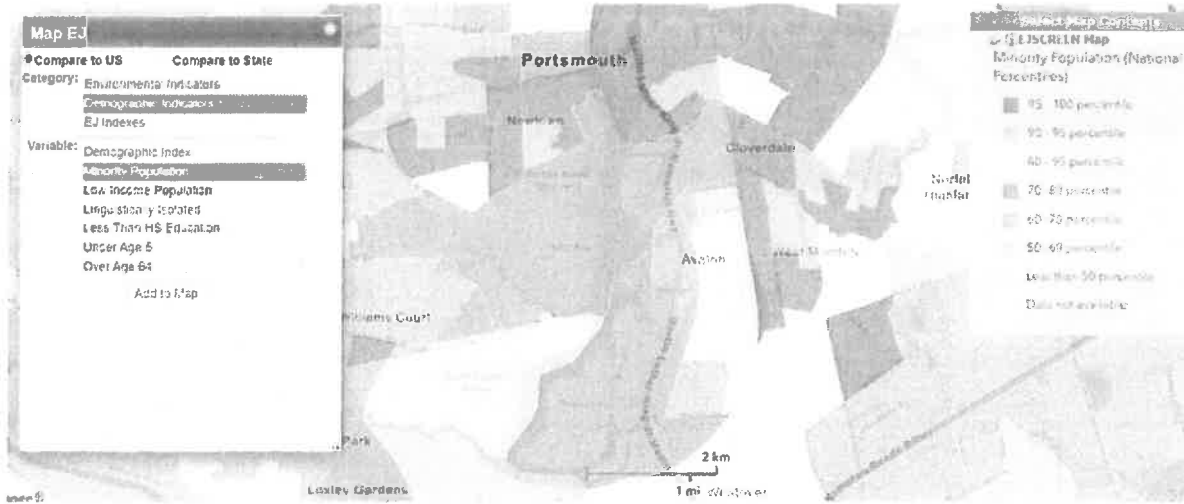
804 287-6307

This permit draft must be denied in its current state due to significant flaws and lack of protection for sensitive populations. Review must be elevated to the Air Board with a new comment period, after addressing the following weaknesses and errors in the draft permit.

As a member of the Steering Committee of the Virginia Environmental Justice Collaborative I am in contact with residents and organizations from Portsmouth and surrounding areas. My interest in this facility occurred as a result of hearing from these populations about concerns and seeing data that reinforces that they are correct in their alarm. This site and surrounding areas should not experience these additional risks and exposures.

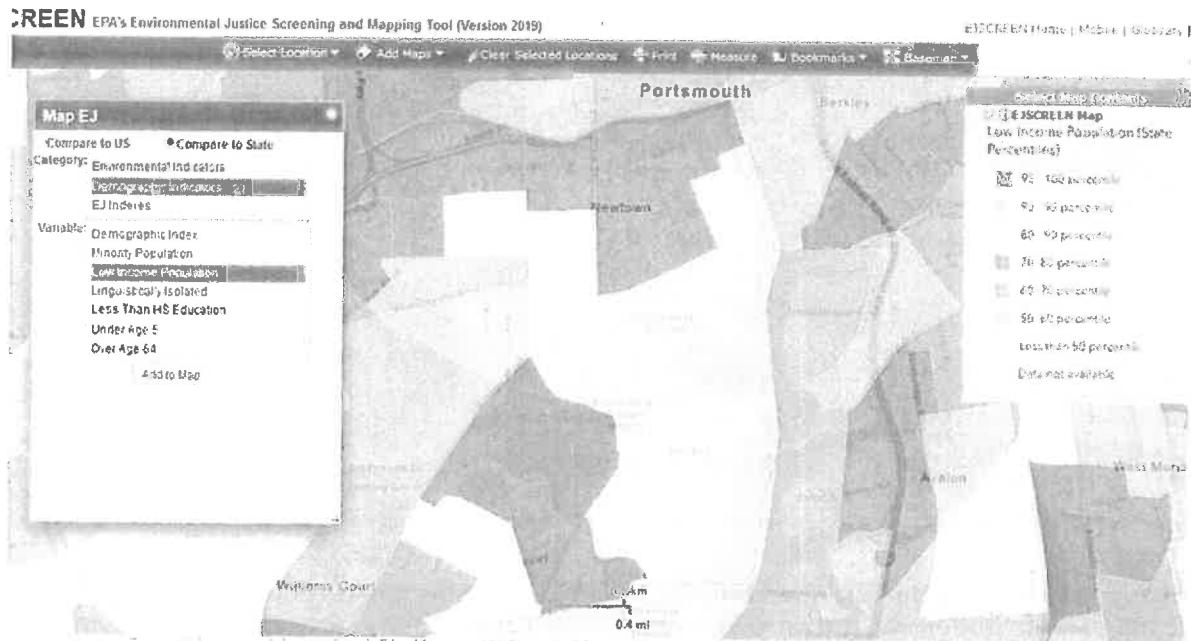
ENVIRONMENTAL JUSTICE ASSESSMENT WAS INSUFFICIENT (YET AGAIN)

Per the EPA EJSCREEN, many of the census tracts in close proximity to the site are in the 80-100th percentile nationally with respect to minority resident status as well as other vulnerabilities, including minority resident status, income, education level less than high school diploma, and children under 5.



Census units adjacent to the Norfolk Naval Shipyard (NNYS) are in the 90-100 percentile for Virginia with respect to multiple environmental justice or other important demographics (minority resident status, income, education level less than high school diploma, and children under 5) per the EPA EJSCREEN mapping tool (for example, see screenshots below).





In the interest of protecting the health of the nearby sensitive populations, a comprehensive risk assessment (including a health impact assessment) must be conducted, along with remedies for mitigating any excess risk identified by the risk assessment. In addition, there needs to be a full environmental justice assessment. The DEQ continues to improperly use EJSCREEN a preliminary screening tool in place of actual assessment, in spite of warning by the EPA not to. The EPA states:

It is important to understand that EJSCREEN is not a detailed risk analysis. It is a screening tool that examines *some* of the relevant issues related to environmental justice, and there is uncertainty in the data included. It is important to understand both of these limitations.

The first limitation arises because a screening tool cannot capture all the relevant issues that should be considered (e.g., other environmental concerns)...

Many environmental concerns are not yet included in comprehensive, nationwide databases. For example, data on environmental factors such as drinking water quality and indoor air quality are not available with adequate quality, coverage and/or resolution to be included in this national screening tool. EJSCREEN cannot provide data on every environmental impact and demographic factor that may be important to any location. Therefore, its initial results should be supplemented with additional information and local knowledge, for a more complete picture of a location (from <https://www.epa.gov/ejscreen/limitations-and-caveats-using-ejscreen>).

In the interest of protecting the health and safety of nearby populations, a comprehensive risk assessment must use standards for working with sensitive and vulnerable populations must apply (i.e., using environmental justice protocols) to avoid civil rights violations. Those established in guidelines for the Virginia Department of Transportation (V-DOT) could correct many of the deficiencies in this process so far. https://www.virginiadot.org/business/resources/Civil_Rights/ENVIRONMENTAL_JUSTICE_GUIDELINES.pdf

Many Virginians have encouraged DEQ on numerous occasions to improve its public engagement procedures. DEQ was sued for environmental racism in the 4th Circuit Court just last year, and lost, for

actions exactly like the ones repeated once again in this process, such as the incorrect use of EJSCREEN. DEQ claims to have made improvements and yet engagement continues to fall short. The agency lacks basic knowledge of and training in environmental justice protocols even following this court decision.

The surrounding communities already suffer from the environmental harms of established fossil fuel infrastructure in the area, as well as the Navy facility. A comprehensive health impact assessment must include cumulative exposures.

THIS IS ALREADY A SUPERFUND SITE

NNYS is a Superfund site and is surrounded by neighborhoods with long histories of harm as a result of these toxic facilities. This site is not suitable for a new gas plant because any additional exposure contributes to a public health emergency, both due to high risk and because of low health care coverage in the low income populations of the surrounding areas. People in these neighborhoods already suffer from COPD, asthma, and other respiratory illnesses in addition to concerning rates of lead poisoning (see, for example, <https://www.atsdr.edc.gov/news/displaynews.asp?PRid=2011>), mercury exposure (<https://semspub.epa.gov/work/03/2237900.pdf>), asbestos exposure (<https://www.asbestos.com/shipyards/norfolk-naval-shipyard/>) and other forms of environmental injustice based on their residence in proximity to this naval facility and other polluting industry (see <https://vcij.org/stories/virginias-toxic-military-legacy>).

There is a long history of environmental racism in this vicinity. Local populations have pre-existing health conditions as a result of a high toxic burden from various pollution sources and the draft permit did not use a hotspot analysis as part of the methodology to address cumulative exposures from multiple sites over time.

Selection of this site reinforces already existing disproportionate negative impact based on race and income. A proper and comprehensive environmental justice assessment would demonstrate this beyond any doubt.

COMMUNITY OUTREACH WAS INADEQUATE

Due to the history discussed above, there is a lack of trust with the NNSY and DEQ. As I have spoken to residents in the surrounding area, I keep hearing from impacted populations that they did not know about this draft permit. There were a small number (5) of nongovernmental organizations (NGOs) contacted, but vulnerable populations living close to the facility did not receive timely notice about this project with clear and accurate information. The notification procedures for this hearing did not comply with protocols for environmental justice populations, as there should be significant effort to reach at-risk and sensitive groups with non-technical language that can be understood by a typical resident.

Outreach to date was inadequate and materials were misleading to the point of being dishonest. The information sheet says there are no significant direct or indirect impacts and this is simply untrue. Federal regulations of VOCs, HAPs, and heavy metals allow for exposures that harm human health, such as the release of carcinogens. DEQ allows for exemptions to ignore these dangerous releases. Furthermore, if a young child or elderly resident has asthma and lives in the direct vicinity, their quality of life will be diminished as a result of the tons of particular matter and ozone. This amount of NOx contributes to acid rain and harms the ecology and biodiversity of Chesapeake Bay, which thousands of families rely upon. If there is a fuel spill, fire or explosion, given the use of flammable materials, the impact would be highly significant and potentially fatal. All of these are significant direct or indirect consequences that were intentionally ignored in project factsheets, given a false sense of security and discouraging people to ask additional questions or demand emissions control improvements. The BACT analysis did not lead to the Best Available Control Technology. DEQ seeks to allow regulatory exemptions for emissions at dangerous levels for children, including individual and total polycyclic aromatic hydrocarbons and some heavy metals.

Hourly emissions rates for nickel and phosphorus are dangerously high. VOCs from this plant remain excessive.

The information sheets circulated by DEQ stated that there were effective emissions controls and that there are no risks or harm, suggesting people did not need to acquire more information. While this misleading information did generally not reach people, nevertheless, it is incorrect and unethical for DEQ to promote an approval bias such as this given the seriousness of the matter. Communities of color are highly vulnerable to the impacts from air pollution and are disproportionately targeted facilities such as this. Air pollution is deadly and in fact more people will die from poor air quality than from COVID-19 this year.
https://www.who.int/health-topics/air-pollution#tab=tab_1

Deaths from COVID are higher in areas of the US with higher air pollution (see Wu, X., Braun, D., Schwartz, J., Kioumourtzoglou, M.A. and Dominici, F., 2020. Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. *Science advances*, 6.
<https://projects.iq.harvard.edu/covid-pm>)

As someone who knows the impacts of these emissions for children and vulnerable populations, I would be opposed to my family living near this site. It is not accurate to assume that NAAQS keeps sensitive populations safe or that co-pollutants lack importance just because regulatory agencies have dodged responsibility. However, the stated mission of DEQ is:

To ensure the continued vitality of what the Commonwealth has to offer, the mission of the Department of Environmental Quality is to protect and improve the environment for the well-being of all Virginians.

DEQ should follow their mandate and educate the public rather than misinform. Regulators should admit when monitoring systems are too far away or regulatory mandates are too narrow or limited to address the full range of emissions. A child's lungs do not care if a toxic emission is legally regulated or not, and many times damage from air pollution is permanent, creating a lifetime of harm. A child will get sick from hazardous air pollutants, even if the federal government believes it is too expensive or too difficult to trace, or just doesn't care about unregulated co-pollutants. This permit draft demonstrates either inability or unwillingness on the part of DEQ to protect and improve the environment for the well-being of Virginians in the vicinity of this plant, who are defined as vulnerable frontline populations.

COMPREHENSIVE RISK ASSESSMENT

There needs to be a comprehensive risk assessment for this project, including risks of fire, explosion, gas leak, diesel spill, etc. There is discussion in project documents of storage of fuel in large tanks on-site, which creates vulnerability in the face of terrorist attacks. This is of great concern given the importance of this NNSY in global supply and the flammable and explosive nature of surrounding infrastructure.

ASSESSMENT OF ALTERNATIVES WAS POOR

The relationship between this combined heat and power (CHP) plant and the Wheelabrator waste-to-energy facility in Portsmouth is unclear. If steam comes from an existing facility, and energy efficiency can reduce overall need, the main justification for this plant comes down to energy security. Thus, the most resilient

option, with the least environmental harm, is to use an existing plant along with solar back-up and battery storage for blackouts and grid instabilities.

Based on the permit draft, this plant does not guarantee environmental improvements that project developers allege from a CHP plant due to incomplete analysis, with points seemingly geared to justifying this plant rather than neutrally assessing the alternatives. Micro grids based on solar (with battery backup) could be the most resilient form of energy in areas of flooding and hurricanes

<https://www.nbcnews.com/news/us-news/rising-seas-threaten-norfolk-naval-shipyard-raising-fears-catastrophic-damage-n937396>

Pipelines are not resilient in areas prone to hurricanes and flooding because they must be shut down during extreme weather, negating the Navy's justification for this plant providing security in times of grid failure, as fuel sources would be shut off. If large storage tanks were to be used to stockpile fuel, this creates a number of serious risks, as mentioned above, including terrorism and risk of explosion, fire balls, and fires. <https://technokontrol.com/pdf/storage-tank-fires-study.pdf>

SEGMENTATION, LEAKAGE AND MISCALCULATION

In spite of claiming to do cumulative and comprehensive review of direct and indirect impacts, there is in fact a segmentation of many emissions and harms. One example is the lack of information about the fuel source for this facility. This allows for an underestimation in calculations of greenhouse gas (GHG) emissions allowing the applicant to claim overall climate benefits, even though these are erased with a full lifecycle assessment that includes the GHG emissions from the extraction of gas (hydraulic fracturing) as well as transmission emissions, such as compressor stations. These mathematical exclusions are a form of leakage that make it impossible to truly mitigate climate change in the face of a growing global crisis.

The reason leakage matters for the Navy, and especially the Navy infrastructure in Virginia, is because of the vulnerability of these military facilities, including NNSY, to climate change and sea level rise. Given the billions of dollars necessary to move these facilities, or to try to build protective walls and climate change adapted structures, it would be prudent to do a true cost accounting of any new infrastructure. Virginia's economy will be harmed a great deal if we do not protect our economic resources from climate change and from sea level rise and the Navy has released many studies stating exactly this.

<https://www.ucsusa.org/resources/front-lines-rising-seas-naval-station-norfolk-virginia>; <https://insideclimatenews.org/news/10252017/military-norfolk-naval-base-flooding-climate-change-sea-level-global-warming-virginia>

Assessment of the environmental impact of natural gas was incomplete in this draft permit leading to an incorrect finding of positive climate repercussions. There is a misleading claim of NO SIGNIFICANT direct or indirect impacts, which does not effectively take into consideration the 262,459 tons/year of CO₂e, especially because the segmentation and leakage discussed above shows this number to be an underestimation - for example, methane is not fully counted. We are in a climate emergency and these outputs ARE SIGNIFICANT. The most recent synthesis report from the Intergovernmental Panel on Climate Change (IPCC) records methane emissions as approximately 35 times stronger greenhouse gas than carbon dioxide (CO₂) when implications are averaged across 100 years. Potency is higher when shorter timeframes are considered: methane has 86 times the potency of carbon dioxide over the first 20 years after emissions. Moreover, methane is 120 times more powerful when both methane and carbon dioxide co-exist in the atmosphere (see <https://www.ipcc.ch/report/ar5/wg1/>).

SITE THREATS FROM SEA LEVEL RISE

The shipyard now faces its greatest existential threat: rising seas and extreme weather driven by climate change. <https://www.nbcnews.com/news/us-news/rising-seas-threaten-norfolk-naval-shipyard-raising-fears-catastrophic-damage-n937396>; https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf

In the past 10 years, Norfolk Naval Shipyard has suffered nine major floods that have damaged equipment used to repair ships, and the flooding is worsening, according to the Navy. In 2016, rain from Hurricane Matthew left 2 feet of water in one building, requiring nearly \$1.2 million in repairs. If a Category 4 hurricane made landfall at Norfolk Naval Shipyard, the storm surge could be greater than 9 feet in places. The Navy has begun creating micro-grids at some facilities to make electrical supply more resilient to storms. When asked about the Navy's response to climate change at the shipyards, a spokesman pointed to comments Defense Secretary James Mattis made last year: "The Department should be prepared to mitigate any consequences of a changing climate..." William M. Couch, a Navy spokesperson said that "flooding concerns were a major consideration for Norfolk Naval Shipyard in evaluating necessary work" (<https://www.nbcnews.com/news/us-news/rising-seas-threaten-norfolk-naval-shipyard-raising-fears-catastrophic-damage-n937396>);

The main substances affecting health in a polluted atmosphere are nitrogen oxides (NOx), sulphur oxides (SOx), and ozone and particulate matter — with the latter of greatest concern, as these tiny particles penetrate deep into the lungs, affecting both the respiratory and vascular systems. Air pollution will kill more people this year than COVID-19. <https://www.globalcitizen.org/en/content/air-pollution-kill-more-people-covid-19/>

A SERIOUS CALCULATION ERROR IN POLLUTION MODELING

Review of the draft exposes a serious calculation error. The project description includes two dual fuel turbines, each with its own natural gas fired duct burner, along with three dual fuel boilers. The turbines and boilers may burn diesel fuel when the natural gas supply is curtailed, interrupted, or when diesel is burned for testing purposes. One of the operating scenarios in the Engineering Analysis indicates that both turbines and both duct burners will operate concurrently at times.

The Facility Wide Potential to Emit evaluation for hazardous air pollutants (HAPs; Table B-2, Attachment C) determined the maximum hourly emission rates for each of the project's emissions sources (turbines, duct burners, boilers, generators, and tanks). The hourly emissions rates were then added and compared to an hourly emissions rate exemption threshold.

Review of the relevant spreadsheet calculations (Table B-4, Turbine Potential HAP Emissions) shows that the HAP emission rate is based upon emissions from a single turbine and single duct burner. On the contrary, one of the operating scenarios entails the use of two turbines and two duct burners. Hourly HAP emission rates in some cases will be substantially higher after correcting the calculations. DEQ must request the applicant provided corrected emissions rates for all HAPs.

Example: Formaldehyde

"Each turbine has a maximum rated heat input of 93.4 MMBtu/hr"
(Engineering Analysis, page 3)

"NG Heat Input, CT only" = 93.4 MMBtu/hr

CT emission factor = 2.6E-04

CT formaldehyde emission rate (NG) = "F4*F30" = 2.4E-02 lb/hr

(Table B-4, cell F4)

(Table B-4, cell F30)

(Table B-4, cell L30)

Using these values, the maximum emission rate in Table B-4 is determined as the simple sum of the emission rate of one turbine and one duct burner (cell T30; max emission value between gas or diesel + duct burner).

(The maximum emission rate for the turbine occurs when burning diesel, but uses the same calculation method to determine a maximum rate of 2.5E-02 lb/hr for the turbine alone.)

From Table B-2 (HAP summary):

Turbine hourly emission rate = 2.49E-02

(Cell Q41; taken from Table B4, M30)

Sum of emissions rates = Sum Q41:U41

(Cell V41)

The calculations referenced here demonstrate that the HAP emissions rates used maximum rates based upon the operation of a single turbine (and similarly, single duct burner; see Table B-4 cell R30 for calculations based upon fuel flow PER DUCT BURNER, cell F10).

Prior to proceeding with the permitting process, DEQ must require the applicant to correct these calculation errors, and subsequently review to determine that no exemption thresholds are exceeded. The data must be released to the public and interested parties for their consideration prior to continuing with permitting.

DOCUMENTATION OF CATALYST PERFORMANCE

Volatile organic compounds (VOCs) for the turbine will be controlled by a platinum catalyst. On review of the documentation for the project, including the catalyst technical documentation, we were unable to identify any supporting materials that indicate the performance of the catalyst with respect to formaldehyde emissions. The applicant must provide specific documentation that demonstrates the CO/VOC catalyst will reduce formaldehyde to meet the federally required emission rate of 91 parts per billion volume (dry; see 40 CFR Part 63 Subpart YYYY, table 1).

Annual and hourly emissions of formaldehyde may exceed the state's exemption limit, if the above noted calculation error is taken into account.

GAS IN THE PJM IS INCREASINGLY RISKY

While the Navy may have the same funding parameters as private developers do, federal funds should be invested wisely. A series of recent reports show economic risks of new gas plants are growing, spotlighting the PJM in particular. According to these assessments, renewable energy makes more sense from an economic standpoint.

https://ieefa.org/wp-content/uploads/2020/10/Risks-Outweigh-Rewards-for-PJM-Natural-Gas-Project-Investors_October-2020.pdf; <https://rmi.org/clean-energy-is-canceling-gas-plants/>

There has been no clear identification of fuel source in terms of the supply pipeline; the draft permit does not address construction of a lateral pipeline bringing fuel from a main pipeline to the project location - these additional ecological harms require attention in the draft permit, or the environmental impacts are improperly segmented and harm appears to be falsely diminished. There is no certainty of constructing new pipelines, given recent delays and controversies in Virginia.

FEW PERMANENT JOBS

There are forms of energy that provide more long-term jobs than gas. Based on the millions of dollars of proposed investment to this site, the creation of only 17 permanent jobs is inadequate, particularly given the VOC and HAP exposures during work at a plant run on gas and diesel located in a polluted environment. Renewable energy sources create more jobs in the long term and have lower toxic burden. There would be positive spin off job creation from the Navy investing in solar and other renewables. The placement of solar panels is appropriate for this site location, which is, according to some project documents, a former parking lot. There are other brownfields and open areas near this site that are also suitable for solar development.

NNYS CONTROVERSY

The leadership of the NNSY is in flux. <https://news.usni.org/2020/09/21/navy-norfolk-naval-shipyard-co-removed-over-poor-maintenance-rates>; <https://taskandpurpose.com/news/navy-fires-norfolk-naval-shipyard-commander>

This would not be the first time the facility demonstrated leadership weaknesses: a 2017 report after study of NNSY decision making stated "The investigators' outlook is that there was a notable lack of command leadership oversight or engagement." This negligence led to a lack of scrutiny regarding expenses. https://www.pilotonline.com/military/article_7b83abcc-aad9-5063-9165-59ecec274c80c.html

There appears to have been some lack of attention to the details of this project and perhaps a lack of attention to the search for better alternatives.

SITE ASSESSMENT OF A UNIQUE PLACE

The neighborhoods surrounding the NNYS are historic. Elevation to the Air Board will allow for a fuller picture of these areas, including site suitability. The DEQ's environmental and social assessment is too narrow for responsible review in a sensitive and important location like the vicinity of NNYS.

The mandate of the Air Board is to consider the following.

1. The character and degree of injury to, or interference with, safety, health, or the reasonable use of property which is caused or threatened to be caused;
2. The social and economic value of the activity involved;
3. The suitability of the activity to the area in which it is located; and
4. The scientific and economic practicality of reducing or eliminating the discharge resulting from such activity.

ELEVATE TO THE AIR BOARD

Not only must this permit be elevated to the Air Board for proper oversight and review, the information gathered from the public in comments should be allowed to address the full scope of the Air Board mandate, mentioned above. DEQ has a practice of telling the public that their comments must be constrained to

technical information, but site suitability and other broader considerations are required for the Air Board to make a full assessment in accordance with their responsibilities.

THREE PENDING QUESTIONS

1. The NNSY seems to have an expired air permit, according to Trinity Consultants' report: "The facility is currently operating in accordance with Virginia Department of Environmental Quality Title V Permit No. TRO-60326, which expired October 31, 2017. In April of 2017, NNSY submitted a timely Title V renewal application, but the new permit has not been issued to date. Is this still missing?"
2. The draft permit is not clear in terms of the relationship between this CHP plant and the Wheelabrator waste to energy facility in Portsmouth. Would there be a reduction of air emissions, or of jobs, from this nearby facility?
3. It is unclear why the applicant did not need a New Source Performance Standards (NSPS) review, since this is a new gas plant. The Prevention of Significant Deterioration (PSD) permit does not seem like the correct standards for a new facility. Please explain.

10/7/2020 7:36 PM

To: Mariama Ouedraogo, VA Dept. of Environmental Quality (DEQ)

Tidewater Regional Office

5636 Southern Boulevard

Virginia Beach, VA 23462

Email: mariama.ouedraogo@deq.virginia.gov

From: Lynn A. Godfrey, MPH

Mailing Address: 1708 Hoover Avenue, Apt. D, Chesapeake, VA 23324

Permit Name: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicate Name and Registration Number: US Navy–Norfolk Naval Shipyard – 60326

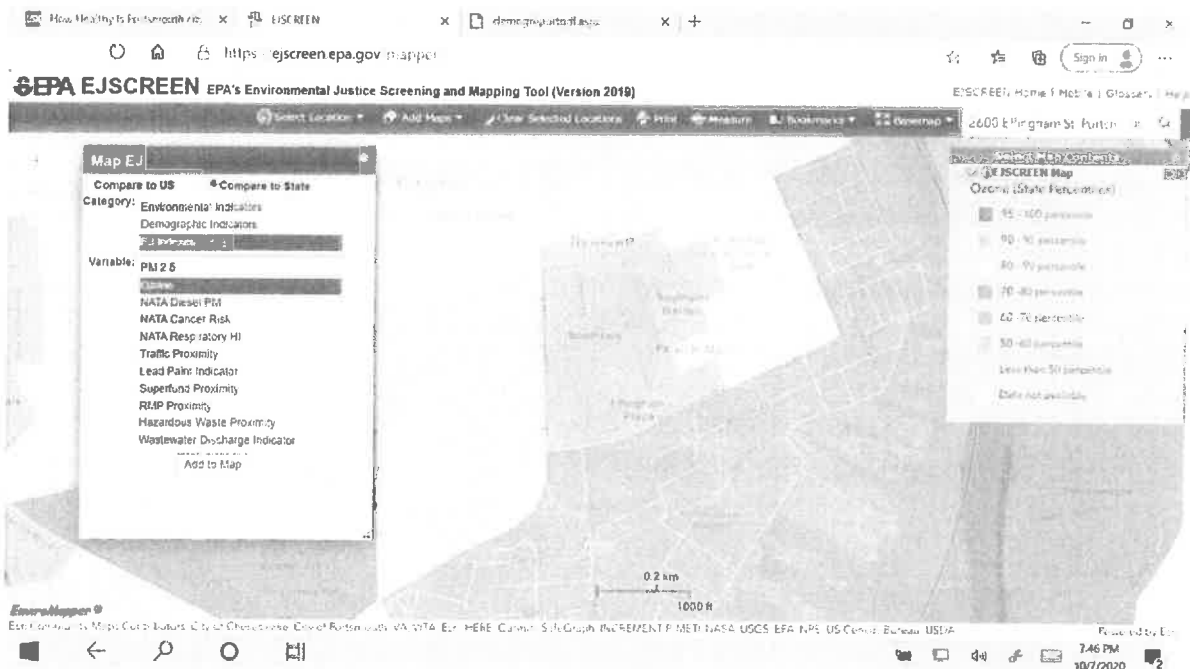
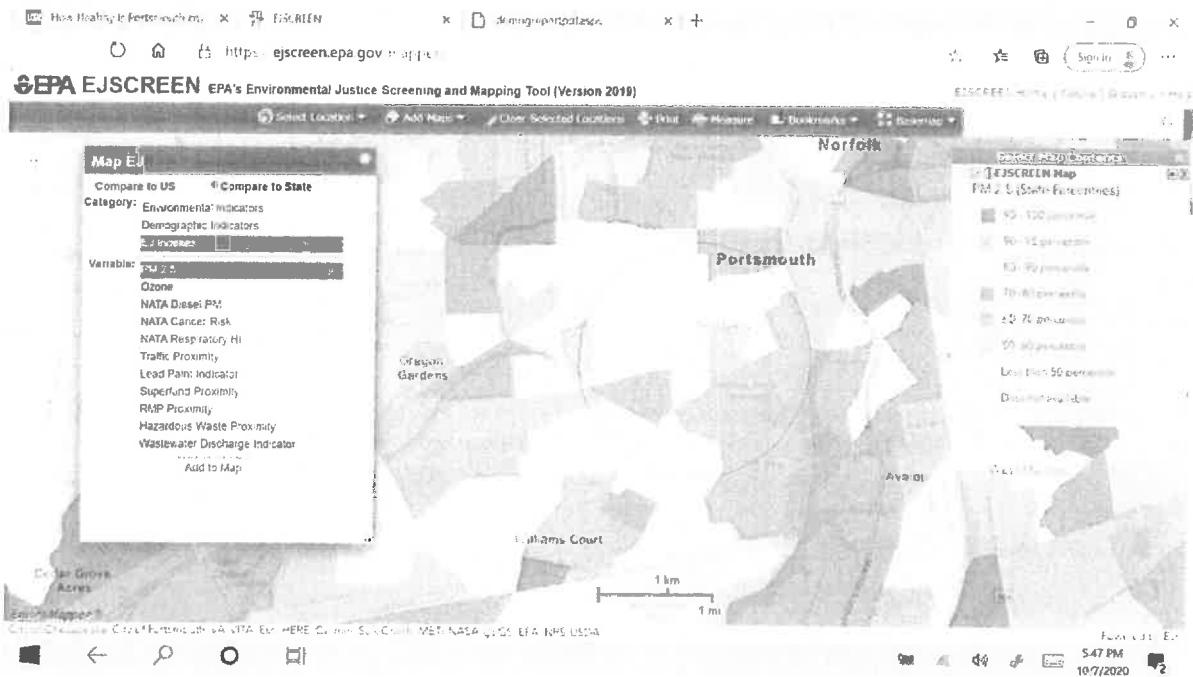
Facility Name and Address: US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

Re.: Public Comment for Referenced Permit

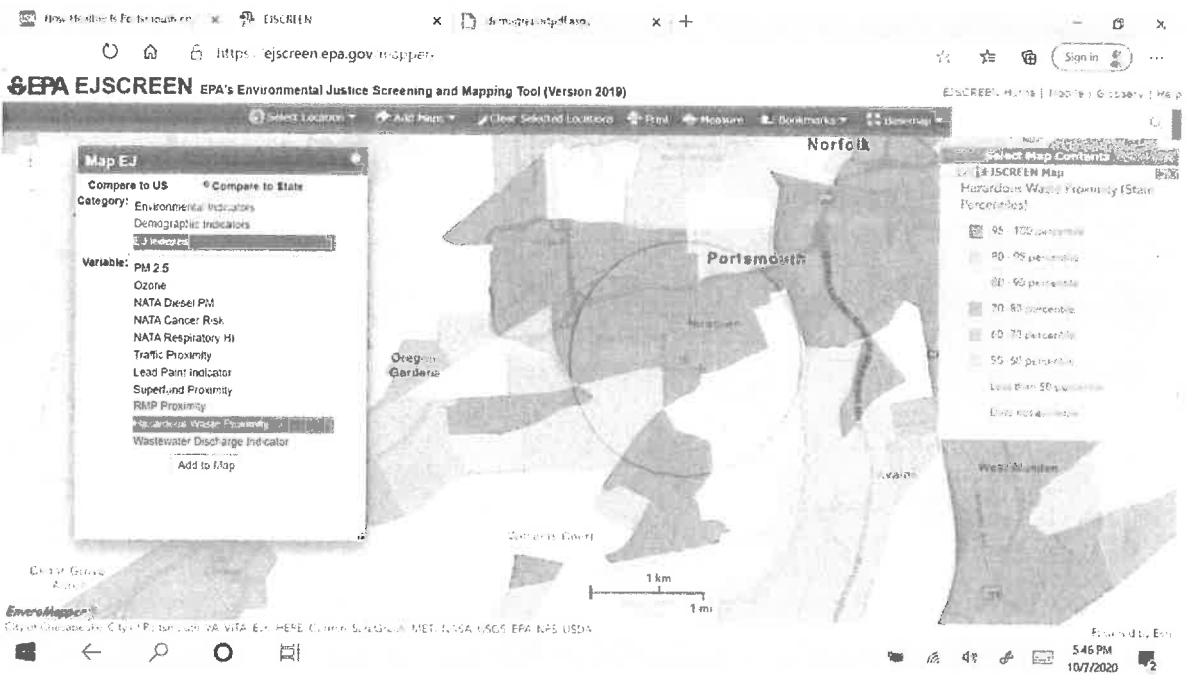
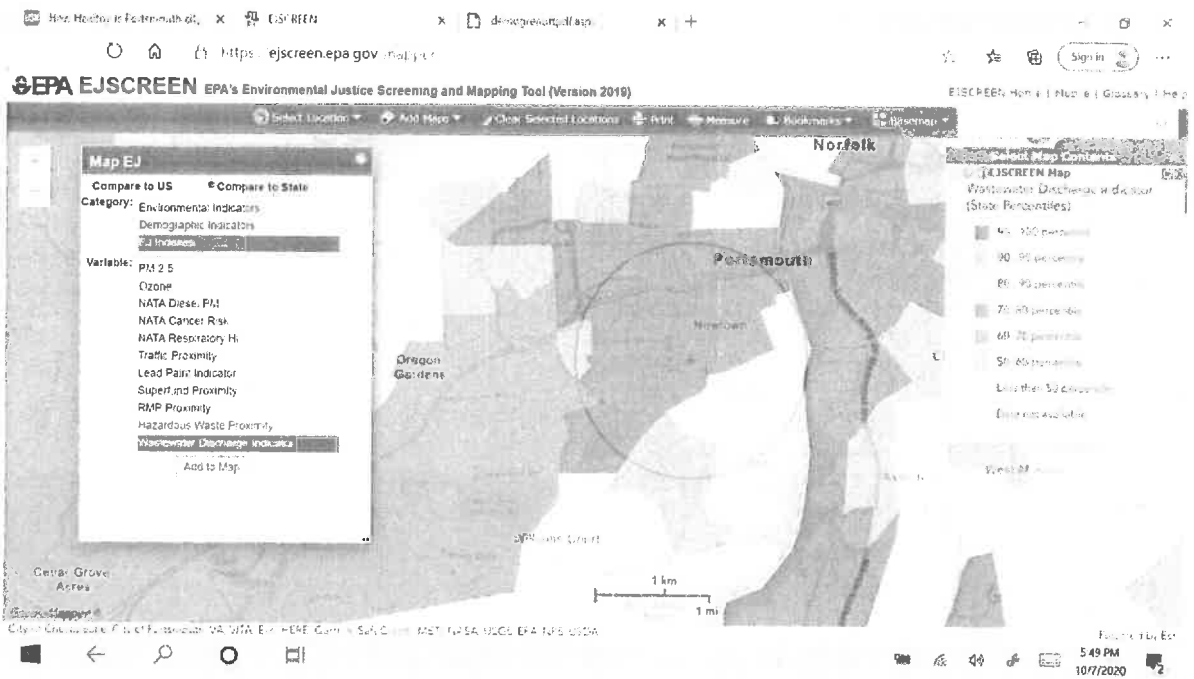
Dear DEQ Representative Mariama Ouedraogo:

I am writing to comment my opposition to the NNSY's (Norfolk Naval Shipyard) application for a permit to construct a gas powered combined heat and power plant in Portsmouth, VA, registration #60326; and, that the project be raised to the level of a full Air Board hearing.

