1.0 Air Quality

1.1 Introduction

This Technical Memorandum describes the existing air quality in the Proposed Action's Region of Influence (ROI) and potential impacts on air quality from the Proposed Action (i.e., Preferred Alternative) and No Action Alternative. Measures to reduce potential adverse air quality effects from the Proposed Action are identified.

Air pollutants may be naturally occurring or emitted from stationary (e.g., permanent fuel-burning equipment) or mobile (e.g., vehicles) human-activity sources.

The Clean Air Act (CAA) of 1970 and its amendments required the United States Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for ambient air pollutants considered harmful to public health and the environment. These are known as "criteria pollutants" (USEPA, 2018a). States have the authority to adopt stricter criteria pollutant standards; however, Maryland has adopted the USEPA standards (Code of Maryland Regulations [COMAR] 26.11.04).

The USEPA uses geographic regions to designate the NAAQS attainment status of an area. As defined by the CAA, for a given pollutant, an attainment area is one in compliance with the NAAQS, while a non-attainment area does not meet one or more of the NAAQS. A maintenance area is an area that was previously in non-attainment but has since come into compliance with the NAAQS. Areas are also often classified by a category or level of attainment or non-attainment, such as "severe," "marginal," or "moderate" (USEPA, 2018a; USEPA, 2016).

In addition to criteria air pollutants, the USEPA also regulates hazardous air pollutants (HAPs) and greenhouse gases (GHGs). Furthermore, the state of Maryland regulates pollutants referred to as toxic air pollutants (TAPs). These pollutants are defined and described in **Table 1**.

This Technical Memorandum reviews criteria pollutants and HAPs within the Proposed Action's ROI based on federal, state, and local (i.e., Prince George's County) requirements. Since GHGs are relatively stable in the atmosphere and are essentially uniformly mixed throughout the troposphere and stratosphere, GHG emissions are reviewed on a broader scale at the state (i.e., regional) level.

Treasury received comments related to air quality from stakeholders during the public scoping period. These comments primarily concerned the potential impacts of air pollution from the currency manufacturing process. Multiple stakeholders commented regarding potential climate change impacts. One comment noted that Treasury should complete a General Conformity Analysis. Please refer to Treasury's Public Scoping Report for further details on the comments received during the scoping period. Each of these comments is considered and addressed in this analysis.

1.2 Affected Environment

1.2.1 Region of Influence

The primary ROI for this analysis is Prince George's County and the National Capital Region (NCR). This primary ROI is used to determine the Proposed Action's regulatory compliance with the criteria described below (see **Figure 1**). The USEPA uses regional, contiguous geographic areas to determine an area's NAAQS compliance, such as a county, city, or other regionally connected areas. The USEPA includes the Project Site within Prince George's County to determine the area's NAAQS attainment status (USEPA, 2019c). Further, the CAA defines larger regional, contiguous geographic areas that have relatively uniform air quality conditions as Air Quality Control Regions (AQCRs). Both the Project Site and the Bureau of Engraving and Printing's (BEP's) Washington, DC Facility (DC Facility) are in the "National Capital Interstate" AQCR, which is equivalent to the NCR (40 Code of Federal Regulations [CFR] 81.12).

Table 1: Air Quality Pollutants Relevant to the Proposed Action

Pollutant	Definition/Description	Notability
Criteria Pollutants	Ambient air pollutants that are considered harmful to public health, the environment, and welfare, and regulated under the NAAQS.	Primary NAAQS protect general public health and the health of sensitive populations, which includes children, the elderly, and the infirmed. Secondary NAAQS protect public welfare as it depends on such things as visibility changes and damage to crops, vegetation, and buildings (40 CFR Part 50).
Ozone (O_3)	Criteria pollutant that results from a chemical reaction of volatile organic compounds (VOCs) and oxides of nitrogen (NOx) in the presence of sunlight.	Breathing O_3 can trigger health issues in humans, such as asthma, chest pain, coughing, and throat irritation or inflammation. Ground-level O_3 can also cause or contribute to problems in natural ecosystems through vegetation disease, decreased plant growth, and reduced photosynthesis by hindering sunlight.
Volatile Organic Compounds (VOCs)	Emitted as off-gases from certain solids and liquids with varying VOC contents, such as inks, cleaning solvents, paints, paint thinners, diesel fuel, and other oil-based and chemical solvents and solutions.	VOCs and NOx are O_3 precursors because their presence, along with sunlight, is necessary for the creation of O_3 in the atmosphere.
Nitrogen Oxides (NO_x)	Emitted from fuel-burning equipment and sources, such as vehicles, boilers, and power plants.	
Nitrogen Dioxide (NO_2)	Criteria pollutant that is primarily emitted from stationary sources and can be a major concern at large stationary point sources, such as fossil fuel power plants or other heavy industrial sources.	Can cause or contribute to adverse effects in humans when inhaled, such as asthma and other respiratory problems.
Sulfur Dioxide (SO_2)	Criteria pollutant that is primarily emitted from stationary sources that use sulfur-containing fuels, such as oil and coal.	Can cause or contribute to respiratory problems in humans when inhaled, can damage or decrease the growth of vegetation, and can cause a reduced visibility in the atmosphere through haze.
Carbon Monoxide (CO)	Criteria pollutant that is primarily emitted by fuel combustion of stationary and mobile sources.	Can cause or contribute to serious health effects by decreasing oxygen delivery throughout the body (when breathed in by humans). If inhaled at extremely high levels, CO can cause death.
Particulate Matter less than 10 microns in diameter (PM_{10})	Criteria pollutant emitted from both stationary and mobile sources and may be either in the form of liquid droplets or solids suspended in the atmosphere. Heavy duty diesel-powered vehicles, such as buses and large construction equipment and trucks, are a significant source of fine particulate matter.	Can cause or contribute to serious respiratory problems in humans when breathed in and is the main cause of reduced visibility in the atmosphere through haze. Can also be a part of "fugitive emissions", which are emissions that do not pass through a stack or vent, such as non-contained dust outdoors (40 CFR 70.2). Fugitive dust emissions are typically temporary (i.e., only generated during a project's construction phase).
Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$)		

Pollutant	Definition/Description	Notability
Lead (Pb)[1]	Criteria pollutant typically associated with industrial sources and vehicles that use leaded fuel. (Note: The CAA banned the sale of leaded fuel in 1996.)	Can cause or contribute to adverse effects to humans' internal organs and functions, most commonly neurological effects in children and cardiovascular effects in adults. Pb in the environment can contaminate soil and water, resulting in decreased growth and reproductive issues in plants and animals.
HAPs	Under Section 112 of the CAA, the USEPA regulates 187 HAPs (42 US Code [USC] 7412). Examples include benzene (found in gasoline), perchloroethlyene (emitted from some dry-cleaning facilities), and methylene chloride (used as a solvent and paint stripper).	Known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or have adverse environmental and ecological effects.
TAPs	Under COMAR 26.11.16.07, the state includes as TAPs all 187 HAPs and any of the listed pollutants in COMAR 26.11.16.06 and .07, plus any other air pollutant that is considered a health hazard as defined by the Occupational Safety and Health Administration (OSHA). Examples of TAPs that are not considered HAPs by the USEPA include ethyl oxalate (used in pharmaceutical manufacturing), diethyl ketone (used in paint production), and dichlorophen (used as an antimicrobial agent).	Can cause cancer or other serious health effects or have adverse environmental and ecological effects. Of the state-listed TAPs, 259 are listed as known, probable, or potentially carcinogenic pollutants (COMAR 26.11.16.06). If not considered exempt as a small emitter, emissions of TAPs could require an ambient impact analysis based on screening levels described in COMAR 26.11.16.03.
GHGs	Gas emissions from natural processes (e.g., water vapor) and human activities that trap heat in the atmosphere. Human-activity GHG emissions include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases.	Scientific evidence indicates that GHGs in the Earth's atmosphere are accelerating a rise in global temperature and affecting global climate patterns.

Source(s): (USEPA, 2018a; USEPA, 2017a; USEPA, 2019a; USEPA, 2017b; MDE, 2019a; USEPA, 2018b; USEPA, 2019b)

A local ROI, which is the area within 1,500 feet of the Project Site, is used in this analysis as the area where sensitive receptors may experience localized air quality impacts (e.g., from fugitive construction dust) from activities occurring at the Project Site (see **Figure 2**).

1.2.2 Applicable Guidance

Table 2 identifies federal, state, and local guidance and regulations relevant and applicable to this analysis. Treasury would comply with all federal, state, and local air quality laws and regulations while constructing and operating the Proposed Action.

[1] No significant sources of Pb are associated with the Proposed Action; therefore, Pb emissions are not considered in this analysis.

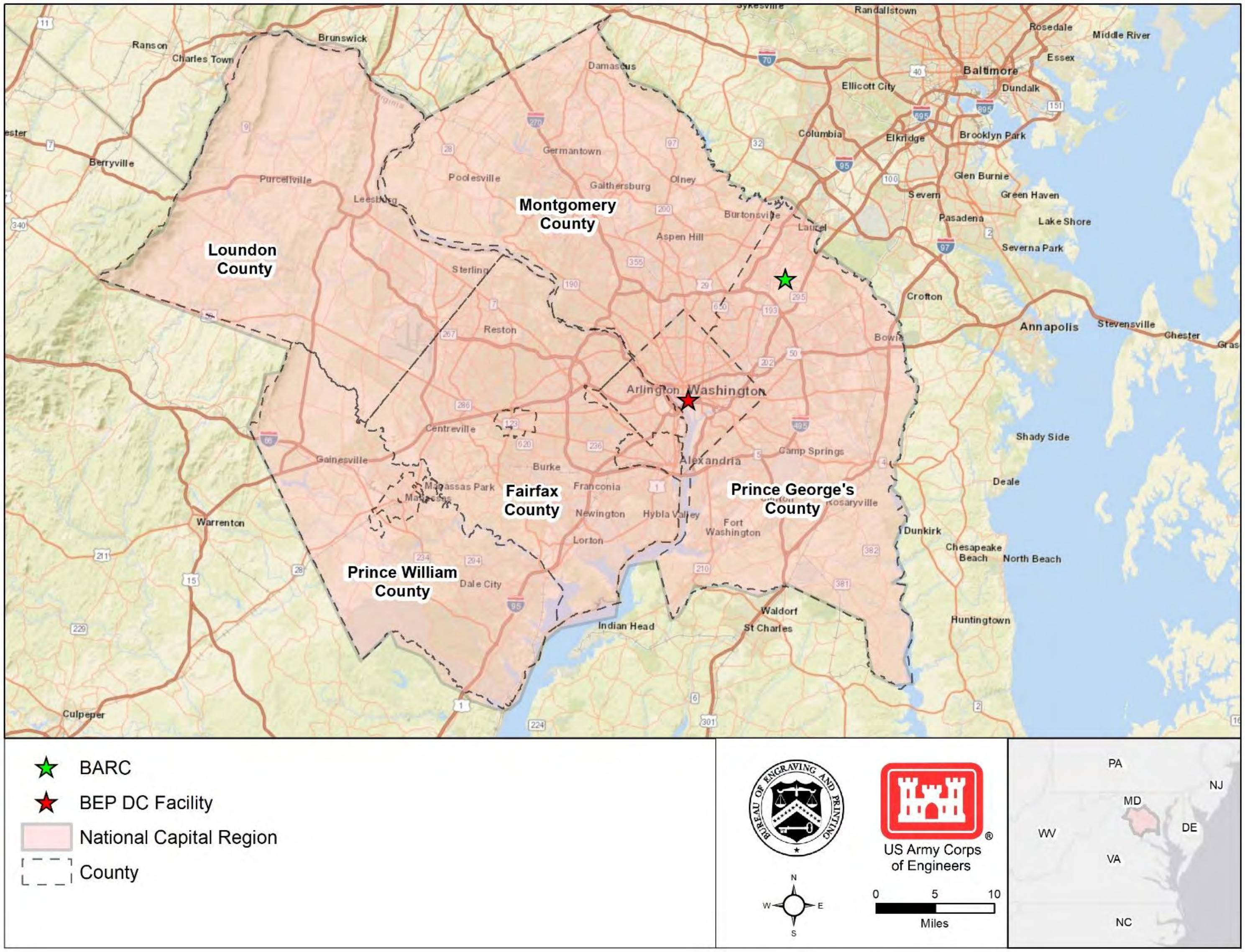

Figure 1: Air Quality Primary ROI (for Regulatory Compliance)

