



ENVIRONMENTAL REVIEW

**PHILADELPHIA GAS WORKS
PASSYUNK PLANT
3100 W. PASSYUNK AVENUE
PHILADELPHIA, PA 19145**

Prepared For:

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1.0 ENVIRONMENTAL REVIEW SCOPE	1
1.1 Site Description	1
1.2 Field Visit	2
1.3 Documents Reviewed	2
2.0 AIR EMISSIONS	3
2.1 Background Information	3
2.2 Current Conditions.....	4
2.3 Proposed Facility Changes.....	6
2.4 Summary of Air Quality Impacts	7
3.0 WATER AND WASTEWATER	9
3.1 Background Information	9
3.2 Current Conditions.....	10
3.3 Proposed Facility Changes.....	10
3.4 Summary of Environmental Water and Wastewater Impacts	11
4.0 STORMWATER MANAGEMENT	11
4.1 Background Information	11
4.2 Current Conditions.....	11
4.3 Proposed Facility Changes.....	11
4.4 Summary of Environmental Stormwater Impacts	11
5.0 HAZARDOUS AND NON-HAZARDOUS/RESIDUAL WASTE	12
5.1 Background Information	12
5.2 Current Conditions.....	13
5.3 Proposed Facility Changes.....	14
5.4 Summary of Environmental Hazardous and Non-Hazardous Waste Impacts.....	14
6.0 NATURAL AND CULTURAL RESOURCES	15
6.1 Background Information	16
6.2 Current Conditions.....	16
6.3 Proposed Facility Changes.....	17
6.4 Summary of Environmental Natural and Cultural Resources Impacts	17
7.0 CONCLUSIONS	17

TABLES

Table 1 Environmental Impacts Summary

Table 2 Comparison of Air Emissions Before/After Project

EXECUTIVE SUMMARY

Langan completed an environmental review of the Philadelphia Gas Works (PGW) Passyunk Plant (facility) located at 3100 W. Passyunk Avenue in Philadelphia, Pennsylvania. The goal of this analysis was to identify and evaluate the potential environmental and regulatory impacts of proposed new equipment and operations associated with a liquefaction enhancement project (enhancement project). This report includes an evaluation of baseline conditions at the facility compared to anticipated environmental and regulatory impacts associated with the enhancement project. Environmental elements considered in this survey include: air emissions (Section 2.0); water and wastewater (Section 3.0); storm water management (Section 4.0); hazardous and nonhazardous/residual waste (Section 5.0); and natural and cultural resources (Section 6.0). Each section includes a summary of our findings.

The Passyunk Plant is currently operating under the following environmental permits:

- Synthetic Minor Operating Permit (SMOP) No. S15-009 – Issued by Philadelphia Air Management Services (AMS) on September 2, 2016 and expiring on September 2, 2021.
- Wastewater Philadelphia Water Department (PWD) industrial discharge permit No. PHIL00070948OM – This permit was last renewed on January 1 2017 and expires on December 31 2021.
- PAG-03 general permit number PAR900024 for discharges of stormwater associated with industrial activities.
- Hazardous Waste Generator EPA ID – PAD000620518 (Small Quantity Generator).

Based on the results of our database searches, site visit, and review of documents provided by PGW, environmental impacts resulting from the proposed enhancement project are expected to be minimal. Table 1 provides a concise comparison of environmental conditions before and after construction of the enhancement project. Table 2 provides a comparison of facility-wide emissions of regulated air pollutants before and after construction of the enhancement project.

1.0 ENVIRONMENTAL REVIEW SCOPE

The scope of our environmental impact analysis included the following elements:

- A review of existing permits, records, and compliance data provided by PGW to document the pre-construction status of environmental impacts and regulatory requirements for the facility;
- A review of plans provided by PGW specifying the details of proposed new equipment and operations associated with the enhancement project; and
- An evaluation of anticipated environmental and regulatory requirements associated with the enhancement project.

1.1 Site Description

The existing facility is a 59-acre natural gas distribution and liquefied natural gas (LNG) storage and vaporization facility located in South Philadelphia. In addition to its primary role as a Liquefied Natural Gas (LNG¹) facility, the Passyunk Plant also houses training facilities for Field Operations employees and a Chemical Services Department and laboratory. The Passyunk Plant operates 24 hours a day, 7 days a week with gas processing operations personnel scheduled on rotating shifts.

Existing Facility Equipment

The existing facility currently includes the following primary operating equipment:

- One LNG storage tank – 250 MMSCF² capacity, installed in 1971;
- Two LNG steam vaporizers – 45 MMSCFD³ capacity each;
- An LNG trailer unloading station for unloading of LNG transported by truck from PGW's Port Richmond Plant;
- LNG boiloff compressors; and
- A natural gas distribution area.

In addition to this equipment, there are existing safety systems, LNG control buildings, electrical switchgear buildings, maintenance shops buildings, a CCTV⁴ room/security building, administrative and employee training buildings, and an onsite store room.

¹ LNG is a composition of methane and some mixture of ethane used to convert natural gas to liquid form for ease and safety of storage and transport.

² MMSCF = Million standard cubic feet, a common US unit of measurement for volume of gas

³ MMSCFD = Million standard cubic feet per day, a common US unit of measurement for daily use of gas

⁴ Closed-circuit television

Proposed New Equipment (Enhancement Project)

According to the Northstar Industries Design Baseline & Criteria for the Liquefaction Addition at the Passyunk LNG Facility draft document (NI Baseline), the proposed enhancement project consists of the following two major sub-systems:

A natural gas liquefaction system (including a gas meter/regulating system, a gas pre-treatment system and a Motor Control Center (MCC)/Distributed Control Building). This system will add the following primary operating equipment:

- A new 10 MMSCFD nitrogen expansion liquefier (120,000 gallons LNG/day production), which will include:
 - One 5,968-kilowatt electrically-driven nitrogen recycle compressor;
 - 12 electrically-driven air-cooled fin fans, 25 horsepower each;
 - One natural gas-fired heater with a heat input rating of 1.5 MMBTU/hr⁵ and an estimated maximum fuel consumption rate of 2,155 SCFH⁶; and
 - Electrically-driven auxiliary equipment, including lube oil and glycol pumps, and a lube oil surge tank with a capacity of 200 – 300 gallons.