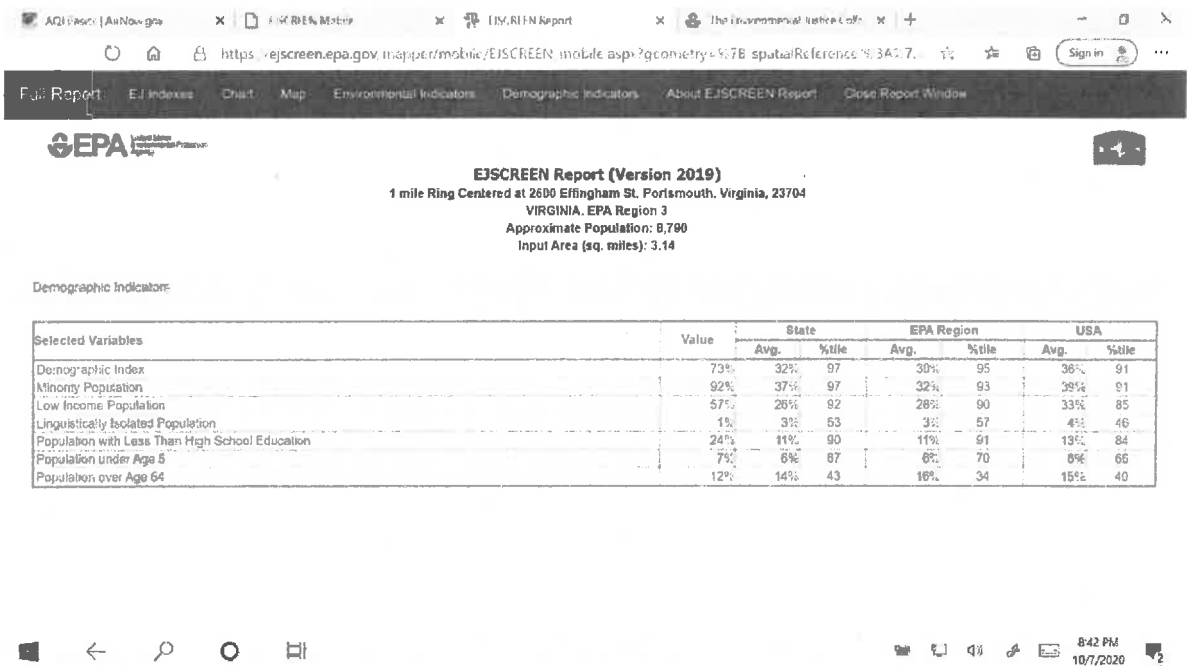
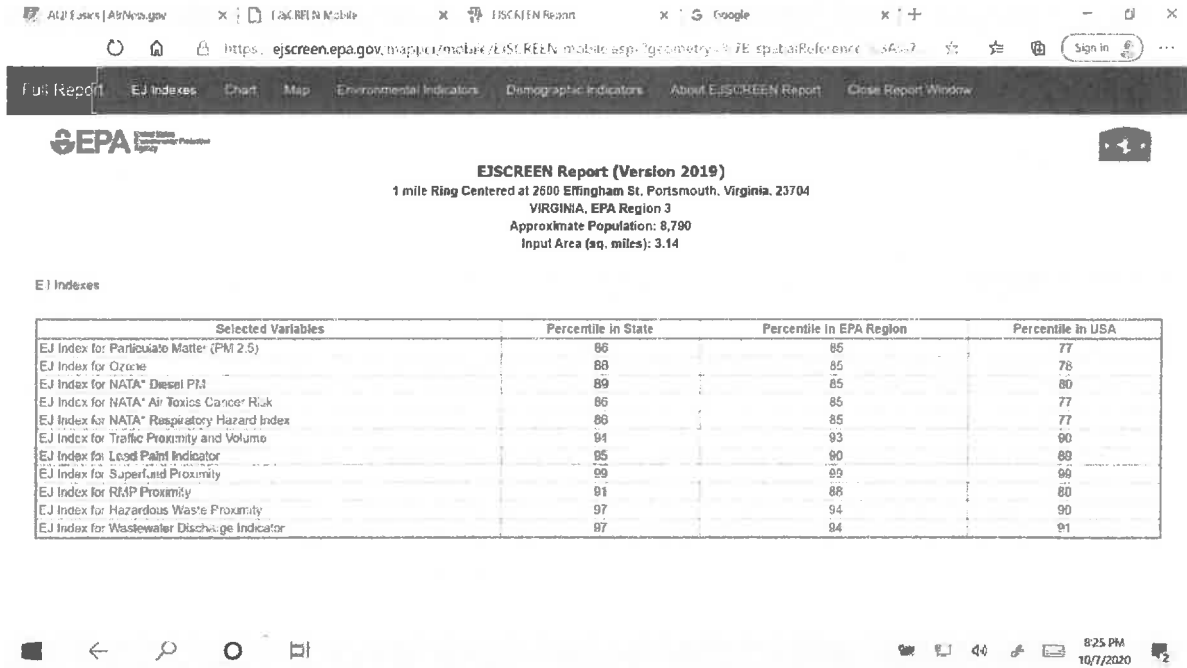
With neighborhoods surrounding the NNSY ranking in the 80-90 and 90-95 percentile range for PM2.5 and Ozone, respectively, two pollutants that pose the greatest threat to human health in this country (AirNow.gov), I think it prudent and reasonable to have the full board review NNSY permit request. A full and comprehensive Environmental Justice Screen is warranted for this project by the DEQ based on the demographics and geography of the neighborhoods surrounding the NNSY and the Yard's current and past history as a Superfund Site.



In addition to the PM2.5 and Ozone concerns already threatening the health of this neighborhood and population, the proximity to a hazardous waste facility, Wheelabrator, places the community in the highest percentile ranks, 95-100 percentile, for proximity to a hazardous waste facility and waste water discharge for both factors.



As the EPA EJ Indexes chart indicates this neighborhood is ranking the highest in the state and nation for many of the variables the EPA identify as indicators of a neighborhood bearing a disproportionate burden of the environmental risk associated with industry energy buildout.



In the midst of a worldwide lethal pandemic, disproportionately impacting the poor and people of color, climate change and social justice demands I implore VA DEQ to conduct a full Air Board hearing to decide this matter and conduct a full environmental justice screen to protect this community from further environmental injustices.

Sincerely,

Lynn A. Godfrey



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

Comment on proposed NNS generation plant

1 message

Ralph Grove <rfgrove@icloud.com>
To: mariama.ouedraogo@deq.virginia.gov

Wed, Oct 7, 2020 at 11:24 AM

From: Ralph Grove
229 W Bute St, #406
Norfolk, VA 23510
ph: 540 478 3677

Permit Name: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number: US Navy--Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy--Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

To Whom it May Concern:

I am opposed to the construction of a new gas-powered generation plant at the Norfolk Naval Shipyard and I request that the project be elevated to a public hearing in front of the Air Board.

My opposition is based on the following:

- This project will affect a minority community that is already burdened by existing pollution sources and proximity to a Superfund cleanup site. There is a history of environmental racism in the affected community, and this project will dump more pollution on people who are already suffering from an unfair burden of environmental degradation. The project should entail a complete Environmental Justice Assessment.
- The hearing for this project should have complied with protocols required for environmental justice populations, including attempts to reach out to at-risk groups with non-technical language and consultation.
- Virginia has made the commitment to move away from fossil fuels and to deploy renewable energy in the future (Virginia Clean Economy Act, 2020). This project contradicts the will of the people of Virginia by creating more fossil fuel infrastructure. The project also failed to fully consider alternative energy sources and energy efficiency that would be consistent with the CEA.
- Methane is one of the worst greenhouse gases, with an impact many times greater than carbon dioxide. This proposal failed to consider the extra impact that methane production, transportation, and storage will have on climate change.
- Given the proximity of the project to urban population centers, a more thorough risk assessment should be conducted, including threats of hurricanes, sea level rise, terrorist attack, accidents, and how people can be evacuated and/or protected from each risk.

Technical Comment for DEQ regarding New Power Plant Construction for NNSY
Opposition to the current proposal of a gas power plant at NNYS

Name: LaKeshia K. Hicks

Mailing Address: 138 Webster Ave. Portsmouth, VA 23704

Phone Number: (757) 597-8478

Permit Name:

Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number:

US Navy–Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

Overview Statement:

As a citizen of the City of Portsmouth and a member of the Portsmouth Branch of the NAACP, I am extremely concerned about the potential environmental impacts from the construction of a New Power Plant for Norfolk Naval Shipyard. I oppose the construction of the gas-powered plant at the Norfolk Naval Shipyard in its current proposal and request that the project be escalated to a public hearing of the State Air Pollution Control Board. After participating in discussions in the community and reviewing documents on my own, I have concluded that there is more that must be done concerning addressing the environmental issues with this plant for myself and my community. This document is my official technical comment to the Department of Environmental Quality (DEQ) outlining my opposition which are as follows:

Historical Toxin Oversaturation to Surrounding Neighborhoods

For over 60 years, NNSY has not been a good neighbor to the citizens of Portsmouth. It has without regard to the health and safety of the residents of nearby neighborhoods, continued activities of conversion and ship repair without addressing environmental impacts. These actions have created toxins of heavy metals that have been widely distributed into the environment. Living in surrounding neighborhoods, I have experienced, heard family, friends and neighbors discuss the high degree of toxicity of these metals that rank high among the priority metals that are of public health significance. They are considered systematic toxins known to induce multiples of organ damage, even at lower levels of exposure. They are also classified as known human carcinogens according to EPA and the International Agency of Research on Cancer. These toxins have an overwhelming effect on children, seniors and childbirth age men and women

especially for surrounding communities such as Southside Gardens and other low-income minority citizens that include some of my friends and neighbors.

The addition of a new power plant will contribute to the above-mentioned concerns regarding emissions and expose to Portsmouth residents and mitigation strategies must be clearly articulated which to date are not. Though levels may be at acceptable standards, an environmental analysis must show how the exposure from the new plant in addition to already existing exposure will have on the citizens of Portsmouth.

Impacts on Environmental Justice communities:

I participated and or have been exposed to information regarding the racial and socioeconomic area that the plant would impact in which I am concerned with and currently live near. At least 2 of the census units adjacent to the Norfolk Naval Ship Yard are in the 90-100 percentile for the Commonwealth of Virginia with respect to multiple environmental justice (EJ) or other important demographics (minority resident status, income, education level less than high school diploma, and children under 5) per the EPA EJSCREEN mapping tool that was given as a resource guide.

Based on the project description from NNSY, they applied for a permit to build a new combined heat and power plant that proposed the following environmental exposures:

The maximum annual emissions of air pollutants from the combined heat and power plant under the proposed permit are expected to be: 21.5 tons per year (tpy) of PM10 and PM2.5; 6.0 tpy of SO₂; 29.4 tpy of NO_x; 35.2 tpy of CO; and 12.4 tpy of VOC.

In the interest of protecting the health of the nearby sensitive populations, an independent (totally separate of the NNSY) risk assessment must be conducted, along with remedies for mitigating any excess risk identified by the risk assessment. In accordance with federal NESHAP regulations, this assessment must include documentation and mitigative recommendations for air pollutants, including volatile organic compounds (VOC's), total polycyclic aromatic hydrocarbons, heavy metals, nickel, phosphorous, formaldehyde and other hazardous air pollutants.

According to a report by NAACP, 'Fumes Across the Fence-Line', "It is not a coincidence that so many African Americans live near oil gas development. Historically, polluting facilities have often been sighted in or near African American communities". Careful consideration must be made to the cumulative effects this project will have on the already overburdened community. Portsmouth, which I have lived for a long period of time, has a long and torrid history of my fellow neighbors and friends suffering from pollutants from Superfund sites, lead poisoning, mold, and impacts from climate change. Every effort must be made to not only mitigate negative impacts from current or future projects but implement pro-active solutions to help correct past transgressions and help our communities to heal.

Deficient and Disparaged Community Outreach Efforts:

Having engaged with project representatives and advocacy groups regarding the community outreach in the City of Portsmouth regarding the construction of the power plant, I feel that efforts to reach out to citizens in the surrounding areas of the proposed plant was insufficient. Critical emphasis on environmental impacts were not thoroughly discussed with us as citizens that could potentially impact quality of life. I want to ensure that my City is not impacted with long term, generational effects that will come from the plant. Additionally, below are reasons why I think the community engagement was not sufficient:

- Community Meetings were not conducted during times to maximize participation and dialogue
- Project managers did not engage with and or interact with a diverse representative sample of the community—specifically amongst black organizations and community leaders
- DEQ only has contacts of 5 stakeholders, which is insufficient and does not engage with a representative sample size of the community.

In conclusion, for the reasons listed above, as a resident of the City of Portsmouth, I oppose the construction of the gas-powered plant at the Norfolk Naval Shipyard in its current proposal and request that the project be escalated to a public hearing of the Air Board. Thank you



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

Support of CHP

1 message

Sheila Hunt <slahunt@icloud.com>
To: mariama.ouedraogo@deq.virginia.gov

Wed, Oct 7, 2020 at 9:38 AM

Hello,

I am Sheila Hunt, and as a resident of the City of Portsmouth, I would like to express my support for the proposed Combined Heat and Power (CHP) plant at the Norfolk Naval Shipyard. The Navy currently sources their steam and electricity through a less efficient combination of refuse-derived fuel and the power grid. Additionally, the Shipyard's energy infrastructure is 40 years old and is in dire need of an energy conservation transformation so it can use energy more efficiently and operate independently of current energy sources.

I find it compelling that the proposed project and additional Energy Conservation Measures (ECMs) are not only environmentally safe but provide enough savings so this project can be self-funded, placing no burden on taxpayers. Furthermore, the project's construction leaders' commitment to working with the local and regional SWaM business community to provide subcontracting opportunities is encouraging given the economic pressures many of us are facing during these trying times.

Thank you for the opportunity to share my support for this project and its potential to reduce emissions and make the Navy more energy secure.

(757)-408-9390
4313 Midfield Parkway, Portsmouth, Virginia 23703

Sent from my iPhone



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

US Navy-NorfolkNaval Shipyard; 60326

1 message

Suzanne Keller <sjkeller.ma@gmail.com>
To: mariama.ouedraogo@deq.virginia.gov

Tue, Oct 6, 2020 at 11:58 AM

Suzanne J. Keller
1312 Amherst Ave
Richmond, Virginia 23227
804-266-4313

PERMIT NAME: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

APPLICANT NAME AND REGISTRATION NUMBER: US Navy-Norfolk Naval Shipyard; 60326

FACILITY NAME AND ADDRESS: US Navy-Norfolk Naval Shipyard; 2600-2700 Effingham St.
Portsmouth, VA 23709

I request that this permit be reviewed by the Air Pollution Control Board

In the analysis of BACT, there is no discussion of renewable energy. Why didn't the applicant consider solar, battery storage with diesel as backup. Clearly they don't consider the gas supply reliable, hence the diesel backup. If the applicant used solar and battery storage, they would achieve a substantial reduction of greenhouse gases, particulate matter, and other hazards. DEQ discusses the issue of "redefining the source" but in the 4th Circuit decision in Buckingham v the Air Board, DEQ lost that argument. DEQ should be working with the applicant to reduce emissions to the lowest level possible, instead they enable applicants to pollute our air.

The Buckingham decision gave explicit direction to DEQ and Air Board: 'Environmental justice is not just a box to be checked.' Yet in this application and engineering analysis that is all DEQ and the applicant have done. DEQ did not consider cumulative impacts on the neighborhoods around the Norfolk Naval Shipyard which is itself a superfund site. DEQ did not consider the pollution from the Wheelabrator facility which has been fined in the past for emissions exceeding their permit. The stressors and hazards surrounding the EJ neighborhoods, which by the way are in the 80th-90th percentile for poverty and race, is not addressed in the permit. DEQ should be guiding applicants to reduce hazards that will have a disproportionate impact who live right next to facility.

DEQ again relies on regional ambient air measurements without considering the proximity of the neighborhoods to the facility. That is not good enough. The history of environmental injustice predicts that these hazardous facilities are located in minority or poor neighborhoods. Wheelabrator is a great example, where waste filled with toxic materials from out of state is burned to produce energy.

Particulate matter is dangerous at any level and as expert testimony in Buckingham showed, particulate matter is more dangerous closest to the source. Ambient air measurements miles away say absolutely nothing about the dose and exposure to people right next door. DEQ should be protecting these neighborhoods from the disproportionate impact inherent in the proximity to the facility. Indeed, the EPA found in its 2009 Integrated Science Assessment that; "Together, the collective evidence from epidemiologic, controlled human exposure, and toxicological studies is sufficient to conclude that *a causal relationship exists between short term exposures to PM2.5 and cardiovascular effects . . . and mortality.*" The permit allows an increase in particulate matter, this is not acceptable.

Virginia cannot just continue to check the box on environmental justice and continue to allow polluting facilities in poor or minority neighborhoods. The Norfolk Naval Shipyard should be commended for its effort to increase efficiency at the shipyard and the energy from its proposed project is probably cleaner than what they currently receive from Wheelabrator. However, it is not the cleanest energy that is both technologically and economically available. Virginia cannot just check the box on environmental justice and continue to allow polluting facilities in poor or minority neighborhoods. We must do better.



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

Comment - CHP at NNSY

1 message

Steve Padgett <steve7642@gmail.com>

Wed, Oct 7, 2020 at 9:28 PM

To: mariama ouedraogo <mariama.ouedraogo@deq.virginia.gov>, Mary Finley Brook <mbrook@richmond.edu>, Jeff Staples <jeff4va@gmail.com>, Lauren Landis <lauren@chesapeakeclimate.org>

Subject: Comment - CHP at NNSY

**Combined Heat and Power Plant project (CSP)
Norfolk Naval Shipyard (NNSY)
Registration # 60326 Portsmouth, VA**

Commenter:

Steve Padgett
Norfolk VA
757 615 7765

Environmental activism:

For the last two years, I have volunteered with various environment groups in Virginia. My activities include research into sustainable energy technology and analysis of Virginia's fossil fuel infrastructure. I write comments to the SCC and DEQ and LTE's to the Pilot, I participate in protest activities in opposition to new pipeline construction

Analysis of CHP permit supporting documents :

Initially I didn't want to do this work because the CHP was only consuming 17 MW. For example the Chesterfield plant consumes 60 times as much power (1000 MW). Yet many of my colleagues were having a problem with the potential for toxic emissions from CHP into EJ communities, so I went forward. I spent a significant number of hours attempting to create a rigorous analysis of the supporting documents for the permit. Because of the complexity of the task which involved endless references and cross references into Federal and Virginia and Portsmouth regulations for the evaluation of turbines, duct burners, etc, I decided to abandon the task of a full analysis and decided to produce a narrative about the research. I do, however, recommend elevating to the Air Board given the number of questions and recommendations given here and in other comments on this project, demonstrating this as a controversial permit draft.

References reviewed: :

1. [National Air Quality Standards \(NAAQS\)](#)
2. [Trinity Consultants modelling report](#)
3. <https://aqicn.org/map/virginia/> Map of air quality monitors in the vicinity of the CHP
4. [DEQ Air Permit Public Notices page](#)
 - A. [Fact Sheet](#)
 - B. [60326 Draft Permit](#)
 - C. [60326 Draft Engineering Analysis](#)
 - D. [DEQ Memo to air quality manager in Tidewater \(Attachment B \)](#)
 - E. [Spreadsheet with Measurement details and summary \(Attachment C \)](#)
 - F. [August 17, 2020-Recording of Briefing](#)

NARRATIVE I

After perusing the above documents, I decided to focus on DEQ memo (4-D) since this document was fairly short, authoritative, and consistent with the Trinity document (2)

Table 3 NAAQS Modeling - Cumulative Impact Results

Pollutant	Averaging Period	Total Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Ambient Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
PM-2.5	24-hour	0.71	13	13.71	35
PM-2.5	Annual	0.11	6.7	6.81	12

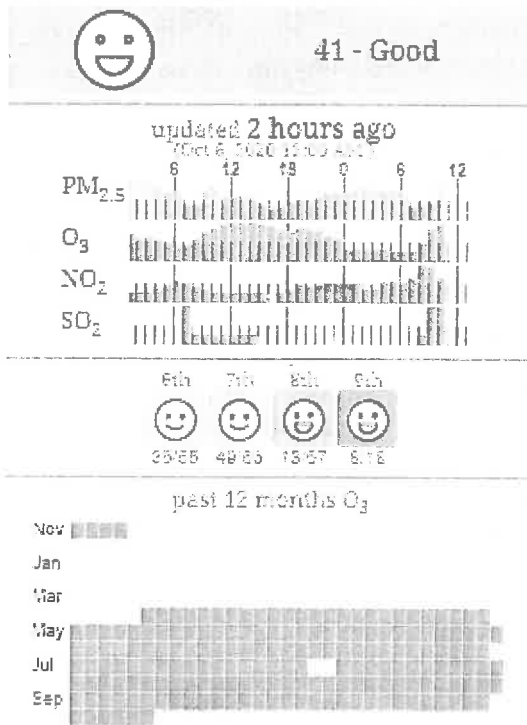
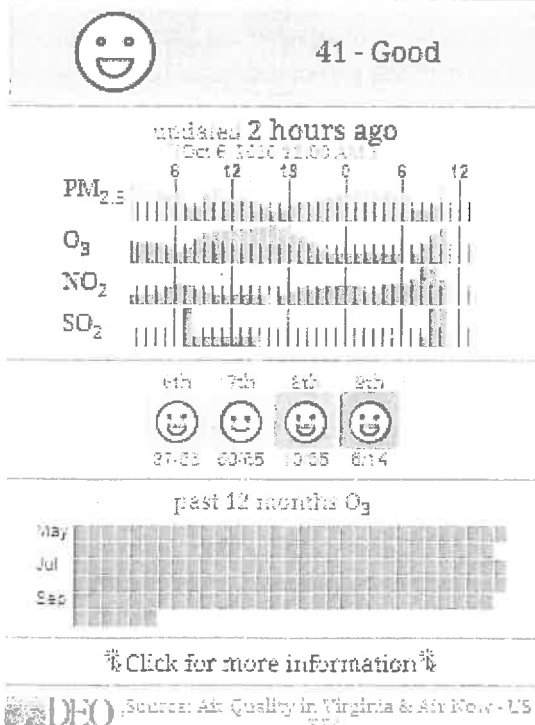
The information in this table is supported by the engineering document (4-C), is consistent with the national standards (1), is easy to understand and is supportive of the other 4 tables in the DEQ Memo.

PM-2.5 represents fine inhalable particles, with diameters that are 2.5 micrometers and smaller. This table shows that the PM-2.5 pollution in the area is within national standards and the contribution of the CHP is insignificant, probably within the error bounds of the ambient PM-2.5 measurements.

According to the DEQ Memo, the ambient estimates were based on a single air quality monitor 3 miles north of the shipyard. I discussed this table DEQ's Mike Kiss then subsequently with one of my colleagues, Jeff Staples. Jeff and I both had concerns about reliance on a single monitor. I used the air quality map (3) to get a report on two monitors closest to the shipyard. The second monitor provides a way to estimate the potential variation (and error) of monitor readings.

**NASA Langley Research Center,
Hampton Roads, USA**

**Tidewater Community College,
Hampton Roads, USA**



These are real time charts that were copied from the online map at noon on October 6, 2020. These charts represent readings of the two monitoring stations closest to the NNSY. A simple visual inspection of these

charts shows almost identical hourly readings for 4 of the pollutants in the NAAQS. Thus we can be confident that PM readings given in Table 3 are sufficiently accurate.

The charts demonstrate convincingly that the ambient level of pollutants in the NAAQS (except for lead) are at safe levels for the 24 hours prior to the time these charts were copied (.noon on October 6, 2020)

The above chart demonstrates that ambient Ozone has been safe every day in the last 3 months. Online there are three other charts not shown above: average daily pollution for PM-2.5, SO₂, NO₂

Anyone can view these charts by [this link](#) and mousing over monitors at NASA Langley and Tidewater college both north of the shipyard. The color coding was not spelled out but I interpreted it as green=safe, light green=marginally safe, light yellow and yellow as marginally unsafe. Also there is another monitor slightly south of the ship yard one can look at.

NARRATIVE II

The DEQ Memo asserts that all pollutants other than the PM-2.5 are exempt from assessment.

The engineering document (4C) on page 7 appears to support this assertion:

" None of the affected emissions units are subject to federal hazardous air pollutant new source review." As described in Section III.E, all the affected emissions units except the storage tanks are in a source category subject to a standard promulgated pursuant to 40 CFR 63 (Subparts YYYY, ZZZZ, DDDDD). None of the affected emissions units are subject to federal hazardous air pollutant new source review. Therefore, all the affected emissions units except the 550,000 gallon storage tank are exempt from the state toxics rule (9VAC5-80-1105(F)) and are not subject to Article 6 for toxic pollutant emissions.

As shown in Attachment C, the emissions from the storage tanks are below the exemption levels; therefore, the storage tanks are exempt from the state toxic rule (9VAC5-60 Article 5). "

Following the references in this statement was tedious to say the least. I finally gave up seeking an unequivocal confirmation. In fact, I encountered references that suggested otherwise but being unable to establish the full context of the many references, I remain uncertain that the pre-construction evaluation of all pollutants other than PM-2.5 are exempt from evaluation. Probably they are, yet proving this unequivocally would be a massive undertaking that is beyond my scope at this time. .

The draft permit (4 B) contained a complex plan for compliance testing after the power plant is built. I doubt there is any formal mechanism by which the environmental community will be notified when this future testing phase is done and if it passes or fails ? I will suggest a method to resolve this issue later in this comment.

NARRATIVE III

On page 12 of the engineering document (4 C) it is stated that formaldehyde must be limited (and therefore tested)

"The concentration of formaldehyde from the turbines must be limited to 91 ppbv ("parts per billion by volume, dry") or less at 15% O₂"

This appears to be derived from this Federal regulation. However there is no mention of formaldehyde in the draft Permit and there are no test results given in any of the reviewed documents.

Formaldehyde has been an issue mentioned to me by several of my colleagues. We would appreciate an easy to understand statement as to why formaldehyde does not require assessment for the permit. Or does it?

NARRATIVE IV

My recollection of phone and email communications with other activists:

- The Sierra Club fervently believes the potential air pollution requires a special meeting with the Air Board.
- Formaldehyde was a common concern.
- Dr Mary Findley-Brooke was of the impression that evaluation results were for only one turbine, when there are two. I was unable to confirm or disconfirm her assertion. DEQ should make a response to her comment.
- Jeff Staples of Chesapeake was concerned about ground pollution from the trash burning having witnessed pollution running across the road from the Wheelabrator plant.

NARRATIVE V

Reporting suggestions for the CSP:

- A tabular display for the component hardware of the project with a minimal characterization of each component. Reference to further details if deemed helpful to public readers.
- Table 3 of the DEQ Memo is an ideal and unambiguous presentation of information. It could be extended to include all pollutants in the NAAQS. For those pollutants that require no evaluation, the corresponding table cell can provide a starting reference for the justification. This type of presentation is much easier to follow for the lay reader.

NARRATIVE VI

Suggestions for improving the process of collecting public comments

1. *Public record of comments:* Comments to the SCC go into the SCC Docket. This provides a public record for all comments. A readily accessible public record for DEQ comments should be part of DEQ's comment system as well.
2. *Commenter application:* Commenters come from different geographic locations and with different levels of knowledge of the subject matter. Commenters should be required to complete an application before submitting. This application will collect information related to subject matter knowledge of the subject and the commenter's areas of interest and professional background. The completed application will be linked to the commenter's comments in a DEQ database. The commenters will need update capability to their profiles. This database can serve as a public record.
3. *Notifications:* In the application, the commenter can indicate a preference for notifications. Whenever there is an event (eg, webinar, hearing, comment period opening , etc) the commenter will receive an automatic email notification for the event if it is related to the commenter's indicated area of interest. If a new document is added to the event (eg: the final permit), the commenter will receive notification with a link to the newly added document immediately on its creation. A notification system such as this will obviate a common complaint of commenters: that they found out too late to properly respond.
4. *Standard background materials.* The DEQ should further develop standard background materials on the subject areas in its purview. These documents should be reviewed and edited by third party professional science writers who specialize in these types of communications. These materials will be referenced in the notifications to those commenters who have indicated interest in the subject area.
5. *Stand alone public summary for permit documents.* The permit documents ideally should be summarized by professional science writers as a self contained internally consistent document. The summary permit document should be sent out to all commenters who have indicated notification the moment it becomes available. Requests for the technical documents required by Virginia code can be honored but discouraged. The summary document should provide full coverage of the relevant

permitting issues but in a skillfully condensed form. DEQ internal documents should be made available by special request only.

Final Remarks: The DEQ monitors and measures Virginia's natural environment and assesses the impact of industrial activity. The employees of the DEQ are subject matter experts, they work full time for years on this endeavor. Yet environmental activists in Virginia are suspicious of the DEQ, many believing they work for the energy companies and the politicians. This perception I think is due to DEQ's tedious responsibility to be conformant to the complicated matrix of legal infrastructure on all levels of government.