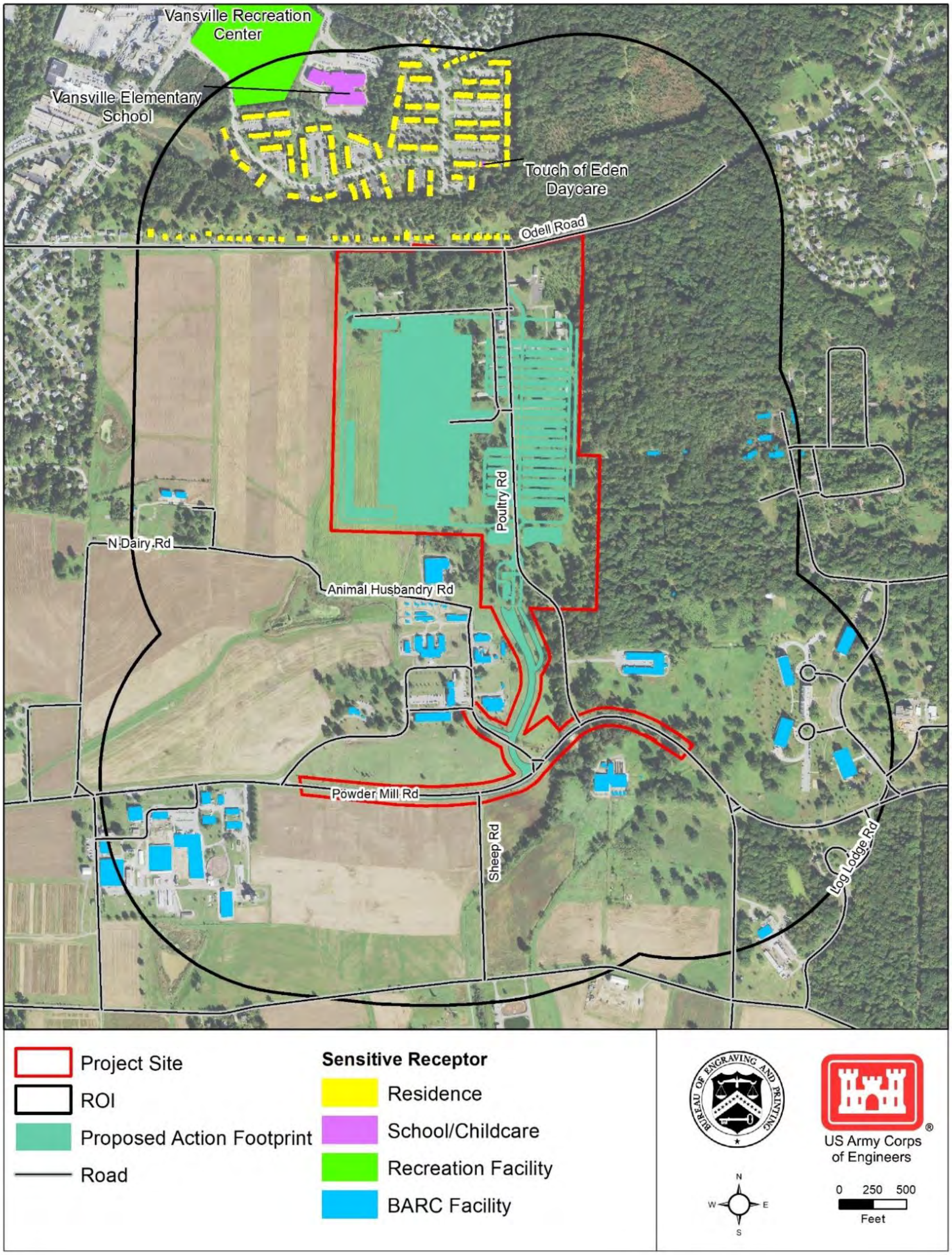

Figure 2: Air Quality Local ROI and Potential Sensitive Receptors

Table 2: Air Quality Applicable Guidance and Regulations

Guidance/Regulation	Description/Applicability to Proposed Action
Federal	
Anti-backsliding rules (80 Federal Register [FR] 12264 and 81 FR 58010)	Ensures that areas previously designated as non-attainment do not reverse air quality improvement progress by removing certain emission controls and standards in place, even after a non-attainment status or NAAQS standard is revoked.
General Conformity Rule (40 CFR 51 and 93)	Requires federal actions or federally funded actions planned to occur in a non-attainment or maintenance area to be reviewed prior to their implementation to ensure that the actions would not interfere with state's plans to meet or maintain the NAAQS. Considers the total direct and indirect emissions of a proposed action under a General Conformity Analysis. Requires a General Conformity Determination if the projected air emissions are not below *de minimis* levels specified in 40 CFR 93.153. *De minimis* levels are minimum thresholds for criteria pollutants in non-attainment and maintenance areas.
Ozone Transport Region (42 USC 7511c)	Designates a region from Northern Virginia to Maine where there may be stricter ozone standards. 40 CFR 93.153 of the General Conformity Rule establishes *de minimis* levels for ozone precursors (i.e., VOC and NO_x) that may be more restrictive in this region.
New Source Performance Standards (NSPS) (40 CFR 60)	Establishes standards to minimize emissions of criteria pollutants and HAPs from specific types of man-made, stationary emission sources (USEPA, 2019d). Applies to sources that are new, reconstructed, or modified. Authorized under Section 111 of the CAA.
National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 63)	Establishes standards for various HAPs and standard source categories according to Maximum Achievable Control Technology (MACT) or Generally Available Control Technology (GACT) requirements (USEPA, 2019e). Authorized under Section 112 of the CAA.
Prevention of Significant Deterioration (PSD) (40 CFR 51.166 and 52.21)	Establishes requirements for new major sources in attainment areas, such as installing Best Available Control Technology (BACT). Major sources are stationary sources, or groups of stationary sources, with a potential to emit (PTE)[2] more than major source thresholds specified in 40 CFR 70.2. Aims to protect public health and welfare, air quality in areas of special value, and economic growth that is consistent with existing air quality preservation (USEPA, 2019f). Includes regulations on GHGs.
Federal Mobile Emission Standards (42 USC 7521-7590)	Establishes emission standards for manufactures and operators of mobile sources, such as engine and fuel requirements to reduce mobile sources pollution. Include regulations on GHGs. Authorized under Section 202 of the CAA.
Title V Permit Program (40 CFR 71 and COMAR 26.11.03)	Requires major sources to obtain a federal Title V operating permit (as specified in Title V of the CAA) (USEPA, 2018c). Includes regulations on GHGs. Authorized under Section 112 of the CAA and enforced under Section 502 of the CAA.
State Implementation Plan (SIP) (40 CFR 51 and 52)	Requires each state to submit a SIP that supports the implementation, maintenance, and enforcement of air quality standards. Authorized under Section 110 of the CAA.

[2] The USEPA defines PTE as the maximum capacity of a source to emit when considered with its physical and operational design, including any limitations on the source that are enforceable by the USEPA, such as air pollution controls, operational restrictions, and regulatory requirements (USEPA, 1998). Permitting requirements, such as under Title V, are based on a source's PTE. A source's "actual" emissions, or those emissions actually emitted under normal operating conditions, are typically lower.

Guidance/Regulation	Description/Applicability to Proposed Action
Maryland	
Maryland Air Quality Permits (COMAR 26.11.02)	Maryland Department of Environmental (MDE) requires permits for the construction and operation of non-exempt emission sources and fuel-burning equipment, such as boilers and emergency generators (MDE, 2019b).
Maryland Particulate Matter Standards from Materials Handling and Construction (COMAR 26.11.06.3D)	Establishes a requirement that reasonable precautions must be taken during materials handling and construction that prevent PM from becoming airborne (i.e., fugitive dust). Reasonable precautions may include covering stockpiles and spraying water on surfaces.
Maryland Stationary Source Standards (COMAR 26.11.06 and 26.11.09)	Establishes standards on the construction and use of stationary emission sources such as fuel-burning equipment and internal combustion engines. Includes controls on visible emissions, sulfur oxides, and NO_x emissions from major stationary sources.
Maryland Asphalt Paving Standards (COMAR 26.11.11.02)	Restricts the use of cutback asphalt (asphalt cement that is blended with VOCs) unless certain provisions are necessary: (1) long-life stockpile storage; (2) the use or application between October 15-April 15; or (3) sole-use as a penetrating prime coat.
Maryland TAPs Regulations (COMAR 26.11.15 and 26.11.16)	Establishes standards and requirements for TAPs. Standards and requirements for applicable stationary sources include quantification of TAP emissions, application of BACT for toxics (T-BACT) on new sources, and performance of an ambient impact analysis for human health using state-established screening levels.
Maryland VOC Emission Control Standards from Lithographic and Letterpress Printing (COMAR 26.11.19.11)	Establishes VOC emission standards for operators of lithographic and letterpress presses, including requirements on VOC content in materials used, testing VOC control devices, and record keeping.
Maryland's GHG Reduction Act of 2009, as updated in 2015	Founded on a Maryland Commission on Climate Change climate action plan, it requires the state to reduce baseline 2006 GHG emission by 25 percent by 2020 in a way that has a positive benefit to the state economy. In 2015, an updated version included a 40 percent reduction from 2006 levels by 2030 (MDE, 2019c).
Prince George's County	
County Code Section 19-101	Prince George's County adopted MDE's air quality regulations listed under COMAR 26.11. Summaries of these regulations are shown in the "Maryland" section of this table.
County Code Section 19-104 and 19-105	Establishes open burning regulations for areas outside (19-104) and inside (19-105) the Capital Beltway (Interstate-95). Outside the Capital Beltway, an open fire permit is required for any open burning activity except for recreational cooking fires (e.g., campfires and bonfires), and devices designed for space heating. Inside the Capital Beltway, a permit is required for all open burning activities except for fire prevention, firefighter training, protection of public health (e.g., disposing of hazardous materials if no other means of disposal are available), recreational cooking fires, and agricultural operations (e.g., growing crops or raising livestock).

1.2.3 Existing Conditions

Regional Overview

Prince George's County is in marginal non-attainment for 2015 8-hour O_3 and in maintenance for 2008 8-hour O_3 and 1971 CO. Prince George's County was designated as maintenance for 2008 8-hour O_3 and 1971 CO in May 2019 and March 1996, respectively. Prince George's County was previously in maintenance for 1979 1-hour O_3, 1997 8-hour O_3, and 1997 $PM_{2.5}$. However, the NAAQS for these three pollutants were revoked in June 2005, April 2015, and October 2016, respectively (USEPA, 2019c). While revoked standards are no longer in effect, anti-backsliding rules could still apply (see **Table 2**).

The MDE maintains an Ambient Air Monitoring Program with 24 air monitors around the state that measure ground-level concentrations of criteria pollutants and HAPs (MDE, 2019d). Three of these stations are in Prince George's County, with two of those within the unincorporated city of Beltsville:

- **HU-Beltsville:** This station is located north of Odell Road on the Howard University (HU) Beltsville Campus. This station measures all criteria pollutants except for Pb. This station is located approximately 1 mile north of the Project Site.
- **Beltsville-CASTNET:** This station is located on the East Airfield at the Beltsville Agricultural Research Center (BARC). It is part of the USEPA's Clean Air Status and Trends Network (CASTNET), a national monitoring network of 97 sites that assess pollutant and atmospheric trends and changes across the United States (USEPA, 2019g). This station measures O_3. This station is located approximately 3 miles southeast of the Project Site.

The MDE reports the daily and annual measurements of these stations to the USEPA's Air Quality System where the data is accessible on the USEPA's Air Data website (USEPA, 2019h). The 2019 criteria pollutant measurements (and 2018 and 2017 when applicable for averaging) for HU-Beltsville and Beltsville-CASTNET compared to the NAAQS are provided in **Table 3**.

Table 3: 2019 MDE Ambient Air Monitoring Station Measurements Compared to the NAAQS

Criteria Pollutant and Station	Station Measurement	P/S[1] NAAQS	Averaging Time	Type of Measurement	Exceeds NAAQS
CO HU-Beltsville	0.8 parts per million (ppm)	P: 9 ppm	8 hours	Not to be exceeded in a year	**No**
	1.04 ppm	P: 35 ppm	1 hour		
SO_2 HU-Beltsville	0.003 ppm	P: 0.075 ppm	1 hour	99th percentile 3-year average	**No**
	0.006 ppm	S: 0.5 ppm	3 hours	Not to be exceeded in a year	
NO_2 HU-Beltsville	0.006 ppm	P&S: 0.053 ppm	1 year	Annual mean	**No**
	0.03 ppm	P: 0.1 ppm	1 hour	98th percentile 3-year average	
PM_{10} HU-Beltsville	14.8 micrograms per cubic meter (µg/m^3)	P&S: 150 µg/m^3	24 hours	Not to be exceeded in a year on a 3-year average	**No**
$PM_{2.5}$ HU-Beltsville	6.77 µg/m^3	P: 12 µg/m^3	1 year	Annual mean 3-year average	**No**
	15 µg/m^3	P&S: 35 µg/m^3	24 hours	98th percentile 3-year average	
O_3 HU-Beltsville	0.07 ppm	P&S: 0.070 ppm	8 hours	Annual fourth-highest daily maximum 3-year average	**Yes**
O_3 Beltsville-CASTNET	0.073 ppm	P&S: 0.070 ppm	8 hours	Annual fourth-highest daily maximum 3-year average	**Yes**

Green Shading: Pollutant does not exceed NAAQS | Red Shading: Pollutant does exceed NAAQS

1. Primary / Secondary NAAQS
2. The NAAQS are expressed as a concentration in the air and as a duration of exposure to a criteria pollutant, often including both short-term and long-term exposure.

Maryland's GHG Emission Reduction Act (see **Table 2**) requires the MDE to inventory statewide GHG emissions on a 3-year cycle. The most recent inventory in 2017 found annual state-wide GHG emissions to be approximately 78,493,210 metric tons of CO_2 equivalent (CO_2e)[3] (not including sinks).

In 2017, the sector that contributed the most to GHG emissions in Maryland was transportation at approximately 41 percent of the total GHG emissions. The electricity production sector was approximately 30 percent of the total, with other sectors rounding out the total (MDE, 2019e).

For comparison, the 2017 GHG emissions in Washington, DC and the United States were approximately 7,328,971 and 6,456,700,000 metric tons of CO_2e, respectively. As with the state of Maryland, the transportation sector was the largest producer of GHGs in the United States. In Washington, DC, commercial and industrial buildings, and particularly their energy use, were the largest producer of GHGs (USEPA, 2019i; DDOE, 2017).

Treasury's Existing Air Emission Sources and Emissions

The BEP's DC Facility currently holds a Title V permit (Permit Number 035-R1). The Title V permit contains general details such as reporting requirements, fugitive dust control, fuel oil content and quality, and general equipment operation. The Title V permit also contains emission limitations and unit-specific requirements (e.g., monitoring, recordkeeping, testing, maintenance, and reporting) for stationary air emission sources, such as diesel emergency generators, a paint shop, currency presses (e.g., printing – lithographic and letterpress), and plating lines. Treasury submits Semi-Annual Monitoring Reports and Annual Compliance Certifications to the Washington, DC Department of Energy and Environment and the USEPA in accordance with Title V requirements (BEP, 2018).

The BEP's Western Currency Facility (WCF) does not require a Title V permit because its PTE emissions are below the applicable major source thresholds in its region (BEP, 2015). Currently, neither the DC Facility nor the WCF are in violation of the CAA and both facilities have been in CAA compliance for at least the past three years (USEPA, 2019j; USEPA, 2019k).

VOCs from inks and cleaning solvents are the main pollutant of concern when operating currency presses. Treasury implements various VOC limitations and operating controls for the presses as required, such as:

- Limitations on the VOC content in inks and cleaning solvents in the DC Facility.
- Use of a thermal oxidizer in the WCF that breaks down VOCs into CO_2 and water.
- Limitations on press operating hours.
- Implementing technologies and process changes that improve efficiency and reduce consumption of inks and solvents.
- Best management practices when using inks and cleaning solvents (e.g., storage of VOC-containing materials in a manner that prevents their evaporation, only opening VOC-containing materials containers when necessary, and maintaining ink and cleaning solvent usage records).