A new truck loading system (120,000 gallons LNG/day capable), which will include:

- A custody transfer scale; and
- A bill-of-lading system.

1.2 Field Visit

Langan personnel completed a field visit at the Passyunk Plant on August 8, 2018. The purpose of the field visit was to observe equipment and plant processes to confirm consistency with documentation provided by PGW. Langan also observed the current and proposed truck routes and areas planned for construction for the liquefaction enhancement project. There were no significant differences between what was observed at the site compared to what was described of the facility in documentation provided by PGW.

1.3 Documents Reviewed

The following is a list of documents provided by PGW that were reviewed by Langan as part of this Environmental Impact Survey:

⁵ MMBTU/hr – stands for millions of British Thermal Units (BTU) per hour, a measure of the usage of the energy content in fuel per hour

⁶ SCFH = standard cubic feet per hour, a unit for volumetric flow rate of air or gas

1. Passyunk Plant Overview for Langan Traffic and Environmental Impact Surveys (June 22, 2018)
2. Draft Design Baseline & Criteria for the Liquefaction Addition at the Passyunk LNG Facility (Northstar Industries, LLC, September 13, 2018)

2.0 AIR EMISSIONS

The first item of potential environmental impact analyzed was air emissions. As described above, Langan reviewed existing records and proposed plans for the Enhancement Project, and evaluated the potential air emission impacts. Based on the results of our database searches, site visit, and review of documents provided by PGW, environmental impacts resulting from increased emissions of air pollutants from new stationary sources associated with the proposed enhancement project are expected to be minimal. In addition, anticipated changes in truck traffic patterns as a result of new LNG loading operations are also expected to have a minimal impact on air emissions generated by mobile sources at the facility. The analysis for these items is further discussed in sections 2.1 through 2.4, below.

We should also note that this Environmental Review does not include an evaluation of potential emissions resulting from temporary emission sources involved in the construction of the enhancement project. However, based on our July 19, 2018 conversation, with the Chief of Source Registration at Philadelphia Air Management Services (AMS), temporary emissions generated during construction activities are not subject to AMS regulation or permit requirements, and are also not expected to be significant.

2.1 Background Information

Air emissions of criteria air pollutants are generated by the existing Passyunk Plant from both stationary sources (*e.g.*, non-mobile plant equipment) and mobile sources (*e.g.*, passenger cars, trucks, and plant vehicles/mobile equipment). For facilities located in the City of Philadelphia, stationary and mobile, on-site sources of emissions are regulated by AMS. AMS issues permits and enforces regulatory requirements for the installation and operation of air pollution sources in the City of Philadelphia. The type of facility-wide operating permit that is required depends on both the facility's potential to emit criteria air pollutants and the limitations on actual emission levels that can be taken as a limit in the permit. According to the AMS "Guide to Air Pollution and Asbestos Abatement Permits and Licenses," a federally-enforced Title V permit is required for facilities with the potential to emit air pollutants in excess of the following levels:

- 25 tons of Volatile Organic Compounds (VOC) or Nitrogen Oxides (NO_x) per year;
- 100 tons of Carbon Monoxide (CO), Sulfur Oxides (SO_x), or Particulate Matter less than 10 microns (PM₁₀) per year;
- 10 tons of an individual Hazardous Air Pollutant (HAP) per year; or
- 25 tons of all HAPs combined per year.

Because of the Philadelphia region's former status as a severe nonattainment area for the 2008 ground-level ozone 8-hour standard, Title V thresholds were reduced to 25 tons per year for VOCs or NO_x. Counties outside of the southeast region of Pennsylvania and greater Philadelphia area are subject to Title V thresholds of 50 tons per year for VOCs and 100 tons per year for NO_x. Facilities that have the potential to emit air pollutants in excess of one or more of the above-listed Title V threshold levels are able to obtain a synthetic minor operating permit (SMOP) instead of a Title V permit if they can take permit limits that will restrict actual emissions to below these levels. The permit conditions will then require the facility to keep adequate records that show that they have not exceeded any of the Title V thresholds during any rolling 12-month period.

2.2 Current Conditions

As referenced in Tables 2.1 and 2.2, the following stationary sources are currently in operation at the Passyunk Plant:

- One diesel-fired CAT emergency generator
- Three natural-gas-fired Nebraska Boilers
- One diesel-fired firewater pump
- One diesel-fired Onan emergency generator
- One diesel-fired Cummins emergency generator
- One diesel-fired Kohler emergency generator.

In order to evaluate the baseline environmental impacts from air emissions generated by the facility before construction of the enhancement project, PGW provided the following air permit documents for Langan to review:

- July 23, 2015 Synthetic Minor Operating Permit (SMOP) renewal application;
- SMOP No. S15-009 (Issued by AMS on September 2, 2016 and expiring on September 2, 2021);
- 2017 annual emissions calculations spreadsheet for the Passyunk Plant; and

- 2017 Annual Emissions Statement (Emission Inventory Production Report) submitted to AMS via the Pennsylvania Department of Environmental Protection's Greenport online reporting program on February 27, 2018.

Evaluation of Stationary Emission Sources

Based on our review of the above-listed documents, the Passyunk Plant is currently operating as a synthetic minor facility because it has the potential to emit more than 25 tons per year of NO_x from stationary sources. Permit conditions in Section D of the SMOP No. S15-009 require the facility to calculate and confirm that cumulative facility-wide actual emissions from permitted stationary sources will amount to less than 25 tons of NO_x and less than 100 tons of carbon monoxide per rolling 12-month period. According to the facility's 2017 emission totals reported to AMS in the February 27, 2018 annual emission statement, facility-wide NO_x emissions were reported to be approximately 3.1 tons and carbon monoxide emissions were reported to be approximately 1.7 tons in the 2017 calendar year. Although 12-month rolling emission calculations were not provided by PGW, the annual emission totals confirm that the facility is currently meeting the facility-wide emission limits from their SMOP and a Title V permit is not required.