It is the job of activists to persuade politicians to do the right thing for the citizenry. It behooves the DEQ to expand its public education and outreach to create an effective collaboration with Virginia's environmental activists. I think this collaboration will lead to improvement and simplification of regulations that will be beneficial to everyone except those looking for excess profits through loopholes.

~~~~~



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

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## Combined Heat and Power Plant

1 message

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Patricia Weaver <pat2009.cp@gmail.com>

Wed, Oct 7, 2020 at 9:20 AM

To: Mariama Ouedraogo <mariama.ouedraogo@deq.virginia.gov>

*I support the Norfolk Naval Shipyard in building the Combined Heat and Power Plant (CHP) in the City of Portsmouth, VA. I feel it's time for a new Environmentally Friendly Plant. This project can also help our local economy by supplying jobs to the unemployed people in our city. This project will be bringing revenue to our city. It's time to move forward with a more Clean, Reliable and Efficient Solution to help save our Plant.*

--  
Patricia A. Weaver  
4325 Midfield Pkwy.  
Portsmouth, VA 23703  
757-484-2285



October 7, 2020

Mariama Ouedraogo  
Virginia Department of Environmental Quality  
Tidewater Regional Office  
5636 Southern Boulevard, Virginia Beach, VA 23462  
[mariama.ouedraogo@deq.virginia.gov](mailto:mariama.ouedraogo@deq.virginia.gov)

*Via Electronic Mail Only*

**Re: Comment Letter on Proposed Draft Prevention of Significant Deterioration Permit/Stationary Source Permit to U.S. Navy - Norfolk Naval Shipyard to Construct and Operate a Combined Heat and Power Plant at the Norfolk Naval Shipyard, Portsmouth, Virginia 23709 (Registration Number 60326)**

Mariama Ouedraogo:

Thank you for the opportunity to comment on the proposed draft Prevention of Significant Deterioration Permit/Stationary Source Permit to the U.S. Navy - Norfolk Naval Shipyard for construction and operation of a combined heat and power plant (CHP) at the Norfolk Naval Shipyard (NNSY), 2600-2700 Effingham Street, Portsmouth, Virginia 23709 (Registration Number 60326). This comment letter is submitted by Darya Minovi and David Flores, Center for Progressive Reform, 2021 L St NW, #101-330, Washington, DC. 20036, (202) 747 - 0698.

The draft permit for the proposed facility is deficient because it does not adequately consider and address whether accidental emissions and chemical disaster, especially incidents induced, in part, by extreme weather and flooding, pose unreasonable risks of harm to the health and safety of the public and residents of neighboring communities. We, therefore, respectfully request a hearing and further consideration of the permit by the Virginia Air Pollution Control Board ("Board").<sup>1</sup> The Board and the Department of Environmental Quality ("Department") should consider the specific probabilities of extreme weather and flooding impacts to the proposed site and the risk of harm posed by potential uncontrolled releases, spills, upsets, and other deleterious emissions to the health and safety of the public and to the quality of the environment. Any analysis of the specific risks of accidental emissions or other chemical releases should also take into account the circumstances and characteristics of workers and members of adjoining communities that make these populations particularly vulnerable to harm from exposure to these incidents. These threats to public health and safety are significant and warrant both further consideration and revision of this draft permit by the Department and the consideration of and a public hearing by the Board.

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<sup>1</sup> Code of Virginia, Title 10.1., Chapter 13 § 10.1-1307.



**I. The Board Should Consider the Threat of Harm to Public Health and Safety due to the Particular Risks of Accidental Emissions and Chemical Spills at the Proposed Facility.**

The Board and the Department should consider the reasonableness and suitability of siting a new hazardous chemical facility at the NNSY given the present-day and future risk of exposure to extreme weather and flooding and the particular risk of harm that an accidental release or other chemical disaster would pose to the health and safety of workers and visitors at the NNSY and members of the communities that adjoin the NNSY. Addressing the risk of extreme weather and flood-induced accidental releases and chemical disasters is increasingly important given the observed and projected increase in the frequency and intensity of tropical storms, precipitation, and flooding, especially for facilities and communities located within climate-vulnerable coastal areas.<sup>2</sup>

The proposed location for the NNSY CHP facility is vulnerable to both present-day and future risk of flooding. Indeed, a 2019 U.S. Environmental Protection Agency report examined the probability and impact of flooding at the Wheelabrator Waste-to-Energy facility at the NNSY installation.<sup>3</sup> The proposed location of the CHP is adjacent to the existing Wheelabrator facility and at least 1,000 feet closer to and within 1,000 feet of the Elizabeth River. According to the findings of the report, the proposed location of the CHP facility may be vulnerable to present-day risk of flooding due to Category 1 and/or 2 hurricane storm surge. A 2018 joint investigation by NBC News and InsideClimate News found that facilities at the NNSY have already experienced major flooding and flood-related damage at least nine times over a ten year period of time.<sup>4</sup> The report also documents concerns about the potential for catastrophic damage at the NNSY were the region to be affected by a major hurricane.

Therefore, the Board and the Department should examine the risk that hurricanes and storm surge will strike this region over the expected lifetime of this facility in its consideration of the reasonableness and suitability of siting a hazardous chemical facility that would regularly store and combust highly flammable and explosive chemicals at this location. Additionally, the Board and the Department should examine and consider the probabilities and risks of flooding and other impacts due to projected sea level rise, including flooding impacts at the NNSY installation projected to occur during fair weather with as few as 1 to 2 feet of sea level rise, as well as wet-weather flooding, in general, due to the increasing intensity of precipitation within the region. As part of this analysis, the Board and the Department should determine whether the

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<sup>2</sup> *E.g.*, U.S. Chemical Safety and Hazard Investigation Board, Investigation Report: Organic Peroxide Decomposition, Release, and Fire at Arkema Crosby Following Hurricane Harvey Flooding, May, 2018. Available at <https://www.csb.gov/csb-releases-arkema-final-report/>; also Ari Phillips, Preparing for the Next Storm: Learning from the Man-Made Environmental Disasters that Followed Hurricane Harvey, August, 2018. Available at <https://environmentalintegrity.org/wp-content/uploads/2018/08/Hurricane-Harvey-Report-8.16.18-final.pdf>.

<sup>3</sup> Kaplan, O., B. Bierwagen, S. Julius, M. Liang, S. Thorneloe, and K. Weitz. Vulnerability of Waste Infrastructure to Climate-Induced Impacts in Coastal Communities. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-18/011, 2019. Available at [https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?Lab=NRMRL&dirEntryId=345784](https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=345784).

<sup>4</sup> Nicholas Kusnetz, Rising seas threaten Norfolk Naval Shipyard, raising fears of 'catastrophic damage,' NBCNews.com, Nov. 19, 2018. Available at <https://www.nbcnews.com/news/us-news/rising-seas-threaten-norfolk-naval-shipyard-raising-fears-catastrophic-damage-n937396>.

proposed facility is likely to store, use, transfer, or produce hazardous chemicals and substances in quantities sufficient to trigger Clean Air Act regulatory requirements, including the Risk Management Program and General Duty Clause, that address risk by requiring planning and practices to prevent and mitigate harm from accidental chemical releases.<sup>5</sup>

**II. The Board Should Consider the Potential Cumulative and Compounding Risks of Harm to Public Health and Safety due to the Flood Vulnerability of Hazardous Chemical Facilities in the Region and the Social Vulnerability to Disaster of Communities that Adjoin the Shipyard.**

The Board and Department should consider and factor into their decision-making for this draft permit and other approvals the reasonableness of potential environmental and public health hazards arising from the risks of chemical disaster or other accidental release at the proposed facility. The Board and the Department should also consider the potential for cascading or compounding industrial or chemical disaster precipitated by the proposed facility, given the high number of flood- and extreme weather-exposed hazardous chemical facilities located at the NNSY as well within and surrounding the adjoining communities. The analysis should also include consideration of the particular social vulnerability to natural disaster and industrial pollution of members of the communities surrounding the proposed CHP facility and the NNSY.

In 2019, the Center for Progressive Reform published a study of the flood-exposure of hazardous chemical facilities in Virginia and the social vulnerability to disaster of the communities in proximity to these sites.<sup>6</sup> The report presents findings from a geospatial analysis of state and Federally-regulated facilities that contain hazardous chemicals (e.g., Superfund, Risk Management Program, Tier II Reports of Extremely Hazardous Substance, etc.) and the facilities' particular risk of exposure to present-day Hurricane storm surge and waterway flooding (based upon National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake, and Overland Surges from Hurricanes (SLOSH) and Federal Emergency Management Administration's (FEMA) flood hazard zone designations) and future risk of exposure to sea level rise (based upon NOAA projections). The analysis also integrates geospatial data from the Social Vulnerability Index (SVI), a product of the Centers for Disease Control and Prevention's Agency for Toxic Substances and Disease Registry (CDC) that measures potential negative effects on communities caused by external stresses on human health, including natural or human-caused disasters.<sup>7</sup> SVI incorporates metrics relevant to risk of harm from chemical disasters, such as poverty, health insurance, minority status and language, transportation, age, and disability.

Our analysis identifies those hazardous chemical facilities that are most exposed to present- and future flood risks and that are located within communities that are among the most-socially vulnerable to disaster within Virginia and nationwide. Many of the facilities and communities identified within our report are concentrated in the Hampton Roads region, and, especially,

<sup>5</sup> Clean Air Act Section 112(r); 40 CFR Part 68.

<sup>6</sup> Noah Sachs and David Flores. Toxic Floodwaters: The Threat of Climate-Driven Chemical Disaster in the James River Watershed. Center for Progressive Reform, 2019. Available at <http://progressivereform.org/our-work/energy-environment/virginia-toxic-floodwaters/>.

<sup>7</sup> Agency for Toxic Substances and Disease Registry. CDC Social Vulnerability Index. Available at <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.

within the portions of the cities of Norfolk, Portsmouth, and Chesapeake located along the Elizabeth River. The NNSY is located within Census Tract 9801 (“NNSY Tract”), which is not assigned a SVI score by the CDC because of insufficient data.<sup>8</sup>

Seven different census tracts adjoin the NNSY Tract.<sup>9</sup> Three of these adjoining tracts are among the top ten highest scoring tracts in our Toxic Floodwaters analysis, meaning that the tracts have high SVI scores and numerous hazardous chemical facilities exposed to a high degree of flood risks. Two tracts adjoining the NNSY Tract are the top two highest scoring tracts in our analysis, between them containing 295 hazardous chemical facilities exposed to varying degrees of flood risk. These flood-exposed facilities include at least four Superfund/National Priority List sites and 11 petroleum storage and distribution terminals, as well as two Risk Management Program facilities exposed to present-day risk of flooding from hurricane storm surge and future-risk due to sea level rise. Further, many of these facilities are located within the 100-year floodplain, meaning FEMA projects a 1% probability of eight-foot flood occurring in these areas in any given year. However, those projections are likely too conservative. As climate change alters weather patterns and causes sea level rise, floods will increase in frequency and intensity. The Hampton Roads region is already experiencing the highest rate of sea level rise on the Atlantic Seaboard.

### **III. The Cumulative Burden of Adverse Health Outcomes, Existing Pollution Emissions, and Worsening Climate Impacts May Unnecessarily Harm Nearby Communities**

In addition to experiencing various social stressors, such as higher rates of unemployment and a larger proportion of sensitive sub-populations (such as children under five or adults over sixty-five years of age), the communities adjacent to the NNSY Tract are already exposed to fugitive pollution emissions from existing hazardous facilities, which may contribute to chronic health issues. The City of Portsmouth, the location of the proposed facility, has reported higher rates of mortality and morbidity compared to the state.<sup>10</sup> Further, the four census tracts in the city adjoining the NNSY Tract rank significantly lower on the Virginia Department of Health’s Health Opportunity Index compared to the city overall, meaning that communities in these tracts have a lower opportunity for good health.

Additional pollution emissions from the proposed facility may exacerbate these effects. The permit states that the facility will release sulfur dioxide, particulate matter, nitrogen oxides, volatile organic compounds, carbon monoxide, and carbon dioxide. Exposure to sulfur dioxide, particulate matter, and nitrogen oxides is associated with respiratory health issues, especially

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<sup>8</sup> See <https://svi.cdc.gov/map.html>.

<sup>9</sup> Census Tract 50, Norfolk city, Virginia with 2016 Overall SVI Score: 0.8039; Census Tract 205, Chesapeake city, Virginia, with 2016 Overall SVI Score: 0.6679; Census Tract 214.03, Chesapeake city, Virginia with 2016 Overall SVI Score: 0.8484; Census Tract 2123, Portsmouth city, Virginia with 2016 Overall SVI Score: 0.852; Census Tract 2119, Portsmouth city, Virginia with 2016 Overall SVI Score: 0.9404; Census Tract 2120, Portsmouth city, Virginia with 2016 Overall SVI Score: 0.8649; and Census Tract 2121, Portsmouth city, Virginia with 2016 Overall SVI Score: 0.9839.

<sup>10</sup> Portsmouth Health District, Virginia Department of Health. The 2017 Portsmouth Community Health Survey (CHS) using CASPER Methodology. 2018. Available at <https://www.vdh.virginia.gov/content/uploads/sites/125/2018/11/CHS-2017-Report-FINAL.pdf>.

among children and people with asthma.<sup>11</sup> Elevated levels of carbon monoxide outdoors can harm people with cardiovascular disease by preventing oxygen from reaching the heart.<sup>12</sup>

Communities with high SVI scores are more vulnerable to human suffering and economic loss in the face of disaster.<sup>13</sup> If the region is hit with a severe storm and/or flooding that precipitates a chemical release, families in the nearby residential areas could be exposed to toxic chemicals that yield ill health effects, such as dermatitis, rashes, headaches, fatigue, abdominal pain, fever, decreased appetite, nausea, sore throat, and eye irritation.<sup>14</sup> Some contaminants, like heavy metals, may also adsorb to sediments and redistribute throughout an area with floodwaters.<sup>15</sup>

The cumulative impacts of existing pollution emissions, social vulnerabilities and low health opportunity, and worsening climate impacts cannot be ignored. Furthermore, the proposed facility may exacerbate environmental injustices in the region, as all seven census tracts have a higher proportion of Black and low-income residents compared to the state as a whole.<sup>16</sup>

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<sup>11</sup> Environmental Protection Agency. Sulfur Dioxide Basics. Available at <https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects>; Environmental Protection Agency. Particulate Matter (PM) Basics. Available at <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#effects>; Environmental Protection Agency. Basic Information about NO2. Available at <https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects>.

<sup>12</sup> Environmental Protection Agency. Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution. Available at <https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution#Effects>.

<sup>13</sup> Agency for Toxic Substances and Disease Registry. CDC Social Vulnerability Index. Available at <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.

<sup>14</sup> Darya Minovi. Toxic Floodwaters: Public Health Risks and Vulnerability to Chemical Spills Triggered by Extreme Weather. Center for Progressive Reform, 2020. Available at <http://progressivereform.org/our-work/energy-environment/toxic-floodwaters-health-risks/>.

<sup>15</sup> Darya Minovi. Toxic Floodwaters: Public Health Risks and Vulnerability to Chemical Spills Triggered by Extreme Weather. Center for Progressive Reform, 2020. Available at <http://progressivereform.org/our-work/energy-environment/toxic-floodwaters-health-risks/>.

<sup>16</sup> In seven census tracts adjoining the NSYY tract: 30-97% Black, \$23,750-\$54,595 median household income, and 11-39.5% persons below the federal poverty line. In Virginia: 19% Black, \$71,564 median household income, and 11% persons below the federal poverty line. See <https://censusreporter.org/>.

Thank you for your attention and consideration of our comment. As residents of the Commonwealth and as public interest researchers and advocates who work with communities in Portsmouth, Chesapeake and Norfolk, we are deeply concerned by the threat of harm that this proposed facility poses to the health and safety of the public, many of whom already bear a disproportionate burden from industrial pollution and the impacts of climate change. We respectfully request a hearing and further consideration of the permit by the Virginia Air Pollution Control Board.

Sincerely,

Darya Minovi, MPH, Policy Analyst

David Flores, JD, Senior Policy Analyst



CHESAPEAKE BAY FOUNDATION  
Saving a National Treasure

October 7, 2020

*Via email to:*

Mariama Ouedraogo  
Virginia Department of Environmental Quality  
Tidewater Regional Office  
5636 Southern Boulevard  
Virginia Beach, VA 23462  
[mariama.ouedraogo@deq.virginia.gov](mailto:mariama.ouedraogo@deq.virginia.gov)

**Re: Norfolk Naval Shipyard Draft Prevention of Significant Deterioration (PSD)  
Permit to Construct and Operate a Combined Heat and Power Plant (Registration  
No. 60326)**

Dear Ms. Ouedraogo,

The Chesapeake Bay Foundation, Inc. (“CBF”) submits the following comments on the draft Prevention of Significant Deterioration Permit (“Permit”) for the construction and operation of a proposed Combined Heat and Power (CHP) Plant (“Plant”) at the Norfolk Naval Shipyard in Portsmouth, Virginia (Registration No. 60326). CBF is a non-profit conservation organization dedicated to restoring and protecting the health of the Chesapeake Bay watershed and its residents.<sup>1</sup>

The Norfolk Naval Shipyard (“NNSY” or “applicant”) proposes to build a new natural gas-fired power plant in a community that is already overburdened by industrial pollution and at a time when the Commonwealth is trying to transition its electric grid to cleaner, renewable energy sources to respond to the urgent climate crisis. The Plant would introduce a new source of nitrogen pollution to the Chesapeake Bay watershed with no proposal for offsets. The draft Permit contains technical deficiencies and raises questions, as discussed in detail below along with specific recommendations for revisions. Accordingly, the project deserves further scrutiny and the draft Permit must be strengthened to protect the health of the surrounding communities. Because the proposed Plant is subject to considerable public interest and there are substantial, disputed issues relevant to the permit—as discussed below—CBF requests Board consideration of the proposed Permit, pursuant to Va. Code Ann. § 10.1-1322.01.

<sup>1</sup> <https://www.cbf.org/about-cbf/>

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## **I. Introduction**

The U.S. Navy Norfolk Naval Shipyard has applied for a Prevention of Significant Deterioration (PSD) Permit, under the Clean Air Act, to build and operate a Combined Heat and Power Plant (“Plant”) at the Norfolk Naval Shipyard in Portsmouth, Virginia. The Plant would primarily burn natural gas, with the ability to burn ultra-low sulfur diesel as backup fuel, and would have a net generating capacity of 17.3 MW. According to the Draft Engineering Analysis, the proposed Plant would consist of the following equipment: two (2) 7 MW dual-fuel fired combustion turbines; two (2) natural gas-fired heat recovery steam generators (HRSG); three (3) dual-fuel fired boilers; one (1) diesel fired emergency generator; one (1) 550,000 gallon diesel fuel tank; one (1) 2.4 MW steam turbine; two (2) electric fire pumps; and one (1) air-cooled condenser. Currently, NNSY obtains the majority of its steam from the adjacent Wheelabrator plant and its electricity from the grid. The proposed Plant would provide the facility with its own source of steam and electricity.

### **A) Communities surrounding the Shipyard**

The proposed Plant will be located on the Norfolk Naval Shipyard’s site in the City of Portsmouth, Virginia. The community of Portsmouth is predominantly African-American<sup>2</sup> and low-income. In a study commissioned by the Portsmouth City Council, researchers found that the city of Portsmouth had a poverty rate of 18%, which is higher than both the Commonwealth of Virginia (10.6%) and the United States (13.4%).<sup>3</sup> Many residents and their families have called the area home for generations and watched as the City welcomed industry after industry into their backyards.

Virginia’s Environmental Justice Act defines a “fenceline community” as “an area that contains all or part of a low-income community or community of color and that presents an increased health risk to its residents due to its proximity to a major source of pollution.” Va. Code Ann. § 2.2-234. The U.S. EPA’s EJSCREEN mapping system indicates that the majority of Portsmouth is in the 99<sup>th</sup> percentile for Superfund proximity, with the rest of the area not far behind. *See* Figure 1 below. Concerns related to this extreme concentration of toxics are exacerbated by consistent flooding in the area.<sup>4</sup> Residents have reported flood waters that are ankle deep or higher with a noticeable current during wet weather events. In addition to environmental concerns, individuals living in the area have reported various cancers, hormonal

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<sup>2</sup> *QuickFacts – Portsmouth city, Virginia (county)*, UNITED STATES CENSUS BUREAU, <https://www.census.gov/quickfacts/portsmouthcityviriniacounty>.

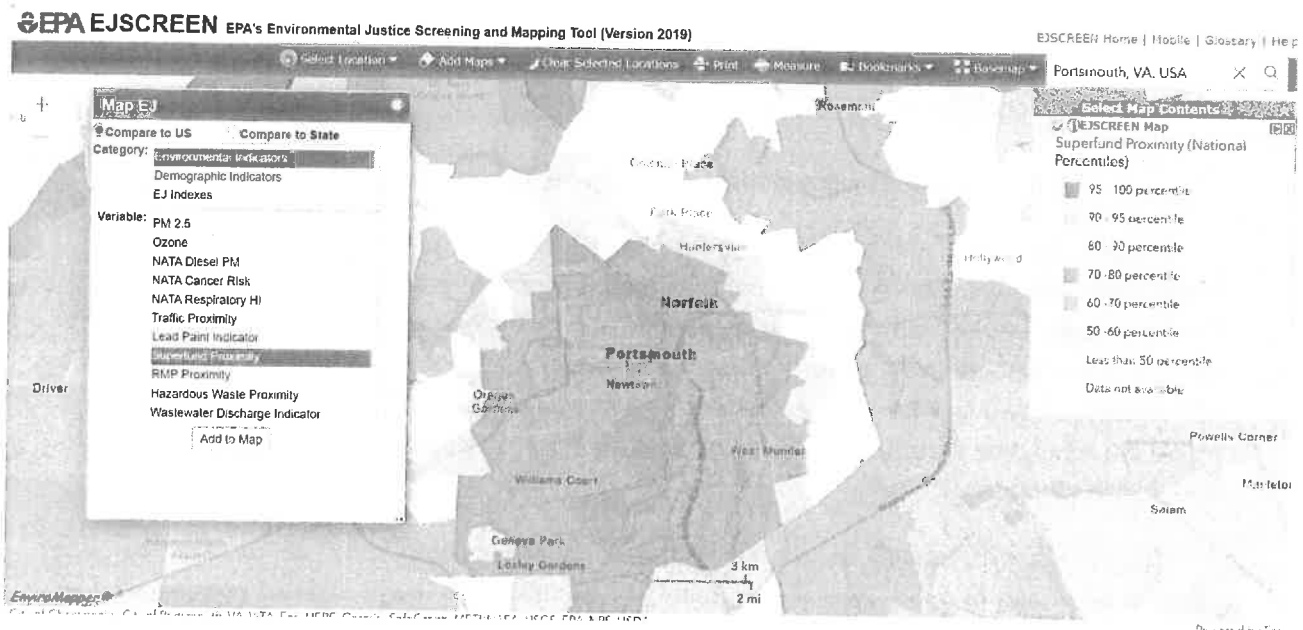
<sup>3</sup> *City of Portsmouth, VA Poverty Study*, Thomas P. Miller & Associates, LLC, <http://www.portsmouthva.gov/DocumentCenter/View/7385/City-of-Portsmouth-Poverty-Study>.

<sup>4</sup> *See* Donta Council et al., *Resilience Adaptation Feasibility Tool (RAFT), The New Normal of Flooding in Portsmouth, Virginia: Perspectives, Experiences and Adaptive Responses of Residents and Business Owners in Low-to-Moderate-Income Communities (2018)*, available at <https://raft.ienvirginia.edu/system/files/The%20New%20Normal%20of%20Flooding%20in%20Portsmouth.pdf>.

issues, and infertility. Many believe that these illnesses, and their prevalence in the community, are directly connected to the legacy contamination in the area.

The fact that many of the surrounding Superfund sites have yet to be fully remediated has led residents to wonder why DEQ would consider the addition of a new source that poses a further threat to the community. At this juncture, Portsmouth is in desperate need of a comprehensive plan to restore environmental integrity and safeguard human health. Neither of these objectives is accomplished by the construction of a fossil fuel-fired power plant without thorough, transparent review and a protective, enforceable permit.

*Figure 1: EPA EJSCREEN Map Showing Superfund Proximity in Portsmouth, VA*



## B) Human health impacts of the proposed pollutants

The turbines, boilers, and other equipment at the proposed Plant will emit harmful air pollutants including, but not limited to, particulate matter (PM 2.5 and PM 10), volatile organic compounds (VOCs), sulfur dioxide, nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and more than two tons per year of hazardous air pollutants, including hexane and formaldehyde.<sup>5</sup> The negative health risks from exposure to these pollutants are serious and well-documented.

In particular, breathing fine particulate matter, or PM 2.5, poses short- and long-term health risks including: cardiovascular harm (e.g., heart attacks, strokes, heart disease, congestive heart failure), respiratory harm (e.g., inflammation and irritation of airways, worsened asthma,

<sup>5</sup> Application Addendum – “Ameresco\_NNYS Construction Potential Emission Calcs v11.xlsx (Table B-1a listing total potential HAP emissions as 2.07 tpy; Table B-2. Facility Wide Potential HAP/TAP Emissions Summary).



worsened chronic obstructive pulmonary disease (COPD)), early death, cancer, harm to the nervous system, and may cause reproductive and developmental harm.<sup>6</sup> Low-income communities and communities of color, particularly African Americans, are disproportionately exposed to PM 2.5 pollution and suffer increased numbers of related health effects.<sup>7</sup>

The attached 2018 report by expert George Thurston, Sc.D, summarizes the state of the science regarding PM 2.5 and its health effects.<sup>8</sup> Dr. Thurston specifically notes that “[a]ir pollutants associated with fossil fuel combustion (e.g., from oil, coal and natural gas fired fossil fuel combustion sources) have well-documented adverse human health effects.”<sup>9</sup> Dr. Thurston also acknowledges the increasing body of scientific research showing that exposure to PM 2.5 at levels below the current federal air quality standards poses serious health risks.<sup>10</sup> He notes: “just as cleaning the air below the standards would avoid more of those deaths, any increase in pollution will increase the risk of adverse effects at all levels of prevailing air pollution, even when the NAAQS standards are not violated.”<sup>11</sup> Dr. Thurston also notes that there are certain “characteristics of natural gas combustion particles that make them likely to have especially high health effects, on a per pound basis, than usual PM2.5”<sup>12</sup>

In addition, the Plant would emit nitrogen oxides (NOx)—which pose health risks on their own<sup>13</sup>—and volatile organic compounds, which combine in sunlight to form ground-level ozone, a pollutant known to cause a well-documented range of acute and chronic health effects.<sup>14</sup> The proposed Plant would also emit hundreds of thousands of tons per year of greenhouse gas

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<sup>6</sup> U.S. EPA, *Integrated Science Assessment (ISA) for Particulate Matter*, EPA/600/R-19/188 (2019).

<sup>7</sup> U.S. EPA, *Integrated Science Assessment (ISA) for Particulate Matter*, EPA/600/R-19/188, at 12.5.3, 12.5.4 (2019).

<sup>8</sup> Attachment A, Thurston Report.

<sup>9</sup> Thurston Report at 8.

<sup>10</sup> Thurston Report at 11-13; *see also*, Shi L, Zanobetti A, Kloog I, et al. Low-concentration PM2.5 and mortality: estimating acute and chronic effects in a population-based study, *Environ Health Perspect.* 2016;124:46-52.

<http://dx.doi.org/10.1289/ehp.1409111>; Schwartz J, Bind MA, Koutrakis P. Estimating causal effects of local air pollution on daily deaths: Effect of low levels. *Environ Health Perspect.* 2017; 125:23-29.

<http://dx.doi.org/10.1289/EHP232>; Di Q, Dai L, Wang Y, Zanobetti A, Choirat C, Schwartz JD, Dominici F. Association of Short-Term Exposure to Air Pollution with Mortality in Older Adults. *JAMA.* 2017;318:2446-2456;

Thurston GD, Ahn J, Cromar KR, et al. Ambient particulate matter air pollution exposure and mortality in the NIHAARP Diet and Health Cohort. *Environ Health Perspect.* 2015;124:484-490; Lepeule J, Laden F, Douglas Dockery D, and Schwartz J. Chronic exposure to fine particles and mortality: An extended follow-up of the Harvard Six Cities Study from 1974 to 2009. *Environ Health Perspect.* 2012;120:965-970; Shi L, Zanobetti A, et al. Low-concentration PM2.5 and mortality: estimating acute and chronic effects in a population-based study. *Environ Health Perspect.* 2015;124:46-52.

<sup>11</sup> Thurston Report at 13.

<sup>12</sup> Thurston Report at 19 (“(1) they have a higher percentage of ultrafine particles, as compared with other fossil-fuel options... and 2) there are acidic sulfates associated with these emissions...Both of these factors would tend to increase the ‘bio-availability’ of the toxins for gas-fired PM, which would therefore likely increase the toxicity of gas-fired combustion particles, relative to other ambient particles.”).

<sup>13</sup> *See* U.S. EPA, *Integrated Science Assessment (ISA) For Oxides of Nitrogen*, EPA/600/R-15/068 (2016).

<sup>14</sup> Thurston Report at 22-30; U.S. EPA, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*, Sections 8.3.1.1, 8.3.1.2, 8.2.2, 8.2.3, EPA-600/R-10/076F (2013).

emissions which contribute to the increasingly harmful impacts of climate change on human health.

### C) Climate change impacts in the Chesapeake Bay watershed

The damaging effects of climate change are already impacting people and ecosystems throughout Virginia and the Chesapeake Bay watershed. The Bay's coastal communities face some of the fastest rates of sea-level rise in the country.<sup>15</sup> Storms and hurricanes—and the destruction they cause—are expected to intensify. “[C]oastal homes and infrastructure will flood more often as sea level rises, because storm surges will become higher... Many roads, railways, and ports are vulnerable to the impacts of storms and sea level rise, and most of the heavily populated Hampton Roads area could be flooded by a major hurricane.”<sup>16</sup> The risk of heat-related illnesses and death will continue to increase and air quality will degrade.<sup>17</sup> Agricultural productivity will suffer myriad harmful effects from extreme heat, drought, and erratic precipitation patterns.<sup>18</sup>

The Fourth National Climate Assessment highlighted impacts to the Chesapeake Bay, “a critical and highly integrated natural and economic system threatened by changing land-use patterns and a changing climate – including sea level rise, higher temperatures, and more intense precipitation events... As sea levels rise, the Chesapeake Bay region is expected to experience an increase in coastal flooding and drowning of estuarine wetlands.”<sup>19</sup>

Climate change poses a significant threat to water quality, and the goals of the Chesapeake Bay Total Maximum Daily Load (TMDL) and the 2014 Chesapeake Bay Agreement: stronger storms<sup>20</sup> lead to increases in polluted runoff; sea level rise will continue to destroy the wetlands and marshes that filter polluted runoff and provide critical habitat to watershed species; warmer water holds less dissolved oxygen, exacerbating dead zones; changing salinity regimes will

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<sup>15</sup> See, e.g., Union of Concerned Scientists, "Virginia Faces Chronic Inundation" (2017), <https://www.ucsusa.org/sites/default/files/attach/2017/07/when-rising-seas-hit-home-virginia-fact-sheet.pdf>; University of Maryland Center for Environmental Science, Sea Level Rise Projections for Maryland 2018, [https://www.umces.edu/sites/default/files/Sea-Level%20Rise%20Projections%20for%20Maryland%202018\\_1.pdf](https://www.umces.edu/sites/default/files/Sea-Level%20Rise%20Projections%20for%20Maryland%202018_1.pdf); Virginia Institute of Marine Science, Sea Level Rise Report Card, <https://www.vims.edu/research/products/slrc/index.php>.

<sup>16</sup> U.S. EPA, What Climate Change Means for Virginia (Aug. 2016), <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-va.pdf>.

<sup>17</sup> See Sarofim, M.C. et al., 2016: Ch. 2: Temperature-Related Death and Illness. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, 43–68. <http://dx.doi.org/10.7930/J0MG7MDX>.

<sup>18</sup> 2014 National Climate Assessment: "Agriculture", <https://nca2018.globalchange.gov/>.

<sup>19</sup> 2014 National Climate Assessment: "Northeast": "Chesapeake Bay", <https://nca2014.globalchange.gov/report/regions/northeast>.

<sup>20</sup> Zhang, Fan; Li, Ming; Impacts of Ocean Warming, Sea Level Rise and Coastline Management on Storm Surge in a Semi-enclosed Bay, *Journal of Geophysical Research: Oceans*, Vol. 124, Issue 9 (modeling how sea level rise, ocean warming, and coastline management affects storm surge in Chesapeake Bay).

threaten species and water quality.<sup>21</sup> Importantly, “[t]he magnitude of these changes is sensitive to the CO<sub>2</sub> emission trajectory, so that actions taken now to reduce CO<sub>2</sub> emissions will reduce climate impacts on the Bay.”<sup>22</sup>

## **II. The Plant introduces a new source of nitrogen deposition to the Chesapeake Bay watershed and no offsets are proposed.**

In 2010, in response to pervasive dead zones caused by excessive sediment, nitrogen, and phosphorus pollution, EPA established a federal-state clean-up plan called the Chesapeake Bay Total Maximum Daily Load (“Bay TMDL”).<sup>23</sup> To develop the Bay TMDL, EPA calculated the maximum amount of sediment, nitrogen, and phosphorus the Chesapeake Bay could receive and still meet water quality standards.<sup>24</sup> These overall pollutant loads were then allocated to each of the seven Bay jurisdictions. Each jurisdiction is responsible for reducing its amount of pollutant contribution to meet the TMDL goals and developing a Watershed Implementation Plan (WIP) detailing the strategies that will be used to achieve the TMDL goals.<sup>25</sup> At the time the Bay TMDL was established, EPA found that atmospheric deposition contributed about one-third of the total nitrogen loads delivered to the Chesapeake Bay.<sup>26</sup>

The proposed Plant is located within the Chesapeake Bay airshed<sup>27</sup> and would emit an estimated 96.05 tons per year of nitrogen oxides (NO<sub>x</sub>).<sup>28</sup> This is a new source of nitrogen oxides and some amount of this nitrogen will fall to land and water in the Bay watershed and the James River watershed.<sup>29</sup> The James River watershed—like all sub-watersheds within the Bay watershed—is subject to specific nitrogen allocations in the Bay TMDL.<sup>30</sup>

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<sup>21</sup> See *id.*; see also U.S. EPA Chesapeake Bay Program, “Climate Change”, [https://www.chesapeakebay.net/issues/climate\\_change](https://www.chesapeakebay.net/issues/climate_change).

<sup>22</sup> Najjar, R. G. et al., Potential climate-change impacts on the Chesapeake Bay, *Estuarine, Coastal and Shelf Science*, 86, 1-20 (2010), <https://doi.org/10.1016/j.ecss.2009.09.026>.

<sup>23</sup> U.S. EPA, Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus, and Sediment (Dec. 2010), available at <https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document> [hereinafter Bay TMDL].

<sup>24</sup> Bay TMDL at Executive Summary, ES-1.

<sup>25</sup> *Id.*

<sup>26</sup> Bay TMDL at Section 4, 4-33.

<sup>27</sup> Bay TMDL at 4-34 (“The Bay’s NO<sub>x</sub> airshed—the area where emission sources that contribute the most airborne nitrates to the Bay originate—is about 570,000 square miles, or nine times the size of the Bay’s watershed.”).

<sup>28</sup> Appendix A – “Ameresco\_NNYS Construction Potential Emission Calcs v11 (1).xlsx.”

<sup>29</sup> See Chesapeake Bay Program, Influence of Volkswagen Settlement Agreements on Chesapeake Water Quality, at 10 (Aug. 20, 2018), available at

[https://www.chesapeakebay.net/channel\\_files/28679/influence\\_of\\_volkswagen\\_settlement\\_agreements\\_on\\_chesapeake\\_water\\_quality\\_final\\_8-20-18.pdf](https://www.chesapeakebay.net/channel_files/28679/influence_of_volkswagen_settlement_agreements_on_chesapeake_water_quality_final_8-20-18.pdf) (establishing “protocols to effectively translate reductions of oxidized (NO<sub>x</sub>) or reduced (ammonia) emissions from air sources throughout the Chesapeake watershed to estimated nitrogen loads delivered to the tidal Bay at the state level.”).

<sup>30</sup> See Bay TMDL at 9-4 (2010), available at [https://www.epa.gov/sites/production/files/2014-12/documents/cbay\\_final\\_tmdl\\_section\\_9\\_final\\_0.pdf](https://www.epa.gov/sites/production/files/2014-12/documents/cbay_final_tmdl_section_9_final_0.pdf) (“Table 9-1. Chesapeake Bay TMDL total nitrogen (TN) annual allocations (pounds per year) by Chesapeake Bay segment to attain Chesapeake Bay WQS” and listing specific allocations for the James River watershed).