Besides VOCs, all other criteria pollutants are emitted from natural gas boilers and diesel fuel use in emergency generators and fire pumps at the BEP's facilities. The majority of PM is produced in the Central Trim Line, which is the collector of the "trim" during paper processing. However, most of the PM produced

[3] Each GHG is assigned a global warming potential, which refers to the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. The equivalent CO_2 rate is calculated by multiplying the emissions of each GHG by its global warming potential and adding the results together to produce a single, combined emissions rate representing all GHGs, referred to as the CO_2 equivalent (CO_2e) (Yale Climate Connections, 2009).

in the Central Trim Line is not directly emitted into the atmosphere; it is exhausted through a mechanical baghouse that collects the dust before it reaches the atmosphere.

Table 4 shows the PTE emissions from stationary sources at the DC Facility and WCF (BEP, 2015; BEP, 2010). For comparative purposes, **Table 4** also shows the actual emissions from stationary sources at the DC Facility in 2018, which are substantially lower than the DC Facility's PTE emissions (BEP, 2018). Emissions from mobile sources on-site at the DC Facility and WCF, such as from employee's privately-owned vehicles (POVs) and delivery trucks, are intermittent and only generated when vehicles are in operation to comply with vehicle idling restrictions. Emissions data from these intermittent mobile sources are not available.

Table 4: Treasury's Emissions from Current Operations (Current Conditions)

Pollutant	Sources	DC Facility 2018 Actual (tons per year [tpy], or metric tons CO_2e for GHGs)	DC Facility PTE (tpy)	WCF PTE (tpy) and 2018 Actual GHGs (metric tons CO_2e)[1]
VOCs	presses (primary), paint shop, diesel emergency generators, fire pumps, ink solids handling, and miscellaneous sources[2]	22.63	83.12	43.70
Combined HAPs	presses (primary), paint shop, diesel emergency generators, fire pumps, and miscellaneous sources[2]	0.16	4.61	0.98
HAP: Chromium[3]	plating lines	2.99E-06	8.70E-04	<0.01
HAP: Nickel[3]	plating lines	5.59E-05	2.00E-03	0.04
PM	Central Trim System (primary), diesel emergency generators, fire pumps, and ink solids handling	0.06	2.39	2.75
NO_x	diesel emergency generators and fire pumps	0.32	7.07	5.13
SO_2	diesel emergency generators, fire pumps, and plating lines	0.00	0.03	0.02
CO	diesel emergency generators and fire pumps	0.02	0.60	10.23
GHGs	various stationary sources, including presses, diesel emergency generators, and fire pumps	21,974[4]	N/A	21,932

Sources: (BEP, 2010; BEP, 2015; BEP, 2018)

1. WCF PTE calculations, besides printing operations, include only emissions from the thermal oxidizer and do not include diesel emergency generators or boilers.
2. Miscellaneous sources are those considered to be "insignificant activities" in the Title V permit. These include, but are not limited to, small shop operations (e.g., carpentry, electrical, masonry), a small laboratory with fume hoods, and small stationary fuel burning equipment (e.g., kitchen equipment) (BEP, 2018).
3. Treasury may not incorporate operations using chromium and nickel into the proposed CPF; therefore, these particular emission values may not be relevant to the proposed CPF.
4. The Landover warehouse contributes 781 metric tons of CO_2e to this total.

The BEP has been very effective in reducing emissions of HAPs from its production operations through a series of material substitutions, reformulations, and operational controls, and as a result, BEP facilities are minor sources of HAPs. Use of inks and cleaning solvents, paints, and natural gas and diesel fuel generates small amounts of HAP emissions. Trace amounts of glycol ethers and xylenes may be present in inks and cleaning solvents, respectively. The BEP's paint shops primarily use water-based, HAP-free paints, with the exception of a stain that contains trace quantities of HAPs. Natural gas and diesel fuel may contain trace amounts of HAPs, such as acetaldehyde, benzene, formaldehyde, and propylene (BEP, 2018). Currency press operation emissions do not include formaldehyde, which was eliminated from currency paper in the 1980s (BEP, 2019a).

Additionally, HAP emissions in the currency production processes at the existing DC Facility and WCF include trace amounts of nickel and chromium compounds emitted from the plating lines. Line plating techniques involve forming nickel printing plates in electrolytic tanks, and then placing a thin layer of chromium on the surface of the plates to increase their corrosion and wear resistance. Treasury controls emissions from plating lines with scrubbers.

Treasury's environmental mission strives to reduce regulated air emissions. Since 1999, Treasury has reduced its air emissions from BEP facilities by more than 55 percent by replacing old presses with resource-efficient presses that reduce the overall consumption of inks, solvents, and water; using solvents with lower VOC contents; installing VOC and HAP controls; and eliminating certain processes. Treasury's emphasis on energy and operational efficiency has reduced the BEP's GHG emissions by approximately 30 percent since 2008 (or 20,000 metric tons of CO_2e per year) (BEP, 2019a).

Current and planned projects for future emission reductions include replacing nickel plate electroforming with laser engraving, replacing chromium electroplating with an emission-free physical vapor deposition plating process, evaluating the use of additional inks and solvents with low VOC contents (e.g., ultraviolet [UV] inks), evaluating the use of additional emissions and process controls, using electricity from renewable energy sources such as rooftop solar arrays, installing a green roof on the proposed CPF, and continuing to conduct comprehensive air emission and GHG evaluations (BEP, 2019a).

Project Site

Existing air emissions on the Project Site are minimal; most of the buildings at the site are unused and no longer generate air emissions (e.g., from heating, ventilating, and air conditioning equipment equipment). The Project Site is also generally vegetated (see the ***Biological Resources Technical Memorandum***), which contributes slightly to carbon sequestration. Minor emissions from mobile sources are present when vehicles are on-site intermittently. No sensitive air quality receptors, including children, the elderly, or the infirm, are present on the Project Site.

Off-site sensitive receptors located within the local ROI include the following (see **Figure 2**):

- Children, elderly, and infirmed persons who may live in the approximately 391 residential properties along Odell Road and in the Vansville community.
- Children at Touch of Eden Daycare and Vansville Elementary School (located approximately 1,300 and 1,500 feet north of the Project Site, respectively).
- Children, elderly, and infirmed users of the Vansville Recreation Center (located approximately 1,500 feet north of the Project Site).
- Elderly or infirm employees who may work in the approximately 61 BARC facilities west, south, and east of the Project Site in the ROI.

For additional information on sensitive receptors in the local ROI and region, as well as Environmental Justice populations, please refer to the ***Socioeconomics and Environmental Justice Technical Memorandum***.

1.3 Environmental Effects

This section identifies the potential impacts to air quality within the ROI that would occur under the Proposed Action (i.e., Preferred Alternative) and the No Action Alternative. Measures to reduce potential adverse air quality effects from the Proposed Action are identified.

1.3.1 Approach to the Analysis

Treasury developed preliminary, conservative Proposed Action emission projections for all criteria pollutants (except for Pb, as the Proposed Action would not emit Pb), fugitive dust, HAPs, and GHGs to support this impact analysis. These projections are based on conservative assumptions and best available data, as discussed below. While these projections provide a framework for potential impact analysis, they are subject to change based on the final design of the proposed CPF during the final design and permitting phases.

As noted previously, air quality permitting is conducted based on a facility's PTE emissions, despite these values typically being substantially greater than the facility's actual emissions. In accordance with this methodology, Treasury estimated PTE emissions for the construction phase of the Proposed Action. These PTE estimates are conservative and are based on both standard construction processes and the assumptions identified in **Table 5** and **Appendix A**.

However, since the Proposed Action is still in the early conceptual design process and includes various uncertainties regarding its operational capacity, Treasury determined that developing PTE emissions estimates for operation of the proposed CPF at this stage would be premature. For example, changes to the following factors could substantively affect Treasury's PTE emissions estimates between the conceptual design phase and the permitting phase:

- Currency design.
- Amount of printed currency required.
- Ink formulations (e.g., use of UV cured inks).
- Design of printing presses to achieve printing efficiencies.
- Use of additional operational and control measures to minimize ink consumption and VOC emissions.

Therefore, instead of PTE emissions estimates, Treasury developed "projected actual" emission estimates on which to base the operational impact analysis. These projected actuals reflect the emissions that Treasury conservatively anticipates the proposed Currency Production Facility (CPF) to actually generate based on its best available data, including the following:

- Historical consumption data for printing operations from existing facilities over a 3 year period (calendar years 2017 – 2019). To be conservative, Treasury used average emissions values from this time period even when the data clearly indicate a 3-year downward trend.
- Consideration of potential emission increases based on the number of sheets printed per hour or proposed number of presses at the proposed CPF.

To analyze the potential impacts of the proposed CPF, Treasury compares these projected actual emissions from the proposed CPF to the historical emissions data for the DC Facility under existing conditions.

Additionally, because this is a federal Proposed Action in a non-attainment and maintenance area, Treasury completed a General Conformity Analysis (see **Appendix A**). For the purposes of the General Conformity Analysis, Treasury compared projected criteria pollutant emissions to the applicable *de minimis* levels specified in Maryland's federally enforceable SIP: 25 tpy for VOCs and NO_x, and 100 tpy for each other criteria pollutant. Although the conformity analysis is required only for non-attainment or maintenance area pollutants (i.e., O_3 in Prince George's County), the tables present emissions from all pollutants and compare the values with the *de minimis* levels (major source thresholds).

Treasury also compared projected actual HAP emissions for stationary sources to applicable major source thresholds specified in 40 CFR 70.2: 10 tpy for a single HAP or 25 tpy for any combination of HAPs.

For this analysis, Treasury assumed that a significant impact would occur if the Proposed Action would generate or induce:

- Projected actual criteria pollutant emission levels that exceed NAAQS *de minimis* levels.
- Fugitive dust emissions that would cause substantial long-term visibility or health issues or would substantially adversely affect off-site sensitive receptors in the vicinity of the Project Site.
- Projected actual HAP emissions that would exceed major source thresholds.
- GHG emissions that would be noticeable on a regional level.

Additional detail regarding the specific analyses of criteria pollutants, fugitive dust, HAPs, and GHGs, including Treasury's assumptions, are provided below.

Criteria Pollutant Emissions

Treasury estimated criteria pollutant PTE emissions for the proposed construction equipment and related activities. Treasury also calculated projected actual criteria pollutant emissions from permanent stationary equipment associated with operation of the proposed CPF. These calculations, and associated data sources, are provided in **Appendix A**. Loading factors and emission factors for the proposed construction and stationary equipment are from USEPA's AP-42 (and subsequent revisions) (USEPA, 1995), the Air Emissions Guide for Air Force Mobile Sources (AFCEC, 2018a), and the Air Emissions Guide for Air Force Stationary Sources (AFCEC, 2018b)[4]. Treasury's general assumptions used to conduct this analysis are provided in **Table 5**[5].

Treasury also considered existing conditions at the DC Facility and WCF when calculating and analyzing the proposed CPF's projected actual criteria pollutant emissions:

- Emergency generators at the proposed CPF would only operate during testing, maintenance, and emergencies (e.g., a power outage). The two emergency generators at the DC Facility ran for a combined total of approximately 121 hours in 2018. Using that number as a basis, Treasury conservatively estimated the proposed CPF's emergency generators would run for 200 hours per year under actual operations.
- The WCF boilers consumed approximately 40 million cubic feet of natural gas in 2018[6] (BEP, 2019c). Using that number as a basis, Treasury estimated the proposed CPF's natural gas boilers would consume 40 million cubic feet per year under actual operations.
- Truck deliveries between the Landover, MD and DC Facilities would be eliminated under the Proposed Action, and full-sized loading docks at the proposed CPF could reduce delivery truck numbers when compared to those associated with the DC Facility.

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[4] The Air Emissions Guide for Air Force Mobile Sources (AFCEC, 2018a) and the Air Emissions Guide for Air Force Stationary Sources (AFCEC, 2018b) are used when emission factors are not readily available in USEPA's compilation of emission factors (AP-42) (USEPA, 1995). These guides are user-friendly and are comprehensively used by DoD agencies to prepare emissions inventories for facilities across the United States and worldwide.

[5] Assumptions on construction equipment (e.g., types, horsepower ratings, and numbers) can be found in the calculations in **Appendix A**.

[6] Natural gas equipment at the DC Facility is sized at less than 5 MMBTU. Operation of this equipment is considered "insignificant activities" in the DC Facility's Title V and is not included in their emission totals.

Table 5: Air Quality Impact Analysis Assumptions

During Construction	During Operations
Typical workweek would be Monday through Friday. Typical workday would be 8 hours. Twenty construction workers in light-duty gasoline POVs would commute to the construction site per construction workday. Construction workers commute from home locations that are local at an estimated average of 10 miles away (i.e., 20 miles round-trip). Demolition and site preparation would begin in 2021 and be completed by 2022. Proposed CPF construction would begin in early 2023 and be completed by late 2025. Construction equipment would be fueled by diesel. Rock would not be excavated. There would be 7,278 dump truck trips during construction. Dump trucks would travel 10 miles roundtrip. In accordance with the cutback asphalt limitation of COMAR 26.11.11.02 (see **Table 2**), Treasury assumed that cutback asphalt would not be used and VOC emission from asphalt paving would be negligible.	Typical workweek would be Monday through Friday. The proposed CPF would operate eight Super Orlof Intaglio (SOI) presses, four Simultan presses, four large examining printing equipment (LEPE) presses, and all of the DC Facility's miscellaneous printing presses. Since operations at the proposed CPF would be implemented in a phased approach between 2026 and 2028, Treasury assumed that operations would increase by 25 percent annually until reaching full operations in 2029. The proposed CPF would operate seven natural gas boilers at 6 million British thermal units (BTU) each that have NO_x efficiencies greater than or equal to 90 percent (BEP, 2017). Emergency power would be provided by two emergency generators (BEP, 2017). Treasury assumed that these generators would each be 1,500 kilowatts (kW). The emergency generators would be expected to meet USEPA Tier II requirements and use ultra-low sulfur diesel (ULSD) fuel (i.e., less than 15 ppm by weight). Treasury used manufacturer information and emission factors for a generator that conforms to these assumptions (i.e., a Caterpillar 3512C) for the calculations. Based on Treasury's ***Transportation Impact Study*** (BEP, 2020), Treasury conservatively assumed 1,345 light duty gasoline POVs would commute per day and night. During the phased operational implementation between 2025 and 2028, Treasury assumes there would be a 25 percent increase annually in commuter POVs until the CPF reaches full operational potential in 2029. According to Treasury's truck traffic estimates, an average of 15 heavy-duty diesel trucks would be delivering and/or picking up materials per working day during full operations. During the phased operational implementation between 2025 and 2028, it was assumed that there would be a 25 percent increase annually in delivery trucks until the CPF reaches full operational potential in 2029. The total number of POVs commute every working day. The total average daily numbers of trucks deliver every working day. POVs and trucks travel from locations that are an estimated average of 20 miles away (i.e., 40 miles round-trip). Operational GHG emissions from proposed CPF operations were conservatively assumed to be the same as the WCF in 2019 (BEP, 2019b).

