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Biological Assessment

Rohm and Haas Texas, Incorporated

A Wholly Owned Subsidiary of the Dow Chemical Company

Boiler House Unit Installation Project

Deer Park, Harris County, Texas

Prepared for:

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Executive Summary

Rohm and Haas Texas, Incorporated (Rohm and Haas), a Wholly Owned Subsidiary of the Dow Chemical Company, owns a chemical manufacturing facility in Deer Park, Harris County, Texas. The Rohm and Haas Deer Park Operations Site (DPO Site) produces acrylic acid, methacrylic acid, methyl methacrylate, alkyl amines, and sulfuric acid (Dow Chemical Company, L.P. 2013).

Rohm and Haas proposes to install two new gas-fired steam boilers (EPN: BH2-5 and EPN: BH2-6) and associated equipment within the existing Boiler House Unit; which is operated under New Source Review (NSR) Permit No. 2165. The two new boilers will be constructed within the existing plant footprint for the purpose of maintaining a reliable steam supply that will allow planned maintenance to be performed on steam producing equipment without sacrificing peak steam production. Rohm and Haas has determined that the proposed project will require a Prevention of Significant Deterioration (PSD) permit issued by the U.S. Environmental Protection Agency (U.S. EPA) for Greenhouse Gas (GHG) emissions.

Rohm and Haas has retained the services of URS Corporation (URS) to prepare a Biological Assessment (BA) to evaluate the proposed project site for federally-protected threatened and endangered (T&E) species and/or their potential habitat and to provide an evaluation of the project's likelihood to jeopardize the continued existence of listed species. This BA includes a pedestrian protected species habitat evaluation of the DPO Site property and an evaluation of potential environmental impacts based on ground disturbing activities from construction and operation of the project and air quality dispersion modeling results.

Rohm and Haas completed detailed pollutant emission calculations for the project in accordance with the Air Permit Application requirements. URS performed dispersion modeling of air pollutants that will be emitted by the proposed project in accordance with the PSD Permit requirements. Dispersion models indicate that when the new boiler is operational, concentrations of all regulated constituents will be below significant impact levels (SIL) outside the fence line of the DPO Site.

The Action Area of potential impact has been defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" according to federal regulation (50 CFR 402.2). For the proposed project, the Action Area includes impacts by ground disturbance and changes in air quality resulting from the

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construction and operation of the boilers and associated appurtenances. The total Action Area is approximately 6.87 acres and includes three separate areas:

1) **Boiler Site** – The boilers will be constructed on an approximate 0.93-acre block within the DPO Site. The project includes the installation of the two new boilers and associated appurtenances. In addition, an associated control room will be constructed on an approximate 0.14-acre area northwest adjacent to the proposed boilers.

2) **Construction Laydown Area** – Rohm and Haas will utilize a temporary laydown area consisting of approximately 3.17 acres in close proximity to the boiler construction area during construction of the proposed project. This area has been previously disturbed.

3) **SIL Exceedance Area** - Areas where criteria air pollutants exceed SIL. Air dispersion modeling identified $PM_{2.5}$ to be at levels above the SIL within a 2.63-acre area located within the DPO Site on maintained grass (Figure 3).

The proposed project will not result in a change of the volume or chemical composition of wastewater effluent from the DPO Site; therefore, the Action Area does not include any effluent discharge areas with the DPO Site's receiving body of water, the Houston Ship Channel. In addition, no new linear facilities will be installed for the project; construction and operation of the proposed project will use existing pipelines, utilities, and roadways.

There will be no direct permanent effects to protected species from the construction of the new boilers and associates structures; there is no suitable habitat in the areas proposed for new construction of the project. No indirect impacts resulting from air emissions on protected species and their habitats are anticipated.

Based on the information gathered for this BA, URS recommends the following determinations:

Protected Species	USFWS Classification- Reason for Evaluation	Determination of Effect
Federal List of T&E Species		
Texas Prairie Dawn	Endangered	No effect
West Indian Manatee	Endangered	No effect
NOAA List of T&E Species		
Blue Whale	Endangered	No effect
Finback Whale	Endangered	No effect
Humpback Whale	Endangered	No effect
Sei Whale	Endangered	No effect

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Protected Species	USFWS Classification- Reason for Evaluation	Determination of Effect
Sperm Whale	Endangered	No effect
State-Recognized List of Federal T&E Species		
Green Sea Turtle	Threatened	No effect
Atlantic Hawksbill Sea Turtle	Endangered	No effect
Kemp's Ridley Sea Turtle	Endangered	No effect
Leatherback Sea Turtle	Endangered	No effect
Loggerhead Sea Turtle	Threatened	No effect
Whooping Crane	Endangered	No effect
Red-cockaded Woodpecker	Endangered	No effect
Red Wolf	Endangered	No effect
Louisiana Black Bear	Threatened	No effect
Smalltooth Sawfish	Endangered	No effect
Houston Toad	Endangered	No effect

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1.0 Introduction

Rohm and Haas Texas, Incorporated (Rohm and Haas), a Wholly Owned Subsidiary of the Dow Chemical Company, owns a chemical manufacturing facility in Deer Park, Harris County, Texas (Figure 1). The Rohm and Haas Deer Park Operations Site (DPO Site) produces acrylic acid, methacrylic acid, methyl methacrylate, alkyl amines, and sulfuric acid (Dow Chemical Company, L.P. 2013). The property is divided into North Plant and South Plant (Figure 2). North Plant consists of the chemical manufacturing equipment, and South Plant consists primarily of utility equipment. Rohm and Haas proposes to install two new gas-fired steam boilers (EPN: BH2-5 and EPN: BH2-6) and the associated piping and equipment within the existing Boiler House Unit located at South Plant. Rohm and Haas operates the Boiler House Unit under New Source Review (NSR) Permit No. 2165

The two new boilers will be constructed within the existing plant footprint for the purpose of maintaining a reliable steam supply that will allow planned maintenance to be performed on steam producing equipment without sacrificing peak steam production. Rohm and Haas has determined that the proposed project will require a Prevention of Significant Deterioration (PSD) permit issued by the U.S. Environmental Protection Agency (U.S. EPA) for Greenhouse Gas (GHG) emissions.