Virginia has been working to address nutrient pollution through substantial investments for approximately 50 years. These commitments were first formalized through the 1983 Chesapeake Bay Watershed Agreement, were reaffirmed most recently in the 2014 Chesapeake Bay Agreement, and have involved more than a billion dollars in state investments to upgrade wastewater treatment plants alongside hundreds of millions of dollars in agricultural and stormwater investments. These investments are matched by investments from local government and agricultural producers across the Commonwealth. In August 2019, Virginia finalized the Phase III Watershed Implementation Plan to achieve nutrient reductions to the Chesapeake Bay.<sup>31</sup> This plan represents the last version that will occur prior to the 2025 deadline to achieve the goals of the Bay TMDL. The plan lays out ambitious objectives for the Commonwealth which include enhanced reductions for wastewater treatment facilities, regulatory programs for agricultural producers, and enhanced efforts to achieve reductions from developed lands. Achieving these goals represents a significant challenge. Thus, it is imperative that new facilities such as the proposed Plant, not offset Virginia's progress on nutrient reduction efforts. Nutrient impacts should be offset through mitigation requirements.

In addition to DEQ's role as the permitting agency, the applicant—as a federal entity—has a responsibility to consider its role in the Chesapeake Bay clean-up. In 2009, President Obama issued an Executive Order directing federal government agencies to lead a renewed effort to restore and protect the Chesapeake Bay watershed. The Order recognized the federal government's role as a landowner of property located within the watershed, stating: "Agencies with land, facilities, or installation management responsibilities affecting ten or more acres within the watershed of the Chesapeake Bay shall, as expeditiously as practicable and to the extent permitted by law, implement land management practices to protect the Chesapeake Bay and its tributary waters..."<sup>32</sup>

Based on a review of the draft Permit and available application materials, neither the applicant nor DEQ has considered the impact of the proposed new load of nitrogen oxides emissions on waterbodies, including the Chesapeake Bay watershed and TMDL goals.<sup>33</sup> As a

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<sup>31</sup> Commonwealth of Virginia, Chesapeake Bay TMDL Phase III Watershed Implementation Plan (Aug. 23, 2019), [https://www.deq.virginia.gov/Portals/0/DEQ/Water/ChesapeakeBay/Final%20Phase%20III%20WIP/Virginia\\_Chesapeake\\_Bay\\_TMDL\\_Final\\_Phase%20III\\_WIP%20\(2\).pdf](https://www.deq.virginia.gov/Portals/0/DEQ/Water/ChesapeakeBay/Final%20Phase%20III%20WIP/Virginia_Chesapeake_Bay_TMDL_Final_Phase%20III_WIP%20(2).pdf).

<sup>32</sup> Exec. Order No. 13508, Chesapeake Bay Protection and Restoration, Section 501, 74 Fed. Reg. 23099 (May 15, 2009), available at <https://www.govinfo.gov/content/pkg/FR-2009-05-15/pdf/E9-11547.pdf> (Section 201 lists the Department of Defense as a federal entity participating in the Federal Leadership Committee for the Bay).

<sup>33</sup> An Environmental Assessment was to be conducted for the Plant, pursuant to the federal National Environmental Policy Act (NEPA), and planned to "assess the potential impacts of the Proposed Action on the following resource areas: air quality; water, cultural, visual, and biological resources; infrastructure; hazardous materials and wastes, and environmental justice." Available at [https://www.ready.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Mid-Atlantic/PDFs/EV/Env\\_Compliance/Public\\_Notices/ESPC\\_EA\\_Factsheet\\_21May2019.pdf](https://www.ready.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Mid-Atlantic/PDFs/EV/Env_Compliance/Public_Notices/ESPC_EA_Factsheet_21May2019.pdf). However, based on the available application and Permit materials, it is unclear whether DEQ considered the EA in its review. If an EA was performed and considered by DEQ, it should be made available to the public and become part of the administrative record of this decision.

Bay jurisdiction and signatory to the 2014 Chesapeake Bay Agreement, DEQ should consider these impacts before issuing a permit for a new source of nitrogen to the Bay watershed.

### **III. The draft Permit contains technical deficiencies.**

CBF commissioned engineering expert Ranajit Sahu to conduct a technical review of the draft Permit, and his complete analysis and resume are enclosed as Attachment B. Included in Dr. Sahu's analysis are suggested revisions to the draft Permit terms and conditions that are necessary to ensure the Permit complies with the intent and provisions of the Virginia Air Pollution Control Law. Va. Code Ann. § 10.1-1300 *et seq.* Among the technical comments provided in Dr. Sahu's analysis are the following concerns:

- **The draft Permit makes a critical component of the emissions standards unenforceable.** The draft Permit includes specifications for the major equipment at the Plant, including the rated capacity for each (i.e., how much fuel is burned per hour (MMBtu/hr) or the amount the equipment can hold (gallons or lbs)). Draft Permit at 2-3. However, the draft Permit notes on page 3 that these specifications are not enforceable. This means the draft Permit would not prevent the Plant from changing or replacing the equipment in a way that increased the rated capacity. The current emissions standards and estimates in the draft Permit are calculated from these underlying capacities, and the draft Permit currently contains no monitoring or reporting requirement (e.g., CEMS) to consistently verify that the Plant is meeting the emissions standards. The only way to make sure the emissions standards are being met is by verifying the rated capacity of the equipment—a specification that is explicitly not an enforceable term of the draft Permit. In this way, the draft Permit makes a critical component of the emissions standards unenforceable. *See Sahu Analysis at Comment 1.* The equipment specifications should be included as enforceable terms of the Permit.<sup>34</sup>
- **The draft Permit requires no continuous emissions monitoring or reporting of emissions from the two turbines or three boilers.** The draft Permit only requires periodic stack testing, every two (2) years, for the two turbines. In addition, the only publicly available reporting required in the draft Permit is regarding fuel quality. Draft Permit at Condition 58. All other monitoring records are only to be maintained "On Site" by the applicant, including monthly and annual emissions calculations for NO<sub>x</sub>, VOC, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, CO<sub>2e</sub>, and SO<sub>2</sub>. Draft Permit at Condition 57. This means there is no way for DEQ or the public to consistently ensure compliance with the Permit limits. There is no justification for this omission, and continuous emissions monitoring systems (CEMS) are widely available for NO<sub>x</sub>, CO, VOCs, and filterable PM 10 and PM 2.5. DEQ should explain why CEMS is not required by the Permit. *See Sahu Analysis at Comments 12, 13.*

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<sup>34</sup> *See* 42 U.S.C. § 7661c(a) ("Each permit issued under this title shall include enforceable emission limitations and standards...and such other conditions as are necessary to assure compliance with applicable requirements of this Act...").

- **The draft Permit uses many undefined terms**, such as “good combustion practices,” “high efficiency design and operation”, “good air pollution control practices”, “best engineering practices”, and “proper operation and maintenance.” Absent clear definitions in the Permit, the terms are effectively unenforceable. Each of the terms should be clearly defined so as to make them enforceable. *See Sahu Analysis at Comments 3, 4.*
- **The draft Permit sets no emissions limits and requires no monitoring or reporting for the hazardous/toxic air pollutants that would be emitted by the Plant.** The Draft Engineering Analysis, at 12, describes the hazardous air pollutants that will be emitted from the Plant and the federal emissions limitations and compliance demonstrations that apply.<sup>35</sup> However, the draft Permit completely fails to incorporate *any* requirements for hazardous/toxic air pollutants. For example, the applicant’s calculations list the Plant’s potential to emit 0.2 tons per year (400 lbs/yr) of formaldehyde and 1.61 tons per year (3,220 lbs/yr) of hexane.<sup>36</sup> The calculations also list the reduced emissions of these and other hazardous pollutants pursuant to federal MACT (Maximum Achievable Control Technology) requirements, but the draft Permit does not cite the MACT or any other federal standards.

Furthermore, there is conflicting information in the application and Draft Engineering Analysis regarding hazardous air pollutants. The Permit Application, at 3-2, notes: “Per 9VAC5-60-300 C.4 exemptions apply to both turbines, all three boilers, and the emergency generator as each unit *is regulated by a specific NESHAP.*” (emphasis added). The Draft Engineering Analysis, however, states that “None of the CHP units are subject to a NESHAP.” Draft Engineering Analysis at 11.<sup>37</sup>

DEQ must clarify the standards that apply to the hazardous/toxic air pollutant emissions from the proposed Plant, and must ensure the Permit clearly identifies the standards and provides for annual testing and reporting to ensure compliance and public transparency. *See Sahu Analysis at Comment 14.*

- **It is not clear why ultra low NOx burners were not considered as part of the BACT analysis for the three boilers.** Condition 6 of the Draft Permit states that emissions from each boiler “shall be controlled by low NOx burners with flue gas recirculation.” Draft Permit at Condition 6. Best Available Control Technology (BACT) applies to the NOx emissions from the boilers. *See 9 VAC 5-50-260(C); 40 C.F.R. 51.166(j)(2); Draft*

<sup>35</sup> *See also*, email communication between applicant and DEQ, 60326 – Norfolk Naval Shipyard (NNSY) CHP – Additional Information 12092019 to 01142020.pdf, at 3 (“Is there HAP control from the oxidation catalyst? There is no documented control of HAPs from the Oxidation Catalyst.”).

<sup>36</sup> Appendix A, “Ameresco\_NNYS Construction Potential Emission Calcs v11 (1).xlsx.

<sup>37</sup> *See also* DEQ, Memo re: PSD Air Quality Analyses – Norfolk Naval Shipyard Combined Heat and Power Plant, at 5 (Apr. 29, 2020) (“All potential sources of toxic air pollutants will be regulated by a National Emission Standard for Hazardous Air Pollutants (NESHAP). Therefore, a toxic pollutant modeling analysis was not conducted.”).

Engineering Analysis at p. 15. The three boilers are permitted to emit 14.9 tons per year of NOx. Draft Permit at Condition 43. DEQ has previously determined that ultra low NOx burners are BACT for a natural gas-fired auxiliary burner.<sup>38</sup> As significant NOx sources at the proposed Plant, DEQ should clarify why ultra low NOx burners were not considered as part of the BACT analysis for the boilers. *See* Sahu Analysis at Comment 5.

These and other technical comments are discussed in more detail in Dr. Sahu's analysis in Attachment B. CBF submits these technical comments, questions, and recommendations to strengthen the draft Permit and ensure it is protective of the surrounding communities.

**IV. The proposed Plant poses environmental justice concerns; DEQ must thoroughly analyze the impact to the surrounding communities that will occur from the construction and operation of a new fossil fuel-fired power plant.**

Virginia law and policy direct DEQ to conduct a thorough and meaningful environmental justice analysis. CBF appreciates DEQ's initial steps towards conducting an environmental justice analysis, *see* Draft Engineering Analysis at 2, but Virginia law and policy require DEQ to go further. The Constitution of Virginia states that it is the Commonwealth's policy to "protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth." Constitution of Virginia, Art. XI, Sec. 1. The Virginia Environmental Justice Act states: "It is the policy of the Commonwealth to promote environmental justice and ensure that it is carried out throughout the Commonwealth, with a focus on environmental justice communities and fenceline communities." Va. Code Ann. § 2.2-235.

The 2020 General Assembly re-authorized<sup>39</sup> Virginia's Council on Environmental Justice to "advise the Governor and provide recommendations that maintain a foundation of environmental justice principles intended to protect vulnerable communities from disproportionate impacts of pollution." Va. Code Ann. § 2.2-2699.9. The Virginia Code defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, faith, disability, national origin, or income, regarding the development, implementation, or enforcement of any environmental law, regulation, or policy." Va. Code Ann. § 2.2-2699.8.

And of particular relevance to the proposed Plant, Virginia law specifically states that part of the Commonwealth's Energy Policy is to "[e]nsure that development of new, or expansion of

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<sup>38</sup> *See, e.g.*, PSD Permit for Virginia Electric Power Company, at 6 (2015), [https://www.deq.virginia.gov/Portals/0/DEQ/Air/Permitting/PSDPermits/52404\\_permit.pdf](https://www.deq.virginia.gov/Portals/0/DEQ/Air/Permitting/PSDPermits/52404_permit.pdf) ("Nitrogen Oxides – NOx emissions from the auxiliary boiler (B-1)...shall be controlled by ultra low-NOx burners with a NOx performance of 9 ppmvd at 3% O2 for natural gas...").

<sup>39</sup> Executive Order 73 (2017), <https://www.naturalresources.virginia.gov/media/governorviriniagov/secretary-of-natural-resources/pdf/eo-73-establishment-of-an-advisory-council-on-environmental-justice.pdf>.

existing, energy resources or facilities does not have a disproportionate adverse impact on economically disadvantaged or minority communities.” Va. Code Ann. § 67-102(8).

The proposed Plant—an energy facility—introduces an additional source of pollution into communities already overburdened by industrial pollution and flooding. *See supra* section I.A. DEQ’s environmental justice analysis, as currently described in available documents, is not adequate to ensure no disproportionate impact to the communities surrounding the Shipyard.

DEQ has not conducted any cumulative impacts analysis to consider how the proposed Plant will contribute to the existing pollution sources affecting the surrounding communities. DEQ should holistically review the facts and circumstances of the Permit in order to evaluate the “reasonableness of the activity involved and the regulations proposed to control it.” Va. Code Ann. § 10.1–1307(E). DEQ should provide a list of all permits that will be required for the Plant. For example, will the facility be applying for a permit to discharge wastewater? When and how will the effects of the wastewater discharge and air emissions be considered in a cumulative way? Will the facility require a permit for the 550,000 gallon diesel storage tank? Will the permit include a spill prevention plan and adequate measures to prepare for increased flooding, extreme weather events, and sea level rise? Will an impacts analysis be conducted for the new natural gas pipeline that will supply the new Plant?

In particular, DEQ’s summary conclusion that air quality will not be impacted because the Plant’s emissions will comply with air quality standards is insufficient. The only cumulative impact air modeling conducted was for PM 2.5 and ozone to determine compliance with the NAAQS.<sup>40</sup> As noted above, there are negative health risks associated with exposure to certain pollutants below NAAQS levels, and the Plant will introduce a number of pollutants into the communities surrounding the Shipyard that are not subject to NAAQS. As the Fourth Circuit recently explained in rejecting the Board’s environmental justice review for an air permit,

The Board’s reliance on air quality standards [NAAQS] led it to dismiss EJ concerns. Even if all pollutants within the county remain below state and national air quality standards, the Board failed to grapple with the likelihood that those living closest to the Compressor Station -- an overwhelmingly minority population... will be affected more than those living in other parts of the same county. The Board rejected the idea of disproportionate impact on the basis that air quality standards were met. But environmental justice is not merely a box to be checked, and the Board’s failure to consider the disproportionate impact on

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<sup>40</sup> NNSY New CHP PSD Modeling Report (2020-04-23, revised submittal).pdf at 3-2.



those closest to the Compressor Station resulted in a flawed analysis.<sup>41</sup>

DEQ must ensure its environmental justice analysis satisfies Virginia law and policy, including Va. Code Ann. § 10.1-1307(E).

The Draft Engineering Analysis states that “air quality modeling demonstrates that the air quality impact of the pollutants with permitted emissions greater than the respective rates deemed significant are all in accordance with the applicable NAAQS.” As a result, the Analysis concludes that the Plant “will not cause a disproportionately high and adverse impact on any resident of the local community or any resident of Virginia.”<sup>42</sup> While NAAQS are intended to provide an “adequate margin of safety”<sup>43</sup> as necessary to “protect the public health”<sup>44</sup> they are not capable of contemplating all of the unique factors that might contribute to a community’s vulnerability to particular criteria pollutants. As previously mentioned, residents of Portsmouth are surrounded by Superfund sites in various stages of remediation all of which have the potential to significantly endanger the health and well-being of the community. In addition, the poverty study notes that 45.1% of those impacted by poverty are under the age of 18, 20% live with a significant disability, and 20% are over the age of 65.<sup>45</sup> In light of these unique environmental and public health factors, DEQ should not rely on NAAQS as a conclusory metric for assessing the risk the proposed Plant poses to the local community.<sup>46</sup>

The proposed Plant warrants full consideration by the Board, including review pursuant to Va. Code Ann. § 10.1-1307(E). The public interest in the Plant, the proximity to surrounding communities, and the significant issues relevant to the draft Permit terms justify review and consideration by the Board. *See* Va. Code Ann. § 10.1-1322.01 (the Director “shall grant...Board consideration...if the Director finds” that there is “significant public interest” in the permit and commenters “raise substantial, disputed issues relevant” to the permit). Board consideration would ensure a thorough review of the impacts of the proposed Plant, including consideration of the “character and degree of injury to, or interference with, safety, health, or the reasonable use of property” and the “suitability of the activity to the area in which it is located.” Va. Code Ann. § 10.1-1307(E); *see also*, *Friends of Buckingham v. State Air Pollution Control Board*, 947 F.3d 68 (4th Cir. 2020) (vacating and remanding decision of the Board for failure to make findings and conduct an adequate review of an air permit pursuant to § 10.1-1307(E)).

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<sup>41</sup> *Friends of Buckingham v. State Air Pollution Control Board*, 947 F.3d 68, 91 (4th Cir. 2020).

<sup>42</sup> Draft Engineering Analysis at 2

<sup>43</sup> 42 U.S.C. § 7409(b).

<sup>44</sup> *Id.*

<sup>45</sup> City of Portsmouth, VA Poverty Study, Thomas P. Miller & Associates, LLC, <http://www.portsmouthva.gov/DocumentCenter/View/7385/City-of-Portsmouth-Poverty-Study>.

<sup>46</sup> *See also* *Friends of Buckingham*, 947 F.3d at 92 (“This strikingly limited analysis goes hand in hand with the EJ error analyzed above, making the health risk and site suitability analysis all the more important. Instead, the Board accepts without deciding that this area may be an EJ minority community with a high risk for asthma complications, and then does not properly recognize the localized risk of the *very particulate matter* that exacerbates asthma.”)

V. **DEQ should require an alternatives analysis to justify the need for a new fossil fuel-fired power plant in the midst of a climate crisis.**

The proposed Plant would rely on fossil fuels and have the potential to emit 260,752.78 tons per year of carbon dioxide equivalent (CO<sub>2e</sub>),<sup>47</sup> greenhouse gas emissions that contribute to the increasingly devastating impacts of climate change. Based on a review of the available application and draft Permit documents, it is unclear whether the applicant has conducted any alternatives analysis to determine the need for a new, natural gas power plant rather than an existing or renewable source of energy.

According to a public presentation, NNSY has conducted an Environmental Assessment (EA) per the National Environmental Policy Act (NEPA).<sup>48</sup> A two-page notice for the Environmental Assessment describes an extremely limited alternatives analysis: “The Navy is considering two alternatives, the Action Alternative that meets the purpose and need, and a No Action Alternative. No other reasonable action alternatives that would satisfy the purpose and need were identified.”<sup>49</sup> Separately, a fact sheet for the project concludes that, “[w]hen accounting for the elimination of emissions from the remote power plants that are currently providing electricity to NNSY, there will be a net decrease in Greenhouse Gas emissions, because CHP is more efficient than separate procurement of electricity and steam.”<sup>50</sup>

Based on a review of the documents currently available, it is unclear whether DEQ has considered the Environmental Assessment or any of the underlying analyses for NNSY’s conclusions in its review of the Permit application. CBF urges DEQ to include these analyses in its review of the application and to include its assessment of these findings in the public record supporting its ultimate decision on the Permit

Virginia recognizes the urgency of responding to climate change and has developed policies that look towards a cleaner energy future. The Commonwealth’s Energy objectives include the following:

- Facilitating conservation;

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<sup>47</sup> Appendix A, “Ameresco\_NNYS Construction Potential Emission Calcs v11 (1).xlsx.

<sup>48</sup> Norfolk Naval Shipyard Combined Heat and Power Plant and Energy Conservation Measures Briefing, at slide 10 (May 21, 2020),

[https://www.navsea.navy.mil/Portals/103/Documents/NNSY/NNSY%20ESCP%20and%20CHP%20Information%20Session%20Briefing%20FINAL%205\\_21\\_2020.pdf?ver=2020-05-28-123100-940](https://www.navsea.navy.mil/Portals/103/Documents/NNSY/NNSY%20ESCP%20and%20CHP%20Information%20Session%20Briefing%20FINAL%205_21_2020.pdf?ver=2020-05-28-123100-940).

<sup>49</sup> “Environmental Assessment for Implementation of Energy Conservation Measures at Norfolk Naval Shipyard in Portsmouth, Virginia”, available at

[https://www.ready.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Mid-Atlantic/PDFs/EV/Env\\_Compliance/Public\\_Notices/ESPC\\_EA\\_Factsheet\\_21May2019.pdf](https://www.ready.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Mid-Atlantic/PDFs/EV/Env_Compliance/Public_Notices/ESPC_EA_Factsheet_21May2019.pdf).

<sup>50</sup> NNSY ESPC CHP Information 5.14.2020,

[https://www.navsea.navy.mil/Portals/103/Documents/NNSY/NNSY%20ESCP%20CHP%20Information%205\\_14\\_2020.pdf?ver=2020-05-14-124123-390](https://www.navsea.navy.mil/Portals/103/Documents/NNSY/NNSY%20ESCP%20CHP%20Information%205_14_2020.pdf?ver=2020-05-14-124123-390).

- Increasing Virginia's reliance on sources of energy that, compared to traditional energy resources, are less polluting of the Commonwealth's air and waters;
- Establishing greenhouse gas emissions reduction goals across Virginia's economy sufficient to reach net-zero emissions by 2045, including the electric power, transportation, industrial, agricultural, building, and infrastructure sectors;
- Requiring that pathways to net-zero greenhouse gas emissions be determined based on technical, policy, and economic analysis to maximize their effectiveness, optimize Virginia's economic development, and create quality jobs while minimizing adverse impacts on public health, affected communities, and the environment;
- Developing energy resources necessary to produce 30 percent of Virginia's electricity from renewable energy sources by 2030 and 100 percent of Virginia's electricity from carbon-free sources by 2040;
- Mitigating the negative impacts of climate change and the energy transition on disadvantaged communities and prioritizing investment in these communities;
- Developing the carbon-free energy resources required to fully decarbonize the electric power supply of the Commonwealth, including deployment of 30 percent renewables by 2030 and realizing 100 percent carbon-free electric power by 2040.

Va. Code Ann. § 67-101. In pursuit of these objectives, all agencies of the Commonwealth “in taking discretionary action with regard to energy issues, shall recognize the elements of the Commonwealth Energy Policy and where appropriate, shall act in a manner consistent therewith.” Va. Code Ann. § 67-102.C. DEQ is an agency of the Commonwealth, governed by these energy policies. Indeed, the General Assembly specifically charged DEQ with addressing climate change by, among other things, “developing and implementing policy and regulatory approaches...and ensuring that climate impacts and climate resilience are taken into account across all programs and permitting processes.”<sup>51</sup>

The proposed Plant will burn fossil fuels and emit greenhouse gases. Consistent with Virginia law and policy and in recognition of the urgency of the climate crisis, DEQ should ensure the applicant has considered alternative sources of electricity prior to issuing a Permit for the new Plant. To the extent this analysis has already been conducted by NNSY, DEQ should review and consider the analysis in fulfilling its own obligations, and should make any such analysis part of the public record.

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<sup>51</sup> Va. Code Ann. § 10.1-1183.B.2.

**VI. Conclusion**

Thank you for the opportunity to provide comments and feedback on the draft Permit. For the reasons discussed above, CBF also formally requests Board consideration. Va. Code Ann. § 10.1-1322.01. Please contact us with any questions or to discuss any part of these comments.

Sincerely,

Margaret L. (Peggy) Sanner  
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Chesapeake Bay Foundation  
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(804) 258-1539 (direct)

Cc: Joe Wood, Virginia Senior Scientist, CBF

**IN THE MATTER**  
**Of the Proposed Buckingham Compressor Station**

**Report of**  
**George Thurston Sc.D.**  
**Chester, NY 10918**

**September 9, 2018**

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## Report of George Thurston, Sc.D.

### A. Qualifications

I am George D. Thurston, Sc.D. I am a Professor at the New York University School of Medicine in the Department of Environmental Medicine. My business address is: Three Catherine Ct., Chester, NY 10918. I am providing expert testimony that addresses the public health impacts of emissions of fine particulate matter (PM<sub>2.5</sub>) generally and, specifically, the expected public health impacts of PM<sub>2.5</sub> emissions from the proposed Buckingham Compressor Station (BCS). My testimony will address the potential health effects of the facility, if approved. I conclude that the that the air pollution emissions from this facility can be expected to increase adverse health risks in the surrounding community.

I received my undergraduate degree in Engineering from Brown University (with a Concentration in Environmental Engineering) in 1974, and my doctorate in Environmental Health Sciences from the Harvard University School of Public Health in 1983. I was Chairman of the Health and Environment Panel of the Canadian Joint Industry/Government Study of Sulfur in Gasoline and Diesel Fuels in 1997. I also served on the National Academy of Science's Committee on the Health Effects of Incineration from January 1995 through November 1999, and am presently serving as the Chair of the Environmental Health Policy Committee of the American Thoracic Society. I have published extensively regarding the health effects of inhaled air pollutants on humans, particularly as it relates to asthma attacks, hospital admissions, and mortality. I have been called upon by both the U.S. House of Representatives and the U.S. Senate on multiple occasions over the years to provide testimony before them regarding the human health effects of air pollution. I have also been a contributing author to both the 1996 and 2001 EPA Particulate Matter ("PM") Criteria Documents, which the EPA uses as a scientific basis for its decisions regarding the setting of the nation's PM ambient air quality standards. More recently, I served on the U.S. EPA's Clean Air Science Advisory Committee (CASC) on the human health effects of Nitrogen Oxides and Sulfur Oxides. I was a Principal Investigator of a study that has shown that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality in the US. (See Pope, CA, 3rd; Burnett, RT; Thun, MJ; Calle, EE; Krewski, D; Ito, K; and; Thurston, GA. (2002). Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution. *JAMA* 2002; 287: 1132-

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1141. The publications reviewed or relied upon for this testimony are listed at the end of this report as "Literature Cited."

In the past, I have provided testimony about the human health impacts of air pollution from fossil fuel combustion sources on numerous occasions, and on the health effects of natural gas combustion-related pollution specifically, including in the Issues Conference in Case 00-F-1256, in the Matter of the Application of Calpine Construction Finance Company, L.L.P. (2001) and on the application by TransGas Energy Systems LLC for a Certificate of Environmental Compatibility and Public Need to Construct and Operate a 1,100 Megawatt Combined Cycle Generating Facility (2003).

### **B. The State of the Science Regarding Particulate Matter (PM) Air Pollution and its Human Health Effects**

The adverse health consequences of breathing air pollution that results from sources such as fossil fuel combustion facilities are well documented in the published medical and scientific literature. During the past decades, medical research examining air pollution and public health has shown that air pollution is associated with a host of serious adverse human health effects. This documentation includes impacts revealed by observational epidemiology, and confirmed by controlled chamber exposures, showing consistent associations between air pollution and adverse impacts across a wide range of human health outcomes.

Observational epidemiology studies provide the most compelling and consistent evidence of the adverse effects of air pollution. "Epidemiology" is literally "the study of epidemics", but includes all statistical investigations of human health and potentially causal factors of good or ill health. In the case of air pollution, such studies follow people as they undergo varying real-life exposures to pollution over time, or from one place to another, and then statistically inter-compare the health impacts that occur in these populations when higher (versus lower) exposures to pollution are experienced. In such studies, risks are often reported in terms of a Relative Risk (RR) of illness, wherein a  $RR = 1.0$  is an indication of no change in risk after exposure, while a  $RR > 1.0$  indicates an increase in health problems after pollution exposure, and that air pollution is damaging to health.



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These epidemiological investigations are of two types: 1) population-based studies, in which an entire city's population might be considered in the analysis; and 2) cohort studies, in which selected individuals, such as a group of asthmatics, are considered. Both of these types of epidemiologic studies have shown confirmatory associations between air pollution exposures and increasing numbers of adverse impacts, including:

- decreased lung function (a measure of our ability to breathe freely);
- more frequent asthma symptoms;
- increased numbers of asthma and heart attacks;
- more frequent emergency department visits;
- additional hospital admissions; and
- increased numbers of deaths.

The fact that the effects of air pollution have been shown so consistently for so many health endpoints and in so many locales indicates these associations to be causal.

In addition to lung damage, recent epidemiological and toxicological studies of PM<sub>2.5</sub> air pollution have shown adverse effects on the heart, including an increased risk of heart attacks. For example, when PM stresses the lung (*e.g.*, by inducing edema), it places extra burden on the heart, which can induce fatal complications for persons with cardiac problems. Indeed, for example, Peters *et al.* (2001) found that elevated concentrations of fine particles in the air can elevate the risk of Myocardial Infarctions (MI's) within a few hours, and extending 1 day after PM exposure. The Harvard University team found that a 48 percent increase in the risk of MI was associated with an increase of 25  $\mu\text{g}/\text{m}^3$  PM<sub>2.5</sub> during a 2-hour period before the onset of MI, and a 69 percent increase in risk to be related to an increase of 20  $\mu\text{g}/\text{m}^3$  PM<sub>2.5</sub> in the 24-hour average 1 day before the MI onset (Peters *et al.*, 2001). Numerous other U.S. studies have also show qualitatively consistent acute cardiac effects, such as the Zanobetti and Schwartz (2006) study of hospital admissions through emergency department for myocardial infarction (ICD-9 code, and Zanobetti *et al.* (2009) that examined the relationship between daily PM<sub>2.5</sub> concentrations and emergency hospital admissions for

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cardiovascular causes, myocardial infarction, and congestive heart failure in 26 U.S. communities during 2000-2003.

Cardiac effects at the biological level have also been documented in both animal and human studies. Animal experiments at Harvard University by Godleski *et al.* (1996, 2000) indicate that exposures to elevated concentrations of ambient particulate matter can result in cardiac related problems in dogs that had been pre-treated (in order to try to simulate sensitive individuals) to induce coronary occlusion (i.e., narrowed arteries in the heart) before exposing them to air pollution. The most biologically and clinically significant finding was that, in these dogs, the particulate affected one of the major electrocardiogram (ECG) markers of heart attacks (myocardial ischemia) in humans, known as elevation of the ST segment. Cardiac effects at the biological level have been found in human studies, as well. For example, Pope *et al.* (1999) and Gold *et al.* (2000) found that PM exposure is associated with changes in human heart rate variability. Such changes in heart rate variability (HRV) may reflect changes in cardiac autonomic function and risk of sudden cardiac death. In the Pope *et al.* study, repeated ambulatory ECG monitoring was conducted on 7 subjects for a total of 29 person-days before, during, and after episodes of elevated pollution. After controlling for differences across patients, elevated particulate levels were found to be associated with (1) increased mean heart rate, (2) decreased SDNN, a measure of overall HRV, (3) decreased SDANN, a measure that corresponds to ultra-low frequency variability, and (4) increased r-MSSD, a measure that corresponds to high-frequency variability. This confirms, at the individual level, that biological changes do occur in heart function as a result of PM exposure, supporting the biological plausibility of the epidemiological associations between PM exposure and cardiac illnesses.

Epidemiologic research conducted on U.S. residents has indicated that acute short-term exposures to PM air pollution, are associated with increased risk of mortality. For example, a nationwide time-series statistical analysis of daily death counts by the Health Effects Institute (HEI, 2003) examined mortality and PM10 air pollution (a subset of particulate matter air pollution that is less than 10  $\mu\text{m}$  in diameter, including PM2.5) in 90 cities across the United States, finding that, for each increase of 10  $\mu\text{g}/\text{m}^3$  in daily PM10 air pollution concentration, there is an associated increase of approximately 0.3% in the *daily* risk of death by the public. Indeed, and I concur, the most recent U.S. EPA Particulate Matter

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Integrated Science Assessment (ISA) (USEPA, 2009a) unequivocally states that “Together, the collective evidence from epidemiologic, controlled human exposure, and toxicological studies is sufficient to conclude that *a causal relationship exists between short term exposures to PM<sub>2.5</sub> and cardiovascular effects . . . and mortality.*”<sup>1</sup>

With respect to PM<sub>2.5</sub> from fossil fuel combustion, my recent study also found that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. Moreover, long-term exposure to fine particles increases the risk of death, and has been estimated to take more than a year from the life expectancy of people living in the most polluted cities, relative to those living in cleaner cities. For example, Brunekreef (1997) reviewed the available evidence of the mortality effects of long-term exposure to PM air pollution and, using life table methods, derived an estimate of the reduction in life expectancy implied by those effect estimates. Based on the results of Pope et al. (1995) and Dockery et al. (1993), a relative risk of 1.1 per 10 ug/m<sup>3</sup> exposure over 15 years was assumed for the effect of fine PM air pollution on men 25-75 years of age. A 1992 life table for men in the Netherlands was developed for 10 successive five-year categories that make up the 25-75 year old age range. Life expectancy of a 25 year old was then calculated for this base case and compared with the calculated life expectancy for the PM exposed case where the death rates were increased in each age group by a factor of 1.1. A difference of 1.11 years was found between the “exposed” and “clean air” cohorts’ overall life expectancy at age 25. A similar calculation by the authors for the 1969-71 life table for U.S. white males yielded an even larger reduction of 1.31 years for the entire population’s life expectancy at age 25. Thus, these calculations indicate that differences in long-term exposure to ambient PM<sub>2.5</sub> can have substantial effects on life expectancy.