Fugitive Dust Emissions

Treasury calculated potential PM_{10} and $PM_{2.5}$ emissions for site preparation activities (e.g., vegetation clearing, grading, filling, etc.) and the loading, unloading, and transport of demolished concrete. Treasury's conservative assumptions for the fugitive dust analysis are as follows:

- For site preparation activities, the area of disturbance would be 85 percent of the Project Site.
- Site preparation and demolition activities would occur between 2021 and 2022.
- Rock would not be excavated.
- For PM emissions from demolished concrete and soil transport, a 90 percent control efficiency from water sprays and covers on stockpiles and truck beds would occur.
- No heavy truck trips (e.g., dump trucks) would occur on unpaved roads, as the proposed staging areas and transport routes are paved; therefore, PM emissions from heavy trucks travelling on unpaved roads were not incorporated into the emission calculations.

Hazardous Air Pollutant Emissions

Treasury calculated PTE HAP emissions for proposed construction equipment and related activities associated with the Proposed Action. Treasury also estimated projected actual HAP emissions for permanent stationary equipment associated with operation of the proposed CPF. HAP assumptions used in the analysis are the same as those for criteria pollutants (see **Table 5**).

Greenhouse Gas Emissions

Treasury compared projected potential GHG emissions from the Proposed Action against state-wide 2017 GHG emissions of 78,493,210 metric tons of CO_2e (MDE, 2019e). CO_2e emissions were estimated by using emission factors provided by Air Emissions Guide for Air Force Mobile Sources and Air Emissions Guide for Air Force Stationary Sources (AFCEC, 2018a; AFCEC, 2018b). GHG assumptions used in the analysis are the same as those for criteria pollutants (see **Table 5**).

1.3.2 No Action Alternative

Under the No Action Alternative, Treasury would not construct or operate the Proposed Action. Treasury would continue to operate the existing DC Facility and the WCF as under current conditions in compliance with air quality regulations (see **Section 1.2.2**). The Project Site would remain in its current condition. This would not result in the generation of new air pollutant emissions or result in a reduction of existing emissions. Therefore, the No Action Alternative would have ***no impact*** on air quality.

1.3.3 Preferred Alternative

Criteria Pollutant Emissions – Construction

Proposed construction activities that would generate criteria pollutant emissions include:

- Handling and transport of soil and concrete debris during demolition and site preparation.
- Operation of heavy-duty diesel-powered equipment during construction.
- Heavy-duty diesel trucks traveling to and from the Project Site to dispose or deliver materials during construction.
- POVs used by commuting construction workers.

Table 6 shows the estimated criteria pollutant PTE emissions that the Proposed Action would generate during the construction phase would be below the applicable *de minimis* thresholds. Therefore, potential adverse impacts would remain ***less-than-significant*** and a formal General Conformity Determination would not be required for the construction phase.

Table 6: Projected PTE Annual Criteria Pollutant Emissions During Construction

Emission Source	Projected PTE Emissions (tpy)						*De minimis* Threshold
	CO	NO_x	VOCs	PM_{10}	$PM_{2.5}$	SO_2	
Demolition and Site Preparation – 2021	6.67	9.73	1.80	2.82	2.79	0.01	100 tpy for any one criteria pollutant, except for VOCs and NOx, which is 25 tpy
Demolition and Site Preparation – 2022	5.01	9.35	1.39	2.74	2.72	0.01	
Construction – 2023	14.03	19.06	3.46	2.00	1.94	0.02	
Construction – 2024	14.04	19.02	3.45	2.01	1.95	0.02	
Construction – 2025	12.66	13.78	2.90	1.80	1.75	0.01	

Green Shading: Projected PTE emissions would be below *de minimus* thresholds.

Criteria Pollutant Emissions – Operation

Proposed operational activities that would generate criteria pollutant emissions include:

- Equipment within the CPF, such as currency presses.
- Permanent, stationary fuel-burning equipment, such as boilers and emergency generators.
- POVs used by commuting employees.
- Delivery trucks.

Table 7 shows the projected actual criteria pollutant emissions that the Proposed Action would generate during operation[7]. As the proposed CPF is phased into operation, its criteria pollutant emissions would increase proportionately. Concurrently, the DC Facility would phase out operations, and its criteria pollutant emissions would decrease proportionately. Projected actual emissions of all criteria pollutants from full operation of the Proposed Action would not exceed the NAAQS *de minimis* levels. As such, the Proposed Action would likely be a minor source of criteria pollutant emissions, not subject to a General Conformity Determination or Title V permit.

Table 7: Projected Actual Annual Criteria Pollutant Emissions During Operation

Emission Source	Projected Actual Emissions (tpy)						*De minimis* and Major Source Threshold
	CO	NO_x	VOCs	PM_{10}	$PM_{2.5}$	SO_2	
Operation – 2026	12.76	11.24	4.60	1.06	1.06	0.04	100 tpy for any one criteria pollutant, except for VOCs and NOx, which is 25 tpy
Operation – 2027	12.80	11.24	8.75	1.64	1.64	0.04	
Operation – 2028	12.84	11.24	12.90	2.23	2.23	0.04	
Annual Operations (full operation)	12.88	11.25	17.06	2.81	2.81	0.04	

Green Shading: Projected actual emissions would be below *de minimus* thresholds.

[7] As noted previously, Treasury calculated preliminary projected actual emissions using conservative assumptions based on best available data. These values do not reflect the maximum possible emissions (i.e., PTE emissions), and are subject to change as the design of the proposed CPF progresses.

At the AQCR level, projected actual VOC emissions from the proposed CPF would be lower than those emitted from the DC Facility under existing conditions due to improved controls and efficiencies. Therefore, the Proposed Action would have a ***beneficial impact*** on air quality relative to VOC emissions. Emissions of all other criteria pollutants would increase relative to the DC Facility, but remain below applicable major source thresholds, resulting in ***less-than-significant adverse impacts*** to the ROI. Near the Project Site (i.e., within 1,500 feet of the proposed CPF), VOC and other criteria pollutant emissions would increase under the Proposed Action, but required construction permits obtained for the emission sources would be in accordance with the Maryland SIP; therefore, any adverse impacts from these emissions would be ***less-than-significant***.

For permitting purposes, Treasury would likely establish allowable emissions limits of VOCs and NO_x pollutants from the proposed CPF at approximately 24 tpy, each, to provide the BEP greater operational flexibility and opportunity to increase emissions from the proposed CPF in the future (while remaining a minor source) if so required to fulfill the BEP's mission. Each other criteria pollutant has a major source threshold of 100 tpy, which is likely substantially greater than the proposed CPF could potentially emit.

Treasury would obtain the required construction and operation permits based on applicability of permit exemptions under COMAR 26.11.02.10. These could include permits to construct and operate boilers, emergency generators, printing operations and miscellaneous sources and associated emission points (i.e., stacks), and certain control equipment (MDE, 2019b). Treasury would also adhere to the applicable federal and state regulations identified in **Table 2**, such as NSPS, NESHAP, and COMAR 26.11.19.11.

As stated earlier, due to uncertainties inherent during the conceptual design phase, the PTE emissions of criteria pollutants from operation of the Proposed Action are difficult to predict at this stage. While Treasury currently believes that operation of the Proposed Action would remain below the applicable major source thresholds in Prince George's County for all criteria pollutants, it is possible that the BEP could determine during the final design phase that the proposed CPF's VOC or NO_x emissions could exceed the major source thresholds (i.e., 25 tpy for these pollutants). In that case, the proposed CPF would be permitted as a major source in a non-attainment area, and would be subject to stringent requirements under COMAR 26.11.17, including a Nonattainment New Source Review analysis and meeting the following requirements:

- Certifying that all existing major stationary sources owned or operated by the BEP in the state of Maryland comply with all applicable emission limitations or an approved federally enforceable plan for compliance.
- Meeting an emission limitation which specifies the lowest achievable emissions rate.
- Obtaining emission offset credits in the area impacted for each criteria pollutant with allowable emissions over the major source threshold (i.e., 25 tpy for VOCs or NO_x); 1.3 tpy of emission offset credits must be obtained per 1 tpy of allowable emissions, and they must be obtained and federally enforceable before construction begins.
- Performing an analysis of alternative sites, sizes, production processes, and environmental control techniques for the proposed source (i.e., the proposed CPF) to demonstrate that the benefits of the proposed source significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification.

Treasury would comply with these requirements if it determines that the proposed CPF would be a major source of criteria pollutant emissions. Compliance with these requirements would also ensure Treasury abides by General Conformity requirements even if the proposed CPF is permitted as a major source of criteria pollutants.

Because Treasury would be required, under this scenario, to obtain emission offset credits at a rate of 1.3:1, the Proposed Action would substantially reduce emissions of those criteria pollutants in the ROI, resulting in a net ***beneficial impact*** to air quality in the ROI relative to any pollutants for which it must acquire offsets. Potential impacts from pollutant emissions that do not exceed major source thresholds would be the same as under the minor source scenario. Therefore, even if the Proposed Action is permitted as a major source for one or more pollutants (e.g., VOCs or NO_x), potential adverse air quality impacts from criteria pollutants would remain ***less-than-significant***.

Finally, if the BEP were to permit the proposed CPF as a major source, the BEP would be required to obtain a Title V operating permit for the facility. A Title V operating permit would require the BEP to submit semi-annual monitoring reports for all permitted activities and an annual compliance certification report certifying compliance status of each permit condition. This would ensure that the facility operates in compliance with applicable requirements.

Fugitive Dust Emissions

Likely sources of fugitive dust during construction of the proposed CPF would include building demolition, handling and transport of demolished materials (e.g., concrete), storage of demolished materials in stockpiles, and site preparation activities (i.e., vegetation clearing, grading, filling, etc.).

The fugitive dust emissions analysis (see **Table 8**) identified that proposed construction PM emissions would be substantially lower than the *de minimis* threshold. Fugitive dust, however, would be the most likely emission source to travel off-site and potentially affect sensitive receptors near the Project Site (see **Figure 2**) during construction activities. Implementation of the fugitive dust-reduction measures listed in **Section 1.4** would minimize these emissions. Therefore, a ***less-than-significant adverse impact*** to local air quality would be anticipated from fugitive dust emissions during construction.

Table 8: Estimated Annual Fugitive Dust Emissions from the Proposed CPF

Emission Source	Projected Emissions (tpy)			*De Minimis* Threshold
	PM_{10}	$PM_{2.5}$	Total	
Demolition – 2021	3.03E-05	4.58E-06	**3.48E-05**	**100 tpy**
Site Preparation – 2021	2.08	2.08	**4.16**	
Demolition – 2022	3.03E-05	4.58E-06	**3.48E-05**	
Site Preparation – 2022	2.08	2.08	**4.16**	

Green Shading: Projected emissions would be below *de minimus* thresholds.
Note: The PM_{10} and $PM_{2.5}$ values in this table are also included in the criteria pollutant total summary.

No fugitive dust emissions would be anticipated during operation of the proposed CPF. All areas of the site would be landscaped, have natural vegetation, or be covered with impervious surfaces (e.g., sidewalks and parking lots); no areas of bare or exposed soil would be present. Therefore, ***no impacts*** from fugitive dust emissions are expected during operation of the proposed CPF, including to sensitive receptors.

Toxic and Hazardous Air Pollutant Emissions

HAP emissions[8] associated with construction of the Proposed Action could occur but would be ***negligible*** when compared to regional HAP emissions. HAPs emitted during construction would not meet or exceed major source thresholds.

HAP emission sources during operation of the proposed CPF would primarily include permanent, stationary equipment, such as currency presses, boilers, and emergency generators. **Table 9** shows the projected annual HAP emissions that would occur during operation of the proposed CPF.

As with criteria pollutants, the proposed CPF's operational HAP emissions would increase as the facility phases into operation, and the DC Facility's HAP emissions (see **Table 4**) would decrease as it phases out of operation.

As shown in **Table 9**, emission levels of individual and combined HAPs during operation of the proposed CPF would be *substantially less* than the major source thresholds. While combined HAP emissions would be greater than those from the DC Facility under existing conditions, they would still be very low overall, and chromium and nickel HAPs emissions would be eliminated entirely. Based on the calculated air emission levels and compliance with applicable emission and work practice standards, the impacts of HAPs would be ***less than significant***. Details of HAP-specific emissions are provided in **Appendix A**.

Table 9: Projected Actual Annual HAP Emissions

Emission Source	Emergency Generators (tpy)	Boilers (tpy)	Thermal Oxidizer (tpy)	Currency Production (tpy)	Total (tpy)	Major Source Thresholds
Operations – 2026 (25%)	4.43E-03	3.70E-02	0.07	7.00E-02	**0.18**	**10 tpy for a single HAP or 25 tpy for any combination of HAPs**
Operations – 2027 (50%)	4.43E-03	3.70E-02	0.07	0.14	**0.25**	
Operations – 2028 (75%)	4.43E-03	3.70E-02	0.07	0.21	**0.32**	
Annual Operations (100%)	4.43E-03	3.70E-02	0.07	0.28	**0.39**	

Green Shading: Projected actual emissions would be below major source thresholds.

As stated in **Table 2**, the MDE air quality permitting process established under COMAR 26.11.16.07 applies to facilities that may emit TAPs, such as the proposed CPF, and requires quantification of TAP emissions, the application of T-BACT on new sources, and an ambient impact analysis for human health along the property boundary using state-established screening levels. As stated earlier, the proposed activity is currently in the conceptual design phase and all of the equipment, processes, and inks and solvents to be used have not been finalized. Therefore, it would be premature for Treasury to include the TAP analyses in this Environmental Impact Statement (EIS). Overall, considering the conservative assumptions used to estimate the projected actual HAP emissions, it is likely that any TAP emissions generated by the proposed CPF would be less than the values shown in **Table 9** and **Appendix A** and below the MDE's TAP screening limits, resulting in ***less-than-significant adverse impacts***.

[8] As noted previously, Treasury calculated preliminary projected actual emissions using conservative assumptions based on best available data. These values do not reflect the maximum possible emissions (i.e., PTE emissions) that are used for permitting, and are subject to change as the design of the proposed CPF progresses.