Rohm and Haas has retained the services of URS Corporation (URS) to prepare a Biological Assessment (BA) to evaluate the proposed project site for federally-protected threatened and endangered (T&E) species and/or their potential habitat and to provide an evaluation of the project's likelihood to jeopardize the continued existence of listed species.

1.1 Project Location

The DPO Site South Plant is located approximately 0.4 miles northwest of the intersection of State Highway 134 and State Highway (SH) 225 and 2.8 miles southeast of the intersection at East Sam Houston Tollway and SH 225 in Deer Park, Harris County, Texas (Figure 1). The site is located on the La Porte United States Geological Survey (USGS) Quad, at 29.72897° north latitude and -95.09914° west longitude. The Boiler House Unit is located on the eastern property boundary adjacent to a landfill owned and operated by Clean Harbors Waste Management.

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1.2 Project Purpose

The proposed project is part of Rohm and Haas' plan to maintain a reliable steam supply as well as efficiently burn absorber off-gas (AOG) from the N-Area Unit, located just west of the Boiler House Unit (Figure 2). The construction of additional boilers and associated process equipment will allow maintenance on steam producing equipment to be performed without sacrificing peak steam production.

1.3 Process and Operations

The role of the boiler is to produce steam. Water is fed through the boiler tubes where it is heated to a specific temperature. This is accomplished by using natural gas or a combination of natural gas and AOG from the N-Area Unit. Through this process, each boiler can produce approximately 600 pounds of steam for manufacturing facilities within the DPO Site. The combusted gases from the boiler are fed through a Selective Catalytic Reduction (SCR) system where nitrogen oxide (NOx) emissions are reduced. The gas stream then travels through an economizer that uses heat from the combusted gases to increase the temperature of the water from the deaerator; which is sent to the boiler as feedwater. Gas steam is emitted from the boiler stack. A detailed list of the necessary components for this process is provided below.

The Boiler House Unit installation project will include installation of the following equipment:

- (2) New gas-fired steam boilers;
- (2) One economizer per boiler;
- (2) One ammonia injection grid per boiler;
- (2) One SCR system per boiler;
- (2) One forced draft fan per boiler;
- (2) One emissions stack per boiler;
- (1) Deaerator;
- (3) Boiler feedwater pumps;
- (2) Fuel knock out drums;
- (1) A back-up instrument air system;
- (1) A new potable water system;
- (1) A condensate blowdown system;
- (1) A new control building; and
- (1) A new motor control center/substation.

Existing utilities including plant air, nitrogen, process water, demineralized water, potable water, and cooling water will support the project as needed.

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1.3.1 Regulation of Air Quality

The Clean Air Act requires that air quality standards be maintained to protect public health and the environment. These standards are the National Ambient Air Quality Standards (NAAQS) and are regulated by the U.S. EPA. Ambient air is the air to which the general public has access, as opposed to air within the boundaries of an industrial facility. The NAAQS are concentration limits of pollutants in ambient air within specific averaging time. The averaging time is the time period over which the air pollutant concentrations must be met to comply with the standard. The NAAQS are classified into two categories: primary and secondary standards. Primary standards are set to protect public health, including "sensitive" populations. Secondary standards are set to protect public welfare, including the environment.

The Clean Air Act also requires the U.S. EPA to establish regulations to prevent significant deterioration of air quality in attainment areas. PSD permits are required for major sources of GHGs. The U.S. EPA established PSD Increments to satisfy this requirement. A PSD Increment is a measure of the maximum allowable increase in ambient air concentrations of a criteria pollutant from a baseline concentration after a specified baseline date. A significant impact level (SIL) is a concentration that represents a *de minimis*, or insignificant, threshold applied to PSD permit applicants. The SIL is a measurable limit above which a source may cause or contribute to a violation of a PSD Increment for a criteria pollutant. Before a PSD permit can be issued, the applicant must demonstrate that the proposed emissions from a project will not cause or contribute to a violation of a NAAQS or to an increase above a PSD Increment for each pollutant emitted in significant amounts by the project.

The U.S. EPA sets NAAQS for six principal air pollutants, also referred to as "criteria air pollutants." The six criteria air pollutants are nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), particulate matter (PM), carbon monoxide (CO), and lead (Pb). A geographic area whose ambient air concentration for a criteria pollutant is equal to or less than the primary standard is an "attainment area." A geographic area with an ambient air concentration greater than the primary standard is a "nonattainment area." A geographic area will have a separate designation for each criteria pollutant.

1.3.2 Emission Controls

The Boiler House Unit Installation Project will include two new fire-gas steam boilers and associated equipment as detailed in Section1.3. Each boiler will be permitted to operate 8,760 hr/yr. During normal operations, these boilers are fueled by either natural gas or a combination

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of natural gas and AOG from the N-Area Unit (Figure 2). During the boilers startup and shutdown activities, and when N-Area Unit is down for maintenance, the boilers will only burn natural gas.