The attached Tables 2.1-2.2 provide a summary of the potential and actual emissions from each stationary source currently permitted under the facility's SMOP.

Evaluation of Mobile Emission Sources

According to the Passyunk Plant Overview document and follow-up information provided by PGW, mobile sources of emissions at the facility currently consist of employee passenger vehicles and diesel-fueled delivery trucks that transport LNG from the Port Richmond Plant to fill the tank at the Passyunk Plant. These deliveries currently take place at a maximum rate of eight truck deliveries per day from November to January for a total of 100 to 150 truck deliveries of LNG per year.

According to Philadelphia's Air Management Regulation X, a Complex Source Permit is currently not required for the Passyunk Plant because it does not have a parking facility with a capacity greater than 500 motor vehicles and the facility does not generate peak rate traffic in excess of 100 motor vehicles per hour; 25 diesel buses per hour; or 12 heavy duty diesel vehicles per hour.

Because the facility is not subject to the requirement for a Complex Source Permit, the facility does not need to prepare and submit a Traffic Impact Study (TIS) or an Air Quality

Impact Statement (AQIS) to AMS, and quantification of emissions from mobile emissions sources at the facility is not required.

2.3 Proposed Facility Changes

According to the Passyunk Plant Overview document, the proposed enhancement project will result in a minimal increase in emissions from both stationary and mobile emission sources.

Stationary Sources

The liquefaction enhancement project is expected to impact stationary sources of emissions at the facility as follows:

- One new natural gas-fired heater will be installed with a heat input rating of 1.5 MMBTU/hr and an estimated maximum fuel consumption rate of 2,155 SCFH; and
- An increase in LNG vaporization operations will require the existing Nebraska boilers (Sources 26, 27, and 28) to be operated more frequently. PGW estimates that these boilers will need to burn an extra 20,850 Mscf of natural gas per year to support the increase in vaporization.

Table 2-1 presents a summary of the facility's potential to emit nitrogen oxides (NO_x) and carbon monoxide (CO) from stationary sources and the reported actual emissions from PGW's 2017 Annual Emission Statement for the Passyunk Plant. Table 2-2 presents a summary of the facility's updated potential to emit NO_x and CO from stationary sources after construction of the new liquefaction project has been completed. As shown in Table 2-3, the above-listed changes to stationary emission sources will result in an increase of the facility's potential to emit by an additional 1.87 tons per year of NO_x and 1.38 tons per year of carbon monoxide. Anticipated post-construction emissions are expected to be 4.98 tons per year of NO_x and 3.10 tons per year of CO, both of which are below the major source thresholds of 25 tons per year NO_x and 100 tons per year CO. Therefore, the facility will still be able to operate as synthetic minor facility under the current SMOP, and a Title V permit is not required.

New Mobile Source Emissions

The following new mobile or modifications to existing mobile sources of emissions are anticipated after construction has been completed for the enhancement project:

- New Truck Loading System (120,000 gallons LNG/day capable)
 - A maximum of 12 LNG- or diesel-powered trailers will enter and exit the Passyunk facility each day.
 - The truck loading process will take approximately one hour and the trucks leave the site immediately after they have been filled.
 - The upgraded truck loading station can accommodate the loading of one LNG tanker truck at a time but will be designed so that a second truck filling station can be added in the future.
 - PGW will discontinue the practice of transporting LNG from the Port Richmond Plant to unload in the tank at the Passyunk Plant.

With a maximum of 12 LNG- or diesel-fueled trucks entering and exiting the facility each day, the peak rate of heavy-duty diesel truck traffic is not expected to exceed 12 trucks per hour and will not trigger the AMS requirement for a Complex Source Permit in accordance with Air Management Regulation X.

2.4 Summary of Air Quality Impacts

Based on the results of our database searches, site visit, and review of documents provided by PGW, Langan identified the following environmental and regulatory impacts associated with new stationary and mobile emission sources proposed for the enhancement project.

1. The natural gas-fired heater is the only new stationary source of emissions that is proposed. According to the PADEP's list of Air Quality Permit Exemptions (Document No. 275-2101-003), electrically operated equipment from which no emissions of air contaminants occur are considered trivial activities, which do not require a plan approval (*i.e.*, permit to install) and do not need to be described in an operating permit application. The electrically-driven nitrogen recycle compressor, air cooled fin fans, lube oil pumps, and glycol pumps are not expected to emit any air contaminants and therefore will not impact the facility's air emissions.
2. The rated heat input capacity of the proposed new natural gas-fired heater is 1.5 mmBTU/hr, which exceeds the 0.25 mmBTU/hr threshold for requiring an installation permit. Therefore, an installation permit application must be submitted to AMS and the permit must be issued before the heater can be installed. The installation permit will allow for installation and operation of the heater. Upon renewal of the facility's

SMOP, this heater and associated permit conditions from the installation permit will be incorporated into the renewed SMOP.