In addition to the acute health effects associated with daily PM pollution, long-term exposure to fine PM is also associated with increased lifetime risk of death and has been estimated to take years from the life expectancy of people living in the most polluted cities, relative to those living in cleaner cities. For example, in the Six-Cities Study (that was a key basis for the setting of the original PM<sub>2.5</sub> annual standard in 1997), Dockery *et al.* (1993) analyzed survival probabilities among 8,111 adults living in six cities in the central and eastern

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<sup>1</sup> U.S. Environmental Protection Agency (2009a)

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portions of the United States during the 1970's and 80's. The cities were: Portage, WI (P); Topeka, KS (T); a section of St. Louis, MO (L); Steubenville, OH (S); Watertown, MA (M); and Kingston-Harriman, TN (K). Air quality was averaged over the period of study in order to study long-term (chronic) effects. As shown in Figure 1, it was found that the long-term risk of death, relative to the cleanest city, increased with fine particle exposure, even after correcting for potentially confounding factors such as age, sex, race, smoking, etc.

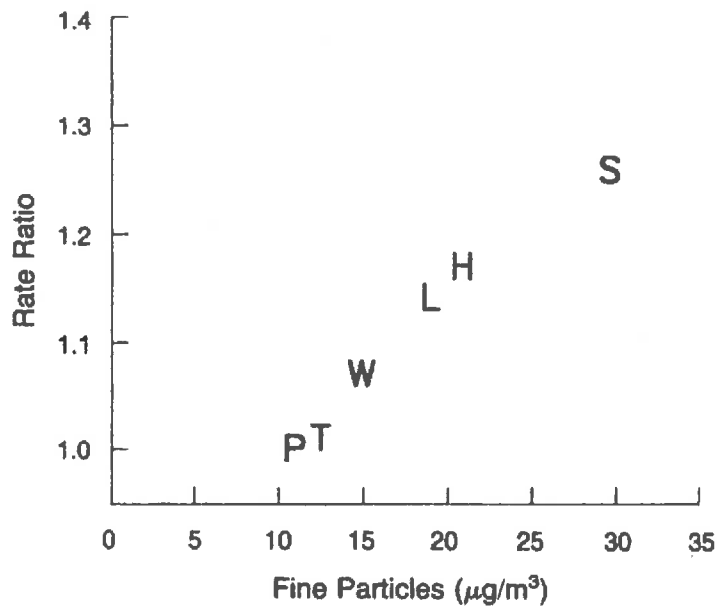


Figure 1. The Harvard Six-Cities Study showed that the lifetime risk of death increased across 6 U.S. cities as the average fine PM levels increased. (Source: Dockery *et al.*, 1993).

Moreover, a study that I and co-authors published in the Journal of the American Medical Association (JAMA), shows that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. Indeed, as shown in Figure 2, this study indicates that the increase in risk of lung cancer from long-term exposure to PM<sub>2.5</sub> in a polluted city was of roughly the same size as the increase in lung cancer risk of a non-smoker who breathes passive smoke while living with a smoker, or about a 20% increase in lung cancer risk (*see Pope, CA, et al.*, 2002).

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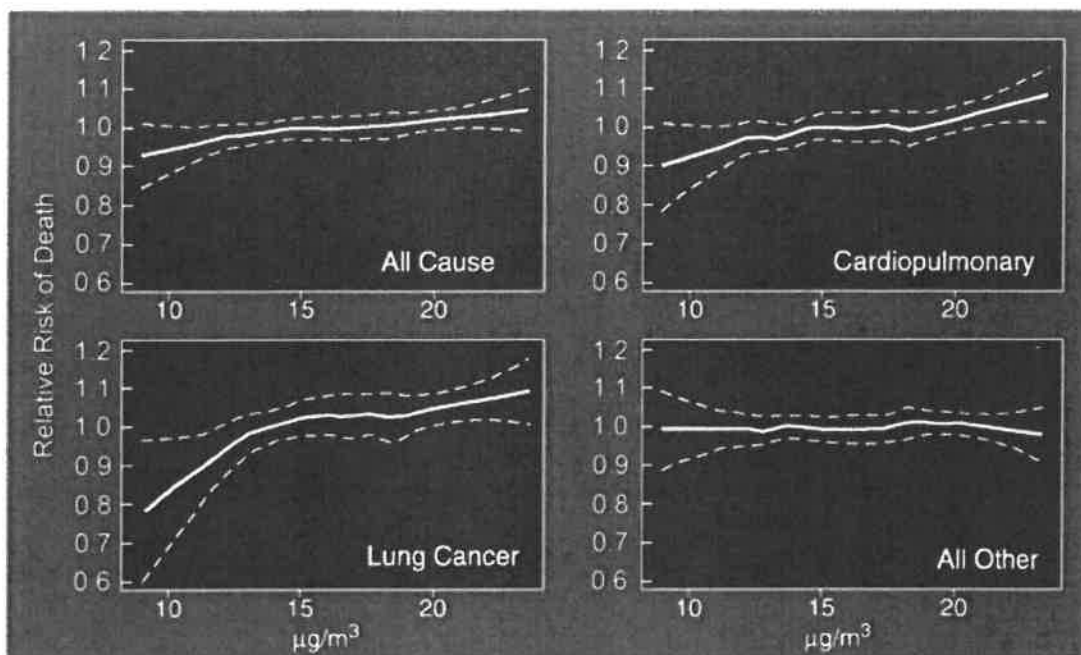


Figure 2. Cardiopulmonary and Lung Cancer Mortality Risks Increase Monotonically with Exposure to Long-Term Fine PM  
(Adapted from: Pope, Burnett, Thun, Calle, Krewski, Ito, and Thurston, 2002)

Long-term exposure to fine particles has also been estimated to take more than a year from the life expectancy of people living in the most polluted cities, relative to those living in cleaner cities. For example, Brunekreef (1997) reviewed the available evidence of the mortality effects of long-term exposure to PM air pollution and, using life table methods, derived an estimate of the reduction in life expectancy implied by those effect estimates. Based on the results of Pope et al. (1995) and Dockery et al. (1993), a relative risk of 1.1 per 10  $\mu\text{g}/\text{m}^3$  exposure over 15 years was assumed for the effect of fine PM air pollution on men 25-75 years of age. A 1992 life table for men in the Netherlands was developed for 10 successive five-year categories that make up the 25-75 year old age range. Life expectancy of a 25 year old was then calculated for this base case and compared with the calculated life expectancy for the PM exposed case where the death rates were increased in each age group by a factor of 1.1. A difference of 1.11 years was found between the “exposed” and “clean air” cohorts’ overall life expectancy at age 25. A similar calculation by the authors for the 1969-71 life table for U.S. white males yielded an even larger reduction of 1.31 years for the entire population’s life expectancy at age 25. Thus, these calculations indicate that

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differences in long-term exposure to ambient PM<sub>2.5</sub> can have substantial effects on life expectancy.

The above discussed increases in mortality documented by these studies represents only the “tip of the iceberg” of effects that would result. As shown in Figure 3 below, for every death associated with air pollution, there is a pyramid of much greater numbers of morbidity effects, including hospital admissions, emergency department visits, doctor visits, missed work days, missed school days, asthma symptoms days, etc. Clearly, when the whole scope of other adverse health effects associated with these air pollution deaths are considered, there is no doubt as to the significance of these adverse effects.

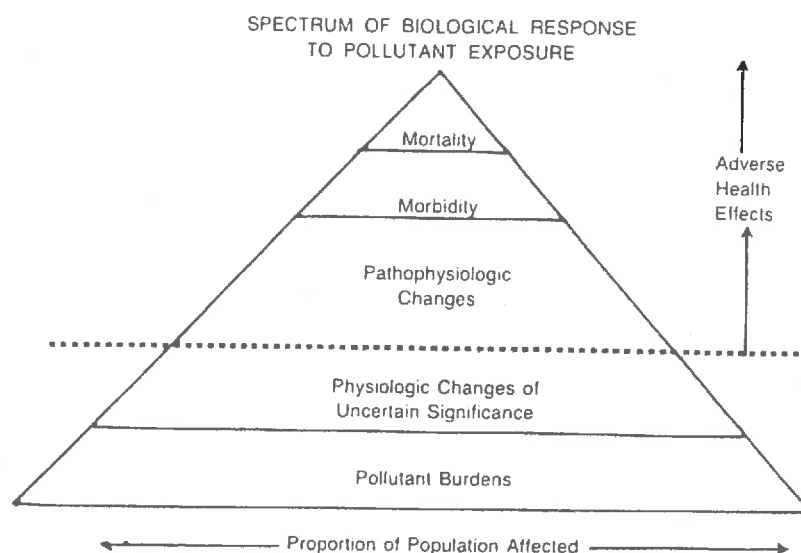


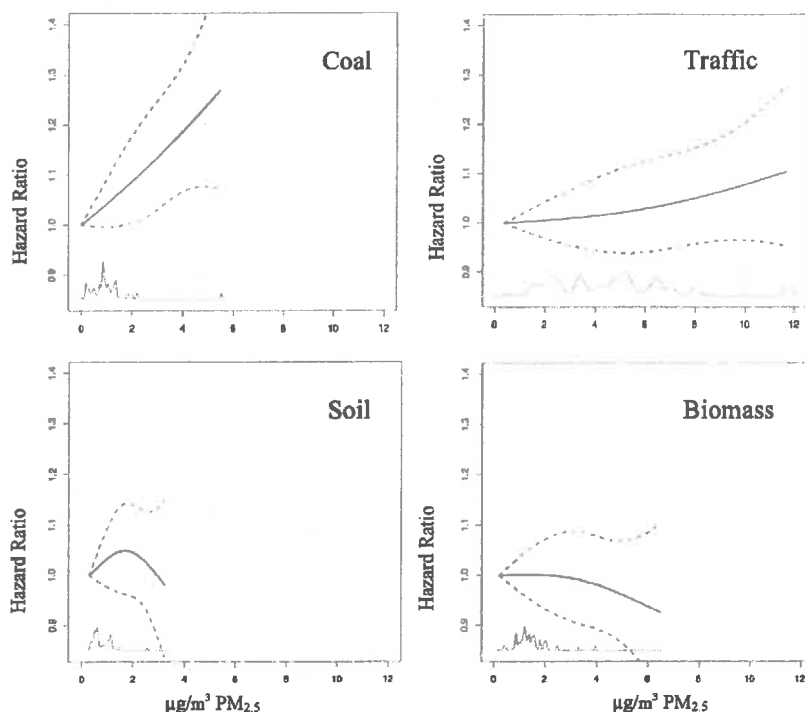
Figure 3. The Pyramid of Adverse Health Effects of Air Pollution on Health

(From: *Guidelines as to what constitutes an adverse respiratory health effect, with special reference to epidemiologic studies of air pollution.* Am Rev Respir Dis. 1985 Apr;131(4):666-8.)

My recent studies, and those by others, have also found that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. Air pollutants associated with fossil fuel combustion (e.g., from oil, coal and natural gas fired fossil fuel combustion sources) have well-documented adverse human health effects. The health impact is particularly high for particulate matter from fossil fuel-burning facilities, such as coal burning, which has been

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associated with an ischemic heart disease mortality risk that is roughly five times that of the average for PM<sub>2.5</sub> particles in general (Thurston et al., 2016), and more damaging per  $\mu\text{g}/\text{m}^3$  than PM<sub>2.5</sub> from other common sources (Figure 4).



**Figure 4. Concentration-response curve (solid lines) and 95% confidence intervals (dashed lines) for Source-Specific PM<sub>2.5</sub> mass in the US ACS Cohort. (Thurston et al., 2016).**

The United States Environmental Protection Agency (EPA) is required under Sections 108 and 109 of the Clean Air Act to periodically evaluate the air quality criteria that reflect the latest scientific information relevant to review each of the regulated air pollutant's National Ambient Air Quality Standard (NAAQS). The EPA recognized the adverse health effects of small particulate matter (PM) air pollution as early as 1987 when, pursuant to its authority under the Clean Air Act, it promulgated a NAAQS for particulate matter that is 10 micrometers in diameter or smaller (PM<sub>10</sub>). The NAAQS promulgated by EPA are required for certain air pollutants "that may reasonably be anticipated to endanger public health and welfare." The NAAQS' air criteria must be "requisite to protect the public health" with an "adequate margin of safety." Under the particulate matter NAAQS, states must reduce PM<sub>10</sub> concentrations in their ambient atmosphere to no more than 50 micrograms per cubic meter on an annual average

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basis, and to no more than 150 micrograms per cubic meter on an average 24-hour period. Prior to 1987, EPA's particulate NAAQS had only regulated total suspended particulate matter. The focus in 1987 on smaller particles -- that is, 10 micrometers or less -- resulted from increasing scientific evidence that human inhalation of smaller particles had more serious respiratory effects than larger particles.

In 1994, EPA began the process of again reviewing its particulate matter standards. In 1996, EPA proposed a new NAAQS for even smaller particles -- those that are 2.5 micrometers in diameter or smaller ("PM2.5"). In July 1997, upon determining that the PM10 NAAQS is no longer protective of human health, 62 Fed. Reg. 38652, 38665 (July 18, 1997), EPA issued a final rule revising the NAAQS for PM to include two new NAAQS for PM2.5. These consisted of: 1) a long-term annual standard of 15 ug/m<sup>3</sup>, annual arithmetic mean, averaged over three years from single or multiple community-oriented monitors; and 2) a 24-hour standard that is met when the three-year average of the 98th percentile of 24-hour PM2.5 concentrations at each population-oriented monitor within an area does not exceed 65 ug/m<sup>3</sup>. 62 Fed. Reg. 38652, 38679 (July 18, 1997). These new PM2.5 standards were based on an increasing scientific consensus that the current NAAQS for PM10 was not sufficiently protective of human health. EPA's scientific review concluded that fine particles, in the 2.5 micrometer and smaller range, penetrate more deeply into the lungs, and may be more likely than coarse particles to contribute to the health effects (e.g., premature mortality and hospital admissions) found in a number of recently published community epidemiological studies at concentrations that extend well below those allowed by the current PM10 standards. As EPA stated in its rulemaking, a greatly expanded body of community epidemiological studies provide "evidence that serious health effects (mortality, exacerbation of chronic disease, increased hospital admissions, etc.) are associated with exposures to ambient levels of PM, even in concentrations below current U.S. PM standard." (*Federal Register*, 1997). Since that time, the U.S. EPA has lowered the allowable limits of ambient concentration of PM2.5 to 35 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> for the daily and annual standards, respectively, in recognition of its effects at lower levels of exposure.

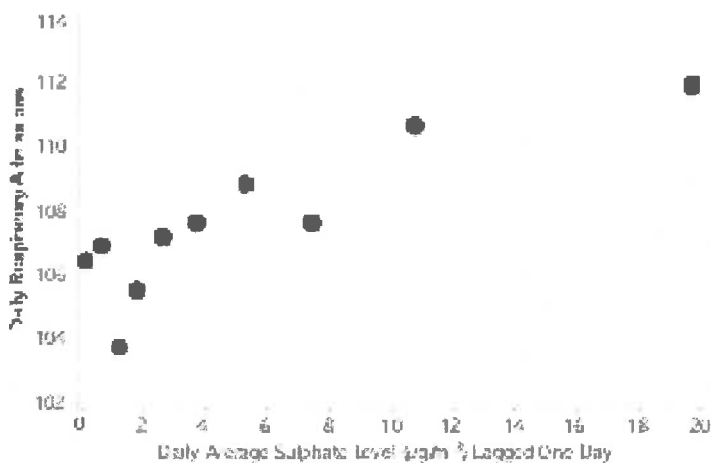
The EPA PM Staff Paper at the time of the setting of the PM2.5 standards concluded that "fine and coarse particles can be differentiated by their sources and formation processes, chemical composition, solubility, acidity, atmospheric lifetime and behavior, and transport



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distances.” EPA also concludes that: “Primary fine particles are formed from condensation of high temperature vapors during combustion”; and that: “Fine mode PM is mainly composed of varying proportions of several major components: sulfates, nitrates, acids, ammonium, elemental carbon, organic carbon compounds, trace elements such as metals, and water.” (U.S. EPA, 1996b).

There is no evidence to date that there is any threshold below which the adverse effects of air pollution will not occur. For example, the incremental effects of sulfate containing fine particles, and the lack of a threshold of air pollution effects at ambient levels are indicated for sulfate and hospital admissions in Figure 5 below.

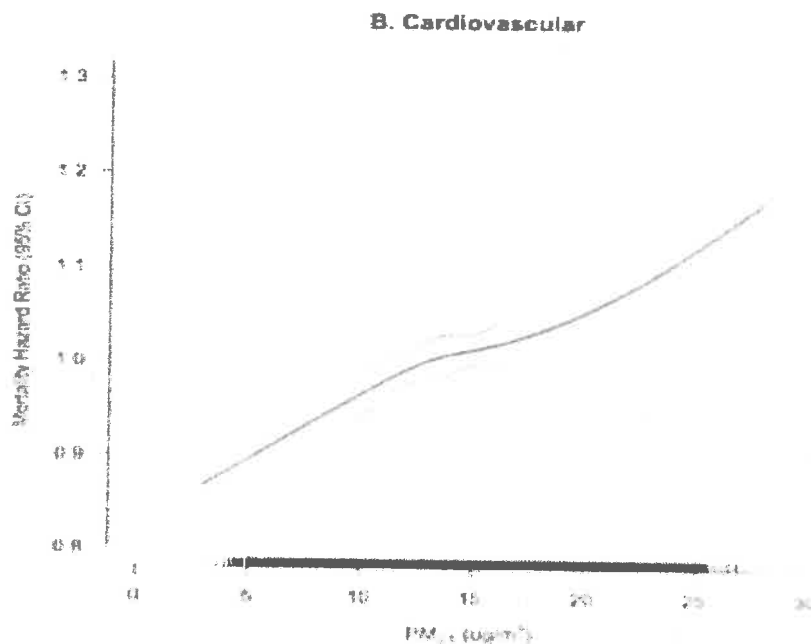


**Figure 5. Average number of respiratory admissions among Ontario hospitals adjusted for other factors, by decile of the daily average sulfate fine particle concentration (ug/m<sup>3</sup>). (Burnett et al, 1994).**

In addition, as displayed in the Figure 6 below, my research has shown that increases in long-term exposure to PM<sub>2.5</sub> particulate matter air pollution are associated with increases in the risk of cardiovascular death among those exposed, even well below the present 12  $\mu\text{g}/\text{m}^3$  annual PM<sub>2.5</sub> air quality standard (Thurston et al., 2016). This lack of a threshold of effects indicates that any reduction in air pollution can be expected to result in commensurate health benefits to the public at ambient levels, even below the legal ambient pollution standards. I have served as a contributing author of the 1996 and the 2003 PM Criteria documents. In addition, my research was cited by the U.S. EPA as a “key study” in promulgating both the PM<sub>2.5</sub> and

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ozone air quality standards in the past. I was also called upon by both the U.S. House and Senate to testify regarding the human health effects of air pollution when they were considering these new air quality standards.

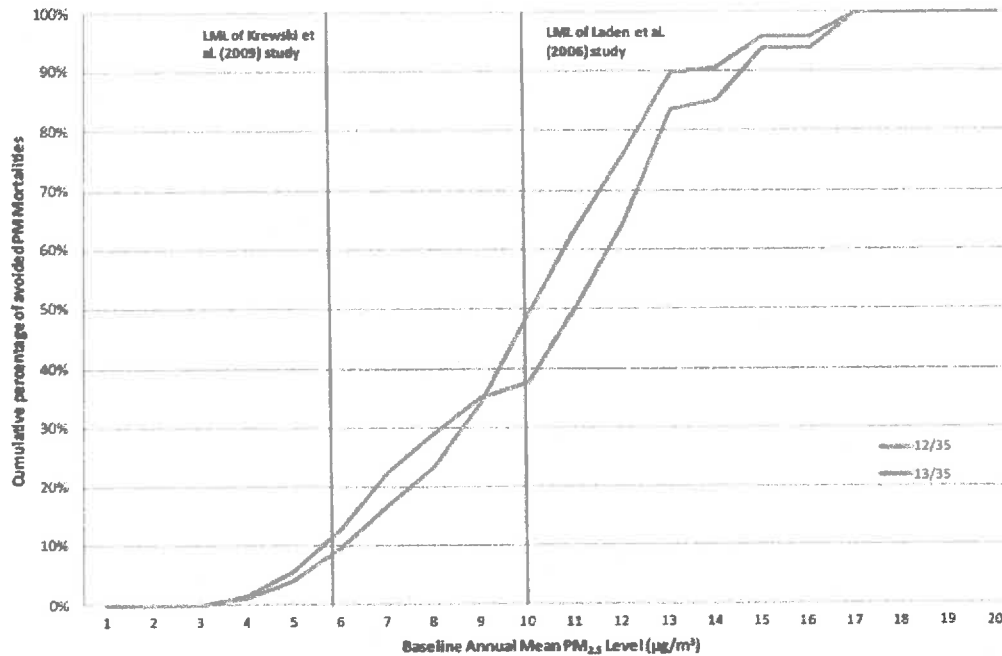


**Figure 6. Mortality Risk from Cardiovascular Disease Increases with Rising PM<sub>2.5</sub> Exposure, Even Well Below the Present US Ambient Air Quality Standard annual limit for PM<sub>2.5</sub> (12 µg/m<sup>3</sup>). Thurston et al, 2016.**

Furthermore, in its calculations of the benefits of potentially reducing the PM<sub>2.5</sub> NAAQS, EPA has also implicitly acknowledged that there can be extant adverse health risks occurring below the NAAQS. For example, in a recent EPA Regulatory Impact Analysis for reducing the annual PM<sub>2.5</sub> standard from 15 µg/m<sup>3</sup> to 12 µg/m<sup>3</sup> (U.S. EPA, 2012), EPA included a figure summarizing the best, most current science regarding PM<sub>2.5</sub> health effects, which clearly illustrates that air pollution deaths occur below the existing PM<sub>2.5</sub> NAAQS (35 µg/m<sup>3</sup> for the daily standard, and 12 µg/m<sup>3</sup> for the annual standard). Figure 7 provides EPA's best estimate of the deaths that would be avoided by implementing the proposed more stringent standard, with roughly half of the avoided deaths occurring in places where the air would be cleaned to levels below (i.e., with air quality better than) the proposed air quality standard. While this particular EPA analysis is for the annual average concentrations, the same principle of effects occurring below the standard applies to the short-term PM<sub>2.5</sub>

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standard as well. Thus, just as cleaning the air below the standards would avoid more of those deaths, any increase in pollution will increase the risk of adverse effects at all levels of prevailing air pollution, even when the NAAQS standards are not violated.



**Figure 7. U.S. EPA Regulatory Impact Assessment of the Number of Premature PM<sub>2.5</sub>-Related Deaths Avoided for 12/35 vs. 13/35 Ambient PM<sub>2.5</sub> Air Quality Standards. (LML = Lowest Measured Level of PM<sub>2.5</sub> in the study population) (U.S. EPA 2012, Fig. 5-7)**

It should be noted that the U.S. EPA agrees with me that meeting an air quality standard does not prevent significant adverse health effects from occurring in the exposed population. Indeed, in its 2013 rulemaking, adopting the revised annual particulate matter NAAQS standard, EPA explained that “evidence- and risk-based approaches using information from epidemiological studies to inform decisions on PM<sub>2.5</sub> standards are complicated by the recognition that *no population threshold, below which it can be concluded with confidence that PM<sub>2.5</sub>-related effects do not occur, can be discerned from the available evidence.*” (emphasis added). (U.S. EPA, 2013).

PM<sub>2.5</sub> is directly emitted by both stationary sources (e.g. fossil fuel combustion sources and other industrial sources) and mobile sources, such as diesel buses and trucks. PM<sub>2.5</sub> is also

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formed in the atmosphere from gaseous emissions, such as sulfur oxides from fossil fuel combustion, resulting in "secondary" PM<sub>2.5</sub>.

PM<sub>2.5</sub> air pollution has been carefully studied in the past few decades. PM is composed of two major components: "primary" particles, or soot, emitted directly into the atmosphere by pollution sources, and; "secondary" particulate matter, formed in the atmosphere from gaseous pollutants, such as the sulfur oxides (SO<sub>x</sub>) and nitrogen oxides (NO<sub>x</sub>) also emitted by fossil fuel combustion sources. After formation in the atmosphere, this secondary PM largely condenses upon the smallest existing primary particles that, collectively, represent the greatest surface area for the secondary PM to condense upon. These particles are very small, commonly having an aerodynamic diameter of less than 1.0 micrometer ( $\mu\text{m}$ ) – a fraction of the diameter of a human hair. For example, after it is released from a smokestack, gaseous SO<sub>x</sub> is chemically converted in the atmosphere to become sulfate PM.

There is ever-growing scientific evidence indicating that particulate matter (PM) air pollution emitted by fossil fuel combustion is among the important contributors to the toxicity of PM<sub>2.5</sub>. Evidence from historical pollution episodes, notably the London Fog episodes of the 1950's, indicate that extremely elevated daily particulate matter concentrations from fossil fuel combustion may be associated with excess acute human mortality (Ministry of Health of Great Britain, 1954).

Recent epidemiological and toxicological evidence also suggests that the particles resulting from fossil-fuel combustion air emissions are among the most toxic in our air. Indeed, my own published analysis of U.S. mortality and PM by source category found that combustion-related particles were more strongly associated with variations in annual mortality rates across U.S. cities than were other components of PM (Ozkaynak and Thurston, 1987). More recently, an analysis by Laden and co-authors (2000) at Harvard University of PM sources and daily pollution confirms that fossil fuel combustion particles were among the PM components that most affected daily variations in mortality. In addition, toxicological studies have indicated that particles resulting from fossil-fuel combustion that contain metals are very toxic to cells in

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the lung. Thus, both the toxicological and epidemiological evidence available indicate that pollution from fossil-fuel combustion are of great human health concern.

The conclusion that fossil fuel combustion particle pollution is one of the more toxic types of particles that we breathe is supported by the facts that combustion particles have different sizes, physio-chemical characteristics, and deposit in different parts of the lung than other more "natural" particles, such as wind-blown soil.

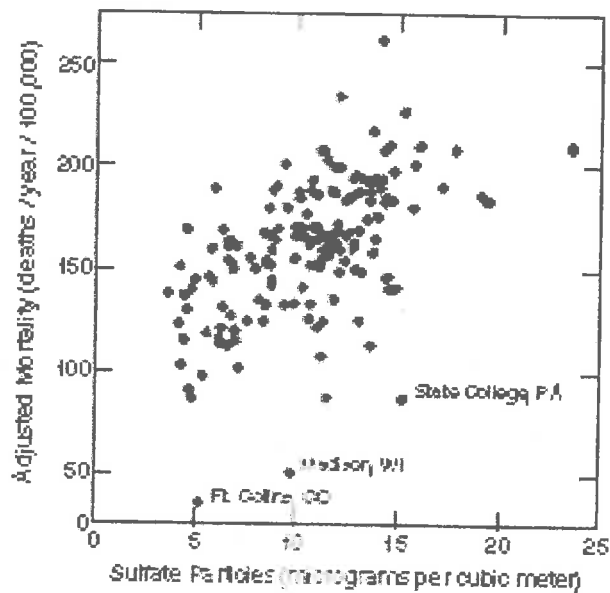
In the past, I have testified that this is especially true of coal-fired power plant emissions, but since all fossil-fuel emissions particles share certain key characteristics, such as containing transition metals, this is also true of oil-fired and natural gas-fired emissions. Although the mass of particles emitted per unit energy is less for oil- and gas-fired units, there is no reason to believe that they are less toxic on a pound for pound basis, and every reason to expect they would be more toxic, since there are so many more ultrafine particles emitted by natural gas burning facilities, per pound of emission, and ultrafine (e.g., nanoparticles) are thought to be far more toxic per unit mass than large particles, because they can reach deep into the lung, and even pass across the lung's membranes into the bloodstream to travel systemically throughout the body of a person who breathes them.

Such fossil-fuel combustion particles are very small, and can defeat the body's natural defenses, thereby having a far greater adverse effect on health. In particular, these fossil fuel combustion particles are enriched in toxic metals, such as arsenic and cadmium, as well as in transition metals, such as iron and vanadium, that can cause damaging oxidative stress in lung cells (see, e.g., Costa et al, 1997; Dreher et al, 1997, and Lay et al, 1999). This may also be especially true in the case of fossil fuel combustion particles because such PM is composed of very small particles that bypass the natural defenses of the lung, and therefore can penetrate deep into the lung where they are not easily cleared, and can therefore reside there for long times, potentially causing significant damage to the lung and to the human body. Thus, PM air pollution from the combustion of fossil fuels, including natural gas-fired units, is cause for special concern, and the health of persons in nearby populations can be adversely affected by this fossil fuel combustion related air pollution.

Epidemiological studies support the conclusion that sulfate containing particles (i.e., fossil fuel combustion products) are among the most toxic particles (e.g., Ozkaynak and

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Thurston, 1987; Dockery et al., 1993; and Pope et al., 1995, and 2002). In my own published research examining the associations of PM with human mortality, we have found that PM emitted from fossil-fuel combustion and from the metals industry are more strongly associated with mortality than particles from other sources, such as soil-derived and automobile emission-related particles (Ozkaynak, H. and Thurston, G.D., 1987, Associations between 1980 U.S. mortality rates and alternative measures of airborne particle concentration. *Risk Analysis* 7:449-460). An example of the relationship that has been found between sulfate fine particle pollution and mortality is shown in Figure 8.



**Figure 8. Age-, sex-, and race-adjusted population-based mortality rates for U.S. metropolitan areas in 1980 plotted versus mean sulfate fine particle air pollution levels. (Adapted from Pope, et al 1995).**

Lab studies also suggest that the presence of acidity in particles, which is usually the case for fossil fuel combustion emissions, increases the toxicity of PM (e.g., Chen, et al, 1990). This conclusion is supported by studies of human respiratory cells (e.g., Veronesi et al., 1999). The presence of acidity increases the solubility of toxic metals, thereby making them more biologically-available to damage the body. This may be an important pathway by which acidic particles, such as those resulting from fossil fuel combustion, can have heightened toxicity versus other ambient particles, and provides a plausible physiological mechanism for the epidemiological associations found between acidic particle exposures and adverse human health effects.

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Particulate matter from the combustion of different fossil fuels generally have shared characteristics. Fossil fuels have all undergone a similar process — they have a similar derivation, they have been underground and compressed, and they are combusted in relatively similar ways. Also, fossil fuel emissions consist of very fine particles, tiny particles, that have large surface areas available to interact with the lung. And the particles have transition metals in them. For example, the percentages of transition metals are similar for natural gas and residual oil.

Second because fossil fuel particles, especially those near a fossil fuel burning facility, are freshly combusted, they have more active sites on them by which to damage health. The work by Oberdorster has shown PM concentrations at ambient levels,  $60 \mu\text{g}/\text{m}^3$  and less, cause mortality in healthy rats. And then he found the aging of those fumes with aggregation of the ultrafine particles significantly decreased their toxicity. So “fresher” (more recently generated) particles are more toxic. Thus, living near a major fossil fuel combustion facility is more impactful because both the concentrations breathed are higher than downwind, but also because they are more recently emitted, and likely more reactive than more aged particles downwind.

Since fossil fuel particles are all fresh aerosols when they are coming out of the facility, and they are combustion aerosols, they share many characteristics. Hence, even though we haven't directly studied natural gas particles, since they share many of the same characteristics as particles from oil and coal combustion, it is very likely that they would share the toxicity of their “sister” fuels, and potentially at a higher effect per pound of pollution breathed.

Freshly combusted particles will have sharp edges, and will be composed, in part, of unoxidized compounds that haven't been neutralized. The sharp edges are the active sites at which these particles irritate and interact with the lining of the lung. Natural gas particles from combustion turbines that use ammonia as part of an SCR system, also include ammonium bisulfate, which is strongly acidic. Unoxidized and acidic compounds would be more reactive, and therefore, be more likely to irritate and interact with the lining of the lung, and, in combination with the metallic components of fine particles, cause more damage than aged and neutralized particles.

Although the quantities, in terms of mass per unit Btu are lower, there is no evidence that, on a pound for pound basis, the particles from gas-fired facility are any less toxic than

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PM2.5 from other fossil fuels. Indeed, because gas-fired sources can emit a much greater percentage of the particles as ultra-fine particles, which have a much higher surface area per mass than larger particles, it is likely that there is a much *greater* effect per pound of PM2.5 emitted by gas-fired sources than for PM2.5 emitted by sources burning other fossil fuels. For this reason, the impacts of the proposed facility in terms of PM2.5 mass concentration are an inadequate indication of the health risks associated with the proposed BCS.

In my own research, I have found that acute (short-term) increases in PM air pollution are associated with increases in the number of daily asthma attacks, hospital admissions, and mortality. In particular, I have found that both ozone and particulate matter air pollution is associated with increased numbers of respiratory hospital admissions in New York City, Buffalo, NY, and Toronto, Ontario, as well as with mortality in cities such as Chicago, IL, and Los Angeles, CA (see, e.g., Thurston et al. 1992). My results have been confirmed by other researchers considering locales elsewhere in the U.S. and throughout the world (see, e.g., Schwartz, J., 1997; and see: U.S. EPA, 2001). I was a Principal Investigator of a study published in the Journal of the American Medical Association (JAMA) in March of 2002, that shows that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. In fact, it was found that the increase in risk of lung cancer from long-term exposure to PM2.5 in a polluted city was of roughly the same size as the increase in lung cancer risk of a non-smoker who breathes passive smoke while living with a smoker, or about a 20% increase in lung cancer risk. (Pope et al, 2002).

Among the groups of persons found in scientific research to be especially affected by environmental insults, including particulate matter air pollution, are: the very young, the poor, the very old, and persons with pre-existing health conditions, such as heart disease and asthma. (see, e.g., U.S. EPA, 1996). Ethnicity, age and pre-existing medical conditions play a role in determining whether adverse health impacts are the predictable result of exposure to increased PM2.5 emissions. Analyses by me and by others in the field of air pollution health effects indicate that the poor are especially at risk from air pollution (e.g., Gwynn and Thurston, 2001). Similarly, older adults are at greater risk of severe adverse outcomes from air pollution. Also, children, a population known to be especially susceptible to the effects of air pollution because their bodies are developing (and because they spend larger amounts of time exercising outside)



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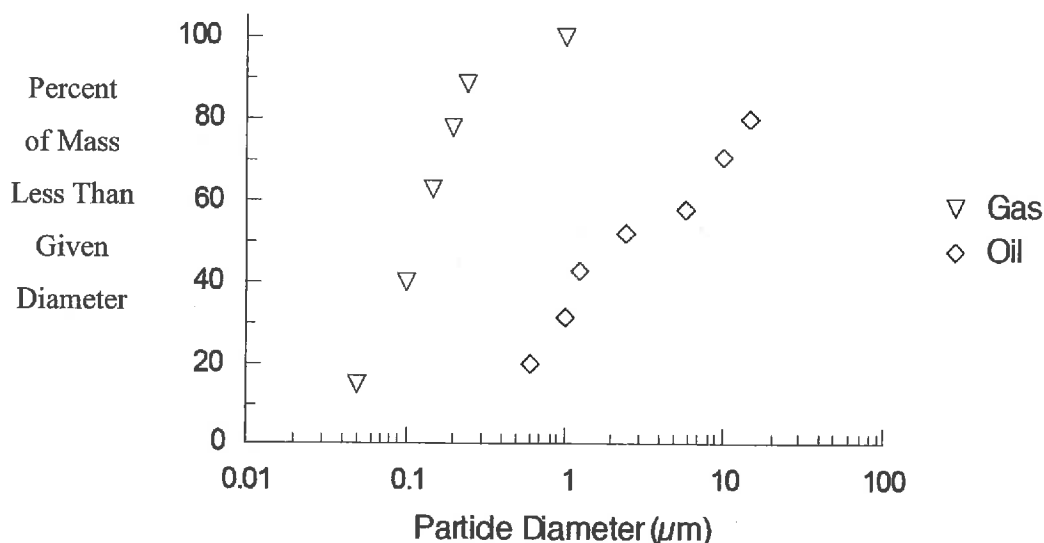
are an especially affected sub-population that is well represented in the community surrounding the facility. This subpopulation of children can be expected to be among those most strongly affected by any increases in PM<sub>2.5</sub> concentrations in the vicinity of the facility.

It is reasonable to assume that nearby residents will be exposed to these emissions even while inside their apartments? Outdoor air pollution, and especially fine particle pollution, is known to infiltrate into buildings with high efficiency as exchanges between outdoor and indoor air occur (via transfer through windows, doors, ventilation systems, etc.). As the levels of air pollution in the air outside a building increase, the exposures of residents inside the building to pm of outdoor origins will therefore also rise.

While other PM<sub>2.5</sub> exposures, such as indoor air pollution, may have health effects, they are independent of the impacts of increases of exposures to PM<sub>2.5</sub> of outdoor origins in general and of the proposed facility in particular. If the levels of outdoor PM<sub>2.5</sub> impinging the living areas of residents increase, then it can be expected that their personal exposures to PM<sub>2.5</sub> of outdoor origins, and their associated health risks,

There are two known characteristics of natural gas combustion particles that make them likely to have especially high health effects, on a per pound basis, than usual PM<sub>2.5</sub>: 1) they have a higher percentage of ultrafine particles, as compared with other fossil-fuel options (see Figure 9). These ultrafine particles have very high surface areas, relative to other fossil-fuel emissions, which likely increase the health impacts of gas-fired PM considerably; and 2) there are acidic sulfates associated with these emissions, especially as strongly acidic ammonium bisulfate. Both of these factors would tend to increase the "bio-availability" of the toxins for gas-fired PM, which would therefore likely increase the toxicity of gas-fired combustion particles, relative to other ambient particles.

## Cumulative Mass Distribution



**Figure 9. Comparison of Particle Mass Size Distribution for Natural Gas vs. Oil Combustion Emissions. Source: Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Fifth Edition," AP-42. Table 1.3-4 (9/98), Table 3.1-1 (10/96)**

The composition of gas combustion particles also makes them to likely be more toxic than usual PM<sub>2.5</sub>. As summarized in Table 1, a comparison of the metal content of gas-and oil-fired particles shows that gas-fired particles have just as high or higher a percentage of a number of metals as oil-fired particles, including barium, cadmium, chromium, molybdenum and zinc. Moreover, even if one assumes that total metals content is generally lower in gas-fired particles, a higher percentage of gas-fired particles are ultrafine particles, compared to particles from other combustion sources (e.g. residual oil combustion particles). This can be expected to increase the toxicity of these metals, relative to other combustion sources with a smaller percentage of ultrafines (e.g., residual oil combustion particles). Thus, there is a high presence of ultrafine particles that are high in transition metal content, making them of especially high toxicity.

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**Table 1. Metal Content of Natural Gas vs. Residual Oil PM Emissions**

| Pollutant       | PM Emissions (lb./MMBtu) |                | PM Emissions as % of PM Mass |              |
|-----------------|--------------------------|----------------|------------------------------|--------------|
|                 | Natural Gas              | Residual Oil   | Natural Gas                  | Residual Oil |
| Antimony        |                          | 3.5E-05        |                              | 0.070%       |
| Arsenic         | 2.0E-07                  | <8.8E-06       | 0.003%                       | 0.018%       |
| Barium          | 4.3E-06                  | 1.7E-05        | 0.058%                       | 0.034%       |
| Beryllium       | <1.2E-08                 | <1.9E-07       | 0.000%                       | 0.000%       |
| Cadmium         | 1.1E-06                  | 2.7E-06        | 0.014%                       | 0.005%       |
| Chloride        |                          | 2.3E-03        |                              | 4.641%       |
| Chromium        | 1.4E-06                  | 5.6E-06        | 0.018%                       | 0.011%       |
| Cobalt          | 8.2E-08                  | 4.0E-05        | 0.001%                       | 0.081%       |
| Copper          | 8.3E-07                  | 1.2E-05        | 0.011%                       | 0.024%       |
| Fluoride        |                          | 2.5E-04        |                              | 0.499%       |
| Lead            | 4.9E-07                  | 1.0E-05        | 0.007%                       | 0.020%       |
| Manganese       | 3.7E-07                  | 2.0E-05        | 0.005%                       | 0.040%       |
| Mercury         | 2.5E-07                  | 7.5E-07        | 0.003%                       | 0.002%       |
| Molybdenum      | 1.1E-06                  | 5.2E-06        | 0.014%                       | 0.011%       |
| Nickel          | 2.1E-06                  | <5.6E-04       | 0.028%                       | 1.130%       |
| Phosphorus      |                          | 6.3E-05        |                              | 0.127%       |
| Selenium        | <2.4E-08                 | <4.6E-06       | 0.000%                       | 0.009%       |
| Vanadium        | 2.3E-06                  | 2.1E-04        | 0.030%                       | 0.425%       |
| Zinc            | 2.8E-05                  | 1.9E-04        | 0.382%                       | 0.389%       |
| <b>Total PM</b> | <b>7.5E-03</b>           | <b>5.0E-02</b> |                              |              |

Source: EPA, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. AP-42, Tables 1.3-1 (with S = 0.3), 1.3-2, 1.3-11, 1.4-2, 1.4-4.  
<https://www.epa.gov/air-emissions-factors-and-quantification>

Furthermore, the likely co-presence of strongly acidic vapor in the BCS emissions will tend to further enhance the bio-availability, and hence the toxicity, of the metals that are present. Sulfuric acid is the most strongly acidic form, with a pH of less than 1 at 50% RH, and ammonium bisulfate is also very strongly acidic, with a pH of 1-2 at 50% RH, while ammonium sulfate is only weakly acidic, with a pH of 5-6 (vs. a pH of 7.0 for completely neutral conditions) (NRC, 1978). Although the applicant has provided no data indicating the breakdown of ammonia sulfates in its proposed facility's emissions, the facility emissions can be expected to be in a strongly acidic, and therefore more toxic, form. The potential toxicity of exposure to these natural gas combustion metals cannot be dismissed, even at very low PM2.5 mass levels.

For all these reasons, the PM2.5 emissions from the new facility cannot be dismissed because of their high ultrafine fraction, their composition, and the likely co-presence of acidic vapors, they potentially could be more toxic than other forms of particulate matter. Thus, I

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disagree with the Supplemental Report's conclusion that "The emissions from the proposed BCS will result from combustion of clean burning natural gas; in no case, will the emissions cause air quality to exceed regulatory standards, which are protective of human health and the environment."

Studies using laboratory animals and humans support the notion that ambient or moderately elevated concentrations of relatively non-acidic, soluble sulfates or nitrates in particular harm health. Some controlled animal exposures of air pollution have shown adverse effects at PM<sub>2.5</sub> at levels close to ambient levels. Recent animal experiments by Godleski and coworkers at Harvard indicate that exposures to elevated concentrations of ambient particulate matter (PM) can result in cardiac related problems in animals (Godleski et al., 1996, Godleski, 2000). The most biologically and clinically significant finding was that in dogs with induced coronary occlusion, particles affected one of the major ECG signs of myocardial ischemia in humans, known as elevation of the ST segment. Consistent cardiac effects at the biological level have also been found in human epidemiological studies, as well. For example, Pope et al (1999) and Gold et al (2000) report that PM exposure is associated with changes in human heart rate variability, confirming that biological changes do occur in heart function as a result of PM exposure.

### **C. The Human Health Effects of Ozone (O<sub>3</sub>) and Nitrogen Oxides (NO<sub>x</sub>) Air Pollution**

Ozone (O<sub>3</sub>) is an air pollutant, resulting from nitrogen oxide and hydrocarbon emissions from fossil fuel combustion, that adversely affects human health. Ozone is a highly irritating gas that is formed in the atmosphere in the presence of sunlight from other "precursor" air pollutants, including NO<sub>x</sub> and hydrocarbons that are emitted by combustion sources such as fossil fuel burning facilities. The adverse health consequences of breathing ozone are serious and well documented. This documentation includes impacts demonstrated in controlled chamber exposures of humans and animals, and observational epidemiology showing consistent associations between ozone and adverse impacts across a wide range of human health outcomes.

The noxious nature of ozone is also evidenced by the way it visibly "eats away" at materials such as rubber, an elastic substance, sharing characteristics with human lungs. Indeed, in the early years of air pollution monitoring, the number of cracks in a stretched rubber band left outdoors for weeks was used as an index of the ozone concentration in the

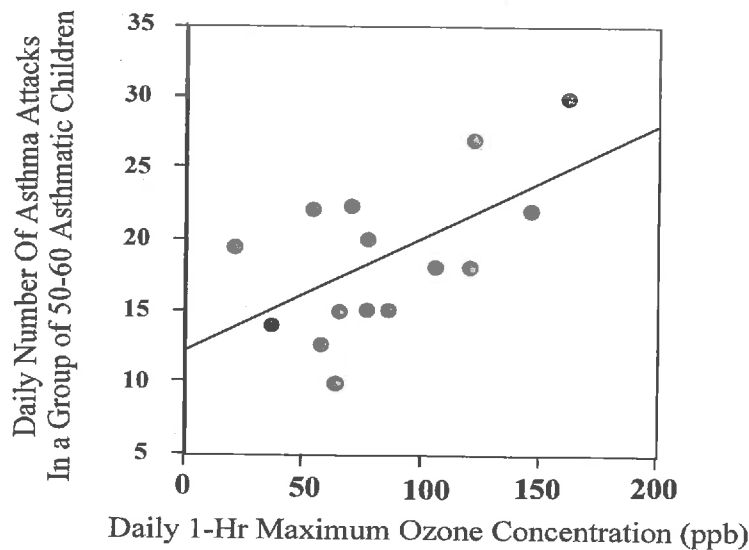
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air. Similarly, ozone has been known to cause fading of certain colors in fabrics because they oxidize the dye, causing "O-fading." As a result, automobile manufacturers today utilize ozone-resistant rubbers, while carpet and drape manufacturers use ozone-resistant dyes (NRC, 1976). In addition, Cass *et al.* (1991) have discussed the importance of protecting works of art from damage due to O<sub>3</sub>. Given this evidence of ozone's devastating effects on solid materials, it comes as no surprise that ozone can also have serious adverse health effects on the more vulnerable human lung.