The DPO Site is in a nonattainment area for O_3. The proposed Boiler House Unit installation project will not trigger Nonattainment New Source Review (NNSR) for the O_3 precursors: NOx and volatile organic compounds (VOC). However, the proposed project will trigger PSD review for PM less than 10 microns in diameter (PM_{10}), PM less than 2.5 microns in diameter ($PM_{2.5}$), and CO. In addition, PSD review will be triggered due to the project's proposed increase in GHG emissions by more than 100,000 tons per year on a carbon dioxide equivalent (CO_2e) basis. A CO_{2e} is a metric measure that is typically used to compare the emissions from GHG based upon global warming potential (GPW) as defined by U.S. EPA (2013a). This value is derived by multiplying the tons of the gas by the associated GPW.

The GHG emissions from the proposed Boiler House Unit will include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHG emissions are calculated from the following sources for the proposed project: boilers and fugitive emissions from piping components in GHG service.

Per 30 TAC §116.111(a)(2)(c), new or modified facilities must utilize Best Available Control Technology (BACT), with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility.

Rohm and Haas will utilize BACT to control emissions from the project and thus minimize impacts to the surrounding environment to the maximum extent practicable. Rohm and Haas have selected Texas Commission on Environmental Quality (TCEQ) BACT guidance for each of the criteria pollutants. Details of the selection can be found in the TCEQ and U.S. EPA permit applications for this project: TCEQ Permit #2165; U.S. EPA application submittal date October 26, 2012 for Rohm and Haas, Boiler House Unit; U.S. EPA Permit PSDTX1320. The following control technologies were identified for potential control options for gas fired boilers:

- Use of low carbon gaseous fuel;
- Use of good combustion practices;
- Energy efficiency; and

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Low Carbon Gaseous Fuel

CO_2 is a product of combustion generated with any carbon-containing fuel. The preferential use of gaseous fuels such as natural gas or AOG is a method of lowering CO_2 emissions versus use of solid or other fuels available at the Rohm and Haas site. Rohm and Haas proposes to use natural gas or a combination of natural gas and AOG.

Good Combustion Practices

Another opportunity for reducing GHG emissions is good combustion practices, such as proper equipment maintenance and operation. Rohm and Haas will incorporate the following practices as recommended by the boiler manufacturer:

- periodic burner tuning;
- good fuel/air mixing in combustion zone;
- proper fuel gas supply system design and operation to minimize instability of fuel gas during load changes; and
- sufficient excess air for complete combustion.

Using good combustion practices results in longer life of the equipment and more efficient operation. Because CO_2 emissions are a direct result of the amount of fuel fired (for a given fuel), a more efficient process requiring less fuel can result in fewer GHG emissions.

Energy Efficiency

CO_2 emissions are inversely proportional to boiler efficiency. As the efficiency improves, less fuel is consumed and less CO_2 emitted. The following factors commonly affect boiler efficiency:

- Excess Air – Boiler efficiency decreases as the amount of air beyond stoichiometric combustion, or excess air, increases. The effect of excess air on boiler efficiency is due to nitrogen in the air that absorbs heat from the combusted fuel. The amount of excess air required is a function of boiler load, rate of change of boiler load, fuels being burned and burner design. Some excess air must be present to effectively combust the fuel. When there is insufficient air present to react with the fuel, partially oxidized fuel will be present. Partially oxidized fuel creates an unsafe condition when mixed fresh air. The mixed fuel can ignite creating a deflagration or boiler explosion. Partially oxidized fuel can also produce air pollutants in the form of CO and organic carbons that did not fully oxidize to CO_2.

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- Air Temperature – Boiler efficiency is relative to an arbitrary air temperature, typically 80°F. Efficiency increases at temperatures above this point and decreases when temperatures are colder.
- Exit Flue Gas Temperature – The lower the temperature of flue gas leaving the boiler system, the more heat has been extracted and the higher the efficiency. Heat transfer equipment such as an economizer can transfer heat from the flue gases to preheat boiler feedwater. However, as heat is recovered and flue gas temperature drops, moisture in the flue gas begins to condense and combine with sulfates present in the flue gas. The sulfates combine with the moisture to create corrosive acids which destroy the heat exchange equipment, ductwork, and/or stack. Therefore, boiler manufacturers design the boiler system to limit the Exit Flue Gas Temperature. A typical limit is 280°F at full design capacity when burning natural gas.
- Fuel Composition –Boiler efficiency decreases as percentage of AOG used as fuel because of the hydrogen and nitrogen present in AOG. Latent heat is absorbed resulting in a constant temperature, and sensible heat is absorbed resulting in a temperature change. The nitrogen in the AOG fuel degrades boiler efficiency because both the latent and sensible heat utilized in the process, if not transferred to the steam, is lost to atmosphere. The AOG also contains a significant amount of nitrogen. The sole combustion of AOG produces little GHG; however, the AOG must be co-fired with natural gas for safe effective combustion.
- Boiler Burner Tune-Ups –Although boiler tune-ups cannot directly quantify efficiency improvements, periodic boiler tune-ups such as checking fuel/air mixing in combustion zone can aid in optimizing boiler performance. This was discussed in detail above as Good Combustion Practices.

Carbon Capture and Storage

CO_2 capture and storage (CCS) is a relatively new concept. In its March 2011 PSD and Title V Permitting Guidance for GHGs, U.S. EPA takes the position that, "for the purpose of a BACT analysis for GHGs, U.S. EPA classifies CCS as an add-on pollution control technology that is 'available' for facilities emitting CO_2 in large amounts, including fossil fuel-fired power plants, and for industrial facilities with high-purity CO_2 streams (e.g. hydrogen production, ammonia production, natural gas processing, ethanol production, ethylene oxide production, cement production, and iron and steel manufacturing). For these types of facilities, CCS should be listed in Step 1 of a top-down BACT analysis for GHGs".