3. As noted above in Section 2.3 and shown in Table 2C, the increase in emissions from stationary sources after construction of the liquefaction project has been completed will be an additional 1.87 tons per year of NO_x and 1.38 tons per year of carbon monoxide (CO). Anticipated post-construction emissions are expected to be 4.98 tons per year of NO_x and 3.10 tons per year of CO, both of which are below the major source thresholds of 25 tons per year NO_x and 100 tons per year CO. Therefore, the facility will still be able to operate as synthetic minor facility under the current SMOP, and a Title V permit is not required.
4. According to the Northstar Industries Design Baseline and Criteria report, noise exposure associated with the new liquefaction system will be in accordance with OSHA Requirements from 29 CFR 1910.95 and City of Philadelphia requirements in Chapter 10 Parts 400-411 of City of Philadelphia regulations. Additionally, the air fins are set to automatically shut down if vibration levels are too high.
5. A Complex Source Permit in accordance with Air Management Regulation X will not be required for the facility because the proposed enhancement project will not increase the parking capacity to greater than 500 motor vehicles or cause the facility to generate peak rate traffic in excess of 100 motor vehicles per hour; 25 diesel buses per hour; or 12 heavy duty diesel vehicles per hour.
6. The facility is subject to the following idling restrictions for heavy-duty diesel powered trucks according to Philadelphia Air Management Regulation IX (Control of Emissions from Mobile Sources):
 - Maximum allowable period of idling shall not exceed two consecutive minutes or zero for layovers, except under the following conditions:
 1. The engine may be idled for a period of up to five (5) consecutive minutes when the ambient temperature is less than 32° F (0°C).
 2. The engine may be idled for a period of up to twenty (20) consecutive minutes when the ambient temperature is less than 20°F (-7°C).

PGW procedures require that the truck must be off during loading and unloading activities.

Based on these findings, air emissions impacts from the enhancement project prove to be of minimal scale. This is most apparent in comparison to other fuel sources, such as the use of diesel or fuel oil for heating. For comparison, at full production and 300 days of operation, the new liquefier system could displace up to 21 million gallons of diesel-fuel equivalent in a single year, or over 6 tons of NOX per year from oil refineries that produce diesel fuel. That amount of diesel fuel could also fuel over 46,000 diesel pickup trucks or SUVs; if removed from the road, that would be the equivalent of 32.6 tons of NOX per year⁷.

Finally, the project is committed to further reduce air emissions and impacts from the plant. For example, an application for the Pennsylvania Redevelopment Assistance Capital Program (RACP) has been filed for a renewable energy enhancement project at the Passyunk Plant. If approved, the grant would be used to finance the installation of renewable electricity generation for the new liquefaction plant, which would further reduce plant emissions.

3.0 WATER AND WASTEWATER

Based on the results of our database searches, site visit, and review of documents provided by PGW, environmental impacts are expected to be negligible resulting from the water used and wastewater produced onsite, and associated with the proposed enhancement project.

3.1 Background Information

The Passyunk Plant reportedly has minimal water supply requirements (only a few office buildings and minimal water needs for industrial processes, such as the Nebraska boilers). In addition, only one wastewater industrial discharge permit with the Philadelphia Water Department, Permit No. PHIL00070948OM. This permit was last renewed on January 1 2017 and expires on December 31 2021. The permit authorizes discharge from an onsite treatment system which processes contaminated stormwater

⁷ These equivalent figures can be arrived at with simple calculations. For the diesel refinery model, 21 million gallons of diesel can be produced in just a few days by a typical refinery facility, and emit between 500 and 1,500 tons of NOX per year. Six tons per year is does not significant. For the pickup truck/SUV model, according to the federal Energy Information Administration, a typical such vehicle consumes on average 453 gallons per year, thus resulting in the 46,000 vehicles. Using typical vehicle emission factors, that then results in the 32.6 tons of NOX per year. Even that figure is still orders of magnitude below the level of emission of a typical refinery.

or groundwater by aeration, separation and skimming of oil before discharge to the city sewer system. Categorical limits are in place for the effluent, including for pH, several metals and several organic contaminants. Monitoring and reporting requirements are also part of the permit.

In addition, the Passyunk Plant has an internal sanitary sewer system, made up of:

- One major trunk line along the Schuylkill Avenue right of way (north-south direction), which extends west to a building near the site's northwest corner and near the Schuylkill River waterfront; and which seems to be connected to the south to the major Passyunk Avenue sewer line.
- East of this line, two trunk lines follow parallel internal driveways in a west to east direction, before proceeding southeast to Passyunk Avenue sewer connections past the southeast corner of the site.
- Several lateral connector lines, including five to the major trunk line, one small one to the southernmost trunk line, and about 10 additional laterals to the remaining trunk line.

An independent stormwater sewer system has a series of inlets along the east-west centerline of the site, and drains in the opposite direction towards an outfall on the Schuylkill River.

3.2 Current Conditions

Langan personnel completed a field visit at the Passyunk Plant on August 8, 2018. The purpose of the field visit was to observe equipment and plant processes to confirm consistency with documentation provided by PGW. No actual opening and gauging of manholes and utility lines was performed, only general visual observation and inquiries to PGW staff. There were no significant differences between what was observed at the site compared to what was described of the facility in documentation provided by PGW.

3.3 Proposed Facility Changes

According to the Passyunk Plant Overview document and the NI Baseline, no new water or wastewater connections will be required as part of the enhancement project. All proposed cooling systems will be closed-loop systems, and any water consumption will be incidental to operations. Accordingly, no new water or wastewater permits are expected to be required.

3.4 Summary of Environmental Water and Wastewater Impacts

No new water or wastewater permits are expected to be required.

4.0 STORMWATER MANAGEMENT

Based on our review of online databases and the proposed plant expansion plans, the amount of impervious area is expected to go marginally up for the site. This increase is discussed in more detail below.

4.1 Background Information

According to the online PWD Stormwater Parcel Info Viewer, the Site has a gross property area of 2,623,317 square feet (sf), and impervious area of 888,965 sf. The majority of the impervious area consists of the site pavement and parking lots, while building roofs and tank tops cover only 20 to 30 percent of the impervious area.

4.2 Current Conditions

As described above, the total approximate 2.6 million sf site has an impervious coverage of approximately 33 percent.

4.3 Proposed Facility Changes

Components of the enhancement project will be installed on skids on separate concrete foundations. Otherwise the surface will remain gravel-covered. Based on the schematic plans provided by NI, the approximate limit of disturbance for the proposed new installation will be approximately 50,000 sf, and the new impervious areas (concrete foundations or roofs/equipment) will be approximately 30 to 40 percent of that figure. PWD will require that new stormwater management practices (SMPs) be installed during construction to result in no significant increase in impervious area and less runoff entering the city sewer system. Careful design and engineering consideration can reduce either or both the assumed 50,000 sf of disturbance and the Water Quality Volume (WQv) that PWD requires that be managed.