Ozone can irritate the human respiratory system, causing exposed people to cough, feel an irritation in the throat, and/or experience an uncomfortable sensation in the chest area. Ozone has also been shown to reduce the lung's ability to inhale and exhale, thereby making it more difficult for people to breathe as deeply and vigorously as they normally would (*e.g.*, *see* Bates, 1995). Research shows that ozone can also acutely aggravate asthma, and new evidence suggests that it may cause more children to get asthma. When ozone levels are high, people with asthma have more attacks that require a doctor's attention or the use of additional medication. One reason this happens is that ozone makes people more sensitive to allergens, which are the most common triggers for asthma attacks. Ozone can inflame and damage cells that line the human lung, and O<sub>3</sub> has been compared by some to "getting a sunburn on your lungs." Ozone may also aggravate chronic lung diseases, such as emphysema and bronchitis, and can reduce the immune system's ability to fight off bacterial infections in the respiratory system.

Among the important adverse effects associated with ozone exposure to asthmatics is the triggering of asthma attacks. The effects of ozone air pollution on children with asthma have been demonstrated in my own research following a group of children at an asthma summer camp located in Connecticut. This study of a group of about 55 moderate to severely asthmatic children showed that these children experienced statistically significant reductions in lung function, increases in asthma symptoms, and increases in the use of unscheduled asthma medications as ozone pollution levels rose. As shown in Figure 10, the risk of a child having an asthma attack was found to be approximately 40 percent higher on the highest ozone days than on an average study day (Thurston *et al.*, 1997). Consistent with other research in this area, there is no indication in this plot of a threshold concentration below which children with asthma are safe from the effects of ozone increases.

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**Figure 10. The number of asthma attacks among children at an “Asthma Camp” in Connecticut increase as the ozone levels rise (Source: Thurston *et al.*, 1997)**

These asthma camp results have been confirmed by a larger study published in the *Journal of the American Medical Association (JAMA)*. Gent *et al.* (2003) presented a cohort study of asthmatic children from the New Haven, CT area, including 130 children who used maintenance medications for asthma and 141 children who did not. The more severe asthmatics were identified as those using maintenance medication. For these severe asthmatics, the study found that the level of O<sub>3</sub> exposure was significantly associated with worsening of symptoms and an increase in the use of rescue medication. Each 50 parts per billion (ppb) increase in 1-hour average O<sub>3</sub> was associated with an increased likelihood of wheezing (by 35%) and chest tightness (by 47%). The findings indicate that asthmatic children are particularly vulnerable to ozone, even at pollution levels below the U.S. EPA air quality standards.

My own research has also shown ozone air pollution to be associated with diminished lung function in non-asthmatic healthy children at a YMCA summer camp in a pristine area in the Kittatinny Ridge, in the northwestern part of the state (Spektor *et al.*, 1988a). Similarly, in the summer of 1988, Berry *et al.* (1991) conducted a field health study at two summer day camps in suburban-central New Jersey. Thirty-four campers and counselors had daily lung function tests, and it was found that the campers had a statistically significant decrease in peak expiratory flow rate associated with increasing ozone concentrations, indicating an acute loss in the children’s ability to inhale and exhale after ozone exposure.

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The adverse effects of exposure to ozone in ambient air on the lungs of individuals has been demonstrated in studies that I have conducted in the State of New York, as well. For example, respiratory function damage was demonstrated in a study I co-authored of 30 healthy adult non-smokers engaged in a regular daily program of outdoor exercise in Tuxedo, NY during the summer of 1985 (Spektor *et al.*, 1988b). All measured health indices showed statistically significant O<sub>3</sub>-associated decreases in the lung function of the runners as ozone levels increased. More recently, using lung bronchoscopy (which allows a visualization of the main tubes of the lungs, by means of a flexible lighted instrument introduced through the vocal cords and windpipe) and broncho-alveolar lavage (BAL, or a washing of the lining of the lung), Kinney *et al.* (1996) examined some 19 normal volunteer joggers from Governors Island, NY. The joggers exercised in the afternoon during the 1992 summer season. These results indicate a significant inflammatory response in the lungs of recreational joggers in New York City exposed to regional ozone and associated co-pollutants during the summer months.

Airway inflammation in the lung is among the serious effects that have also been demonstrated by controlled human studies of ozone at levels typically experienced by most Americans. Airway inflammation is especially problematic for children and adults with asthma, as it makes them more susceptible to having asthma attacks, consistent with the asthma camp results discussed above. For example, controlled human studies have shown that prior exposure to ozone enhances the reactivity of asthmatics to aeroallergens, such as pollens, which can trigger asthma attacks (*e.g.*, see Molfino *et al.*, 1991).

The increased inflammation of the lung, and diminished immune system effects associated with ozone air pollution can also make the elderly more susceptible to pneumonia, a major cause of illness and death in this age group. Both *in vivo* and *in vitro* experimental studies have demonstrated that O<sub>3</sub> can affect the ability of the immune system to defend against infection. Increased susceptibility to bacterial infection has been reported in mice at below 80ppb ozone for a single 3-hr exposure (Ehrlich *et al.* 1977). Related alterations of the pulmonary defenses caused by short-term exposures to O<sub>3</sub> include impaired ability to inactivate bacteria in rabbits and mice (Coffin and Gardner 1972; Ehrlich *et al.* 1979) and impaired macrophage defense mechanisms in the lung (Dowell *et al.* 1970; Goldstein *et al.* 1971; McAllen *et al.* 1981; Amoruso *et al.* 1981). Thus, the biological plausibility of the

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adverse air pollution health effects associations found by epidemiological studies is supported by a body of controlled exposure animal studies.

The O<sub>3</sub> - morbidity associations indicated by the above-presented epidemiological studies are also supported by a large body of data from controlled human exposure studies that give consistent and/or supportive results, and that have demonstrated pathways by which ozone can damage the human body when breathed. Clinical studies have demonstrated decreases in lung function, increased frequencies of respiratory symptoms, heightened airway hyper-responsiveness, and cellular and biochemical evidence of lung inflammation in healthy exercising adults. For example, in controlled exposure studies, McDonnell *et al.* (1991) and Devlin *et al.* (1991) found that prolonged controlled exposures of exercising men to levels of ozone common in present-day U.S. (only 80 ppb) resulted in significant decrements in lung function, induction of respiratory symptoms, increases in nonspecific airway reactivity, and cellular and biochemical changes in the lung.

Ozone exposure has also been shown to have adverse effects on athletic performance. Epidemiological evidence compiled more than three decades ago suggested that the percentage of high school track team members failing to improve performance increased with increasing oxidant concentrations the hour before a race (Wayne *et al.* 1967). Controlled exposure studies of heavily exercising competitive runners have demonstrated decreased function at 200 to 300 ppb (Savin and Adams 1979; Adams and Schelegle 1983). More recent studies have shown reduced athletic performance at even lower O<sub>3</sub> concentrations. Schlegle and Adams (1986) exposed 10 young male adult endurance athletes to 120, 180, and 240 ppb O<sub>3</sub> while they exercised for 60 minutes. Although all 10 completed the protocol for filtered (clean) air exposure, 1, 5, and 7 of them could not complete it for the 120, 180 and 240 ppb O<sub>3</sub> exposures, respectively, indicating that higher O<sub>3</sub> concentrations made exercising more difficult.

Another study considers a broadly relevant case showing the benefits of cleaner air. During the Atlanta Summer Olympics of 1996, traffic-related ozone and PM declined significantly as a result of the alternative mass transportation strategy implemented to reduce road traffic during the Games (Friedman *et al.*, 2001). These improvements were correlated with changes in the rate of children's hospital admissions. Compared to a baseline period, traffic related ozone and PM<sub>10</sub> levels declined by 28% and 16%, respectively.



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Concentrations of both PM and ozone also rose noticeably after the end of the Olympics. The study showed a significant reduction in asthma events associated with these pollution improvements. This study supports the hypothesis that improvements in acute air pollution can provide immediate health benefits.

Ozone may also cause permanent lung damage. For example, repeated short-term ozone damage to children's developing lungs may lead to reduced lung function in adulthood (*e.g.*, see Kunzli et al, 1997). In adults, ozone exposure may accelerate the natural decline in lung function that occurs as part of the normal aging process (*e.g.*, see Detels, *et al.*, 1987). One important study suggests that long-term ozone exposure can increase the chances that children will develop asthma disease (McConnell *et al.*, 2002).

Ozone has also been shown to have long-term cumulative health effects in the State of New Jersey in a study that included cadets from the U.S. Military Academy at West Point who attended special summer training in Fort Dix, New Jersey. There was a statistically significant drop in forced expiratory volume in 1 sec of 44 ml ( $p = .035$ ), and there were also significant increases in reports of cough, chest tightness, and sore throat at the follow-up clinic visit: a larger decline in long-term mean Forced Expiratory Volume lung function was observed in cadets at Fort Dix, where ozone exposures were the highest (Kinney and Lippmann, 2000).

Emergency Room Visits and Hospital Admissions are also increased by O<sub>3</sub> air pollution. Cody *et al.* (1992) analyzed data on New Jersey hospital emergency department (ED) visits for asthma, bronchitis, and finger wounds (a non-respiratory control) for the period May through August for 1988 and 1989, finding that, when temperature was controlled for in a multiple regression analysis, a highly significant relationship between asthma visits and ozone concentration was identified. In addition, a 5-year retrospective study by Weisel *et al.* (1995) of the association between ED visits for asthma with mean ambient ozone levels was conducted for hospitals located in central New Jersey. An association was identified in each of the years (1986-1990), and ED visits occurred 28% more frequently when the mean ozone levels were greater than 60 ppb O<sub>3</sub>, as compared to when they were less than 60 ppb O<sub>3</sub>.

Epidemiological evidence has accumulated over recent years indicating a role of O<sub>3</sub>

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in daily hospital admissions. As displayed in Figure 11, time-series studies conducted in the U.S. have shown increased risk of hospital admissions (Relative Risk > 1.0) at higher O<sub>3</sub> levels, even after accounting for the effects of PM (Schwartz, J. in *Health at the Crossroads*, 1997). This work has now been expanded to consider 36 cities across the U.S., finding that, during the warm season of the year, the 2-day cumulative effect of a 5-ppb increase in O<sub>3</sub> was an estimated 0.3% increase in the risk of chronic obstructive pulmonary disease admissions, and a 0.4% increase in the risk of pneumonia admissions (Medina-Ramon *et al.*, 2006).

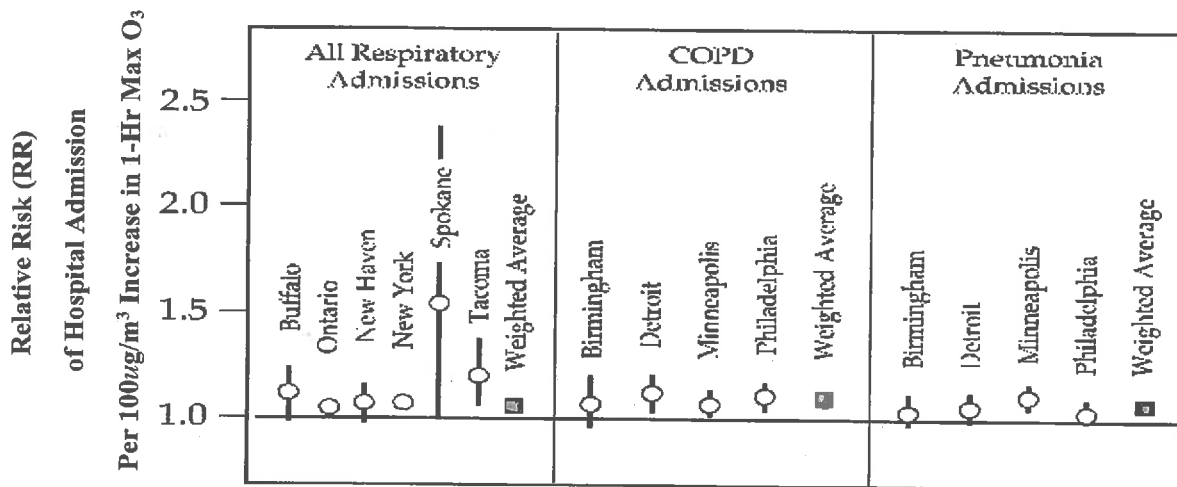
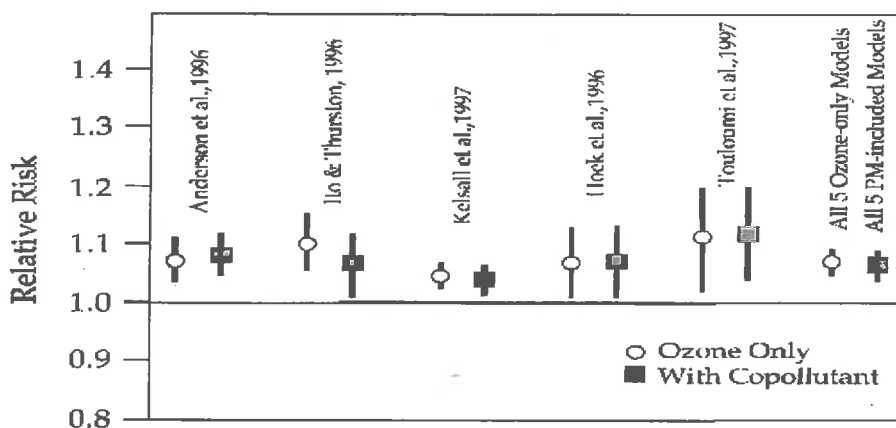


Figure 11. Studies of air pollution in many cities have shown increased risk of respiratory hospital admission (RR > 1.0) on days of high ozone air pollution (Source: Schwartz, J. in *Health at the Crossroads*, 1997).

Epidemiological evidence has also accumulated over recent years indicating a role by ozone in daily human mortality. As shown in Figure 12, time-series studies conducted in cities around the world have shown increased mortality (Relative Risk > 1.0) at higher ozone concentrations, even after accounting for the mortality effects of PM (Thurston and Ito, 2001).

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**Figure 12. Studies indicate an increased risk of mortality (RR >1.0) at higher ozone concentrations, even after considering the effects of PM. (Source: Thurston and Ito, 2001)**

Multi-city analyses have confirmed the ozone-mortality relationship. These include meta-analyses of multiple past ozone studies that show consistent associations between ozone and increases in mortality (Levy et al, 2005; Ito *et al.*, 2005; Bell *et al.*, 2005). In one analysis of some 95 U.S. cities over two decades published in *JAMA*, Bell et al (2004) showed that, even after controlling for PM and weather, an increase of 10 parts-per-billion in daily ozone pollution was associated with approximately a 0.5% increase in daily risk of death. As discussed earlier, this size percent increase in daily admissions, though small, affects a huge portion of the population and accumulates day after day, week after week, and month after month, so that it accumulates to account for thousands of deaths each year in the U.S.

More recently, mortality effects from long-term exposure to ozone air pollution has now been confirmed in a major cohort study (Jerrett et al, 2009; Turner et al, 2016). In Jerrett et al, data from the study cohort of the American Cancer Society Cancer Prevention Study II were correlated with air-pollution data from 96 metropolitan statistical areas in the United States. 448,850 subjects, with 118,777 deaths in an 18-year follow-up period were considered. Data on daily maximum ozone concentrations were obtained from April 1 to September 30 for the years 1977 through 2000. Data on concentrations of fine particulate matter (PM<sub>2.5</sub>) were obtained for the years 1999 and 2000. Associations between ozone concentrations and the risk of death were evaluated with the use of standard and multilevel Cox regression models. In single-pollutant models, ozone was associated with the risk of death from respiratory causes. The estimated relative risk of death from respiratory causes

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that was associated with an increment in ozone concentration of 10 ppb was 1.040 (95% confidence interval, 1.010 to 1.067). The association of ozone with the risk of death from respiratory causes was insensitive to adjustment for confounders and to the type of statistical model used. In a follow-up analysis of this same database, Turner et al (2016) improved ozone exposure estimates by employing estimates of O<sub>3</sub> concentrations at the participant's residence, as derived from a hierarchical Bayesian space-time model. In two-pollutant models, adjusted for PM<sub>2.5</sub>, significant positive associations remained between O<sub>3</sub> and all-cause (hazard ratio [HR] per 10 ppb, 1.02; 95% confidence interval [CI], 1.01–1.04), circulatory (HR, 1.03; 95% CI, 1.01–1.05), and respiratory mortality (HR, 1.12; 95% CI, 1.08–1.16) that were unchanged with further adjustment for NO<sub>2</sub>.

Exposures to nitrogen oxides themselves have also been associated with adverse human health effects, in addition to leading to the formation of PM<sub>2.5</sub> and ozone. As concluded in a U.S. EPA Risk and Exposure Assessment Report for NO<sub>x</sub> (EPA-452/R-08-008a), research studies have provided scientific evidence that is sufficient to infer a similar relationship to also exist between short-term (e.g., daily) NO<sub>2</sub> exposure and adverse effects on the respiratory system. This finding is supported by the large body of recent epidemiologic evidence as well as findings from human and animal experimental studies. These epidemiologic and experimental studies encompass a number of endpoints including ED visits and hospitalizations, respiratory symptoms, airway hyperresponsiveness, airway inflammation, and lung function (U.S. EPA, 2008).

### D. CONCLUSIONS

It is my conclusion that additional emissions from the proposed facility will add to the existing levels of PM<sub>2.5</sub> and nitrogen oxides in the vicinity of the facility, and, because no threshold of air pollution effects has yet been found, any incremental air pollution exposures add an incremental adverse health risk to residents near a source of fossil fuel combustion air pollution. Also, such an increased population risk of health effects constitutes an individual adverse health effect has been confirmed by the American Thoracic Society (American Thoracic Society. "What constitutes an adverse health effect of air pollution?" Official statement of the American Thoracic Society. *Am J Respir Crit Care Med.* 2000 Feb;161(2 Pt 1):665-73.). Therefore, any action that increases ambient concentration of PM<sub>2.5</sub> and other air pollutants in this area will have an adverse impact on human health in the exposed

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population. These incremental health effects risks would in no way be mitigated or negated by other respiratory health effects risks, such as indoor air pollution exposures, which would represent independent health risks of their own. I therefore conclude that, to the extent that the proposed facility will emit additional levels of PM<sub>2.5</sub>, it will cause an increase in the risk of adverse health effects among those who breathe that pollution, and especially for the socio-economically disadvantaged populations living within the most affected areas immediately surrounding the facility. Furthermore, in addition to the effects of PM<sub>2.5</sub>, the proposed facility's emissions of nitrogen oxides will also contribute to the increases in health risks from added local air pollution, as well as to the downwind formation of, and exposures to, ozone air pollution, and to associated downwind increases in adverse human health effects caused by those incremental O<sub>3</sub> exposures. This, this proposed facility will have both local and downwind adverse human health consequences.

Although the state's air quality modeling report concludes that "the results of the air quality modeling analysis demonstrate that the proposed Buckingham Compressor Station Project does not cause or contribute to any exceedance of the NAAQS for NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and CO", this does not mean there are no health impacts, as there are no known thresholds of effects, as documented in this report. Quite the opposite, the report results indicate to me that the adverse human health effects of long-term (annual) exposures to PM<sub>2.5</sub> at these locations will rise by at least 21%, while the adverse human health effects of short-term (24-hr) exposures to PM<sub>2.5</sub> will rise by at least 44%. The reason the rise in risk will likely be higher than these percentages indicate is that, as discussed in this report, the PM<sub>2.5</sub> from fossil fuel combustion has much greater health impacts (up to 5 times higher) than most other types of PM<sub>2.5</sub> mass.

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**Comments on the  
PSD Permit/Stationary Source Permit to Construct and Operate**

**a**

**Combined Heat and Power (CHP) Plant**

**at the**

**U.S. Navy Norfolk Naval Shipyard  
Portsmouth, VA 23709-5000  
Registration No.: 60326**

**By Ranajit Sahu<sup>1</sup> on behalf of the Chesapeake Bay Foundation, Inc.**

The following significant comments are provided:

1. Below the table containing the equipment list (shown below), the draft permit (pp. 2-3) states that "Specifications included in the above tables are for informational purposes only and do not form enforceable terms or conditions of the permit." This is highly inappropriate. These specifications, which include the rated capacities of the various equipment are the basis for all the emissions calculations (and therefore the impact analyses, etc.) contained in the application and the permit. They are critical data that should be enforceable. Without this data, the source can make changes to equipment without an assessment of its impacts.

Also, as a practical matter, by not making this information enforceable via the permit, compliance inspections at the facility become largely meaningless. Most inspections include verification of equipment consistent with those listed in the permit. If no information about the equipment such as their rated capacities are included in the permit, the inspector simply cannot verify if the actual equipment at the site is the same as that which was permitted.

| Reference No.           | Equipment Description                                                                                                                                                                                  | Rated Capacity                                                                                                                                             | Delegated Federal Requirements |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| CT-HRSG-1,<br>CT-HRSG-2 | Two Solar Taurus 70 dual fired combustion turbine generators with Cleaver Brooks heat recovery steam generators (HRSG) with duct burners. Each unit is equipped with an SCR and an oxidation catalyst. | 93.4 MMBtu/hr (HHV) on NG for each CT<br>88.9 MMBtu/hr (HHV) on Fuel oil for each CT<br>HRSG - 42.6 MMBtu/hr (HHV)<br>(FAF - 96.7 MMBtu/hr (HHV))<br>each. | NSPS KKKK                      |
| B1-B3                   | Three Cleaver Brooks dual fired boilers                                                                                                                                                                | 76.6 MMBtu/hr (HHV), each on NG<br>72.8 MMBtu/hr (HHV), each on Fuel Oil                                                                                   | NSPS Dc                        |
| GEN01                   | Emergency Engine Generator Set                                                                                                                                                                         | 2,220 HP                                                                                                                                                   | -                              |

<sup>1</sup> Resume provided as Exhibit 1.

| Reference No. | Equipment Description                                                                  | Rated Capacity            | Delegated Federal Requirements |
|---------------|----------------------------------------------------------------------------------------|---------------------------|--------------------------------|
| T-1           | ULSD Storage Tank                                                                      | 550,000 gallons           | -                              |
| PS            | One electric pad mount distribution switch with sulfur hexafluoride (SF <sub>6</sub> ) | 40 lbs of SF <sub>6</sub> | -                              |

2. Condition 1 (and Conditions 5a/5b) state that startup and shutdown when using natural gas will include periods below 50% load and below 65% load when using ULSD. However, no technical basis is provided for these load levels demarcating startup/shutdown from “normal” operation. Since emissions such as NO<sub>x</sub> and VOC/CO from the turbines depend on the proper functioning of the SCR catalyst as well as the oxidation catalyst, startup/shutdown should be defined via the minimum operating temperatures of the catalysts (with technical justification provided for the temperatures selected, which should be as low as possible so as to minimize emissions during startup and shutdown). Since Conditions 14 (for the SCR) and 15 (for the oxidation catalyst) already require the continuous measurements of inlet temperatures, it is technically proper and more appropriate to use the minimum operating temperatures to define the end of startup and beginning of shutdown.

3. The draft permit uses many non-defined terms such as:

- (i) “good combustion practices” (see, e.g., Conditions 2, 3, 7, 8, 12);
- (ii) “high efficiency design and operation” (see e.g., Conditions 4, 9);
- (iii) “good air pollution control practices” (Condition 5);
- (iv) “best engineering practices” (Condition 5c), and
- (v) “proper operation and maintenance” (Condition 7)

None of these phrases are defined anywhere in the permit. Therefore, the permit conditions that use these phrases and terms are unenforceable and therefore meaningless. Each of these terms should be defined in such manner as to make them enforceable.

4. Condition 5f references “SoLoNO<sub>x</sub>.” While Condition 1 states that this is a “dry low NO<sub>x</sub> combustion control technology”, it is a proprietary technology specific to Solar Turbines.<sup>2</sup> Solar does not provide sufficient detail about how this technology works. It should be defined in the permit.

5. Condition 6 requires that the boilers use “low NO<sub>x</sub> burners with flue gas recirculation” for NO<sub>x</sub> control. This is insufficient especially given the much higher NO<sub>x</sub> emissions permitted from the boilers as opposed to the turbines – compare the 14.9 tons/year of NO<sub>x</sub> allowed in Condition 43 for the three boilers as compared to the 4.1 tons/year of NO<sub>x</sub> from each turbine (or 8.2 tons/year from both) as allowed in Condition 38. It is not clear why ultra low NO<sub>x</sub> burners were not considered and the application or other documents do not discuss if the flue gas recirculation is internal or external. More detail should be provided to justify the NO<sub>x</sub> levels proposed for the boilers.

<sup>2</sup> See, for example, [https://www.solarturbines.com/en\\_US/services/equipment-optimization/system-upgrades/safety-and-sustainability/solonox-upgrades.html](https://www.solarturbines.com/en_US/services/equipment-optimization/system-upgrades/safety-and-sustainability/solonox-upgrades.html)

6. Condition 13 pertains to SF<sub>6</sub>, a highly potent greenhouse gas: (i) while a leak rate (0.5% annual) is proposed, it is not technically justified – i.e., why it should not be smaller. It is also not clear how/if the permit accounts for any fugitive emissions of SF<sub>6</sub> when it is added per Condition 30 into the switch. VDEQ should clarify; (ii) Condition 13 also requires an alarm under low pressure conditions, but the low pressure level is not specified (i.e., it is not clear how much SF<sub>6</sub> would be allowed to leak before triggering the alarm and how the leaked mass would be quantified). It is not appropriate to simply reference a future plan that may or may not contain this information. The permit condition should include the low pressure level in order to make it enforceable.

7. Condition 29c allows the HRSG to be operated in so-called “fresh air” mode, independent of the combustion turbines “except during periods of transitions, not to exceed 2 hours per occurrence, when boiler capacity is brought online to maintain steam load.” (i) How will the “not to exceed 2 hours per occurrence” be tracked? And (ii) Condition 29c fails to state the fuels that will be used by the duct burners in fresh air mode. Presumably it is only natural gas. DEQ should clarify.

8. PM<sub>10</sub> and PM<sub>2.5</sub> emissions to the atmosphere from the combustion turbines reflect not only the generation of these pollutants by the different fuels but also the passage of the exhaust gases through the SCR and oxidation catalysts. While the catalysts do not reduce these particulates *per se*, the very passage of the exhaust gases through the catalysts should cause reduction of these pollutants due to physical impaction and “collection” of particulates within the catalysts. Since these mechanisms are unavoidable regardless of the fuel being combusted and serve to modulate and equalize the emissions after the catalysts regardless of the amounts of particulates that are generated when the fuel is combusted, DEQ should provide a technical justification for the higher levels of PM<sub>10</sub>/PM<sub>2.5</sub> being allowed in the exhaust when using ULSD (Condition 34: 0.019 lb/MMBtu) as opposed to when burning natural gas (Condition 23: 0.011 lb/MMBtu).

9. Condition 33 states that SO<sub>2</sub> emissions will be 0.5 lb/hr when burning natural gas and 0.1 lb/hr burning ULSD. Since natural gas is a supposedly cleaner fuel than ULSD, even accounting for the use of diesel up to 65% of load (i.e., startup, as currently proposed), how is the natural gas allowable limit 5 times the diesel limit?

10. The VOC limit when firing natural gas (Condition 33) or diesel (Condition 35) is the same at 5 ppmcd@15%O<sub>2</sub>). Why? It should be lower, around 3 ppm when firing natural gas, similar to the CO limit.

11. Condition 37 shows the short term limits when the HRSGs are used in fresh air mode using natural gas, and the limits for NO<sub>x</sub>, CO, and VOC are significantly higher than when the combustion turbines are operating with natural gas with or without duct firing (Condition 33). Does this mean that the SCR and oxidation catalysts are operating with reduced efficiency in this mode? DEQ should clarify.

12. Condition 54 requires periodic (every 2 years) stack testing for continuous compliance demonstration for the two turbines. This is insufficient. The condition should require Continuous Emission Monitoring Systems (CEMS) for NO<sub>x</sub>, CO, VOC, filterable PM<sub>10</sub>, and filterable PM<sub>2.5</sub>.

These can be supplemented by annual stack tests for condensable PM and SO<sub>2</sub>, for which no CEMS are currently available. Using stack tests every 2 years (i.e., for a few hours every 2 years) to demonstrate “continuous” compliance with the short term limits proposed in the permit is antithetical to the concept of continuous compliance. CEMS for each of these pollutants is widely available. In fact, proper operation of the SCR requires continuous measurement of the NO<sub>x</sub> at the inlet and outlet in order to determine the ammonia injection rate required. Also, without CEMS how will continuous compliance be addressed in the various turbine/HRSG operating modes provided in Condition 29? Will the stack test be done in each of these modes, which is completely impractical and not anticipated nor required in the permit? There is no justification or rationale to not require CEMS in the Permit.

13. Strikingly, the permit includes no other continuous compliance requirements other than Condition 54 (see comment above) for the combustion turbine/HRSGs. There are therefore no requirements for the boilers or the engine. The permit should include CEMS, same as for the combustion turbines (see comment above) for the three boilers. And, it should include an annual stack test requirement for the engine.

14. The entire permit is also completely silent with regards to monitoring and reporting emissions of hazardous air pollutants or toxic air pollutants from all of the combustion equipment (i.e., the turbines, the boilers, and the engine) using any of the fuels. For example, formaldehyde, a known human carcinogen, is a product of combustion of natural gas, as are numerous other similar toxics from both natural gas as well as diesel combustion. The permit should require annual testing for all of the regulated toxic/hazardous air pollutants that will be emitted by the CHP sources.



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**EXPERIENCE SUMMARY**

Dr. Sahu has over thirty years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources including stationary and mobile sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over twenty seven years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty five years include various trade associations as well as individual companies such as steel mills, petroleum refineries, cement manufacturers, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, several states, various agencies such as the California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in all 50 states, numerous local jurisdictions and internationally.

In addition to consulting, for approximately twenty years, Dr. Sahu taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management). He also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

**EXPERIENCE RECORD**

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.), public sector (such as the US Department of Justice), and public interest group clients with project management, environmental

consulting, project management, as well as regulatory and engineering support consulting services.

- 1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for Air Quality/Geosciences/Hazardous Waste Groups**, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.
- Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.
- 1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.
- 1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.
- 1989-1990 Kinetics Technology International, Corp. **Development Engineer**. Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.
- 1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

#### EDUCATION

- 1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.
- 1984 M. S., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.
- 1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

#### TEACHING EXPERIENCE

##### Caltech

- "Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.
- "Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.
- "Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.
- "Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.
- "Thermodynamics and Heat Transfer," Fall and Winter Terms of 1996-1997.

#### U.C. Riverside, Extension

- "Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.
- "Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.
- "Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.
- "Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.
- "Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.
- "Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.
- "Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.
- "Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

#### Loyola Marymount University

- "Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.
- "Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.
- "Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.
- "Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

#### University of Southern California

- "Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.
- "Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

#### University of California, Los Angeles

- "Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

#### International Programs

- "Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.
- "Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.
- "Air Pollution Planning and Management," IEP, UCR, Spring 1996.
- "Environmental Issues and Air Pollution," IEP, UCR, October 1996.

#### PROFESSIONAL AFFILIATIONS AND HONORS

- President of India Gold Medal, IIT Kharagpur, India, 1983.
- Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992.
- American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-mid-1990s.
- Air and Waste Management Association, West Coast Section, 1989-mid-2000s.

#### PROFESSIONAL CERTIFICATIONS

- EIT, California (#XE088305), 1993.
- REA I, California (#07438), 2000.
- Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.
- QEP, Institute of Professional Environmental Practice, since 2000.
- CEM, State of Nevada (#EM-1699). Expiration 10/07/2021.

#### PUBLICATIONS (PARTIAL LIST)

- "Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).
- "Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).
- "On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).
- "Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).
- "Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).
- "A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).
- "Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R. Gavalas, *Combust. Flame*, **77**, 337-346 (1989).
- "Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).
- "Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.
- "Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).
- "Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).
- "HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).
- "Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NO<sub>x</sub> Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

"From Purchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada," with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

#### PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

## Annex A

### Expert Litigation Support

#### A. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

1. In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

#### B. Matters for which Dr. Sahu has provided affidavits and expert reports include:

2. Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.
3. Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).
4. Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).
5. Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).
6. Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).
7. Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.
8. Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc.*, 5:04-cv-00034-KSF (Eastern District of Kentucky).
9. Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.
10. Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

11. Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.
12. Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.
13. Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.
14. Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).
15. Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.
16. Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).
17. Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.
18. Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with *General Power Products, LLC v MTD Products Inc.*, 1:06 CVA 0143 (Southern District of Ohio, Western Division) .
19. Expert Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.
20. Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.
21. Affidavits (May 2010/June 2010 in the Office of Administrative Hearings)/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

22. Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).
23. Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.us
24. Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.
25. Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.
26. Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*
27. Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).
28. Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.
29. Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
30. Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.
31. Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).
32. Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
33. Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.
34. Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR



Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

35. Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (Eastern District of Michigan).
36. Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.
37. Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (District of Colorado).
38. Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).
39. Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
40. Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. Public Service Company of New Mexico* (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE) (District of New Mexico).
41. Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.
42. Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.
43. Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (Eastern District of Texas, Texarkana Division).

44. Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).
45. Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.
46. Expert Report (March 2011), Rebuttal Expert Report (June 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).
47. Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority*, Civil Action No. 4:11-cv-00791 (Southern District of Texas, Houston Division).
48. Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.
49. Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).
50. Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.*, Civil Action No. A-08-CA-648-LY (Western District of Texas, Austin Division).
51. Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.*, Case No. 3:10-cv-747 (TJM/DEP) (Northern District of New York).
52. Declaration (October 2011) on behalf of the Plaintiffs in the matter of *American Nurses Association et al. (Plaintiffs), v. US EPA (Defendant)*, Case No. 1:08-cv-02198-RMC (US District Court for the District of Columbia).
53. Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association*, Case No. 11-417-MJP (Western District of Washington).
54. Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v.*

- ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).
55. Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency*, Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).
  56. Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).
  57. Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality*, Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261<sup>st</sup> Judicial District).
  58. Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.*, Civil Action No. 07-CV-5298 (JKG) (Eastern District of Pennsylvania).
  59. Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project.
  60. Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.
  61. Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.
  62. Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.
  63. Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.
  64. Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.
  65. Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to

- Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.
66. Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.
  67. Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).
  68. Declaration (April 2013) on behalf of Petitioners in the matter of *Sierra Club, et al., (Petitioners) v Environmental Protection Agency et al. (Respondents)*, Case No., 13-1112, (Court of Appeals, District of Columbia Circuit).
  69. Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).
  70. Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of *A. J. Acosta Company, Inc., v. County of San Bernardino*, Case No. CIVSS803651.
  71. Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.
  72. Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.
  73. Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).
  74. Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.
  75. Expert Report (January 2014) on behalf of Baja, Inc., in *Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al*, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).
  76. Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific

- Environment, and the Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States*, Civil Action No. 13-1820 RC (District Court for the District of Columbia).
77. Declaration (April 2014) on behalf of Respondent-Intervenors in the matter of *Mexichem Specialty Resins Inc., et al., (Petitioners) v Environmental Protection Agency et al.*, Case No., 12-1260 (and Consolidated Case Nos. 12-1263, 12-1265, 12-1266, and 12-1267), (Court of Appeals, District of Columbia Circuit).
  78. Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).
  79. Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).
  80. Direct Prefiled Testimony (August 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of Consumers Energy Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17317 (Michigan Public Service Commission).
  81. Declaration (July 2014) on behalf of Public Health Intervenors in the matter of *EME Homer City Generation v. US EPA* (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).
  82. Expert Report (September 2014), Rebuttal Expert Report (December 2014) and Supplemental Expert Report (March 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).
  83. Expert Report (November 2014) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).
  84. *Declaration (January 2015) relating to Startup/Shutdown in the MATS Rule (EPA Docket ID No. EPA-HQ-OAR-2009-0234) on behalf of the Environmental Integrity Project.*
  85. Pre-filed Direct Testimony (March 2015), Supplemental Testimony (May 2015), and Surrebuttal Testimony (December 2015) on behalf of Friends of the Columbia Gorge in the matter of the Application for a Site Certificate for the Troutdale Energy Center before the Oregon Energy Facility Siting Council.

86. Brief of Amici Curiae Experts in Air Pollution Control and Air Quality Regulation in Support of the Respondents, On Writs of Certiorari to the US Court of Appeals for the District of Columbia, No. 14-46, 47, 48. *Michigan et. al., (Petitioners) v. EPA et. al., Utility Air Regulatory Group (Petitioners) v. EPA et. al., National Mining Association et. al., (Petitioner) v. EPA et. al.*, (Supreme Court of the United States).
87. Expert Report (March 2015) and Rebuttal Expert Report (January 2016) on behalf of Plaintiffs in the matter of *Conservation Law Foundation v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).
88. Declaration (April 2015) relating to various Technical Corrections for the MATS Rule (EPA Docket ID No. EPA-HQ-OAR-2009-0234) on behalf of the Environmental Integrity Project.
89. Direct Prefiled Testimony (May 2015) on behalf of the Michigan Environmental Council, the Natural Resources Defense Council, and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy and for Miscellaneous Accounting Authority, Case No. U-17767 (Michigan Public Service Commission).
90. Expert Report (July 2015) and Rebuttal Expert Report (July 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).
91. Declaration (August 2015, Docket No. 1570376) in support of "Opposition of Respondent-Intervenors American Lung Association, et. al., to Tri-State Generation's Emergency Motion;" Declaration (September 2015, Docket No. 1574820) in support of "Joint Motion of the State, Local Government, and Public Health Respondent-Intervenors for Remand Without Vacatur;" Declaration (October 2015) in support of "Joint Motion of the State, Local Government, and Public Health Respondent-Intervenors to State and Certain Industry Petitioners' Motion to Govern, *White Stallion Energy Center, LLC v. US EPA*, Case No. 12-1100 (US Court of Appeals for the District of Columbia).
92. Declaration (September 2015) in support of the Draft Title V Permit for Dickerson Generating Station (Proposed Permit No 24-031-0019) on behalf of the Environmental Integrity Project.
93. Expert Report (Liability Phase) (December 2015) and Rebuttal Expert Report (February 2016) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., Environmental Law and Policy Center, and Respiratory Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).

94. Declaration (December 2015) in support of the Petition to Object to the Title V Permit for Morgantown Generating Station (Proposed Permit No 24-017-0014) on behalf of the Environmental Integrity Project.
95. Expert Report (November 2015) on behalf of Appellants in the matter of *Sierra Club, et al. v. Craig W. Butler, Director of Ohio Environmental Protection Agency et al.*, ERAC Case No. 14-256814.
96. Affidavit (January 2016) on behalf of Bridgwatch Detroit in the matter of *Bridgwatch Detroit v. Waterfront Petroleum Terminal Co., and Waterfront Terminal Holdings, LLC.*, in the Circuit Court for the County of Wayne, State of Michigan.
97. Expert Report (February 2016) and Rebuttal Expert Report (July 2016) on behalf of the challengers in the matter of the Delaware Riverkeeper Network, Clean Air Council, et. al., vs. Commonwealth of Pennsylvania Department of Environmental Protection and R. E. Gas Development LLC regarding the Geyer well site before the Pennsylvania Environmental Hearing Board.
98. Direct Testimony (May 2016) in the matter of Tesoro Savage LLC Vancouver Energy Distribution Terminal, Case No. 15-001 before the State of Washington Energy Facility Site Evaluation Council.
99. Declaration (June 2016) relating to deficiencies in air quality analysis for the proposed Millenium Bulk Terminal, Port of Longview, Washington.
100. Declaration (December 2016) relating to EPA's refusal to set limits on PM emissions from coal-fired power plants that reflect pollution reductions achievable with fabric filters on behalf of Environmental Integrity Project, Clean Air Council, Chesapeake Climate Action Network, Downwinders at Risk represented by Earthjustice in the matter of *ARIPPA v EPA, Case No. 15-1180*. (D.C. Circuit Court of Appeals).
101. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Huntley and Huntley Poseidon Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
102. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Backus Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
103. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Drakulic Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
104. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Deutsch Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

105. Affidavit (February 2017) pertaining to deficiencies water discharge compliance issues at the Wood River Refinery in the matter of *People of the State of Illinois (Plaintiff) v. Phillips 66 Company, ConocoPhillips Company, WRB Refining LP (Defendants)*, Case No. 16-CH-656, (Circuit Court for the Third Judicial Circuit, Madison County, Illinois).
106. Expert Report (March 2017) on behalf of the Plaintiff pertaining to non-degradation analysis for waste water discharges from a power plant in the matter of *Sierra Club (Plaintiff) v. Pennsylvania Department of Environmental Protection (PADEP) and Lackawanna Energy Center*, Docket No. 2016-047-L (consolidated), (Pennsylvania Environmental Hearing Board).
107. Expert Report (March 2017) on behalf of the Plaintiff pertaining to air emissions from the Heritage incinerator in East Liverpool, Ohio in the matter of *Save our County (Plaintiff) v. Heritage Thermal Services, Inc. (Defendant)*, Case No. 4:16-CV-1544-BYP, (US District Court for the Northern District of Ohio, Eastern Division).
108. Rebuttal Expert Report (June 2017) on behalf of Plaintiffs in the matter of *Casey Voight and Julie Voight (Plaintiffs) v Coyote Creek Mining Company LLC (Defendant)*, Civil Action No. 1:15-CV-00109 (US District Court for the District of North Dakota, Western Division).
109. Expert Affidavit (August 2017) and Penalty/Remedy Expert Affidavit (October 2017) on behalf of Plaintiff in the matter of *Wildearth Guardians (Plaintiff) v Colorado Springs Utility Board (Defendant,)* Civil Action No. 1:15-cv-00357-CMA-CBS (US District Court for the District of Colorado).
110. Expert Report (August 2017) on behalf of Appellant in the matter of *Patricia Ann Troiano (Appellant) v. Upper Burrell Township Zoning Hearing Board (Appellee)*, Court of Common Pleas of Westmoreland County, Pennsylvania, Civil Division.
111. Expert Report (October 2017), Supplemental Expert Report (October 2017), and Rebuttal Expert Report (November 2017) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant,)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).
112. Declaration (December 2017) on behalf of the Environmental Integrity Project in the matter of permit issuance for ATI Flat Rolled Products Holdings, Breckenridge, PA to the Allegheny County Health Department.
113. Expert Report (Harm Phase) (January 2018), Rebuttal Expert Report (Harm Phase) (May 2018) and Supplemental Expert Report (Harm Phase) (April 2019) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., and Respiratory Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).
114. Declaration (February 2018) on behalf of the Chesapeake Bay Foundation, et. al., in the matter of the Section 126 Petition filed by the state of Maryland in *State of*



- Maryland v. Pruitt (Defendant)*, Civil Action No. JKB-17-2939 (Consolidated with No. JKB-17-2873) (US District Court for the District of Maryland).
115. Direct Pre-filed Testimony (March 2018) on behalf of the National Parks Conservation Association (NPCA) in the matter of *NPCA v State of Washington, Department of Ecology and BP West Coast Products, LLC*, PCHB No. 17-055 (Pollution Control Hearings Board for the State of Washington).
  116. Expert Affidavit (April 2018) and Second Expert Affidavit (May 2018) on behalf of Petitioners in the matter of *Coosa River Basin Initiative and Sierra Club (Petitioners) v State of Georgia Environmental Protection Division, Georgia Department of Natural Resources (Respondent) and Georgia Power Company (Intervenor/Respondent)*, Docket Nos: 1825406-BNR-WW-57-Howells and 1826761-BNR-WW-57-Howells, Office of State Administrative Hearings, State of Georgia.
  117. Direct Pre-filed Testimony and Affidavit (December 2018) on behalf of Sierra Club and Texas Campaign for the Environment (Appellants) in the contested case hearing before the Texas State Office of Administrative Hearings in Docket Nos. 582-18-4846, 582-18-4847 (Application of GCGV Asset Holding, LLC for Air Quality Permit Nos. 146425/PSDTX1518 and 146459/PSDTX1520 in San Patricio County, Texas).
  118. Expert Report (February 2019) on behalf of Sierra Club in the State of Florida, Division of Administrative Hearings, Case No. 18-2124EPP, Tampa Electric Company Big Bend Unit 1 Modernization Project Power Plant Siting Application No. PA79-12-A2.
  119. Declaration (March 2019) on behalf of Earthjustice in the matter of comments on the renewal of the Title V Federal Operating Permit for Valero Houston refinery.
  120. Expert Report (March 2019) on behalf of Plaintiffs for Class Certification in the matter of *Resendez et al v Precision Castparts Corporation* in the Circuit Court for the State of Oregon, County of Multnomah, Case No. 16cv16164.
  121. Expert Report (June 2019), Affidavit (July 2019) and Rebuttal Expert Report (September 2019) on behalf of Appellants relating to the NPDES permit for the Cheswick power plant in the matter of *Three Rivers Waterkeeper and Sierra Club (Appellees) v. State of Pennsylvania Department of Environmental Protection (Appellee) and NRG Power Midwest (Permittee)*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-088-R.
  122. Affidavit/Expert Report (August 2019) relating to the appeal of air permits issued to PTTGCA on behalf of Appellants in the matter of *Sierra Club (Appellants) v. Craig Butler, Director, et. al., Ohio EPA (Appellees)* before the State of Ohio Environmental Review Appeals Commission (ERAC), Case Nos. ERAC-19-6988 through -6991.
  123. Expert Report (October 2019) relating to the appeal of air permit (Plan Approval) on behalf of Appellants in the matter of *Clean Air Council and Environmental Integrity Project (Appellants) v. Commonwealth of Pennsylvania Department of Environmental Protection and Sunoco Partners Marketing and Terminals L.P.*,

before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-057-L.

124. Expert Report (December 2019) on behalf of Earthjustice in the matter of *Objection to the Issuance of PSD/NSR and Title V permits for Riverview Energy Corporation, Dale, Indiana*, before the Indiana Office of Environmental Adjudication, Cause No. 19-A-J-5073.
125. Affidavit (December 2019) on behalf of Plaintiff-Intervenor (Surfrider Foundation) in the matter of *United States and the State of Indiana (Plaintiffs), Surfrider Foundation (Plaintiff-Intervenor), and City of Chicago (Plaintiff-Intervenor) v. United States Steel Corporation (Defendant)*, Civil Action No. 2:18-cv-00127 (US District Court for the Northern District of Indiana, Hammond Division).
126. Declaration (February 2020) in support of Petitioner's Motion for Stay of PSCAA NOC Order of Approval No. 11386 in the matter of the *Puyallup Tribe of Indians v. Puget Sound Clean Air Agency (PSCAA) and Puget Sound Energy (PSE)*, before the *State of Washington Pollution Control Hearings Board*, PCHB No. P19-088.

C. Occasions where Dr. Sahu has provided oral testimony in depositions, at trial or in similar proceedings include the following:

127. Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.
128. Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.
129. Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).
130. Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).
131. Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et al. v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).
132. Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia DEP.
133. Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark

- Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.
134. Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.
  135. Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.
  136. Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.
  137. Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
  138. Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*
  139. Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coletto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
  140. Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
  141. Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.
  142. Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).
  143. Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
  144. Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
  145. Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
  146. Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

147. Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).
148. Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).
149. Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.
150. Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
151. Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.
152. Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.
153. Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).
154. Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).
155. Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).
156. Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).
157. Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

158. Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).
159. Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).
160. Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.
161. Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.
162. Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).
163. Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).
164. Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).
165. Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).
166. Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).
167. Deposition (June 2014) and Trial (August 2014) on behalf of ECM Biofilms in the matter of the *US Federal Trade Commission (FTC) v. ECM Biofilms* (FTC Docket #9358).
168. Deposition (February 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV

- 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).
169. Oral Testimony at Hearing (April 2015) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).
  170. Deposition (August 2015) on behalf of Plaintiff in the matter of *Conservation Law Foundation (Plaintiff) v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).
  171. Testimony at Hearing (August 2015) on behalf of the Sierra Club in the matter of *Amendments to 35 Illinois Administrative Code Parts 214, 217, and 225* before the Illinois Pollution Control Board, R15-21.
  172. Deposition (May 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).
  173. Trial Testimony (October 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).
  174. Deposition (April 2016) on behalf of the Plaintiffs in *UNatural Resources Defense Council, Respiratory Health Association, and Sierra Club (Plaintiffs) v. Illinois Power Resources LLC and Illinois Power Resources Generation LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (Central District of Illinois, Peoria Division).
  175. Trial Testimony at Hearing (July 2016) in the matter of Tesoro Savage LLC Vancouver Energy Distribution Terminal, Case No. 15-001 before the State of Washington Energy Facility Site Evaluation Council.
  176. Trial Testimony (December 2016) on behalf of the challengers in the matter of the Delaware Riverkeeper Network, Clean Air Council, et. al., vs. Commonwealth of Pennsylvania Department of Environmental Protection and R. E. Gas Development LLC regarding the Geyer well site before the Pennsylvania Environmental Hearing Board.
  177. Trial Testimony (July-August 2016) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

178. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Huntley and Huntley Poseidon Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
179. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Backus Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
180. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Drakulic Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
181. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Deutsch Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.
182. Deposition Testimony (July 2017) on behalf of Plaintiffs in the matter of *Casey Voight and Julie Voight v Coyote Creek Mining Company LLC (Defendant)* Civil Action No. 1:15-CV-00109 (US District Court for the District of North Dakota, Western Division).
183. Deposition Testimony (November 2017) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant.)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).
184. Deposition Testimony (December 2017) on behalf of Plaintiff in the matter of *Wildearth Guardians (Plaintiff) v Colorado Springs Utility Board (Defendant)* Civil Action No. 1:15-cv-00357-CMA-CBS (US District Court for the District of Colorado).
185. Deposition Testimony (January 2018) in the matter of National Parks Conservation Association (NPCA) v. State of Washington Department of Ecology and British Petroleum (BP) before the Washington Pollution Control Hearing Board, Case No. 17-055.
186. Trial Testimony (January 2018) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant.)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).
187. Trial Testimony (April 2018) on behalf of the National Parks Conservation Association (NPCA) in the matter of NPCA v State of Washington, Department of Ecology and BP West Coast Products, LLC, PCHB No. 17-055 (Pollution Control Hearings Board for the State of Washington).
188. Deposition (June 2018) (harm Phase) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., and Respiratory*

- Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).
189. Trial Testimony (July 2018) on behalf of Petitioners in the matter of *Coosa River Basin Initiative and Sierra Club (Petitioners) v State of Georgia Environmental Protection Division, Georgia Department of Natural Resources (Respondent) and Georgia Power Company (Intervenor/Respondent)*, Docket Nos: 1825406-BNR-WW-57-Howells and 1826761-BNR-WW-57-Howells, Office of State Administrative Hearings, State of Georgia.
  190. Deposition (January 2019) and Trial Testimony (January 2019) on behalf of Sierra Club and Texas Campaign for the Environment (Appellants) in the contested case hearing before the Texas State Office of Administrative Hearings in Docket Nos. 582-18-4846, 582-18-4847 (Application of GCGV Asset Holding, LLC for Air Quality Permit Nos. 146425/PSDTX1518 and 146459/PSDTX1520 in San Patricio County, Texas).
  191. Deposition (February 2019) and Trial Testimony (March 2019) on behalf of Sierra Club in the State of Florida, Division of Administrative Hearings, Case No. 18-2124EPP, Tampa Electric Company Big Bend Unit 1 Modernization Project Power Plant Siting Application No. PA79-12-A2.
  192. Deposition (June 2019) relating to the appeal of air permits issued to PTTGCA on behalf of Appellants in the matter of *Sierra Club (Appellants) v. Craig Butler, Director, et. al., Ohio EPA (Appellees)* before the State of Ohio Environmental Review Appeals Commission (ERAC), Case Nos. ERAC-19-6988 through -6991.
  193. Deposition (September 2019) on behalf of Appellants relating to the NPDES permit for the Cheswick power plant in the matter of *Three Rivers Waterkeeper and Sierra Club (Appellees) v. State of Pennsylvania Department of Environmental Protection (Appellee) and NRG Power Midwest (Permittee)*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-088-R.
  194. Deposition (December 2019) on behalf of the Plaintiffs in the matter of David Kovac, individually and on behalf of wrongful death class of Irene Kovac v. Bp Corporation North America Inc., Circuit Court of Jackson County, Missouri (Independence), Case No. 1816-CV12417.
  195. Deposition (February 2020) on behalf of Earthjustice in the matter of *Objection to the Issuance of PSD/NSR and Title V permits for Riverview Energy Corporation, Dale, Indiana*, before the Indiana Office of Environmental Adjudication, Cause No. 19-A-J-5073.



*Mariama Ouedraogo*  
*Department of Environmental Quality*  
*Tidewater Regional Office*

Ms. Ouedraogo,

My name is Lauren Landis (mailing address & phone number below) and I am submitting a technical comment on behalf of my organization, Chesapeake Climate Action Network (CCAN).

103 Pettigrew Court  
Williamsburg, VA 23185  
(757) 634-9567

CCAN requests that the Norfolk Naval Shipyard Combined Heat & Power Plant (NNSY CHP) be escalated to an Air Board public hearing.

**Site & permit information:**

**Permit Name:** Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

**Applicant Name and Registration Number:** US Navy–Norfolk Naval Shipyard; 60326

**Facility Name and Address:** US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

As a community field coordinator in Hampton Roads, I organized community members to help pass the Virginia Clean Economy Act and the Regional Greenhouse Gas Initiative in 2019. The success of both of these initiatives clearly indicates Virginians' resolve to move beyond dirty fossil fuel infrastructure and embrace a carbon-free, renewable energy future.

The site of the NNSY CHP is bordered by communities that have historically been targeted by fossil fuel infrastructure and already suffer from air and water pollutants.<sup>1</sup> While the Virginia Department of Environmental Quality (DEQ) maintains that it performed outreach in these communities to solicit comments and address concerns about yet another polluting project, the President of the Portsmouth NAACP chapter himself was only alerted by community organizers to the project in the past week and

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<sup>1</sup> Ctr. for Disease Control, Norfolk Naval Shipyard Public Health Assessment in Virginia (Jan. 2004), available at <https://www.atsdr.cdc.gov/news/displaynews.asp?PRid=2011>.

has frantically coordinated to solicit technically relevant comments by the 10/7/20 deadline. Indeed, the DEQ's Attachment A only lists five community stakeholders and at least one of those stakeholders indicated that the DEQ essentially passed the burden to further publicize the project and solicit feedback on to these stakeholders rather than do its own due diligence. The NNSY CHP must be elevated to the Air Board to allow for additional oversight and community feedback.

Furthermore, on the subject of community feedback, it has been abundantly clear that the requirement of "technical" comments to prompt an Air Board hearing is significantly difficult to meet for the average community member. The intricacies of fossil fuel infrastructure, the associated environmental hazards, and the governing statutes and regulations are complicated. Many people are not familiar enough with the scientific and legal language to confidently draft a unique technical comment and so they simply do not voice their concerns. We have heard this feedback from community members who were not able to attend business hour or a weekday public hearings (an accessibility problem on its own) throughout the NNSY CHP DEQ process and now have only a technical comment as their final recourse.

Turning from this basic but not exhaustive list of issues regarding community input and accessibility, the environmental impact of the project itself is equally concerning. The project managers and NNSY representatives maintain that the CHP is preferable because it is projected to reduce emissions from their current levels. However, this is only in comparison to the pollutants created by the NNSY's current source of power, a Wheelabrator waste-to-energy facility. Trading one polluting source of power for another is not an environmental win. It simply indicates that the NNSY did not properly consider truly clean and renewable sources of energy. The surrounding community deserves better and additional research of renewable energy options must be completed.

Finally, the projected danger and pollutant data associated with the CHP as outlined by the DEQ and NNSY is incomplete. A comprehensive risk assessment (not simply EJSscreen excerpts, as the EPA warns against)<sup>2</sup> was not performed. The Commonwealth is committed to "[e]nsur[ing] that development of new, or expansion of existing, energy resources or facilities does not have a disproportionate adverse impact on economically disadvantaged or minority communities...."<sup>3</sup> Information such as the dangers of the anticipated onsite fuel storage, leaks or spills resulting from the inevitable sea level rise expected to impact NNSY,<sup>4</sup> or the compounded environmental

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<sup>2</sup> See Env'tl. Protection Agency, Limitations and Caveats in Using EJSscreen, <https://www.epa.gov/ejscreen/limitations-and-caveats-using-ejscreen> (last visited Oct. 7, 2020).

<sup>3</sup> Va. Code § 67-102 A II.

<sup>4</sup> Nicholas Kusnetz, InsideClimate News, Rising seas threaten Norfolk Naval Shipyard, raising fears of 'catastrophic damage,' Nov. 19, 2018,

harm to local residents given the existing pollution levels in the region<sup>5</sup> is all missing. As the U.S. Court of Appeals for the Fourth Circuit reminded the Air Board recently, “environmental justice is not merely a box to be checked.”<sup>6</sup> In that case, the Board’s failure to consider the disproportionate impact on those closest to a proposed compressor station caused the federal court to vacate its air permit. As a result of this decision, we expect that the Air Board is taking issues of environmental justice seriously. Indeed, the Board’s treatment of a subsequent application for the same compressor station was met with the appropriate level of scrutiny. A proposal of this scope in an already burdened area raises serious issues that should properly go before the Air Board.

Impacted residents must be allowed to respond to the NNSY CHP once this full spectrum of information is assembled and the concerns above are addressed. CCAN calls for an Air Board public hearing to provide additional oversight and accountability of the proposed NNSY CHP.

Thank you.

Chesapeake Climate Action Network

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<https://www.nbcnews.com/news/us-news/rising-seas-threaten-norfolk-naval-shipyard-raising-fears-catastr-ophic-damage-n937396>.

<sup>5</sup> See, e.g., Env’tl. Protection Agency, <https://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0302841> (designating the Norfolk Naval Shipyard as a Superfund site) (last accessed Oct. 7, 2020).

<sup>6</sup> Friends of Buckingham v. State Air Pollution Control Board, 947 F.3d 68, 92 (4th Cir. 2020).



Ouedraogo, Mariama &lt;wendbebe.savadogo@deq.virginia.gov&gt;

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**Comment against NNYS Pipeline**

1 message

**Tess Amoruso** <tessamoruso@gmail.com>

Wed, Oct 7, 2020 at 12:46 PM

To: "mariama.ouedraogo@deq.virginia.gov" &lt;mariama.ouedraogo@deq.virginia.gov&gt;

Cc: Lauren Landis &lt;lauren@chesapeakeclimate.org&gt;

My name is Tess Amoruso. I live at 828 E Sparrow Rd, Virginia Beach VA 23464. My number is 7575758569.

I am writing in regards to: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board; Applicant Name and Registration Number: US Navy–Norfolk Naval Shipyard; 60326  
Facility Name and Address: US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

**I am vehemently opposed to the construction of the gas-powered plant at the Norfolk Naval Shipyard and request that the project be elevated to a public hearing in front of the Air Board.**

A few of my many reasons are as follows. **First, and perhaps most importantly, insufficient community notification was done and Environmental Justice Guidelines were not followed.**