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These emerging CCS technologies generally consist of processes that separate CO_2 from combustion process flue gas, compression of the separated CO_2, transportation via pipeline to a site for injection and then inject it into geologic formations such as oil and gas reservoirs, un-mineable coal seams, and underground saline formations. Of the emerging CO_2 capture technologies that have been identified, only amine absorption is currently commercially used for state-of-the-art CO_2 separation processes. Amine absorption has been applied to processes in the petroleum refining and natural gas processing industries and for exhausts from gas-fired industrial boilers. Other potential absorption and membrane technologies are currently considered developmental.

1.3.3 Water Use

Battleground Water, a partnership that is made up of several companies in the area, provides process water to the DPO Site. Battleground Water receives Trinity River Water via the Coastal Industrial Water Authority (CIWA) water header. Dow is a majority owner that operates and maintains the water plant. It is comprised of clarifiers, gravity sand filters, and a clear well with distribution pumps. Dow receives filtered CIWA water and polishes it to deionized (DI) water standards to be used as boiler feed water.

Rohm and Haas does not anticipate that an increase in water use will result from the proposed project, which is intended to generate the same volume of steam that is currently produced at the facility. Water use may decrease due to the newer technology within the equipment. Rohm and Haas will be capable of reducing some of the steam venting across the site by running the boilers at a lower rate during lower demand periods.

1.3.4 Wastewater

Wastewaters generated from the proposed boilers will flow through the surface water system into an existing DI pond before treatment in the West Wastewater Treatment Plant (WWTP), a sludge biological wastewater treatment system which discharges through a diffuser at Outfall 001 into the Houston Ship Channel Tidal. Outfall 1 is an 18'' subsurface pipe located approximately 500 feet north of the Rohm and Haas property boundary that discharges treated wastewater and untreated utility water through a diffuser into the Houston Ship Channel.

The purpose of the project is to sustain a reliable steam supply, even during maintenance on steam producing equipment. Proposed project operations are projected to produce the same volume of steam that is currently produced at the facility; therefore, total boiler blowdown is not

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expected to significantly increase from the current boiler rates. The boilers will have a steaming rate of 2% and are anticipated to discharge approximately 8.5 thousand pounds per hour (tph) of boiler blowdown, which is similar to boilers that are currently in use at the facility.

The DPO Site is currently subject to effluent limitations and monitoring requirements as described in the Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0000458000, issued in 2011. Water quality at the outfall is currently maintained within all regulated limits. The proposed water discharge will be subject to these permit limitations. No TPDES permit revisions will be required as a result of the proposed boilers. The levels of permitted chemical concentrations discharged from the affected effluent into the Houston Ship Channel are not expected to change and will remain below the TPDES limitations set forth in TPDES Permit No. WQ0000458000, as amended**.** The proposed project will not result in a change of the volume, temperature, chemical composition, or potential toxicity of wastewater effluent from the DPO Site; therefore, the Action Area does not include any effluent discharge areas with the DPO Site's receiving body of water, the Houston Ship Channel.

Rohm and Haas will develop a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the project. Best Management Practices (BMPs) will be utilized in accordance with Section 401 of the Clean Water Act, Chapter 279 of the Texas Water Code, and as prescribed in the Rohm and Haas SWPPP. Runoff from within the site is directed through a series of onsite ditches and weirs before discharged through permitted outfalls. Additional erosion control measures (silt fence, sandbags) may be used if excess erosion and/or sedimentation are observed during the construction phases. If ancillary areas are disturbed in support of the construction project, structural controls may be used to protect surrounding areas from impacted surface runoff. Re-vegetation is not a concern since the site is a heavy industrial site consisting of gravel or concrete-paved surfaces.

Rohm and Haas will develop a Spill Prevention, Control, and Countermeasure (SPCC) Plans for operation and provide implementation training to plant and contractor employees.

1.3.5 Noise Levels

Rohm and Haas engineers estimate that the proposed project will not produce increased noise levels during construction compared to noise levels from maintenance activities that currently take place at the plant. Any equipment louder than 90 decibels will be evaluated on a case-by-case basis.

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1.4 Construction

The new boilers will be constructed northeast of the existing Boiler House Unit on an approximately 0.93-acre site. The proposed project will expand the Boiler House Unit boundary to encompass approximately 11-acres (Figure 2). Construction of the Boiler House Unit installation project is scheduled to start in September 2014. The new boilers are expected to be operational by September 2015.

Boilers

Project construction will consist of site preparation, boiler installation, and control room construction. The ground surface of the boiler construction area is comprised of concrete, caliche, or previously disturbed soils. All utility pipelines will be tied into existing features used for unit operations. The ground surface of the control room construction is located on a previously disturbed grassy area northwest adjacent to the proposed boilers.

Construction Equipment

Equipment required to complete the proposed boiler construction activities is roughly estimated to include the following for the listed time periods.

- 16 Cranes – 52 weeks
- 20 Welding Machines – 48 weeks
- 6 Fork Trucks – 52 weeks
- 2 Man Lifts – 52 weeks
- 8 Air compressors – 52 weeks
- 2 Excavators – 16 weeks
- 2 Back Hoes – 16 weeks
- 2 Cement Pump Trucks – 8 weeks
- 10 Pick Up Trucks – 52 Weeks
- 8 Gator Personnel Vehicles – 48 weeks

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Construction Laydown Areas

During construction of the proposed project, Rohm and Haas will utilize a temporary laydown area, located primarily within the same paved area as the boilers (Figure 2). This area is currently a concrete-paved area for contractor trailers with a small maintained grass area to the east. Two electrical substations are located within the grassed area. The contractor trailers will be removed prior to the start of construction. The construction laydown area will utilize the southern and eastern 2.7-acre area of existing concrete surface.