Greenhouse Gas Emissions and Climate Change

GHGs would be emitted during construction and operation of the proposed CPF from the same sources as those that emit criteria pollutants. Estimated GHG emissions in terms of metric tons of CO_2e per year are shown in **Table 10** along with the 2017 state-wide inventory for comparison. As shown in **Table 10**, the Proposed Action's GHG emissions would be ***minor*** relative to those emitted in the state of Maryland in 2017.

Table 10: Projected Annual Emissions of Greenhouse Gases

Emission Source	Projected Annual CO_2e Emissions (metric tons)	2017 Statewide GHGs (metric tons)
Demolition and Site Preparation – 2021	2,182	78,493,210
Demolition and Site Preparation – 2022	2,029	
Construction – 2023	3,370	
Construction – 2024	3,332	
Construction – 2025	1,988	
Operations – 2026	5,488	
Operations – 2027	10,976	
Operations – 2028	16,464	
Annual Operations (full operation)	21,932[1]	

1. For this analysis, Treasury conservatively assumed GHG emissions from proposed CPF operations would be the same as from the WCF in 2019 (BEP, 2019b).

Currency production operations at the DC Facility would be phased out once the proposed CPF is fully operational. Existing GHG emissions at the DC Facility (i.e., 21,974 metric tons of CO_2e, see **Table 4**) would *decrease* as the DC Facility phases out; however, they would be *offset* by GHG emissions from a new similar facility in the same region (i.e., the proposed CPF). Therefore, GHG emissions from the proposed CPF ***would not have a perceptible impact*** on a regional level.

In reality, annual GHG emissions from the proposed CPF operations would likely be lower than the DC Facility. The proposed CPF would be designed to achieve a Silver Leadership in Energy and Environmental Design (LEED) energy efficiency rating, and would potentially implement renewable energy systems (e.g., solar panels); the Proposed Action would also reduce the BEP's federal footprint within the NCR by up to approximately 30 percent over the long-term. For additional information on Treasury's goal for a Silver LEED rating, please refer to the ***Utilities Technical Memorandum***.

GHG emission estimates from POVs driven by commuting workers and delivery trucks are included in the operational CO_2e values in **Table 10**. These POVs and delivery trucks would merely change their destination (i.e., from the DC or Landover, MD Facility to the proposed CPF) and would operate within the same ROI as the DC Facility. Furthermore, as described above, operation of the proposed CPF could reduce delivery truck numbers when compared to operation of the DC Facility. Therefore, GHGs from these vehicles would not be "new" regional GHG emission sources and the relocation of employees and their vehicles within the NCR would ***not result in a perceptible change*** in regional GHG emissions.

Much of the existing vegetation on the Project Site (see the ***Biological Resources Technical Memorandum***) would be removed during construction, thereby reducing the site's ability to sequester carbon during the construction period; however, long-term carbon sequestration functions would be replaced in part by the trees and other vegetation planted on-site in accordance with the Forest Conservation Plan and Planting Plan. As such, construction and operation of the Proposed Action would ***not have any noticeable regional impact*** on GHG emissions or climate change.

Sensitive Receptors

As shown in **Figure 2**, there are 485 sensitive receptors within 1,500 feet of the Project Site. During construction of the Proposed Action, fugitive dust emissions would be the most likely emission source to travel off-site and potentially affect these sensitive receptors. However, with implementation of the impact-reduction measures identified in **Section 1.4**, fugitive dust emissions would likely be imperceptible for all sensitive receptors, resulting in ***less-than-significant adverse impacts*** during construction. No fugitive dust emissions would be anticipated during operation of the Proposed Action.

Criteria pollutants and HAPs emitted during operation of the Proposed Action could affect sensitive receptors near the Project Site. However, criteria pollutants would not exceed *de minimis* levels and HAPs would not exceed major source thresholds. In most cases, these pollutants would be *substantially lower* than applicable levels/thresholds. Treasury would comply with all applicable federal, state, and local air quality regulations (see **Table 2**). Furthermore, Treasury would comply with applicable permitting and emission and work practice standards. Therefore, there would be ***less-than-significant adverse impacts*** to sensitive receptors during operation of the Proposed Action.

1.4 Impact-Reduction Measures

As part of the Proposed Action, Treasury would implement the following impact-reduction measures to minimize potential adverse air quality impacts:

Construction Phase

- Comply with the MDE's vehicle idling requirements by turning off equipment and vehicles when not in use.
- Use ULSD, propane, or natural gas as a fuel-source in equipment and vehicles to the extent possible to minimize SO_2 emissions.
- Cover beds of dump trucks while they are in transport to minimize fugitive dust emissions.
- Cover unpaved roads with gravel to minimize fugitive dust emissions.
- Spray water on any stockpiles or unpaved areas to minimize fugitive dust emissions, as appropriate. Ensure water application does not increase erosion or result in increased down-gradient sedimentation of waterways.
- Locate equipment and staging zones as far as practicable from sensitive receptors (e.g., on the southern portion of the Project Site).
- Obtain the appropriate permits for CPF construction and operation from the MDE.

Operational Phase

- Properly maintain fuel-burning equipment by monitoring and maintaining the equipment according to manufacturer specifications.
- Implement current and planned projects for air emission reductions as practicable, such as replacing nickel plate electroforming with laser engraving, chromium electroplating with an emission-free physical vapor deposition plating process, using UV-cured inks which have a low

VOC content, using electricity from renewable energy sources, and continuing to conduct comprehensive air emission and GHG analyses (BEP, 2019a).

- Maintain and adhere to the appropriate operating permits from the MDE for the proposed CPF.

1.5 Mitigation Measures

No project-specific mitigation measures are recommended.

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Appendix A: General Conformity Analysis and Other Air Quality Calculations

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Projected PTE Emissions for CY 2021

All Sources

Demolition and Site Preparation

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	CO_{2e}
Construction Equipment Operation	6.66	9.73	1.80	0.74	0.72	0.01	2,405.59	2,182.31
Concrete Demolition - Fugitive Emissions	--	--	--	3.03E-05	4.58E-06	--	--	--
Site Preparation - Fugitive Emissions	--	--	--	2.08	2.08	--	--	--
Total	**6.66**	**9.73**	**1.80**	**2.82**	**2.79**	**0.01**	**2,405.59**	**2,182.31**
Construction Worker POVs	4.01E-03	1.77E-04	2.38E-04	1.10E-05	4.85E-06	3.09E-06	0.16	0.15
All Emission Sources Total	**6.67**	**9.73**	**1.80**	**2.82**	**2.79**	**0.01**	**2,405.75**	**2,182.46**

Projected PTE Emissions for CY 2022

All Sources

Demolition and Site Preparation

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	CO_{2e}
Construction Equipment Operation	5.01	9.35	1.39	0.66	0.64	0.01	2,236.87	2,029.26
Soil Excavation - Fugitive Emissions	--	--	--	1.35E-05	2.05E-06	--	--	--
Concrete Demolition - Fugitive Emissions	--	--	--	3.03E-05	4.58E-06	--	--	--
Site Preparation - Fugitive Emissions	--	--	--	2.08	2.08	--	--	--
Total	**5.01**	**9.35**	**1.39**	**2.74**	**2.72**	**0.01**	**2,236.87**	**2,029.26**
Construction Worker POVs	3.91E-03	1.63E-04	2.21E-04	1.10E-05	4.85E-06	3.09E-06	0.16	0.15
All Emission Sources Total	**5.01**	**9.35**	**1.39**	**2.74**	**2.72**	**0.01**	**2,237.04**	**2,029.40**

Projected PTE Emissions for CY 2023

All Sources

Facility Construction

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	CO_{2e}
Construction Equipment Operation	14.02	19.06	3.46	2.00	1.94	0.02	3714.84	3,370.05
Total	**14.02**	**19.06**	**3.46**	**2.00**	**1.94**	**0.02**	**3,714.84**	**3,370.05**
Construction Worker POVs	1.72E-03	1.97E-04	1.81E-04	4.85E-06	4.41E-06	3.09E-06	0.16	0.14
All Emission Sources Total	**14.03**	**19.06**	**3.46**	**2.00**	**1.94**	**0.02**	**3,715.00**	**3,370.19**

Projected PTE Emissions for CY 2024

All Sources

Facility Construction

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	CO_{2e}
Construction Equipment Operation	14.04	19.02	3.45	2.01	1.95	0.02	3673.01	3,332.10
Total	**14.04**	**19.02**	**3.45**	**2.01**	**1.95**	**0.02**	**3,673.01**	**3,332.10**
Construction Worker POVs	1.60E-03	1.46E-04	1.58E-04	4.41E-06	3.97E-06	8.82E-07	0.15	0.14
All Emission Sources Total	**14.04**	**19.02**	**3.45**	**2.01**	**1.95**	**0.02**	**3,673.16**	**3,332.24**

Projected PTE Emissions for CY 2025

All Sources

Facility Construction

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e	CO_{2e}
Construction Equipment Operation	12.66	13.78	2.89	1.80	1.75	0.01	2190.70	1,987.37
Total	**12.66**	**13.78**	**2.89**	**1.80**	**1.75**	**0.01**	**2,190.70**	**1,987.37**
Construction Worker POVs	1.51E-03	1.24E-04	1.39E-04	3.97E-06	3.53E-06	8.82E-07	0.15	0.14
All Emission Sources Total	**12.66**	**13.78**	**2.90**	**1.80**	**1.75**	**0.01**	**2,190.85**	**1,987.51**

Estimated Actual Operations Emissions for CY 2026

All Sources

Annual Emissions from Stationary Sources

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	HAPs	CO_{2e}
Natural Gas Equipment	1.65	0.63	0.11	0.15	0.15	0.01	3.70E-02	5,483.00
Thermal Oxidizer	10.23	5.13	0.19	0.27	0.27	0.02	0.07	
Generators	0.83	5.48	0.14	0.06	0.06	0.00	4.43E-03	
Currency Production and Other Operations	0.00	0.00	4.15	0.58	0.58	0.00	7.00E-02	
Total	**12.71**	**11.23**	**4.59**	**1.06**	**1.06**	**0.04**	**0.18**	**5,483.00**
Commuter POVs and Delivery Trucks	4.81E-02	4.36E-03	4.28E-03	1.50E-04	1.32E-04	3.18E-05	-	4.68
All Emission Sources Total	**12.76**	**11.24**	**4.60**	**1.06**	**1.06**	**0.04**	**0.18**	**5,487.68**

Estimated Actual Operations Emissions for CY 2027

All Sources

Annual Emissions from Stationary Sources

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	HAPs	CO_{2e}
Natural Gas Equipment	1.65	0.63	0.11	0.15	0.15	1.18E-02	3.70E-02	10,966.00
Thermal Oxidizer	10.23	5.13	0.19	0.27	0.27	0.02	0.07	
Generators	0.83	5.48	0.14	0.06	0.06	4.88E-03	4.43E-03	
Currency Production and Other Operations	0.00	0.00	8.30	1.17	1.17	0.00	0.14	
Total	**12.71**	**11.23**	**8.75**	**1.64**	**1.64**	**0.04**	**0.25**	**10,966.00**
Commuter POVs and Delivery Trucks	9.11E-02	7.54E-03	7.77E-03	2.91E-04	2.57E-04	6.33E-05	-	10.03
All Emission Sources Total	**12.80**	**11.24**	**8.75**	**1.64**	**1.64**	**0.04**	**0.25**	**10,976.03**

Estimated Actual Operations Emissions for CY 2028

All Sources

Annual Emissions from Stationary Sources

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	HAPs	CO_{2e}
Natural Gas Equipment	1.65	0.63	0.11	0.15	0.15	1.18E-02	3.70E-02	16,449.00
Thermal Oxidizer	10.23	5.13	0.19	0.27	0.27	0.02	0.07	
Generators	0.83	5.48	0.14	0.06	0.06	4.88E-03	4.43E-03	
Currency Production and Other Operations	0.00	0.00	12.45	1.75	1.75	0.00	0.21	
Total	**12.71**	**11.23**	**12.90**	**2.23**	**2.23**	**0.04**	**0.32**	**16,449.00**
Commuter POVs and Delivery Trucks	1.29E-01	9.91E-03	1.06E-02	3.81E-04	3.31E-04	9.49E-05	-	14.61
All Emission Sources Total	**12.84**	**11.24**	**12.91**	**2.23**	**2.23**	**0.04**	**0.32**	**16,463.61**

Estimated Actual Operations Emissions for Full Operations

All Sources

Annual Emissions from Stationary Sources

Emission Source	Projected Emissions (tons per year)							GHG Emissions (metric tons per year)
	CO	NO_x	VOC	PM_{10}	$PM_{2.5}$	SO_2	HAPs	CO_{2e}
Natural Gas Equipment	1.65	0.63	0.11	0.15	0.15	1.18E-02	3.70E-02	21,932.00
Thermal Oxidizer	10.23	5.13	0.19	0.27	0.27	0.02	0.07	
Generators	0.83	5.48	0.14	0.06	0.06	4.88E-03	4.43E-03	
Currency Production and Other Operations	0.00	0.00	16.60	2.33	2.33	0.00	0.28	
Total	**12.71**	**11.23**	**17.05**	**2.81**	**2.81**	**0.04**	**0.39**	**21,932.00**
Commuter POVs and Delivery Trucks	1.62E-01	1.16E-02	1.30E-02	4.37E-04	4.31E-04	1.27E-04	-	18.87
All Emission Sources Total	**12.88**	**11.25**	**17.06**	**2.81**	**2.81**	**0.04**	**0.39**	**21,950.87**

Summary Emissions - Regenerative Thermal Oxidizer (RTO)

U.S. Department of the Treasury - Bureau of Engraving & Printing
Western Currency Facility
Tarrant County, Fort Worth, TX
September 2015
Source: BEP, 2015

Fuel Data		Pilot Gas	Ink Waste Stream (I10s)	Ink Waste Stream (SOIs)	Ink Waste Stream Bottcherin	Ink Waste Stream LO-VO Wash 50	Ink Waste Stream ShellSol (Petroleum Naphtha)
Fuel Flow Rate	scf/hr[1]	8000	10	7	2.46	32	85
	lbs/hr	--	2.58	1.90	0.65	8.46	22.41
	scf/year	70,080,000	68,043	50,126	8497	41,781	295,093
	lbs/yr	--	17,861	13,158	2,230	10,968	77,462
Fuel Heating Value (Btu/scf)		1,020	--	--	--	--	--
Fuel Heating Value[2] (Btu/lb)		--	23,000	23,000	23,000	23,000	23,000
Hourly Heat Value (MMBtu/hr)		8.16	0.06	0.04	0.01	0.19	0.52
Annual Heat Value (MMBtu/yr)		71,482	411	303	51.30	252	1,782