**Second, cleaner fuel alternatives and energy efficiency were not given full consideration before the NNSY moved on to gas-powered infrastructure.**

**Third, apparently expected air pollution was measured by a monitor positioned three miles from the NNSY and subject to prevailing winds; more accurate and onsite monitoring must occur.**

**Fourth, formaldehyde produced by the plant turbines is not mentioned and must be measured and limited to 91 ppbv or less.** There were apparent calculation errors included in permit that underestimate the total amount of hazardous air pollutants that will be emitted by this facility, including emissions of: nickel, phosphorous, and formaldehyde.

**Fifth, surrounding communities already suffer from the environmental harms of established fossil fuel infrastructure in the area and impending catastrophic sea level rise.**

**Sixth, new fossil fuel infrastructure delays Virginia's inevitable and necessary transition to renewable energy as evidenced by the passage of the Virginia Clean Economy Act.** Micro grids based on solar (with battery backup) are the most resilient energy projects in areas of flooding and hurricanes and NNYS knows this and has begun this process.

**Seventh, pipelines are not resilient in areas prone to hurricanes and flooding and must be shut down during extreme weather, abnegating the Navy's justification for providing security in times of grid failure.**

**Eighth, there MUST be a full Environmental Justice assessment.** The DEQ continues to improperly use a basic screening tool (EJSCREEN) in place of actual assessment, in spite of warning by the EPA. Many of the census tracts in close proximity to the site are in the 80-100th percentile nationally with respect to minority resident status and other vulnerabilities, including poverty, education level, and children under age 5. **NNYS is already a Superfund site and is surrounded by neighborhoods with long histories of harm as a result of these toxic facilities** - a pattern that continues to the present. This site is not suitable because any additional exposure contributes to a public health emergency due to high risk and low health care coverage in the low income populations of the surrounding areas. Local populations have pre-existing health conditions as a result of a high toxic burden from various pollution sources and **the draft permit did not use a hotspot analysis as part of the methodology to address cumulative exposures from multiple sources over time.** The notification procedures for this hearing did not comply with protocols for environmental justice populations, as there should be significant effort to reach at-risk and sensitive groups with non-technical language that can be understood by a typical resident.

**Ninth, assessment of the environmental impact of natural gas was incomplete in this draft permit leading to an incorrect finding of positive climate repercussions:** The most recent synthesis report from the Intergovernmental Panel on Climate Change (IPCC) records methane emissions as approximately 35 times stronger greenhouse gas than carbon dioxide (CO<sub>2</sub>) when implications are averaged across 100 years. Potency is higher when shorter timeframes are considered: methane has 86 times the potency of carbon dioxide over the first 20 years after emissions. Moreover, methane is 120 times more powerful when both methane and carbon dioxide co-exist in the atmosphere.

**Tenth, there has been no clear identification of fuel source in terms of the supply pipeline; the draft permit does not address construction of a lateral pipeline bringing fuel from a main pipeline to the project location - these additional ecological harms require attention in the draft permit, or the environmental impacts are improperly segmented and harm appears to be falsely diminished.**

**There needs to be a comprehensive risk assessment for this project, including risks of fire, explosion, gas leak, diesel spill, etc. There needs to be a comprehensive health impact assessment for the sensitive populations living proximate to this site.**

**The main justification for this plant is energy security for the military. Thus the most resilient option, with the least environmental harm, is use of an existing plant for steam with solar back-up and battery storage for electricity to avoid blackouts and grid instabilities.** Adding new gas plants during a climate emergency, when there are other better alternatives, does not make sense; the harm from this unnecessary new construction erodes any proposed efficiency and conservation gains from the cogeneration technology and makes ecological justifications seem more like greenwashing than scientific assessment of the best energy supply option.

**11- There are forms of energy that provide more long-term jobs than gas. Based on the millions of dollars of proposed investment to this site, the creation of only 17 permanent jobs is inadequate, particularly given the volatile organic compound (VOC) and hazardous air pollutant (HAP) exposures during work at a plant run on gas and diesel located in a polluted environment. Renewable energy sources create more jobs in the long term and have lower toxic burden. There would be positive spin off job creation from the Navy investing in solar and other renewables. The placement of solar panels is appropriate for this site location, which is, according to some project documents, a former parking lot. There are other brownfields and open areas near this site that are also suitable for solar development.**

**12- It is unclear why the applicant did not need a New Source Performance Standards (NSPS) review, since this is a new gas plant. NSPS permitting is a more lengthy and more complex process than the Prevention of Significant Deterioration (PSD) permit and we request the applicant comply with standards for a new facility.**

**13- Cleaner air means cleaner water: the EPA recognizes the need to reduce NOx emissions from power plants to protect the health of the Chesapeake Bay.**

**14- Air pollution will kill more people this year than COVID-19:** The main substances affecting health in a polluted atmosphere are nitrogen oxides (NOx), sulphur oxides (SOx), and ozone and particulate matter — with the latter of greatest concern, as these tiny particles penetrate deep into the lungs, affecting both the respiratory and vascular systems. These harms are disproportionately experienced among low-income populations and communities of color. Controversial air permitting cases such as this MUST be elevated to the Air Board to assure proper oversight and accountability.

**LASTLY, WE ARE IN A CLIMATE EMERGENCY AND HAVE PRECIOUS LITTLE TIME TO TRANSITION OFF OF FOSSIL FUELS AND TO RENEWABLE ENERGY to avoid facing a climate catastrophe this century. The massive wildfires in the US west coast and Siberia, and greater frequency and severity of storms we are witnessing worldwide RIGHT NOW are from the near-record low arctic ice recorded in September which has significantly disrupted the jet streams. We must aggressively wean off of fossil fuels and to renewable energy sources now. We need to do everything in our power to support the urgent work of climate restoration NOW. WE CANNOT DO IT IN THE PAST, and WE CAN NO LONGER DO IT IN THE FUTURE, SIMPLY MUST BE DONE NOW. I am a mother and feel passionately about this crisis. If possible, would be happy to meet with you via zoom to discuss this matter personally at your convenience.**

I appreciate your time and attention to this matter.

Sincerely,

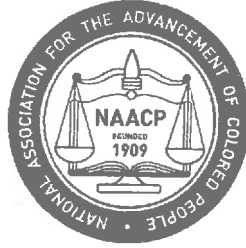
Tess Amoruso

Volunteer Mothers Out Front Hampton Roads

Founder The CROWN Movement for Climate Restoration Ongoing Worldwide Now

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Human Flourishing



Portsmouth Branch  
Unit#7104  
PO BOX 3878, Portsmouth VA 23701

**JAMES P. BOYD**  
President

**DOROTHY WIGGINS**  
Secretary

**Technical Comment for DEQ regarding New Power Plant Construction for NNSY**  
The Portsmouth Branch of the NAACP opposes the current proposal of a gas power plant at NNSY

Permit Name:

Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number:

US Navy-Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy-Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

**Overview Statement:**

The Portsmouth Branch of the NAACP, which includes over 400 members that live and or work in the City of Portsmouth, is extremely concerned about the potential environmental impacts from the construction of a New Power Plant for Norfolk Naval Shipyard. We oppose the construction of the gas-powered plant at the Norfolk Naval Shipyard in its current proposal and request that the project be escalated to a public hearing of the State Air Pollution Control Board. This document is our official technical comment to the Department of Environmental Quality (DEQ) outlining our oppositions which are as follows:

**Historical Oversaturation of Emissions and Pollutants:**

For over 60 years, NNSY has not been a good neighbor to the citizens of Portsmouth in terms of environmental responsibility. It has without regard to the health and safety of the residents of nearby neighborhoods, continued activities of conversion and ship repair without addressing environmental impacts. These actions have created toxins of heavy metals that have been widely distributed into the

environment. Due to their high degree of toxicity, the metals rank high among the priority metals that are of public health significance. They are considered systematic toxins known to induce multiples of organ damage, even at lower levels of exposure. They are also classified as known human carcinogens according to EPA and the International Agency of Research on Cancer. These toxins have an overwhelming effect on children, seniors and childbirth age men and women especially for surrounding communities such as Southside Gardens and other low-income minority citizens.

The addition of a new power plant will contribute to the above-mentioned concerns regarding emissions and expose to Portsmouth residents and mitigation strategies must be clearly articulated which to date are not. Though levels may be at acceptable standards, an environmental analysis must show how the exposure from the new plant in addition to already existing exposure will have on the citizens of Portsmouth.

According to a report by our national NAACP headquarters, 'Fumes Across the Fence-Line', "It is not a coincidence that so many African Americans live near oil gas development. Historically, polluting facilities have often been sighted in or near African American communities". Careful consideration must be made to the cumulative effects this project will have on the already overburdened community. The area has a long and torrid history of its residents suffering from pollutants from Superfund sites, lead poisoning, mold, and impacts from climate change. Every effort must be made to not only mitigate negative impacts from current or future projects but implement pro-active solutions to help correct past transgressions and help our communities to heal.

#### **Impacts on Environmental Justice communities:**

At least 2 of the census units adjacent to the Norfolk Naval Ship Yard are in the 90-100 percentile for the Commonwealth of Virginia with respect to multiple environmental justice (EJ) or other important demographics (minority resident status, income, education level less than high school diploma, and children under 5) per the EPA EJSCREEN mapping tool.

Based on the project description from NNSY, they applied for a permit to build a new combined heat and power plant that proposed the following environmental exposures:

The maximum annual emissions of air pollutants from the combined heat and power plant under the proposed permit are expected to be: 21.5 tons per year (tpy) of PM10 and PM2.5; 6.0 tpy of SO<sub>2</sub>; 29.4 tpy of NO<sub>x</sub>; 35.2 tpy of CO; and 12.4 tpy of VOC.

In the interest of protecting the health of the nearby sensitive populations, an independent( separate from a contractor that is totally separate of the NNSY) risk assessment must be conducted, along with remedies for mitigating any excess risk identified by the risk assessment. In accordance with federal NESHAP regulations, this assessment must include documentation and mitigative recommendations for air pollutants, including volatile organic compounds (VOCs), total polycyclic aromatic hydrocarbons, heavy metals, nickel, phosphorous, formaldehyde and other hazardous air pollutants.

#### **Deficient and Disparaged Community Outreach Efforts: Equal Protections**

Having engaged with project representatives and advocacy groups regarding the community outreach in the City of Portsmouth, we feel that efforts to reach out to citizens in the surrounding areas of the proposed plant was insufficient. Critical emphasis on environmental impacts were not thoroughly discussed with citizens that could potentially impact quality of life.



- Community Meetings were not conducted during times to maximize participation and dialogue
- Project managers did not engage with and or interact with a diverse representative sample of the community—specifically amongst black organizations and community leaders.
- DEQ only has contacts of 5 stakeholders, which is insufficient and does not engage with a representative sample size of the community.

**Hazardous pollutant calculation error:**

The Facility Wide Potential to Emit evaluation for hazardous air pollutants (HAPs; Table B-2, Attachment C) determined the maximum hourly emission rates for each of the project's emissions sources (turbines, duct burners, boilers, generators, and tanks). The hourly emissions rates were then added and compared to an hourly emissions rate exemption threshold.

Review of the relevant spreadsheet calculations (Table B-4, Turbine Potential HAP Emissions) shows that the HAP emission rate is based upon emissions from a single turbine and single duct burner. On the contrary, one of the operating scenarios entails the use of two turbines and two duct burners. Hourly HAP emission rates in some cases will be substantially higher after correcting the calculations. DEQ must request the applicant provided corrected emissions rates for all HAPs.

Example: Formaldehyde

“Each turbine has a maximum rated heat input of 93.4 MMBtu/hr” (Engineering Analysis, page 3)

“NG Heat Input, CT only” = 93.4 MMBtu/hr (Table B-4, cell F4)

CT emission factor = 2.6E-04 (Table B-4, cell F30)

CT formaldehyde emission rate (NG) = “F4\*F30” = 2.4E-02 lb/hr (Table B-4, cell L30)

Using these values, the maximum emission rate in Table B-4 is determined as the simple sum of the emission rate of one turbine and one duct burner (cell T30; max emission value between gas or diesel + duct burner).

(The maximum emission rate for the turbine occurs when burning diesel, but uses the same calculation method to determine a maximum rate of 2.5E-02 lb/hr for the turbine alone.)

From Table B-2 (HAP summary):

Turbine hourly emission rate = 2.49E-02 (Cell Q41; taken from Table B4, M30)

Sum of emissions rates = Sum Q41:U41 (Cell V41)

The calculations referenced here demonstrate that the HAP emissions rates used maximum rates based upon the operation of a single turbine (and similarly, single duct burner; see Table B-4 cell R30 for calculations based upon fuel flow PER DUCT BURNER, cell F10). Hourly emission rates in some cases will be substantially higher after correcting for two turbines and two duct burners.

Prior to proceeding with the permitting process, DEQ must require the applicant to correct these calculation errors, and subsequently review to determine that no exemption thresholds are exceeded. The data must be released to the public and interested parties for their consideration prior to continuing with permitting.

**Conclusion:** We oppose the construction of the gas-powered plant at the Norfolk Naval Shipyard in its current proposal and request that the project be escalated to a public hearing of the Air Board.

**James P. Boyd**  
President  
Portsmouth Branch NAACP  
Unit #7104



## **Virginia Clinicians for Climate Action**

Virginia Clinicians for Climate Action (VCCA)  
1614 Princeton Rd. Richmond, VA 23227  
Contact: John Bagwell, 202-360-8176

PERMIT NAME: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

APPLICANT NAME AND REGISTRATION NUMBER: US Navy--Norfolk Naval Shipyard; 60326

FACILITY NAME AND ADDRESS: US Navy--Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

VCCA request that this permit be reviewed by the Air Pollution Control Board.

Representing over 300 doctors, nurses and allied health professionals in Virginia, Virginia Clinicians for Climate offers the following comment on the draft permit for the Norfolk Naval Shipyard project.

According to the American Lung Association's State of the Air Report the City of Portsmouth population is extremely vulnerable to air pollution. In a population of 94,632, the report shows 1,578 cases of pediatric asthma, 6,205 cases of adult asthma, 5,768 adults with cardiovascular disease, 22,052 children under the age of 18, 14,128 residents aged 65 and older, and 17,540 residents living in poverty. In the most recent report on asthma available from the Virginia Department of Health, asthma deaths and asthma hospital admissions are highest in several Tidewater cities, including Portsmouth. The fenceline neighborhoods per the EJScreen are in the 80-100th percentile nationally with respect to minority resident status and poverty. This is a population that cannot afford to be exposed to the hazards of any additional air pollution.

The engineering analysis argues that there are no adverse health impacts from this project on any resident of Virginia, therefore there is no disproportionate impact on the fenceline neighborhoods. Regional measurements of criteria pollutants do not guarantee that there will be no health impacts at the local level. There is nothing in the DEQ analysis that addresses the dose and duration of exposure to harmful pollutants or the vulnerability of residents in the fenceline neighborhoods. Moreover, there is a growing body of evidence that demonstrates harm to vulnerable populations from air pollution that is considered acceptable by the National Ambient Air Quality Standards. In one recent study of the medicare population, slight increases in ozone and PM<sub>2.5</sub> resulted in excess mortality that was pronounced among men, blacks and poor elders.<sup>1</sup> Other studies found similar disparities in impact among blacks and the poor as well as excess mortality from

PM<sub>2.5</sub>.<sup>2,3</sup>

According to the engineering analysis the project causes significant increases in PM<sub>10</sub> and PM<sub>2.5</sub> and green house gas emissions. Any increase in air pollution should be considered a health hazard that increases the risk of both immediate health impacts and longterm adverse consequences for climate change. Clearly there are multiple vulnerabilities in the population in Portsmouth that heightens the risk of increased air pollution. The entire Hampton Roads area is also vulnerable to sea level rise due to <sup>11</sup> climate change. Clinicians across the Commonwealth are seeing the health impacts of climate change today, and these will only become more apparent as the planet continues to warm. Warming waters are creating more favorable conditions for growth of harmful algae in our rivers and bacteria in our waters. Hotter summers are making it more dangerous for people to work and play outdoors. Earlier springs are bringing allergies and asthma attacks earlier than just a few decades ago. Increasing natural disasters threaten the health and safety of families, our treasured natural resources and our economic well-being.

The applicant is required to conduct a BACT (best available control technology) analysis to demonstrate that emissions will be the lowest possible with available technology. The applicant apparently did not consider solar and battery storage as an option nor did DEQ suggest these no emission technologies. At the very least, the no emissions option should be assessed and proven to be technically or economically not feasible before an air permit is granted.

Environmental justice demands greater scrutiny of the siting of fossil fuel infrastructure in minority communities where the cumulative burden of pollution has wreaked havoc on the health and well-being of residents.<sup>4</sup> Portsmouth has more than one superfund site within its boundaries, including the Norfolk Naval Shipyard itself. The Wheelabrator waste to energy plant at the same location creates tons of air pollution and in August 2016 was fined for exceeding its pollution limits. It is simply unacceptable to locate another fossil fuel project in this community.

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<sup>1</sup> Qian Di, et.al, Air Pollution and Mortality in the Medicare Population, *NEJM* 2017; 376;26.

<sup>2</sup> Parker, Jennifer d., et. al. Particulate Matter Air Pollution Exposure and Heart Disease Mortality Risks by Race and Ethnicity in the United States, *Circulation*. 2018;137:1688–1697.

<sup>3</sup> Maayan Yitshak-Sade, et. al., Estimating the causal effect of annual PM<sub>2.5</sub> exposure on mortality rates in the Northeastern and mid-Atlantic states. *Environmental Epidemiology* (2019) 3:e052

<sup>4</sup> Morello-Frosch, R. et. al., Understanding The Cumulative Impacts of Inequalities in Environmental Health, *Health Affairs* 30, No. 5 (2011): 879-887.

**Commenter:**

Narissa Turner: 1327 Floyd Ave; Richmond, VA, 23220. (404) 805-0210.

On behalf of Virginia Conservation Network: 103 E Main Street; Richmond, VA, 23219. (804) 644-0283

**On:** Oct. 7th, 2020

**To:** mariama.ouedraogo@deq.virginia.gov

Mariama Ouedraogo

Tidewater Regional Office 5636 Southern Boulevard

Virginia Beach, VA 23462

mariama.ouedraogo@deq.virginia.gov Submitted electronically

**RE PERMIT:** Prevention of Significant Deterioration Permit Stationary Source Permit to Construct and Operate Permit issued by DEQ, under the authority of the Air Pollution Control Board

**Applicant Name and Registration Number:** US Navy–Norfolk Naval Shipyard; 60326

**Facility Name and Address:** US Navy–Norfolk Naval Shipyard; 2600-2700 Effingham St.  
Portsmouth, VA 23709

As interested parties to the permit process, The Virginia Conservation Network submits the following comments regarding Prevention of Significant Deterioration Permit Stationary Source as requested by U.S. Navy Norfolk Naval Shipyard Portsmouth, VA 23709-5000, Registration No.: 60326. The Permit would allow the US Navy–Norfolk Naval Shipyard to build a Combined Heat and Power (CHP) Plant. The proposed plant will consist of two combustion turbines in combination with two heat recovery steam generators (HRSGs) with duct burners and other ancillary equipment. The facility is classified as a major source of air pollution and is located at 2600-2700 Effingham St. in Portsmouth, Virginia.

Based upon the issues discussed in this comment letter, DEQ should bring this Permit before the Air Pollution Control Board (The Board). Further review of the permit by The Board is warranted because the regulated activity will pose an imminent threat to the EJ community that exists within the vicinity of the proposed plant.

**Environmental Justice Concerns**

The Board must review this permit because the proposed project raises environmental-justice issues unavoidable by DEQ and the Board. The site is located in an environmental justice community that is over-burdened with industrial development.

Aside from the fact that Virginia conservation Network is fundamentally opposed to new fossil fuel energy producing sites—especially given that the surrounding communities already suffer from the environmental harms of established fossil fuel infrastructure in the area and impending catastrophic sea level rise—DEQ and the Board cannot turn a blind eye to the disproportionate impacts that environmental decisions inflict on underrepresented communities. As of July 1, 2020, a host of statutes now implore the Commonwealth and its agencies to actively secure environmental justice. HB 1162, for example, explicitly provides that a purpose of DEQ is to “further environmental justice and enhance public participation in the regulatory and permitting processes.” A recent Fourth-Circuit case, *Friends of Buckingham v. State Air Pollution Control Board*, Case No. 1152, decided January 7, 2020, also highlights that DEQ and permit-related boards must assess whether proposed activities might cause disproportionate harm to underrepresented communities, as was articulated by Brown Grove community members at the Board’s July 20th public hearing. In light of these mandates, as well as the inequities highlighted through COVID-19 and nationwide demonstrations on race, DEQ and the Board must independently assess how the proposed development will impact surrounding communities.

At least 2 of the census units adjacent to the Norfolk Naval ShipYard are in the 90-100 percentile for the Commonwealth of Virginia with respect to multiple environmental justice (EJ) or other important demographics (minority resident status, income, education level less than high school diploma, and children under 5) per the EPA EJSCREEN mapping tool. In the interest of protecting the health and safety of nearby populations, a comprehensive risk assessment needs to be done using environmental justice protocols to avoid civil rights violations.

### **Procedural Concerns**

Furthermore the Board must review this permit because there isn’t sufficient evidence that the permitting Process allowed for reasonable Public Participation.

The notification procedures for this hearing did not comply with protocols for environmental justice populations, as there should be significant effort to reach at-risk groups with non-technical language that can be understood by a typical resident. Specifically that the DEQ docket lists only 5 community contacts (Attachment A, DEQ docket). This is problematic because there is a long history of environmental racism in this vicinity. Local populations have pre-existing health conditions as a result of a high toxic burden from various pollution sources. To rectify I would recommend that DEQ use outreach strategies as discussed among VA state agencies like V-DOT in their Environmental Justice Guidelines.

Until these matters are adequately addressed, you must at least elevate this permit to the Air Board for improved oversight and better risk management, with necessary attention to sensitive populations who make up the majority in this area.

Thank you,  
Narissa



Ouedraogo, Mariama <wendbebe.savadogo@deq.virginia.gov>

# US Navy-Norfolk Naval Shipyard Public Comment

1 message

**Kidest Gebre** <kgebre@vaip.org>

To: mariama.ouedraogo@deq.virginia.gov

Wed, Oct 7, 2020 at 5:56 PM

Virginia Interfaith Power & Light (VAIPL), 1716 E. Franklin Street Richmond, VA 23223  
, (804) 505-4624

Permit Name: Prevention of Significant Deterioration Permit issued by DEQ, under the authority of the Air Pollution Control Board

Applicant Name and Registration Number: US Navy-Norfolk Naval Shipyard; 60326

Facility Name and Address: US Navy-Norfolk Naval Shipyard; 2600-2700 Effingham St. Portsmouth, VA 23709

Virginia Interfaith Power & Light (VAIPL) opposes the construction of the gas-powered plant at the Norfolk Naval Shipyard and request that the project be elevated to a public hearing in front of the Air Board. The US Navy-Norfolk Naval Shipyard facility is being proposed to be situated in an environmental justice community. Many of the residents of the community are in the 80-100th percentile nationally with respect to minority resident status and other vulnerabilities, including poverty, education level, and children under age 5. There is disproportionate negative impact based on race and income the community for this facility's proposed site. Moreover, those that reside in this community, have pre-existing health conditions as a result of a high toxic burden from various pollution sources near the community. However, the proposed permit did not use a hotspot analysis to point out the cumulative exposures from multiple sites over time for the community. Furthermore, the notification procedures for this hearing failed to comply with protocols for environmental justice populations. There was not significant and proper effort to outreach to the communities that are at-risk and sensitive to pollution. The outreach that has been done lacks non-technical language that can be understood by a typical resident. There needs to be a comprehensive environmental justice assessment and increased outreach to impacted communities. Inadequate air permitting cases such as this need to be elevated to the Air Board to assure proper oversight and accountability. Due to the reasons mentioned, Virginia Interfaith Power & Light requests that US Navy-Norfolk Naval Shipyard air permitting to be elevated to the Air Board. Thank you!

Kidest Gebre | Communications & Education Coordinator | Virginia Interfaith Power & Light



virginia interfaith  
power & light

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**REPORT TO THE STATE AIR POLLUTION CONTROL BOARD  
CONCERNING HIGH PRIORITY VIOLATIONS (HPVs)  
FOR THE FOURTH QUARTER 2020**

**NOVs Issued from July through September 2020**

|            |                                                                                                            |                                                                                                                                                                                                                                                    |                              |
|------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>NRO</b> | <b>Buckeye Terminals LLC<br/>– Fairfax Terminal</b><br><br>Fairfax, Virginia<br><br>Registration No. 70220 | <b>Discovery Date:</b> 9/1/2020<br><br><b>Alleged Violations:</b><br><br>Exceeded VOCmg/liter loading loss limit during stack test; failure to complete required stack test; late submittal of stack test report and late reporting of exceedance. | <b>NOV:</b> Issued 9/22/2020 |
|------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|

**Consent Orders issued from July through September 2020**

|             |                                                                                                           |                                                                                                                                                                                                                                               |                                                                                                                                          |
|-------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BRRO</b> | <b>Wolverine Advanced Materials – Cedar Run</b><br><br>Blacksburg, Virginia<br><br>Registration No. 21240 | <b>Discovery Date:</b> 1/4/2019<br><br><b>Alleged Violation:</b><br><br>Late submittal of catalyst activity report, failed to demonstrate permitted destruction efficiency rate in catalyst activity test.                                    | <b>NOVs:</b> Issued 2/5/2019, 4/17/2019, 6/4/2019<br><br><b>Consent Order issued 7/31/2020, including a civil charge of \$48,435.00.</b> |
| <b>NRO</b>  | <b>Panda Stonewall LLC</b><br><br>Leesburg, Virginia<br><br>Registration No. 73826                        | <b>Discovery Dates:</b> 11/27/2018, 3/28/2019<br><br><b>Alleged Violations:</b><br><br>Exceeded short term and annual CO limit in permit during early stages of operation of the new facility. Also, exceeded short term NOx limit            | <b>NOVs:</b> Issued 12/20/2018, 4/23/2019<br><br><b>Consent Order effective 9/1/2020, including a civil charge of \$61,549.00.</b>       |
| <b>PRO</b>  | <b>AdvanSix Resins and Chemicals LLC</b><br><br>Hopewell, Virginia<br><br>Registration No. 50232          | <b>Discovery Dates:</b> 9/10/2018, 4/26/2019<br><br><b>Alleged Violation:</b><br><br>Title V permit violations reported after third party audit. VOC emissions bypassed flare and vented directly to ambient air through cold box vent stack. | <b>NOVs:</b> Issued 2/4/2019, 7/15/2019<br><br><b>Consent Order effective 7/29/2020, including a civil charge of \$123,082.00.</b>       |
| <b>PRO</b>  | <b>River Pools and Spas</b>                                                                               | <b>Discovery Date:</b> 1/17/2019                                                                                                                                                                                                              | <b>NOV:</b> Issued 2/26/2019                                                                                                             |

|            |                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                              |
|------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | Warsaw, Virginia<br>Registration No. 52484                                                                                 | <b>Alleged Violation:</b><br>Exceeded permitted VOC (styrene) limits at major source levels.                                                                                                                                                                                                                                                        | <b>Consent Order effective 7/8/2020, including a civil charge of \$69,028.00.</b>                                                                            |
| <b>TRO</b> | <b>Hampton Roads Sanitation District – Army Base Sewage Treatment Plant</b><br>Norfolk, Virginia<br>Registration No. 60349 | <b>Discovery Date:</b> 3/17/2020<br><b>Alleged Violation:</b><br>Exceeded HCL limit during stack test.                                                                                                                                                                                                                                              | <b>NOV:</b> Issued 1/27/2020<br><b>Consent Order effective 7/1/2020, including a civil charge of \$11,865 and a compliance plan.</b>                         |
| <b>TRO</b> | <b>Perdue AgriBusiness LLC - Chesapeake</b><br>Chesapeake, Virginia<br>Registration No. 60277                              | <b>Discovery Date:</b> 5/13/2019<br><b>Alleged Violation:</b><br>Exceeded permitted solvent loss ratio for Hexane at the Soybean Oil Extraction Facility.                                                                                                                                                                                           | <b>NOV:</b> Issued 10/8/2019<br><b>Consent Order effective 7/2/2020, including a civil charge of \$15,000.00.</b>                                            |
| <b>VRO</b> | <b>University of Virginia</b><br>Charlottesville, Virginia<br>Registration No. 40200                                       | <b>Discovery Date:</b> 5/17/2019, 9/9/2019<br><b>Alleged Violations:</b><br>Exceeded opacity and CO emission limits from boilers, late tune-up on boiler, failure to notify DEQ of a malfunction.<br><br>Exceeded CO and SO <sub>2</sub> emission limits from boilers; sorbent injection rates below recommended low level and no alarms activated. | <b>NOV:</b> Issued 6/6/2019, 10/4/2019<br><b>Executive Compliance Agreement (multi-media) effective 7/2/2020 including extensive corrective action plan.</b> |

### Consent Orders in Development – Previously Reported NOVs

|             |                                                                              |                                                                                                                                                       |                              |
|-------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>BRRO</b> | <b>Dynax America Corp USA</b><br>Roanoke, Virginia<br>Registration No. 21279 | <b>Discovery Dates:</b> 3/31/2020<br><b>Alleged Violations:</b><br>Exceeded limit for total annual HCL throughput and failed to report the deviation. | <b>NOV:</b> Issued 6/2/2020  |
| <b>BRRO</b> | <b>Lhoist North America – Kimballton Plant</b><br>Ripplemead, Virginia       | <b>Discovery Date:</b> 4/23/2020<br><b>Alleged Violations:</b>                                                                                        | <b>NOV:</b> Issued 5/27/2020 |

|             |                                                                                                 |                                                                                                                                                                                                                                                                                        |                               |
|-------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
|             | Registration No. 20225                                                                          | Continuous Opacity Monitoring System not calibrated in accordance with MACT AAAAA requirements.                                                                                                                                                                                        |                               |
| <b>BRRO</b> | <b>Southern Finishing Company, Inc.</b><br>Martinsville, Virginia<br>Registration No. 30515     | <b>Discovery Date:</b> 10/2/2019<br><b>Alleged Violation:</b><br>Excess opacity observed during VEE; missing MACT DDDDD compliance reporting; missing required MACT JJ certification for how facility complies with formaldehyde usage.                                                | <b>NOV:</b> Issued 11/13/2019 |
| <b>BRRO</b> | <b>U.S. Army – Radford Army Ammunition Plant</b><br>Radford, Virginia<br>Registration No. 20656 | <b>Discovery Date:</b> 4/30/2020<br><b>Alleged Violations:</b><br>Failed to conduct twelve weekly Method 22 visible emissions observations and failed to report these deviations in Semi-Annual Monitoring Report.                                                                     | <b>NOV:</b> Issued 5/13/2020  |
| <b>PRO</b>  | <b>AMPAC Fine Chemicals Virginia, LLC</b><br>Petersburg, Virginia<br>Registration No. 50856     | <b>Discovery Date:</b> 5/8/2019<br><b>Alleged Violations:</b><br>Late submittal of Title V application, late submittal of notification of use of methylene chloride, improper leak testing of chemical manufacturing process unit, missing or incomplete records and inspection plans. | <b>NOV:</b> Issued 8/12/2019  |
| <b>PRO</b>  | <b>INGENCO – Amelia</b><br>Jetersville, Virginia<br>Registration No. 31047                      | <b>Discovery Date:</b> 5/10/2018<br><b>Alleged Violations:</b><br>Failed to maintain records as required by permit or regulation, exceeded inlet charge air temperature.                                                                                                               | <b>NOV:</b> Issued 8/13/2018  |
| <b>PRO</b>  | <b>INGENCO – Rockville Plant</b><br>Rockville, Virginia<br>Registration No. 51201               | <b>Discovery Date:</b> 2/12/2020<br><b>Alleged Violations:</b><br>Failed to maintain records and failed to report deviations in Semi-Annual Monitoring Reports.                                                                                                                        | <b>NOV:</b> Issued 5/6/2020   |
| <b>PRO</b>  | <b>Richmond Energy LLC</b>                                                                      | <b>Discovery Date:</b> 8/12/2019                                                                                                                                                                                                                                                       | <b>NOV:</b> Issued 10/31/2019 |

|            |                                                                                         |                                                                                                                                                           |                              |
|------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
|            | Henrico, Virginia<br>Registration No. 52198                                             | <b>Alleged Violation:</b><br>Exceeded maximum sulfur content in landfill gas analysis; exceeded short term VOC and SO2 emissions limits during stack test |                              |
| <b>VRO</b> | <b>Valley Proteins, Inc. - Linville</b><br>Linville, Virginia<br>Registration No. 80144 | <b>Discovery Date:</b> 5/1/2020<br><b>Alleged Violations:</b><br>Failed stack test –exceeded the exemption emission rate for formaldehyde emissions.      | <b>NOV:</b> Issued 6/15/2020 |