1.5 Purpose of the BA

The purpose of this BA is to evaluate and document the potential for the proposed project and its interdependent and interrelated actions to have a direct, indirect, or cumulative effect on any federally-protected species. Specifically, the BA considers potential temporary impacts from construction activities and permanent impacts from any additional emissions and water discharges that may result from a project. An Action Area of potential impact has been defined and is shown in Figure 3. This BA includes a pedestrian protected species habitat evaluation of the Action Area. This evaluation of potential environmental impacts is based on total emissions, dispersion modeling data, background review data collected, literature review, and research of potential effects of known pollutants on flora and fauna.

The conclusion of this BA will include a recommended determination of effect on each listed federally-protected species and its habitat. Three possible determinations offered by the U.S. Fish and Wildlife Service (USFWS) and National Oceanographic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS)for the purpose of Biological Assessments and Evaluations are described below.

1. No effect – A "no effect" determination means that there are absolutely no effects from the proposed action, positive or negative, to listed species. A "no effect" determination does not include effects that are insignificant (small in size), discountable (extremely unlikely to occur), or beneficial.

2. May affect, not likely to adversely affect – A "may affect, not likely to adversely affect" determination may be reached for a proposed action where all effects are beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat (i.e., there cannot be a "balancing," where the benefits of the proposed action would be expected to outweigh the adverse

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effects – see below). Insignificant effects relate to the size of the effects and should not reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur.

3. May affect, likely to adversely affect - A "may affect, likely to adversely affect" determination means that all adverse effects cannot be avoided. A combination of beneficial and adverse effects is still "likely to adversely affect" even if the net effect is neutral or positive.

1.6 Action Area

According to federal regulation (50 CFR 402.2), the Action Area of potential impact has been defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For the proposed project, the Action Area includes impacts by ground disturbance and changes in air quality resulting from the construction and operation of the boilers and associated appurtenances. The total Action Area is approximately 6.87 acres and includes three separate areas:

4) **Boiler Site** – The boilers will be constructed on an approximate 0.93-acre block within the DPO Site. The project includes the installation of the two new boilers and associated appurtenances. In addition, an associated control room will be constructed on an approximate 0.14-acre area northwest adjacent to the proposed boilers.

5) **Construction Laydown Area** – Rohm and Haas will utilize a temporary laydown area consisting of approximately 3.17 acres in close proximity to the boiler construction area during construction of the proposed project. This area has been previously disturbed.

6) **SIL Exceedance Area** - Areas where criteria air pollutants exceed SIL. Air dispersion modeling identified $PM_{2.5}$ to be at levels above the SIL within a 2.63-acre area located within the DPO Site on maintained grass (Figure 3).

The proposed project will not result in a change of the volume or chemical composition of wastewater effluent from the DPO Site; therefore, the Action Area does not include any effluent discharge areas with the DPO Site's receiving body of water, the Houston Ship Channel. No new linear facilities will be installed for the project; construction and operation of the project will use existing pipelines, utilities, and roadways.

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The analysis of protected species likely to be affected by the proposed project focused on impacts within the Action Area. Land use and plant community types within the Action Area include process areas (fill or concrete) and maintained (mowed) grasses. A significant portion of these habitats have historically been constructed, manipulated, or otherwise previously impacted by industrial activities.

1.6.1 Potential Impacts from Construction

The following information was considered for this analysis regarding threatened and endangered species that may be affected by the proposed project: consultations with USFWS, Texas Parks and Wildlife Department (TPWD), NOAA, and NMFS-Galveston; review of available lists and databases of protected species and habitats, including TPWD's Texas Natural Diversity Database (TXNDD); TPWD's Ecologically Significant Stream Segments; NOAA's Sea Turtle Stranding and Salvage Network (STSSN); and U.S. Army Corps of Engineers' (USACE) Sea Turtle Data Warehouse.

The operation of the new boilers has the potential to impact local air quality due to increased air emissions. The potential for these increases in emissions to impact listed species was assessed through the interpretation of SIL modeling under U.S. EPA standards coupled with species occurrence data and assessment of potential habitat for each species of concern.

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2.0 Existing Conditions

2.1 General Environmental Information

This section provides applicable environmental characteristics for the general region in which the project is located.

2.1.1 General Region Information

The proposed project is located within Harris County and within Major Land Resource Area (MLRA) 150A, the Gulf Coast Prairies ecoregion.

MLRA 150A

Harris County is located within the Gulf Coast Prairies eco-region of Texas, which is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain (USDA-NRCS 2006). Natural grass prairies with hardwood trees originally dominated this MLRA with spots of vegetation such as little bluestem, Indiangrass, switchgrass, and big bluestem. This vegetative community supported local populations of white-tail deer, raccoons, opossums, rabbits, fox, coyotes, and other small mammals as well as migratory waterfowl. Now the area primarily is dominated by grassland vegetation. Some of the major wildlife species supported in the area include white-tailed deer, alligator, javelina, jackrabbit, cottontail, bobwhite quail, ducks, and geese.

2.1.2 Air Quality

Air quality in the area is affected by a high density of industrial facilities and population. The proposed project will be located in a nonattainment area for O_3. Nonattainment areas are locations designated by U.S. EPA where ground-level concentrations of regulated constituents persistently exceed the NAAQS.

2.1.3 Land Use

According to the USGS (2013), land use within the Action Area is designated as developed land and bare land. Small areas in the southern portions of the DPO Site property are identified as forested woodlands, agricultural vegetation, and recently disturbed or modified areas; however these areas are not located within the defined Action Area.

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2.1.4 Climate

According to the World Media Group (2013), mean annual precipitation in Harris County is approximately 50 inches. The annual average low temperature is 53°F, and the annual average high temperature is 84°F. Prevailing winds are from the south with an average speed of 12 miles per hour. Average humidity is 74 percent.