EPN	Pollutant	Emission Factor[3]		Hourly Heat Input	Annual Heat Input	Calculated Emissions	
		lb/MMBtu	lb/10^6 scf	(MMBtu/hr)	(MMBtu/yr)	lbs/hr	tpy
16	NO_X	0.138	--	8.99	74,280	1.24	5.13
	CO	0.2755	--			2.48	10.23
	VOC[4]	--	5.5			0.04	0.19
	PM	--	7.6			0.06	0.27
	SO_2	--	0.6			0.005	0.02
	Arsenic	--	2.00E-04	--	--	1.63E-06	7.05E-06
	Beryllium	--	1.20E-05			9.76E-08	4.23E-07
	Cadmium	--	1.10E-03			8.95E-06	3.88E-05
	Chromium	--	1.40E-03			1.14E-05	4.94E-05
	Cobalt	--	8.40E-05			6.84E-07	2.96E-06
	Lead	--	5.00E-04			4.07E-06	1.76E-05
	Manganese	--	3.80E-04			3.09E-06	1.34E-05
	Mercury	--	2.60E-04			2.12E-06	9.17E-06
	Nickel	--	2.10E-03			1.71E-05	7.41E-05
	Selenium	--	2.40E-05			1.95E-07	8.47E-07
	Benzene	--	2.10E-03			1.71E-05	7.41E-05
	Formaldehyde	--	7.50E-02			6.10E-04	2.65E-03
	Hexane	--	1.80E+00			1.46E-02	6.35E-02
	Naphthalene	--	6.10E-04			4.96E-06	2.15E-05
	Polycyclic Organic Matter (POM)	--	8.82E-05			7.18E-07	3.11E-06
	Toluene	--	3.40E-03			2.77E-05	1.20E-04
	Total HAP	--	--	--	--	**0.015**	**0.067**

Example Calculations:
NOx Hourly Emissions (lbs/hr) = AP-42 EF (lb/MMBtu) x Hourly Heat Value (MMBtu/hr) = 0.138 lbs/MMBtu x 8.99 MMBtu/hr = 1.24 lbs/hr
NOx Annual Emissions (tpy) = AP-42 EF (lb/MMBtu) x Annual Heat Value (MMBtu/yr) / 2000 lbs/ton = 0.138 lbs/MMBtu x 74280.22 MMBtu/hr / 2000 lbs/ton = 5.13 tpy

VOC Hourly Emissions (lbs/hr) = AP-42 EF (lb/MMscf) x Maximum Gas Volume Feed (MMscf/hr) = 5.5 lbs/MMscf x 0.00814 MMscf/hr = 0.04 lbs/hr
VOC Annual Emissions (tpy) = AP-42 EF (lb/MMscf) x Maximum Gas Volume Feed (MMscf/yr) / 2000 lbs/ton= 5.5 lbs/MMscf x 70.54 MMscf/yr / 2000 lbs/ton = 0.19 tpy

Note:

1. Volumetric flow rates for the waste streams are not available. Thus, an assumed worst-case vapor density of 3.5 (Air=1) was used to determine the volumetric flow rate for each waste gas stream routed to the RTO.

2. Heat value data for the waste streams is not available. Thus, an assumed worst-case heat rate of 23,000 Btu/lb was used to determine the total heat value of the waste gas streams routed to the RTO.
3. The emissions for NOx and CO are based upon the emission factors for flares as published in AP-42. The emissions for VOC, PM and SO_2 are based upon the emission factors for external combustion sources as published in AP-42.
4. The VOCs shown in the table above represent the incomplete combustion of fuel assist gas fed to the RTO. The estimation of the VOCs resulting from the combustion of the waste gas are shown in the Intaglio Printing Press calculations (EPN 16).

Proposed CPF Operations Projected Actual Emissions
BEP Currency Production

Pollutant	Estimated CY 2026 Emissions (tons) - Proposed CPF[1]	Estimated CY 2027 Emissions (tons) Proposed CPF[1]	Estimated CY 2028 Emissions (tons) - Proposed CPF[1]	Estimated CY 2029 Annual Emissions (tons) - Proposed CPF[1]	2019 GHGs (metric tons)[2]
Criteria Pollutants and GHGs					
PM_{10}	0.58	1.17	1.75	2.33	FY 2019 GHG emissions for WCF was **21,932 metric tons**. These data were reported by the BEP to the Treasury in December 2019 per FEMP reporting requirements.
$PM_{2.5}$	0.58	1.17	1.75	2.33	
VOC	4.15	8.30	12.45	16.60	
GHGs[2]	5,483	10,966	16,449	21,932	
HAPs					
Total HAPs	0.07	0.14	0.21	0.28	6.39E-02

1. Projected actual emissions for the fully operational proposed CPF were prepard by BEP and sent to AECOM for use in the air quality impact analysis. For purposes of this analysis, it was assumed that the proposed CPF would begin operations at 25% of full capacity in 2026, 50% of full capacity in 2027, 75% of full capacity in 2028, and 100% of full capacity in 2029.

2. For the purposes of conservatively estimating operational GHGs, GHG emissions from proposed CPF operations were assumed to be the same as the WCF. This will be revised if GHG data for the proposed CPF becomes available before the release of the EIS.

VOC Estimated Actual Emissions Summary

Emission Unit Name	Number of Presses/Units Planned at CPF	Press Hours of Operation for Actual Emissions Calculation	lbs/hr	lbs/yr	tons/yr
Currency Production Presses					
SOI III Intaglio Presses	8	4,343	1.83	7,929	3.96
LEPE Letterpresses	4	4,525	1.12	5,073	2.54
Simultan Offset Presses	4	3,911	3.26	12,737	6.37
Miscellaneous Other Presses & Equipment					
Misc. Intaglio	7	1,859	0.03	53	0.03
Research Intaglio Test	1	1,000	0.14	138	0.07
Flatbed Presses	4	991	0.17	173	0.09
Offset Lithographic	2	1,000	1.06	1,060	0.53
Misc. Cleaning Processes	NA	NA	NC	5,524	2.76
Generators	2	40	0.3	12	0.006
Roller MFG	NA	NA	NC	509	0.25
		Totals:	**7.90**	**33,206**	**16.60**

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Construction Equipment Projected Hours of Operation

Demolition and Construction

BEP Demolition, Site Prep, and Construction

Diesel Equipment	USAFCEE Equivalent	Average Rated HP	No. of Units	Demolition/Site Prep No. of Days (CY 2021)	Demolition/Site Prep CY 2021 Hours	Demolition/Site Prep No. of Days (CY 2022)	Demolition/Site Prep CY 2022 Hours	Construction No. of Days (CY 2023)	Construction CY 2023 Hours	Construction No. of Days (CY 2024)	Construction CY 2024 Hours	Construction No. of Days (CY 2025)	Construction CY 2025 Hours	
Paver	Diesel Pavers	130	2		0		0	0	0		0	132	2,112	
Backhoe loader	Diesel Tractors/Loaders/Backhoes	48	2	132	2,112	132	2,112	132	2,112	132	2,112		0	
Chain saws	2 Stroke Chain Saws >6 HP	7	2	66	1,056	0	0		0		0		0	
Compressor	Diesel Air Compressors	90	1		0		0	66	528	132	1,056	66	528	estimated - assumed it is turning on and off when needed
Concrete pump	Diesel Pumps	53	1		0		0	66	528	66	528	66	528	divided in half - assumed it is turning on and off when needed
Crane	Diesel Cranes	225	1		0		0	66	528	66	528	66	528	
Crane	Diesel Cranes	175	1		0		0	66	528	66	528	66	528	
Front end loader	Diesel Tractors/Loaders/Backhoes	200	2	66	1,056	66	1,056		0		0		0	
Welding machine	Diesel Welders	30	1		0		0	66	528	66	528	66	528	estimated - no information on welded items
Grader	Diesel Graders	200	1	265	2,120	0	0		0		0		0	
Hammer, hydraulic	Diesel Crushing Equipment	60	1	132	1,056	0	0		0		0		0	
Loader, skid steer	Diesel Skid Steer Loaders	55	1		0		0	66	528	132	1,056		0	
Cement & morter mixer	Diesel Cement & Morter Mixer	470	1		0		0	66	528	66	528		0	divided in half - assumed it is turning on and off when needed
Wheel Roller	Diesel Rollers	100	2		0		0		0		0	132	2,112	
Water Tank Truck	Diesel Dumpers/Tenders	400	2	265	4,240	265	4,240	265	4,240	265	4,240	265	4,240	estimated - assumed it is turning on and off to spray water every now and then for fugitive dust control
Dump Truck	Diesel Dumpers/Tenders	400	5	265	2,575	132	2,575	265	22,543	265	22,543	265	22,543	
Forklift	Diesel Forklifts	50	2		0		0	265	4,240	66	1,056	66	1,056	
Manlift	Diesel Forklifts	50	1		0		0	132	1,056	132	1,056	66	528	
Pickup Trucks	Diesel Off-Highway Trucks	475	5	265	10,600	265	10,600	265	10,600	265	10,600	132	5,280	estimated - assuming trucks are turned off when not in use and are being used to carry small tools and equipment

Assumptions:

As a placeholder, it was assumed that vehicles would operate for 3, 6, or 12 months or 66, 132, 265 days, respectively. This can be revised if new data become available before the release of the EIS.

Construction was conservatively projected to start in 2021 and be completed by 2025.

Typical workday was assumed to be 8-hours of construction.

Numbers of equipment was estimated based on quantities and size of Proposed Action.

It was assumed as a conservative estimate that the equipment would be diesel.

See table below for dump truck data according to Treasury's Traffic Impact Study.

Work day assumed to be = 8 hours

Building	Building SF	Average Amount of Material (lbs/SF)	Tons	Truck Size	Total Trips	Average Run Per Trip (miles)	Total Hours Operated	Total Hours Per Truck
Demolish Existing Buildings	93,000	155	7,208	14-ton	515	10	5,150	1,030
New CPF Constrction Debris[a]	1,000,000	4	2,000	14-ton	144	10	1,440	288
New CPF Constrction Material[b]	1,000,000	155	77,500	16-ton	6,619	10	66,190	13,238
					7,278		**72,780**	**14,556**

[a] Total truck trips includes one shipment of ACP wastage (7/1/2020 email from M. Busam).

[b] Total truck trips includes 28 shipments of ACP construction materials and 1,747 shipments of asphalt (7/1/2020 email from M. Busam).

Construction Equipment Air Quality Emission Factors

BEP Site Acquisition and Construction

Diesel Equipment	USAFCEE Equivalent	Average Rated HP[1]	Loading Factors[2]	Emission Factors (lbs/1000 HP-hr)[2]							Emission Factors (lbs/hr)[3]						
				CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SOx	CO_2e	CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SOx	CO_2e
Asphalt paver	Diesel Pavers	130	59%	1.58	3.62	0.41	0.25	0.25	0.01	1214.07	1.21E-01	2.78E-01	3.14E-02	1.93E-02	1.88E-02	5.37E-04	93.12
Backhoe loader	Diesel Tractors/Loaders/Backhoes	48	21%	7.38	7.90	1.50	1.15	1.12	0.01	1466	7.44E-02	7.96E-02	1.51E-02	1.16E-02	1.12E-02	9.07E-05	14.77
Chain saws	2 Stroke Chain Saws >6 HP	7	70%	586.49	3.37	137.02	21.49	19.77	0.01	1578	2.87E+00	1.65E-02	6.71E-01	1.05E-01	9.69E-02	4.41E-05	7.73
Compressor	Diesel Air Compressors	90	43%	2.52	5.73	0.53	0.36	0.35	0.01	1266	9.74E-02	2.22E-01	2.05E-02	1.40E-02	1.36E-02	2.71E-04	48.98
Concrete pump	Diesel Pumps	53	43%	3.91	8.60	0.92	0.66	0.64	0.01	1252	8.91E-02	1.96E-01	2.09E-02	1.50E-02	1.45E-02	1.82E-04	28.54
Crane	Diesel Cranes	225	43%	1.10	4.09	0.42	0.19	0.19	0.01	1175	1.06E-01	3.96E-01	4.09E-02	1.86E-02	1.80E-02	6.77E-04	113.73
Crane	Diesel Cranes	175	43%	1.10	4.09	0.42	0.19	0.19	0.01	1175	8.25E-02	3.08E-01	3.18E-02	1.44E-02	1.40E-02	5.27E-04	88.45
Front end loader	Diesel Tractors/Loaders/Backhoes	200	21%	7.38	7.90	1.50	1.15	1.12	0.01	1466	3.10E-01	3.32E-01	6.30E-02	4.83E-02	4.68E-02	3.78E-04	61.56
Welding machine	Diesel Welders	30	21%	9.30	10.21	2.00	1.36	1.32	0.01	1528	5.86E-02	6.43E-02	1.26E-02	8.58E-03	8.33E-03	5.67E-05	9.62
Grader	Diesel Graders	200	59%	0.91	2.46	0.38	0.16	0.15	0.01	1185	1.07E-01	2.90E-01	4.47E-02	1.86E-02	1.81E-02	7.08E-04	139.85
Hammer, hydraulic	Diesel Crushing Equipment	60	43%	1.68	5.23	0.45	0.25	0.24	0.01	1203	4.34E-02	1.35E-01	1.16E-02	6.35E-03	6.17E-03	1.81E-04	31.04
Loader, skid steer	Diesel Skid Steer Loaders	55	21%	10.15	10.12	2.08	1.52	1.47	0.01	1528	1.17E-01	1.17E-01	2.40E-02	1.75E-02	1.70E-02	1.04E-04	17.65
Cement & morter mixer	Diesel Cement & Morter Mixer	470	43%	4.53	9.30	1.04	0.68	0.66	0.01	1253	9.16E-01	1.88E+00	2.10E-01	1.38E-01	1.34E-01	1.62E-03	253.15
Wheel Roller	Diesel Rollers	100	59%	2.12	4.18	0.45	0.33	0.32	0.01	1234	1.25E-01	2.47E-01	2.63E-02	1.93E-02	1.87E-02	4.13E-04	72.78
Water Tank Truck	Diesel Dumpers/Tenders	400	21%	10.40	10.55	2.36	1.55	1.50	0.01	1507	8.74E-01	8.86E-01	1.98E-01	1.30E-01	1.26E-01	7.56E-04	126.58
Dump Truck	Diesel Dumpers/Tenders	400	21%	10.40	10.55	2.36	1.55	1.50	0.01	1507	8.74E-01	8.86E-01	1.98E-01	1.30E-01	1.26E-01	7.56E-04	126.58
Forklift	Diesel Forklifts	50	59%	0.88	2.60	0.34	0.07	0.06	0.01	1265	2.60E-02	7.66E-02	1.01E-02	1.95E-03	1.89E-03	1.77E-04	37.33
Manlift	Diesel Forklifts	50	59%	0.88	2.60	0.34	0.07	0.06	0.01	1265	2.60E-02	7.66E-02	1.01E-02	1.95E-03	1.89E-03	1.77E-04	37.33
Pickup Trucks	Diesel Off-Highway Trucks	475	59%	1.21	4.09	0.45	0.12	0.12	0.01	1183	3.38E-01	1.14E+00	1.26E-01	3.42E-02	3.33E-02	1.68E-03	331.60