4.4 Summary of Environmental Stormwater Impacts

The enhancement project will increase the percentage of the total impervious area of the site, which will require a stormwater management plan and the construction of stormwater management practices (SMPs).

5.0 HAZARDOUS AND NON-HAZARDOUS/RESIDUAL WASTE

Based on the results of our database searches, site visit, and review of documents provided by PGW, environmental impacts resulting from new waste streams associated with the proposed enhancement project are not expected to significantly change current waste streams.

5.1 Background Information

The Resource Conservation and Recovery Act (RCRA) is the public law that regulates the proper management of hazardous and non-hazardous solid wastes. Pennsylvania has incorporated by reference the federal waste management regulations and expanded upon them with the Pennsylvania Solid Waste Management Act. Pennsylvania's hazardous waste program regulates the generation, storage, transportation, treatment, and disposal of hazardous waste. Pennsylvania also regulates facilities that generate nonhazardous "residual waste," which consists of waste materials resulting from industrial activities, if it is not hazardous. Federal and Pennsylvania regulations require generators of solid waste to make an accurate determination as to whether or not each waste stream generated is a hazardous waste and keep records documenting the results of this determination.

Generators of hazardous and residual waste may be subject to the following regulatory reporting requirements:

- Biennial Hazardous Waste Report – Required to be submitted by March 1st of every even-numbered year for facilities that generate more than 2,200 pounds of hazardous waste for at least one month of an odd-numbered year (reporting year).
- Biennial Residual Waste Report – Required to be submitted by March 1st of every odd-numbered year for facilities that generate more than an average of 2,200 pounds of residual waste per generating location per month in an even-numbered year.
- Source Reduction Strategy (Form 25R) – Required for facilities that generate more than an average of 2,200 pounds of residual waste per generating location per month or a total of more than 2,200 pounds of hazardous waste in any single month of the year. The source reduction strategy must be prepared and kept on the premises for PADEP inspection and submitted to PADEP upon request. Source reduction strategies must also be updated at least once every five years, or more frequently if there is a significant change in a type of waste generated or

in the manufacturing process other than a change that is described in the strategy as a source reduction method.

- Annual Chemical Analysis of Residual Waste (Form 26R) – Required to be submitted annually by March 1st for facilities that generates more than 2,200 pounds of residual waste per generating location in any single month in the previous year.

5.2 Current Conditions

In order to evaluate the baseline environmental impacts from hazardous and nonhazardous/residual waste generated by the facility before construction of enhancement project, PGW provided the following documents for Langan to review:

- 2016 Passyunk Plant Waste Tracking Spreadsheet;
- 2017 Passyunk Plant Waste Tracking Spreadsheet;
- 2017 Biennial Hazardous Waste Report;
- 2017 Chemical Analysis of Residual Waste Annual Report by the Generator (Form 26R)

Hazardous Waste

According to the results of our database search, the Passyunk Plant is currently registered as a Small Quantity Generator (SQG) of hazardous waste under EPA ID Number PAD000620518. A SQG generates more than 220 pounds and less than 2,200 pounds of hazardous in a calendar month. Based on our review of hazardous waste generation tracking spreadsheets for 2016 and 2017, the facility generated less than 2,200 pounds of hazardous waste during each month for calendar years 2016 and 2017, with the exception of September of 2017 when 5,539 pounds of hazardous waste was generated.

The facility would have been categorized as a Large Quantity Generator (LQG) for September of 2017 as more than 2,200 pounds of hazardous waste was generated at this location during this particular month; the change in generator status for this month resulted from a pipeline pigging/cleaning operation that is non-routine and episodic in nature. PGW submitted a biennial hazardous waste report for the Passyunk Plant during the 2017 reporting year because the facility exceeded the LQG limits in at least one month. Additionally, PGW prepared a Source Reduction Strategy (PADEP Form 25R) because the facility generated more than 2,200 pounds of hazardous waste during at least one month in 2017.

Residual Waste Generator

According to the 2016 waste tracking spreadsheet, PGW generated a total of 4,147.12 pounds of residual waste, which amounts to an average of 345.59 pounds per month. PGW certified that the facility did not generate more than 13 tons of residual waste during the 2016 reporting year, and therefore the biennial residual waste report was not required. According to the 2017 waste tracking spreadsheet, PGW generated a total of 317,735 pounds of residual waste, which amounts to an average of 26,477.92 pounds per month.

5.3 Proposed Facility Changes

PGW stated that hazardous and residual waste streams will not be significantly impacted by the proposed enhancement project. During the construction process, PGW may encounter hazardous soil and wastewater due to the site's historic use as a manufactured gas plant. Per PGW's operational procedures, chemical sampling and analysis will be performed and a soil management plan will be developed for construction activities and residual or hazardous waste disposal, as needed.

5.4 Summary of Environmental Hazardous and Non-Hazardous Residual Waste Impacts

Based on the results of our database searches, site visit, and review of documents provided by PGW, Langan identified the following environmental and regulatory impacts associated with current and future waste management practices. Recommendations for follow-up activities to address or mitigate these impacts are also provided where appropriate.

1. The facility generated less than 2,200 pounds of hazardous waste and was classified as a SQG during each month for calendar years 2016 and 2017, with the exception of September of 2017 when 5,539 pounds of hazardous waste was generated. The facility would have been categorized as a LQG for September of 2017 as more than 2,200 pounds of hazardous waste was generated at this location during this particular month; the change in generator status for this month resulted from a pipeline pigging/cleaning operation that is non-routine and episodic in nature. PGW should consider utilizing the episodic generator reliefs provided under the Hazardous Waste Generator Improvements rule recently issued by EPA to avoid classification of the Passyunk Plant as a LQG during future episodic hazardous waste generation events.