2.1.5 Topography

The topography of the proposed project site is flat and located adjacent to the Houston Ship Channel. The elevation of the project site is approximately 20-25 feet above mean sea level (Figure 4). Drainage is generally to the north into Houston Ship Channel via its tributaries.

According to the Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM) Community Panel Number 48201C0930L, the proposed boiler construction site is located outside of the designated 100-year floodplain (FEMA 2012). Adjacent tributaries of Houston Ship Channel near the DPO Site are located in the FEMA 100-year floodplain (Figure 5).

2.1.6 Geology

The specific geologic formation found in the proposed project site is the Beaumont formation, (Qb) (USGS 2013). The Beaumont Formation consists mostly of clay, silt, and sand and includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits. Concretions of calcium carbonate, iron oxide, and iron manganese oxides can be found in the zone of weathers. The surface is almost featureless and is characterized by relict river channels shown by meandering patterns and pimple mounds on meander-belt ridges. These are typically separated by acres of low, relatively smooth, featureless backswamp deposits without pimple mounds with a thickness +/- 100 feet.

2.1.7 Soils

The U.S. Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS 2004) soil units mapped within the proposed project areas are listed and described in the following table.

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Table 1 -USDA NRCS Soil Units for Harris County

NRCS Map Unit Symbol	NRCS Map Unit Name	USDA Classification			NRCS Hydric Soil
		Depth (in.)	Drainage	Permeability	
Ba	Beaumont clay	0-9 9-21 21-59 59-73	Poorly Drained	Very Slow	Partially Hydric
Bc	Beaumont-Urban land complex	0-9 9-21 21-59 59-73	Poorly Drained	Very Slow	Partially Hydric
Be	Bernard-Edna complex	0-6 6-34 34-65	Somewhat Poorly Drained	Very Slow	Partially Hydric
Is	Ijam soils	0-8 8-60	Poorly Drained	Very Slow	Partially Hydric
LcA	Lake Charles clay (0-1% slopes)	0-10 10-22 22-74 74-80	Moderately Well Drained	Very Slow	Not Hydric
LcB	Lake Charles clay (1-3% slopes)	0-10 10-22 22-74 74-80	Moderately Well Drained	Very Slow	Not Hydric
Md	Mocarey-Leton Complex	0-7 7-20 20-72	Somewhat Poorly Drained	Very Slow	Partially Hydric
Ur	Urban land	0-40	-	Very Slow	Not Hydric
W	Water	-	-	-	-

2.1.8 Water Resources

The DPO Site is located within the Buffalo-San Jacinto Watershed (Hydrologic Unit Code [HUC] 12040104) and is bordered by the West Galveston Bay Watershed to the south, North Galveston Bay Watershed to the east, West Fork San Jacinto Watershed to the north, and Austin-Oyster Watershed to the west (U.S. EPA 2013b).

The National Wetlands Inventory (NWI) indicates the presence of deep estuarine and marine water features immediately outside and to the east of the DPO Site as well as freshwater emergent and freshwater forested ponds scattered throughout the South Plant. The estuarine and marine deepwater features include the Houston Ship Channel and its tributaries, San Jacinto

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River, and Upper San Jacinto Bay (USFWS 2012a; Figure 6). No wetland areas or open water features were identified within the Action Area.

According to Tricia Campbell from the Galveston District USACE, areas of the Houston Ship Channel from the San Jacinto monument to Beltway 8 are widened and deepened to accommodate the increasing size of maritime vessels every 4 years to maintain a depth of approximately 45 feet (personal communication April 26, 2013). The tidal portion of the Houston Ship Channel, which begins immediately north of the DPO Site, flows into the Gulf of Mexico approximately 40 river miles southwest of the project area. TCEQ has designated the Houston Ship Channel Tidal as a wide tidal river, supporting navigation and industrial water supply. The DPO Site will continue to discharge wastewater to the Houston Ship Channel Tidal (Segment No. 1006), which is on the Section 303(d) state list of impaired stream segments for high levels of bacteria and mercury levels, depressed dissolved oxygen levels, high dioxin and polychlorinated biphenyls (PCB) concentrations in edible tissue, and toxicity in its sediment (TCEQ 2012b).

According to TPWD (2012b), there are no Ecologically Significant Streams near the Action Area as designated under 31 TAC 357.8. The discharge characteristics including flow rate are anticipated to remain unchanged; therefore, the Action Area does not include a dilution plume within the Houston Ship Channel. All construction runoff from the project sites will be mitigated or prevented through BMPs.

2.2 Protected Species

2.2.1 Threatened or Endangered Species List

The USFWS and NOAA-NMFS regulate the Endangered Species Act (ESA) of 1973. “The purpose of the ESA is to protect and recover imperiled species and the ecosystems on which they depend.” Imperiled species specifically include those listed by the USFWS or NOAA-NMFS as threatened or endangered. Candidate species are those “the [US]FWS has enough information to warrant proposing them for listing but is precluded from doing so by higher listing priorities.” Candidate species are not specifically protected by the ESA and will not be included for the purposes of this BA.

Section 9 of the ESA prohibits the “take” of threatened and endangered species. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." “Harm” is defined as “an act which actually kills or injures

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wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

The USFWS lists two threatened or endangered species within the Harris County (USFWS 2013a). These species are Texas prairie dawn (*Hymenoxys texana*) and West Indian manatee (*Trichechus manatus*). NOAA lists an additional ten threatened or endangered species (NOAA 2013a). These species are green sea turtle (*Chelonia mydas*), Atlantic hawksbill sea turtle (*Eretmochelys imbricate)*, Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), blue whale (*Balaenoptera musculus*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). TPWD lists an additional six species with federal threatened or endangered species status as potentially occurring within Harris County (TPWD 2012a): whooping crane (*Grus americana*), red-cockaded woodpecker (*Picoides borealis*), red wolf (*Canis rufus*), Louisiana black bear (*Ursus americanus luteolus*), smalltooth sawfish (*Pristis pectinata*), and Houston toad (*Bufo houstonensis*).