1. Average horsepower ratings were obtained from a review of various manufacturers' specifications
2. Loading factors and emission factors from USAFCEE Air Emissions Guide For Air Force Mobile Sources, August 2018, Section 4.
3. Emission Factors (lbs/hr) = (Average Rated HP X Loading Factors X Emission Factors (lbs/1000 HP-hr)) / 1000

Projected Emissions for CY 2021
Construction Equipment
BEP Demolition and Site Preparation

Construction Equipment	Usage (hrs)	Emissions (lbs)						
		CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Paver	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe loader	2,112	157.03	168.14	31.91	24.48	23.74	0.19	31,203.70
Chain saws	1,056	3,034.75	17.43	708.99	111.20	102.31	0.05	8,164.44
Compressor	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Front end loader	1,056	327.14	350.29	66.48	51.00	49.45	0.40	65,007.70
Welding machine	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grader	2,120	226.90	614.39	94.81	39.53	38.27	1.50	296,488.88
Hammer, hydraulic	1,056	45.85	142.49	12.21	6.70	6.51	0.19	32,774.00
Loader, skid steer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cement & morter mixer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wheel Roller	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Tank Truck	4,240	3,704.06	3,755.71	840.54	552.05	535.31	3.21	536,682.19
Dump Truck	2,575	2,249.52	2,280.88	510.47	335.27	325.10	1.95	325,933.17
Forklift	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pickup Trucks	10,600	3,582.60	12,135.11	1,330.85	362.42	353.51	17.82	3,514,920.61
Total Emissions	**(lb/yr):**	**13,327.9**	**19,464.4**	**3,596.3**	**1,482.6**	**1,434.2**	**25.3**	**4,811,174.7**
Total Emissions	**(tpy)**	**6.66**	**9.73**	**1.80**	**0.74**	**0.72**	**0.01**	**2,405.59**
Total Emissions	**(Metric Tons/yr)**							**2,182.31**

Projected Emissions for CY 2022
Construction Equipment
BEP Demolition and Site Preparation

Construction Equipment	Usage (hrs)	Emissions (lbs)						
		CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Paver	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe loader	2,112	157.03	168.14	31.91	24.48	23.74	0.19	31,203.70
Chain saws	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressor	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete pump	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Front end loader	1,056	327.14	350.29	66.48	51.00	49.45	0.40	65,007.70
Welding machine	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hammer, hydraulic	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader, skid steer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cement & morter mixer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wheel Roller	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Tank Truck	4,240	3,704.06	3,755.71	840.54	552.05	535.31	3.21	536,682.19
Dump Truck	2,575	2,249.52	2,280.88	510.47	335.27	325.10	1.95	325,933.17
Forklift	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manlift	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pickup Trucks	10,600	3,582.60	12,135.11	1,330.85	362.42	353.51	17.82	3,514,920.61
Total Emissions	**(lb/yr):**	**10,020.4**	**18,690.1**	**2,780.3**	**1,325.2**	**1,287.1**	**23.6**	**4,473,747.4**
Total Emissions	**(tpy)**	**5.01**	**9.35**	**1.39**	**0.66**	**0.64**	**0.01**	**2,236.87**
Total Emissions	**(Metric Tons/yr)**							**2,029.26**

Projected Emissions for CY 2023
Construction Equipment
BEP Facility Construction

Construction Equipment	Usage (hrs)	Emissions (lbs)						
		CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Paver	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe loader	2,112	157.03	168.14	31.91	24.48	23.74	0.19	31,203.70
Chain saws	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressor	528	51.41	117.10	10.85	7.40	7.17	0.14	25,862.85
Concrete pump	528	47.05	103.50	11.03	7.92	7.68	0.10	15,071.16
Crane	528	56.04	209.04	21.61	9.81	9.50	0.36	60,047.10
Crane	528	43.59	162.58	16.81	7.63	7.39	0.28	46,703.30
Front end loader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welding machine	528	30.94	33.95	6.65	4.53	4.40	0.03	5,081.26
Grader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hammer, hydraulic	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader, skid steer	528	61.90	61.72	12.67	9.24	8.96	0.05	9,318.06
Cement & morter mixer	528	483.82	992.61	110.87	72.88	70.75	0.85	133,662.16
Wheel Roller	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Tank Truck	4,240	3,704.06	3,755.71	840.54	552.05	535.31	3.21	536,682.19
Dump Truck	22,543	19,693.86	19,968.43	4,468.99	2,935.14	2,846.14	17.04	2,853,444.69
Forklift	4,240	110.20	324.96	43.03	8.26	8.01	0.75	158,269.60
Manlift	1,056	27.44	80.93	10.72	2.06	1.99	0.19	39,418.09
Pickup Trucks	10,600	3,582.60	12,135.11	1,330.85	362.42	353.51	17.82	3,514,920.61
Total Emissions	**(lb/yr):**	**28,049.9**	**38,113.8**	**6,916.5**	**4,003.8**	**3,884.5**	**41.0**	**7,429,684.8**
Total Emissions	**(tpy)**	**14.02**	**19.06**	**3.46**	**2.00**	**1.94**	**0.02**	**3,714.84**
Total Emissions	**(Metric Tons/yr)**							**3,370.05**

Projected Emissions for CY 2024
Construction Equipment
BEP Facility Construction

Construction Equipment	Usage (hrs)	Emissions (lbs)						
		CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Paver	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe loader	2,112	157.03	168.14	31.91	24.48	23.74	0.19	31,203.70
Chain saws	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressor	1,056	102.82	234.21	21.70	14.79	14.34	0.29	51,725.70
Concrete pump	528	47.05	103.50	11.03	7.92	7.68	0.10	15,071.16
Crane	528	56.04	209.04	21.61	9.81	9.50	0.36	60,047.10
Crane	528	43.59	162.58	16.81	7.63	7.39	0.28	46,703.30
Front end loader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welding machine	528	30.94	33.95	6.65	4.53	4.40	0.03	5,081.26
Grader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hammer, hydraulic	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader, skid steer	1,056	123.80	123.43	25.33	18.48	17.92	0.11	18,636.11
Cement & morter mixer	528	483.82	992.61	110.87	72.88	70.75	0.85	133,662.16
Wheel Roller	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Tank Truck	4,240	3,704.06	3,755.71	840.54	552.05	535.31	3.21	536,682.19
Dump Truck	22,543	19,693.86	19,968.43	4,468.99	2,935.14	2,846.14	17.04	2,853,444.69
Forklift	1,056	27.44	80.93	10.72	2.06	1.99	0.19	39,418.09
Manlift	1,056	27.44	80.93	10.72	2.06	1.99	0.19	39,418.09
Pickup Trucks	10,600	3,582.60	12,135.11	1,330.85	362.42	353.51	17.82	3,514,920.61
Total Emissions	**(lb/yr):**	**28,080.5**	**38,048.6**	**6,907.7**	**4,014.2**	**3,894.7**	**40.6**	**7,346,014.1**
Total Emissions	**(tpy)**	**14.04**	**19.02**	**3.45**	**2.01**	**1.95**	**0.02**	**3,673.01**
Total Emissions	**(Metric Tons/yr)**							**3,332.10**

Projected Emissions for CY 2025
Construction Equipment
BEP Facility Construction

Construction Equipment	Usage (hrs)	Emissions (lbs)						
		CO	NOx	VOC	PM_{10}	$PM_{2.5}$	SO_2	CO_2e
Paver	2,112	255.62	586.08	66.25	40.82	39.69	1.13	196,668.17
Backhoe loader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chain saws	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressor	528	1,517.37	8.72	354.50	55.60	51.15	0.02	4,082.22
Concrete pump	528	51.41	117.10	10.85	7.40	7.17	0.14	25,862.85
Crane	528	47.05	103.50	11.03	7.92	7.68	0.10	15,071.16
Crane	528	56.04	209.04	21.61	9.81	9.50	0.36	60,047.10
Front end loader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welding machine	528	163.57	175.15	33.24	25.50	24.73	0.20	32,503.85
Grader	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hammer, hydraulic	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loader, skid steer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cement & morter mixer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wheel Roller	2,112	1,935.27	3,970.42	443.48	291.53	282.99	3.41	534,648.65
Water Tank Truck	4,240	529.59	1,045.42	111.57	81.80	79.30	1.75	308,606.38
Dump Truck	22,543	19,693.86	19,968.43	4,468.99	2,935.14	2,846.14	17.04	2,853,444.69
Forklift	1,056	922.52	935.38	209.34	137.49	133.32	0.80	133,664.24
Manlift	528	13.72	40.47	5.36	1.03	1.00	0.09	19,709.04
Pickup Trucks	5,280	137.22	404.66	53.58	10.28	9.97	0.93	197,090.45
Total Emissions	**(lb/yr):**	**25,323.2**	**27,564.4**	**5,789.8**	**3,604.3**	**3,492.6**	**26.0**	**4,381,398.8**
Total Emissions	**(tpy)**	**12.66**	**13.78**	**2.89**	**1.80**	**1.75**	**0.01**	**2,190.70**
Total Emissions	**(Metric Tons/yr)**							**1,987.37**

Source: Emission factors and methodology from USAFCEE Air Emissions Guide For Air Force Mobile Sources (Section 4, August 2018).

Projected Fugitive Dust Emissions (Site Preparation)
BEP Site Acquisition and Construction

CY 2021	
Description:[1]	
Total acres disturbed by construction:	104
Acres of land disturbed (2021):	52
Assumed number of 8-hr days:	261
Assumed equivalent acres/day:	0.199

CY 2022	
Description:[1]	
Total acres disturbed by construction:	104
Acres of land disturbed (2022):	52
Assumed number of 8-hr days:	261
Assumed equivalent acres/day:	0.199

Equation for Fugitive Dust Emissions (PM_{10})
E_{TSP} (lb/yr) = 80 * No. of 8-hr days * Acres/day

Calculation
E_{TSP} (lb/yr) = 80 * 261 days * 0.199 acres/day

E_{TSP} =	4154.80	lb/yr	
	2.08E+00	tpy	4.15E+00

Assumptions:
1. The area of disturbance is conservatively assumed to be 85 percent of the area.
2. It is assumed that construction activity related to site preparation will be completed by CY 2022.

Source of Equation:
Emission factors and methodology from USAFCEE Air Emissions Guide For Air Force Mobile Sources (Section 5, August 2018).

Note: Assume PM= PM_{10}=$PM_{2.5}$

Projected Fugitive Dust Emissions (Concrete Transport in CY 2021)
BEP Site Acquisition and Construction

Input Parameters:

Concrete moved during demolition =	3,604	tons	(Treasury's Traffic Impact Study)
Mean wind speed =	8.0	mph	(Prince George's County, MD)
Material silt content =	11		(Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content =	12		(Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from loading/unloading demolished concrete into dump trucks (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

EF = k (0.0032) $[U/5)^{1.3} / (M/2)^{1.4}]$	**0.0004**	**lbs/ton**	**PM**
	0.0002	**lbs/ton**	**PM_{10}**
	0.00003	**lbs/ton**	**$PM_{2.5}$**

where:

EF = emission factor, lbs/ton

U = mean wind speed, miles/hr (mph)

M = material moisture content (%)

Therefore, total emissions from loading/unloading demolished concrete from dump trucks =

EF * tons/yr of concrete loading/unloading

1.28	lbs/yr	**6.40E-04**	**tons/yr**	**PM**	**E1**
0.61	lbs/yr	**3.03E-04**	**tons/yr**	**PM_{10}**	**E1**
0.09	lbs/yr	**4.58E-05**	**tons/yr**	**$PM_{2.5}$**	**E1**

Assume 90% control efficiency from water spray and covers on stockpiles and truck beds.

Therefore, actual controlled emissions from loading/unloading demolished concrete from dump trucks =

uncontrolled emissions * 0.1

6.40E-05	**tons/yr**	**PM**	**E2**
3.03E-05	**tons/yr**	**PM_{10}**	**E2**
4.58E-06	**tons/yr**	**$PM_{2.5}$**	**E2**

Projected Fugitive Dust Emissions (Concrete Transport in CY 2022)
BEP Site Acquisition and Construction

Input Parameters:

Concrete moved during demolition =	3,604	tons	(Treasury's Traffic Impact Study)
Mean wind speed =	8.0	mph	(Prince George's County, MD)
Material silt content =	11	(Mean, Table 13.2.2-1, Page 13.2.2-3)	
Material moisture content =	12	(Mean, Table 13.2.4, Page 13.2.4-2)	

Emissions from loading/unloading demolished concrete into dump trucks (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

EF = k (0.0032) $[U/5)^{1.3} / (M/2)^{1.4}]$	**0.0004**	**lbs/ton**	**PM**
	0.0002	**lbs/ton**	**PM_{10}**
	0.00003	**lbs/ton**	**$PM_{2.5}$**

where:

EF = emission factor, lbs/ton

U = mean wind speed, miles/hr (mph)

M = material moisture content (%)

Therefore, total emissions from loading/unloading demolished concrete from dump trucks =

EF * tons/yr of concrete loading/unloading

1.28	lbs/yr	**6.40E-04**	**tons/yr**	**PM**	**E1**
0.61	lbs/yr	**3.03E-04**	**tons/yr**	**PM_{10}**	**E1**
0.09	lbs/yr	**4.58E-05**	**tons/yr**	**$PM_{2.5}$**	**E1**

Assume 90% control efficiency from water spray and covers on stockpiles and truck beds.