2. In accordance with 40 CFR 262.41, PGW submitted a hazardous waste biennial report for calendar year 2017 because the facility was considered a LQG for the month of September 2017.
3. In accordance with 25 PA Code 287.51(a), PGW certified that the facility did not generate more than 13 tons of residual waste in calendar year 2016 and was therefore not required to submit a Generator's Residual Waste Biennial Report for calendar year 2016.
4. The 2016 and 2017 waste tracking spreadsheets provided by PGW do not include quantities for plant trash (Residual Waste Code #710) and a chemical analysis of residual waste Form 26R has not been prepared for this waste stream. PGW should evaluate quantities of plant trash generated at the Passyunk Plant by requesting an estimate of the total weight of trash collected by the waste management service provider. PGW should also prepare a new Form 26R for plant trash.
5. In accordance with 25 PA Code 287.51(a) and 25 PA Code 287.53, PGW prepared a Source Reduction Strategy (PADEP Form 25R) for the facility in July 2018 and maintains a copy of the Source Reduction Strategy on the premises.
6. In accordance with 25 PA Code 287.51(b) and 25 PA Code 287.54, PGW prepared a chemical analysis of residual waste Form 26R for each residual waste stream generated in 2017 because the facility generated more than 2,200 pounds of residual waste in at least one calendar month. When necessary, chemical analyses were performed to verify that the waste stream was not hazardous.

6.0 NATURAL AND CULTURAL RESOURCES

Langan also performed a preliminary analysis of potential cultural and historical resources to identify potential issues that might need to be addressed prior to construction of the proposed enhancement project. Based on the results of our database searches, site visit, and review of documents provided by PGW, no significant impacts resulting from the proposed new liquefaction enhancement project were identified.

6.1 Background Information

For any given development, an analysis of natural and cultural resources that might be impacted is one of the first steps in predevelopment activities. Natural areas, archeological and historical sites, presence of endangered or threatened species, floodplains/floodways, and wetlands all have the potential to limit the area available for development or create additional permitting and mitigation steps to protect these resources.

In relation to natural sites, the Pennsylvania Natural Diversity Index (PNDI) process is the primary source of information utilized by the Pennsylvania Department of Environmental Protection (PADEP) and other state and federal agencies in PA during the permit review process, focused on the protection of threatened and endangered species, and special concern species where applicable. The PNDI Environmental Review starts the natural resources review for any site with an online tool which cross-references the boundaries of a site against databases of available natural resources, including wetlands, floodplains, and endangered and threatened species' habitats. If any potential conflicts are identified, the "PNDI Receipt" flags the specific issue and specific agencies that require follow-up.

In relation to historic sites, the City of Philadelphia's historic preservation ordinance requires the owner or manager of properties listed on the Philadelphia Register to seek and obtain an approval from the Historical Commission and a building permit from the City's Department of Licenses & Inspections prior to commencing any work that would require a building permit and/or alter the exterior appearance of the building(s), site, or permanent site features.

6.2 Current Conditions

The Passyunk Plant is located on the Lower Schuylkill River watershed, in an area of the city that has been industrialized for two centuries. Because of the site's long historical industrial use, the majority of the site surface is covered in pavement or gravel, and significant vegetated areas are not present. Langan performed a preliminary PNDI review for the entire site, and the PNDI Receipt identified no natural resources within the property boundary. In relation to the vicinity of the site, the only natural resource identified was the potential presence of endangered or threatened species on the Schuylkill River.

In relation to cultural resources, no historic sites were identified through the database searches onsite.

6.3 Proposed Facility Changes

The proposed facility changes are limited to an area of 50,000 sf, located in the interior of the eastern half of the property. No changes are proposed to alter any of the natural resources or buildings within or near the site. If any of the parameters of the proposed work change – for example, if any work was proposed to impact the areas identified as potential habitat on the Schuylkill River, further work might then be required (e.g., potential threatened or endangered species coordination with the PA Fish and Boat Commission).

6.4 Summary of Environmental Natural and Cultural Resources Impacts

No potential natural resource or historic resource impacts were identified within the property during the database searches. In addition, based on current design plans, no natural resource or historic resource impacts are expected in the vicinity of the property.

7.0 CONCLUSIONS

In summary, this initial environmental review has determined that the proposed enhancement project will have minimal impact on air emissions and stormwater runoff; and negligible impact on water and wastewater emissions, cultural and historic resources. Nonetheless, additional agency coordination will be required to update air permits; design and permit stormwater management practices (SMPs); and permit new storage and transportation of hazardous and residual wastes generated during construction and operation of the new plant.

TABLES

Table 1
Environmental and Regulatory Impacts Summary
Philadelphia Gas Works - Passyunk Plant
3100 W. Passyunk Avenue, Philadelphia, PA

Environmental Impacts Summary Table - PGW Passyunk Plant Liquefaction Enhancement Project - Environmental Impact Survey - September 2018