2.2.2 Threatened or Endangered Species Descriptions

Texas Prairie Dawn (*Hymenoxys texana*)

The Texas prairie dawn is federally listed as an endangered species. It is a small, tap-rooted, annual plant with extant populations known only from western Harris County and extreme eastern Fort Bend County, west of the city of Houston, Texas (USFWS 1989, TPWD 2013a). The Texas prairie dawn is found in small, sparsely vegetated areas, described as slick spots, on the lower sloping portion of pimple (mima) mounds or on the level land around the mound's base. The soils that comprise the pimple mounds are sandier than the soils of the surrounding flat areas and are sticky when wet, and powdery when dry. The Texas prairie dawn flowers from late February to early April, and may be the dominant plant in its microhabitat in late winter and early spring. Plants may be senescent during the summer. According to the USFWS recovery plan, the primary threat to the Texas prairie dawn is habitat destruction resulting from housing development and roadway construction in western and northwestern Harris County. USFWS (2013b) has not identified critical habitat for this species.

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West Indian Manatee (*Trichechus manatus*)

West Indian manatees have a large fusiform body that lacks hind limbs or flippers. They are typically light to dark gray or brown in coloration. Calves tend to show darker coloration variation than adults. This herbivorous species has been known to reach 15 feet in length and weigh up to 3,570 pounds (Smithsonian 2006). Diet consists of submerged vascular plants, algae, and seagrasses.

West Indian manatees inhabit shallow, slow-moving riverine, estuarine, bay, salt marsh, and other coastal ecosystems. These habitats can support an abundance of seagrass beds. Manatees are typically found in water depths of approximately 12 feet. West Indian manatees can tolerate a wide range of salinities and regularly seek out fresh water sources (Haubold et al. 2006). This species has a high thermal conductance and is susceptible to cold-related illness. Herds cope by congregating in spring waters, canals, or turning basins that maintain a constant temperature above 72^{o}F. Some manatees have been known to seek refuge near power plants and other industrial sites that release warm-water effluents (Smithsonian 2006).

West Indian manatees become reproductively mature after 3 years of age. Females typically gestate for 11-14 months and produce one calf every 2-3 years. Mating occurs throughout the year with successive copulation.

The West Indian manatee U.S. population is concentrated in Florida. During the summer months, many manatees disperse along the coast to nearby states including but not limited to Alabama, Georgia, North Carolina, Mississippi, Louisiana, and Texas. Recent decreases in population are attributed to poaching and hunting, various human-related activities, habitat loss, and cold-related illness. West Indian manatees have been listed since 1967. A sighting occurred in West Galveston Bay on October 2012 (Houston Chronicle 2012). Another 2012 sighting of a West Indian manatee occurred in September 2012 in Corpus Christi Bay (ABC News 2012). Both sightings were verified by the Texas Marine Mammal Stranding Network. Corpus Christi Bay is approximately 217 river miles southwest of the proposed project site, and West Galveston Bay is approximately 37 river miles downstream of the proposed project site.

Green Sea Turtle (*Chelonia mydas*)

The green sea turtle can grow to 4 feet in length and reported weights vary from 350-850 pounds. The carapace is smooth and keelless, and the color varies with shades of black, gray, green, brown, and yellow. Adults are herbivorous. Hatchlings are omnivorous.

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Green sea turtles occupy three ecosystems according to lifestage: terrestrial zone, neritic zone, and oceanic zone. The terrestrial zone is occupied briefly during nesting and hatching activities. Hatchlings move out to the oceanic zone until their carapace reaches approximately 20-25 centimeters in length. Juveniles and adults primarily occupy benthic feeding grounds in shallow, protected waters. Preferred feeding grounds include pastures of seagrasses and/or algae.

Green sea turtles have a worldwide distribution in tropical and subtropical waters. The nesting season in the southeastern U.S. is June through September. Nesting is nocturnal and occurs in 2, 3, or 4 year intervals. Females nest an average of 5 times per season at 14 day intervals. Hatchlings typically emerge at night. Between 200 and 1,100 females are estimated to nest on U.S. beaches. Nesting occurs on high energy oceanic beaches, primarily on islands with minimal disturbance. Green turtles return to the same nesting site and are known to travel long distances between foraging areas and nesting beaches.

Breeding populations of green sea turtles in Florida and on the Pacific coast of Mexico are federally listed as endangered; all other populations, including those on the Texas coast, are listed as threatened (NMFS-USFWS 1991). Green sea turtles have been observed within Galveston Bay, which is approximately 12 miles downstream of the proposed project area, as recently as 2012. This sea turtle species utilize the area for seasonal foraging (Galveston Bay Estuary Program [GBEP] 2007). NOAA identified critical habitat to include coastal waters surrounding Culebra Island, Puerto Rico (NOAA 1998).

Atlantic Hawksbill Sea Turtle (*Eretmochelys imbricata*)

The USFWS describes the hawksbill sea turtle as a small to medium-sized marine turtle with a reddish-brown carapace. The head is relatively small with a distinctive hawk-like beak. The adult hawksbill sea turtle is commonly 2.5 feet in length and weighs between 95-165 pounds.