Therefore, actual controlled emissions from loading/unloading demolished concrete from dump trucks =

uncontrolled emissions * 0.1

6.40E-05	**tons/yr**	**PM**	**E2**
3.03E-05	**tons/yr**	**PM_{10}**	**E2**
4.58E-06	**tons/yr**	**$PM_{2.5}$**	**E2**

Projected Fugitive Dust Emissions (Soil Transport in CY 2022)
BEP Site Acquisition and Construction

Input Parameters:

Soil moved during excavation =	2,000	tons	(Treasury's Traffic Impact Study)
Mean wind speed =	8.0	mph	(Prince George's County, MD)
Material silt content =	6.4	(Mean, Table 13.2.2-1, Page 13.2.2-3)	
Material moisture content =	14	(Mean, Table 13.2.4, Page 13.2.4-2)	

Emissions from loading/unloading excavated soil into dump trucks (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

EF = k (0.0032) $[U/5)^{1.3} / (M/2)^{1.4}]$	**0.0003**	**lbs/ton**	**PM**
	0.0001	**lbs/ton**	**PM_{10}**
	0.00002	**lbs/ton**	**$PM_{2.5}$**

where:

EF = emission factor, lbs/ton

U = mean wind speed, miles/hr (mph)

M = material moisture content (%)

Therefore, total emissions from loading/unloading excavated soil from dump trucks =

EF * tons/yr of soil loading/unloading

0.57	lbs/yr	**2.86E-04**	**tons/yr**	**PM**	**E1**
0.27	lbs/yr	**1.35E-04**	**tons/yr**	**PM_{10}**	**E1**
0.04	lbs/yr	**2.05E-05**	**tons/yr**	**$PM_{2.5}$**	**E1**

Assume 90% control efficiency from water spray and covers on stockpiles and truck beds.

Therefore, actual controlled emissions from loading/unloading excavated soil from dump trucks =

uncontrolled emissions * 0.1

2.86E-05	**tons/yr**	**PM**	**E2**
1.35E-05	**tons/yr**	**PM_{10}**	**E2**
2.05E-06	**tons/yr**	**$PM_{2.5}$**	**E2**

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Projected POV & Delivery Truck Emissions
BEP Site Acquisition and Construction

					Emission Factor (lbs/mile)							Emissions (lbs/year)						
Year (Analysis Year)	Type	No. of Trucks or POVs	No. of driving days	Miles per day	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_2e	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
2021 (2014)	light-duty gas passenger	20	261	20	1.19E-03	2.00E-02	8.86E-04	1.54E-05	5.51E-05	2.43E-05	8.12E-01	4.75E-01	8.02E+00	3.55E-01	6.17E-03	2.20E-02	9.70E-03	324.61
	Total 2021 POV Emission (tpy)											**2.38E-04**	**4.01E-03**	**1.77E-04**	**3.09E-06**	**1.10E-05**	**4.85E-06**	**0.16**
2022 (2015)	light-duty gas passenger	20	261	20	1.10E-03	1.96E-02	8.14E-04	1.54E-05	5.51E-05	2.43E-05	8.11E-01	4.42E-01	7.82E+00	3.25E-01	6.17E-03	2.20E-02	9.70E-03	324.52
	Total 2022 POV Emission (tpy)											**2.21E-04**	**3.91E-03**	**1.63E-04**	**3.09E-06**	**1.10E-05**	**4.85E-06**	**0.16**
2023 (2016)	light-duty gas passenger	20	261	20	9.06E-04	8.60E-03	9.83E-04	1.54E-05	2.43E-05	2.20E-05	7.86E-01	3.62E-01	3.44E+00	3.93E-01	6.17E-03	9.70E-03	8.82E-03	314.37
	Total 2023 POV Emission (tpy)											**1.81E-04**	**1.72E-03**	**1.97E-04**	**3.09E-06**	**4.85E-06**	**4.41E-06**	**0.16**
2024 (2017)	light-duty gas passenger	20	261	20	7.91E-04	8.01E-03	7.28E-04	4.41E-06	2.20E-05	1.98E-05	7.69E-01	3.17E-01	3.20E+00	2.91E-01	1.76E-03	8.82E-03	7.94E-03	307.43
	Total 2024 POV Emission (tpy)											**1.58E-04**	**1.60E-03**	**1.46E-04**	**8.82E-07**	**4.41E-06**	**3.97E-06**	**0.15**
2025 (2018)	light-duty gas passenger	20	261	20	6.97E-04	7.53E-03	6.19E-04	4.41E-06	1.98E-05	1.76E-05	7.50E-01	2.79E-01	3.01E+00	2.48E-01	1.76E-03	7.94E-03	7.05E-03	300.02
	Total 2025 POV Emission (tpy)											**1.39E-04**	**1.51E-03**	**1.24E-04**	**8.82E-07**	**3.97E-06**	**3.53E-06**	**0.15**
2026 (2019)	heavy-duty diesel tucks	4	261	40	8.84E-04	3.67E-03	1.08E-02	2.87E-05	4.12E-04	3.79E-04	3.27E+00	1.33E-01	5.51E-01	1.62E+00	4.30E-03	6.18E-02	5.69E-02	490.13
	light-duty gas passenger	336	261	40	6.26E-04	7.11E-03	5.27E-04	4.41E-06	1.76E-05	1.54E-05	7.30E-01	8.42E+00	9.56E+01	7.09E+00	5.93E-02	2.37E-01	2.08E-01	9,823.39
	Total 2026 POV & Truck Emission (tpy)											**4.28E-03**	**4.81E-02**	**4.36E-03**	**3.18E-05**	**1.50E-04**	**1.32E-04**	**5.16**
2027 (2020)	heavy-duty diesel tucks	8	261	40	8.00E-04	3.39E-03	9.78E-03	2.65E-05	3.57E-04	3.28E-04	3.24E+00	2.40E-01	1.02E+00	2.93E+00	7.94E-03	1.07E-01	9.85E-02	971.95
	light-duty gas passenger	673	261	40	5.69E-04	6.74E-03	4.52E-04	4.41E-06	1.76E-05	1.54E-05	7.10E-01	1.53E+01	1.81E+02	1.22E+01	1.19E-01	4.74E-01	4.15E-01	19,088.96
	Total 2027 POV & Truck Emission (tpy)											**7.77E-03**	**9.11E-02**	**7.54E-03**	**6.33E-05**	**2.91E-04**	**2.57E-04**	**10.03**
2028 (2021)	heavy-duty diesel tucks	11	261	40	7.28E-04	3.14E-03	8.86E-03	2.65E-05	3.11E-04	2.87E-04	3.21E+00	3.27E-01	1.41E+00	3.99E+00	1.19E-02	1.40E-01	1.29E-01	1,446.61
	light-duty gas passenger	1009	261	40	5.18E-04	6.34E-03	3.92E-04	4.41E-06	1.54E-05	1.32E-05	6.88E-01	2.09E+01	2.56E+02	1.58E+01	1.78E-01	6.23E-01	5.34E-01	27,763.62
	Total 2028 POV & Truck Emission (tpy)											**1.06E-02**	**1.29E-01**	**9.91E-03**	**9.49E-05**	**3.81E-04**	**3.31E-04**	**14.61**
2029 (2022)	heavy-duty diesel tucks	15	261	40	6.66E-04	2.93E-03	8.08E-03	2.65E-05	2.71E-04	2.49E-04	3.19E+00	3.99E-01	1.76E+00	4.85E+00	1.59E-02	1.63E-01	1.49E-01	1,915.37
	light-duty gas passenger	1345	261	40	4.76E-04	6.00E-03	3.42E-04	4.41E-06	1.32E-05	1.32E-05	6.66E-01	2.56E+01	3.23E+02	1.84E+01	2.37E-01	7.12E-01	7.12E-01	35,826.50
	Total 2029 POV & Truck Emission (tpy)											**1.30E-02**	**1.62E-01**	**1.16E-02**	**1.27E-04**	**4.37E-04**	**4.31E-04**	**18.87**

Working days/year = 261
g to lbs conversion = 453.592

Assumptions:
To provide conservative estimates, it was assumed no trucks or POVs would be new models. Therefore, emisson factors from 7-years prior were used.
No data was available on actual numbers of construction workers. It was assumed that there would be 20 construction workers commuting to the Project Site per working day (5 days/week, 261 days/year).
It was assumed construction workers commute from home locations that are local at an estimated average of 10 miles away (i.e., 20 miles round-trip).
Construction-related vehicles (e.g., pickup trucks and dump trucks) are not considered "commuting" vehicles and are instead included in the construction equipment emission calculations.
Based on the BEP's Traffic Impact Study, an estimated 1,011 POVs would be commuting to the CPF during the daytime shift. It was conservatively assumed that all employees in the evening and midnight shift (168 and 166, respectively) would be commuting via POV. This is an estimated total of 1,345 POVs traveling to the site per day/night. Based on the BEP's truck traffic estimates, 15 trucks would be delivering/picking up materials per working day during full operations. During the phased operational implementation between 2025 and 2028, it was assumed that there would be a 25 percent increase in commuter vehicles and delivery trucks until the CPF reaches full operational potential in 2029.
Assumed POVs and trucks are on site 5 days/week for 261 days/year. Conservatively assume the total number of workers commute and the trucks deliver every working day.
Based on employees' home locations, it was assumed POVs and trucks are traveling from locations that are an estimated average of 20 miles away (i.e., 40 miles round-trip).
Emission factors are from the 2016 and 2018 USAFCEE *Air Emissions Guide For Air Force Mobile Sources* (Section 5, July 2016 and Section 5, August 2018). Emission factors provided in grams/mile were divided by the conversion factor for pounds/mile.

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Natural Gas Equipment (Boilers) Estimated Actual Emissions
BEP Site Acquisition and Construction

NG Usage Information

Fuel Burned:	Natural Gas
Quantity of NG burned (cf/yr Estimated Actual)[1]:	39,215,686
NG Heat Content (Btu/cf):	1,020
BTUs in One Year	40,000,000,000
Total Capacity of NG Boilers (MMBTU/hr)	42
Assumed Energy Efficiency of NG Boilers	0.9
Hourly NG Consumption (cf/hr)	45,752

Estimated Actual - Criteria Pollutants

Criteria Pollutant	NG Emission Factor[2] (lb/10^6 cf)	Emissions (lb/yr)	Emissions (tpy)
PM	7.6	298.04	0.15
PM_{10}	7.6	298.04	0.15
$PM_{2.5}$	7.6	298.04	0.15
SO_2	0.6	23.53	0.01
NO_x	32	1,254.90	0.63
VOC	5.5	215.69	0.11
CO	84	3,294.12	1.65

Estimated Actual - HAPs

HAP	NG Emission Factor[2] (lb/10^6 cf)	Emissions (lb/yr)	Emissions (tpy)
Arsenic	2.00E-04	7.84E-03	3.92E-06
Beryllium	1.20E-05	4.71E-04	2.35E-07
Cadmium	1.10E-03	4.31E-02	2.16E-05
Chromium	1.40E-03	5.49E-02	2.75E-05
Cobalt	8.40E-05	3.29E-03	1.65E-06
Lead	5.00E-04	1.96E-02	9.80E-06
Manganese	3.80E-04	1.49E-02	7.45E-06
Mercury	2.60E-04	1.02E-02	5.10E-06
Nickel	2.10E-03	8.24E-02	4.12E-05
Selenium	2.40E-05	9.41E-04	4.71E-07
Benzene	2.10E-03	8.24E-02	4.12E-05
Formaldehyde	7.50E-02	2.94E+00	1.47E-03
Hexane	1.80E+00	7.06E+01	3.53E-02
Naphthalene	6.10E-04	2.39E-02	1.20E-05
Polycyclic Organic Matter (POM)	8.82E-05	3.46E-03	1.73E-06
Toluene	3.40E-03	1.33E-01	6.67E-05
Total HAP		**7.40E+01**	**3.70E-02**

1. NG usage actual estimation for the proposed facility is based on the natural gas usage in the WCF in 2018 as identified in BEP's "Utility Information for the New Facility" (2019).

2. Emission Factors from AP-42, Chapter 1.4, Table 1.4-1, Table 1.4-2, Table 1.4-3, and Table 1.4-4.

3. Assumed that other HVAC equipment would be electric and therefore have no emissions.

Emergency Generator Estimated Actual Emissions
BEP Site Acquisition and Construction

Equipment Information

Number of Identicle Units:	2
Generator Demand (hp):	2,012
Generator Rating (kW)[1]:	1,500
Fuel Burned:	Diesel
Estimated Actual Hours of Operation[2]:	200
Fuel Sulfur Content (wt%):	0.0015
Fuel Heat Content (Btu/gal):	137,000

Estimated Actual Emissions - Criteria Pollutants

Criteria Pollutant	Emission Factor[3] (lb/hp-hr) >600 hp	Emissions (lb/yr)	Total (tpy)
$PM/PM_{10}/PM_{2.5}$	1.54E-04	124.17	0.06
SO_2	1.21E-05	9.76	0.00
NO_x	1.36E-02	10,962.14	5.48
VOC	3.53E-04	283.81	0.14
CO	2.07E-03	1,667.38	0.83

Estimated Actual Emissions - HAPs

HAP	Emission Factor[3] (lb/hp-hr) >600 hp	Emissions (lb/yr)	Total (tpy)
Acetaldehyde	1.76E-07	1.42E-01	7.10E-05
Acrolein	5.52E-08	4.44E-02	2.22E-05
Benzene	5.43E-06	4.37E+00	2.19E-03
Formaldehyde	5.52E-07	4.44E-01	2.22E-04
Naphthalene	9.10E-07	7.32E-01	3.66E-04
Polycyclic Aromatic Hydrocarbons (PAHs)[3]	5.74E-07	4.62E-01	2.31E-04
Toluene	1.97E-06	1.58E+00	7.91E-04
Xylenes	1.35E-06	1.09E+00	5.44E-04
Total HAP		**8.86E+00**	**4.43E-03**

1. Generators conservatively estimated to be 1,500 kW.
2. A conservative estimate based on BEP's DC facility's emergency generators' actual hours of operation in 2018 (i.e., 121 hours).
3. Criteria pollutant emission factors from manufacture's specifications for a Tier II certified Caterpillar 3512C and converted from g/hp-hr to lb/hp-hr using 453.6 g to lb conversion factor. HAP emission Factors from AP-42, Chapter 3.4, Table 3.4-3, October 1996.
HAP emission factors converted from lb/MMBtuusing average brake-specific fuel consumption (BSFC) = 7 MMBtu/1000 hp-hr.
4. For inventory purposes, assume PAH is the same as Polycyclic Organic Matter (POM).

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