Environmental Media	Active Environmental Permits	Summary of Current Conditions	Summary of Proposed Changes	Summary of Environmental Impacts	Summary of Regulatory Impacts
<p align="center">Air Emissions (Stationary Sources)</p> <p align="center">EIS Section 2.0</p>	<p>Synthetic Minor Operating Permit (SMOP) No. S15-009 - Issued by Philadelphia Air Management Services (AMS) on September 2, 2016 and expiring on September 2, 2021.</p>	<p>The 2017 Annual Emission Statement submitted to AMS on February 2, 2018 confirms that the facility operated in compliance with all permit emission limits from stationary sources for the 2017 calendar year.</p>	<ol style="list-style-type: none"> 1. Install one new natural gas-fired heater with a heat input rating of 1.5 MMBTU/hr. 2. Increase LNG vaporization 3. Install 12 electrically-driven air-cooled fin fans. 	<ol style="list-style-type: none"> 1. There will be minor increases in NOx and CO emissions from increased combustion of natural gas from the Nebraska boilers to support vaporization and new regeneration heater. 2. There will be a minor increase in noise pollution resulting from operation of fin fans. 	<ol style="list-style-type: none"> 1. An installation permit is required by AMS for construction of the natural gas-fired heater. 2. The increase in emissions of NOx and CO resulting from increased natural gas combustion for LNG liquefaction and vaporization is not expected to cause the facility to exceed major source thresholds of 25 tons per year for NOx or 100 tons per year of CO.
<p align="center">Air Emissions (Mobile Sources)</p> <p align="center">EIS Section 2.0</p>	<p>None Required. Mobile sources of emissions (e.g., passenger vehicles and LNG delivery trucks) associated with the Passyunk Plant are not subject to Philadelphia's Air Management Regulation X and a Complex Source Permit is currently not required because the parking capacity is less than 500 motor vehicles and the facility does not generate peak rate traffic in excess of 100 motor vehicles per hour; 25 diesel buses per hour; or 12 heavy duty diesel vehicles per hour.</p>	<p>LNG is delivered from the Richmond Plant and unloaded by diesel-fueled trailer trucks into the Passyunk Plant storage tank from November to January at a maximum rate of eight truck deliveries per day.</p>	<ol style="list-style-type: none"> 1. A new truck loading system will result in loading of a maximum of 12 diesel-fueled trailer trucks per day with LNG for distribution to end-users. 2. Deliveries of LNG from the Richmond Plant and unloading into the Passyunk Plant storage tank will be discontinued. 	<ol style="list-style-type: none"> 1. There will be an increase in emissions from mobile sources due to the increase from eight to 12 trucks per day and truck trips occurring year-round instead of only from November through January. 2. However, there will also be a decrease in the number of trucks coming from the Richmond Plant, and thus a decrease in emissions resulting from this decrease. 	<ol style="list-style-type: none"> 1. The new truck loading system will not cause the facility to exceed generate peak rate traffic in excess of 100 motor vehicles per hour; 25 diesel buses per hour; or 12 heavy duty diesel vehicles per hour. The parking capacity will also still be less than 500 motor vehicles. Therefore, a Complex Source Permit is still not required for the Passyunk Plant.

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Environmental Media	Active Environmental Permits	Summary of Current Conditions	Summary of Proposed Changes	Summary of Environmental Impacts	Summary of Regulatory Impacts
Water and Wastewater EIS Section 3.0	Wastewater PWD industrial discharge permit No. PHIL00070948OM. This permit was last renewed on January 1 2017 and expires on December 31 2021	The industrial discharge permit authorizes discharge from an onsite treatment system which processes contaminated stormwater or groundwater by aeration, separation and skimming of oil before discharge to the city sewer system. In addition, the Passyunk Plant has an internal sanitary sewer system, which connects to the main sewer line on Passyunk Avenue; and an independent stormwater sewer system, which drains in the opposite direction towards an outfall on the Schuylkill river (see Stormwater Management, below). Finally, a minor water supply line also feeds several buildings within the facility.	No new water or wastewater connections or permits are expected to be required.	No new environmental impacts are expected.	No regulatory impacts are expected.
Stormwater Management EIS Section 4.0	Several PWD accounts are listed for the Site: <ul style="list-style-type: none"> • 043-88350-02339-D04 – 2399 S 28th Street • 043-63240-03001-004 – 3001 W. Passyunk Avenue • 043-88350-02499-D02 – 2499 S. 28th Street • 043-88350-02399-D05 – 2399 S. 28th Street In addition, the facility is regulated under the PAG-03 general permit number PAR900024 for discharges of stormwater associated with industrial activities. There is one discharge point identified (Outfall 001).	The total approximate 2.6 million sf site has an impervious coverage of approximately 33 percent and an independent stormwater sewer system drains in the direction of the Schuylkill River, at Outfall number 001.	Limits of disturbance for the expansion project are expected to be in the range of 100,000 sf in the project's two phases, and that new impervious areas will constitute 30 to 40 percent of that figure.	Additional stormwater runoff would be generated.	Additional stormwater approvals will be required prior to approval of construction plans by PWD and PADEP. The submission and review processes for each of these two agencies will be respectively, the PWD Plan Review process and the PADEP NPDES permit application process for construction activities.
Hazardous and Non-Hazardous/Residual Waste EIS Section 5.0	Hazardous Waste Generator EPA ID: PAD000620518 Hazardous Waste Generator Status: SQG	The Passyunk Plant typically generates between 220 and 2,200 pounds of hazardous waste per calendar month and is therefore classified as a Small Quantity Generator (SQG).	The proposed liquefaction enhancement project is not expected to significantly change current waste streams.	No environmental impacts resulting from generation of hazardous or non-hazardous residual waste are anticipated for the proposed liquefaction enhancement project.	No regulatory impacts resulting from generation of hazardous or non-hazardous residual waste are anticipated for the proposed liquefaction enhancement project.

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Environmental and Regulatory Impacts Summary
Philadelphia Gas Works - Passyunk Plant
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Environmental Impacts Summary Table - PGW Passyunk Plant Liquefaction Enhancement Project - Environmental Impact Survey - September 2018

Environmental Media	Active Environmental Permits	Summary of Current Conditions	Summary of Proposed Changes	Summary of Environmental Impacts	Summary of Regulatory Impacts
<p align="center">Natural and Cultural Resources EIS Section 6.0</p>	<p>None currently exist.</p>	<p>The Passyunk Plant is located on the Lower Schuylkill River watershed, in an area of the city that has been industrialized for two centuries. Because of the site's long historical industrial use, the majority of the site surface is covered in pavement or gravel, and significant vegetated areas are not present.</p> <p>No natural areas, historic sites, wetlands, or FCC/FAA sites were identified onsite. The western edge of the site is contained within the FEMA 100-year flood zone for the area, and the site's northwest corner is contained within the FEMA 500-year flood zone.</p> <p>Potential threatened and endangered species might be present nearby, however located away from the project area.</p>	<p>No changes are proposed to alter any of the natural resources or historic resources within or near the site.</p>	<p>No natural or historic resource impacts are expected to occur as part of the project.</p>	<p>If the scope of the project changes and gets closer to the banks of the Schuylkill River, additional natural resource coordination for the potential presence of threatened or endangered species might be required.</p>

PGW Passyunk Plant

Table 2-1. Stationary Sources Emissions Summary (Pre-Construction)

Source #	Source Type	Equipment Rating	Unit of Measurement	Fuel Type	Oxides of Nitrogen (NOx) Potential to Emit (tons per year)	Oxides of Nitrogen (NOx) 2017 Actual Emissions (tons per year)	Carbon Monoxide (CO) Potential to Emit (tons per year)	Carbon Monoxide (CO) 2017 Actual Emissions (tons per year)
24	CAT Emergency Generator	1,250	HP	Diesel	7.500	0.100	1.719	0.021
26	Nebraska Boiler	58.28	mmBTU/hr	NG	12.513	0.815	21.022	0.685
27	Nebraska Boiler	58.28	mmBTU/hr	NG	12.513	0.439	21.022	0.006
28	Nebraska Boiler	58.28	mmBTU/hr	NG	12.513	1.003	21.022	0.842
29	Firewater Pump	890	HP	Diesel	5.340	0.544	1.224	0.117
30	Onan Emergency Generator	87	HP	Diesel	0.674	0.060	0.145	0.013
31	Cummins Emergency Generator	107	HP	Diesel	0.829	0.030	0.179	0.007
32	Kohler Emergency Generator	460	kW	Diesel	14.627	0.121	2.660	0.026
					66.509	3.112	68.993	1.717

Notes:

1. Potential to Emit (PTE) for all sources except for the Cummins Emergency Generator (Source #31) are presented as provided in the July 23, 2015 Synthetic Minor Operation Permit Application
2. PTE for the Cummins Emergency Generator = Engine rating (107 hp) * AP-42 Ch. 3.3 Emission Factor (0.031 lb/hp-hr) * (500 hrs/yr) * (1 ton/2,000 lbs)
3. Actual emissions for all sources are shown as reported in the 2017 Emissions Inventory submitted to Philadelphia AMS on February 27, 2018.

PGW Passyunk Plant

Table 2-2. Stationary Sources Emissions Summary (Post-Construction)

Source #	Source Type	Equipment Rating	UOM	Fuel Type	Oxides of Nitrogen (NOx) Potential to Emit (tons per year)	Oxides of Nitrogen (NOx) Post-Construction Anticipated Actual Emissions (tons per year)	Carbon Monoxide (CO) Potential to Emit (tons per year)	Carbon Monoxide (CO) Post-Construction Anticipated Actual Emissions (tons per year)
24	CAT Emergency Generator	1,250	HP	Diesel	7.50	0.10	1.72	0.02
26	Nebraska Boiler	58.28	mmBTU/hr	NG	12.51	1.16	21.02	0.98
27	Nebraska Boiler	58.28	mmBTU/hr	NG	12.51	0.67	21.02	0.01
28	Nebraska Boiler	58.28	mmBTU/hr	NG	12.51	1.35	21.02	1.13
29	Firewater Pump	890	HP	Diesel	5.34	0.54	1.22	0.12
30	Onan Emergency Generator	87	HP	Diesel	0.67	0.06	0.15	0.01
31	Cummins Emergency Generator	107	HP	Diesel	0.83	0.03	0.18	0.01
32	Kohler Emergency Generator	460	kW	Diesel	14.63	0.12	2.66	0.03
TBD	Regeneration Heater	2,155	scfh	NG	0.94	0.94	0.79	0.79
					67.45	4.98	69.79	3.10

Notes:

1. Due to expected increase in vaporization, actual emissions for Nebraska Boilers (Sources 26, 27, and 28) were calculated based on an overall increase of 20,850 Mscf of gas in one 12-month period. It is assumed this natural gas will be divided among the three boilers.
2. All emission sources except for the Nebraska boilers and the new regenerative heater are assumed to have the same emission totals as reported in the Passyunk Plant's 2017 Emissions Inventory.
3. Nebraska Boiler Source #26 and #28 Anticipated Actual Emissions = AP-42 Ch. 1.4 Emission Factor (lb of pollutant/10⁶ scf) * [2017 Natural Gas Usage (Mscf/yr)+ 6,950 (Mscf/yr)] * (1000 scf/Mscf) * (1 ton / 2,000 lbs)
4. Nebraska Boiler Source #27 Anticipated Actual Emissions = Stack Test Data Emission Factor (lb of pollutant/10⁶ scf) * [2017 Natural Gas Usage (Mscf/yr)+ 6,950 (Mscf/yr)] * (1000 scf/Mscf) * (1 ton / 2,000 lbs)
5. Regeneration Heater PTE = AP-42 Ch. 1.4 Emission Factor (lb of pollutant/10⁶ scf) * (2,155 scf/hr) * (1 ton / 2,000 lbs) * (8,760 hrs/yr)
6. Regeneration heater anticipated actual emissions is conservatively assumed to be the same as the potential to emit.
7. The Regeneration Heater requires an installation permit from AMS prior to construction. After the installation permit is authorized, the heater will be added to the SMOP with a new Source ID after the next renewal application is submitted.

PGW Passyunk Plant

Table 2-3. Increase in Emissions and Projected Total Emissions (Post-Construction)

Total Passyunk Plant Emissions (tons/year) - 3100 W. Passyunk Avenue		
	NOx	CO
Current Passyunk Plant 2017 Emissions	3.11	1.72
"Delta" - Increase in Emissions post-expansion	1.87	1.38
Total Post-Expansion Projected Emissions	5.0	3.1

ENVIRONMENTAL REVIEW
PHILADELPHIA GAS WORKS
PASSYUNK PLANT
October 19, 2018
Langan Project Number 220115601