Hawksbill hatchlings live in a pelagic environment, specifically in the weedlines that accumulate at convergence zones. Juveniles will return to a coastal environment when their carapace reaches approximately 20-25 centimeters in length. Juveniles and adults will spend most of their time in their primary foraging habitat, coral reefs. The hawksbill sea turtle feeds primarily on sponges.

Hawksbill sea turtle nesting occurs sometime between April and November. Nesting is nocturnal and occurs every 2 to 3 years, 4 to 5 times per season, approximately every 14 days. Preferred nesting habitat includes low and high energy beaches in tropical oceans. Nesting habitat is often shared with green sea turtles. Hawksbill sea turtles can traverse beaches limited to other species

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of sea turtles with their ability to cross fringe reefs. Hawksbill sea turtles have a tolerance for a variety of nesting substrates and often build their nests under vegetation.

The hawksbill sea turtle is found in tropical and subtropical waters of the Atlantic, Pacific, and Indian Oceans. Hawksbill sea turtles are typically associated with rocky areas and coral reefs in water less than 65 feet. Mexico is now considered the most important region for hawksbills in the Caribbean yielding 3,000 to 4,500 nests/year. The hawksbill sea turtle is an occasional visitor to the Texas coast (NMFS-USFWS 1993). Hawksbill sea turtles' favored habitat is coral reefs and coral reefs are not known to occur within Galveston Bay (GBEP 2007). NOAA identified critical habitat to include coastal waters surrounding Mona and Monito Islands, Puerto Rico (NOAA 1998).

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

The Kemp's ridley sea turtle is the smallest of the sea turtles. This species has an olive-gray carapace and a triangular shaped head and a hooked beak. Adults can grow to about 2 feet in length and weigh up to 100 pounds. This turtle is a shallow water benthic feeder with a diet consisting primarily of shrimp, jellyfish, snails, sea stars, and swimming crabs.

Kemp's ridleys, similar to loggerhead sea turtles, occupy three ecosystems according to lifestage: terrestrial zone, neritic zone, and oceanic zone. The terrestrial zone is occupied briefly during nesting and hatching activities. Hatchlings move out to the oceanic zone for an average of 2 years. Juveniles and adults primarily occupy the neritic zone (nearshore marine environment).

Most nesting occurs on the eastern coast of Mexico, however a small number consistently nest at Padre Island National Seashore in Texas and various other locations along the Gulf and lower Atlantic coasts. Nesting occurs from May to July during daylight hours. Large numbers of females emerge for a synchronized nesting event referred to as "arribada". Arribadas are thought to be caused by female pheromone release, offshore winds, and/or lunar cycles. Females nest up to 4 times per season at intervals of 10 to 28 days. The preferred nesting beaches are adjacent to extensive swamps or large bodies of open water.

The Kemp's ridley turtle's range includes the Gulf coasts of Mexico and the US, and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland (NMFS-USFWS and SEMARNAT 2011). Kemp's ridley sea turtles have been observed within Galveston Bay, which is approximately 12 miles downstream of the proposed project site, as recently as 2012; they are known to utilize the area for seasonal foraging (GBEP 2007).

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Leatherback Sea Turtle (*Dermochelys coriacea*)

The leatherback sea turtle is the largest sea turtle. The adult leatherback can get up to 8 feet in length and up to 2,000 pounds. The turtle lacks a traditional turtle shell and is covered by firm, rubbery skin that is approximately 4 inches thick. Coloration is predominantly black with varying degrees of pale spotting; including a notable pink spot on the dorsal surface of the head in adults. Their diet is primarily jellyfish and salp, but it is also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed.

Leatherbacks are highly migratory and the most pelagic of all sea turtles. Females prefer high energy, sandy beaches with vegetation immediately upslope and a shallow sloped beach for nesting. Preferred beaches have deep, unobstructed oceanic access on continental shorelines. In the U.S., nesting occurs from March to July. Females nest on average 6 times per season at 10 day intervals. Most leatherbacks return to their nesting beaches at 2 to 3 year intervals.

Distribution is worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The leatherback is also found in small numbers as far north as British Columbia, Newfoundland, and the British Isles and as far south as Australia and Argentina. The leatherback has a small presence in the U.S. with most nesting occurring on the Florida east coast, Sandy Point, U.S. Virgin Islands, and Puerto Rico (NMFS-USFWS 1992).

Leatherback sea turtles are most commonly found in deep water habitats and are not known to nest in Galveston Bay (USFWS 2012b). Leatherback sea turtles would not be expected to utilize habitat in the vicinity of the project that is approximately 40 river miles upstream of deeper waters in the Gulf of Mexico.

Loggerhead Sea Turtle (*Caretta caretta*)

The loggerhead sea turtle is a reddish-brown marine turtle characterized by a large head with blunt jaws. Adults can be up to 500 pounds and 4 feet in length. Adult loggerheads feed on jellyfish, floating egg clusters, flying fish, mollusks, crustaceans, and other marine animals.

Loggerheads occupy three ecosystems according to lifestage: terrestrial zone, neritic zone, and oceanic zone. The terrestrial zone is occupied briefly during nesting and hatching activities. Hatchlings move out to the oceanic zone until their carapace reaches approximately 40-60 centimeters in length. Juveniles and adults primarily occupy the neritic zone (nearshore marine environment).

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The nesting season in the U.S. is May through August. Nesting occurs every 2-3 years and is mostly nocturnal. Females can nest up to 5 times per season at intervals of approximately 14 days. Hatchling emergence is mostly nocturnal. Loggerheads nest on oceanic beaches between the high tide line and dune fronts and occasionally on estuarine shorelines with suitable sand. Females prefer narrow, steeply sloped, coarse-grained beaches.

Distribution of loggerhead sea turtles includes the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Although the majority (~80%) of the U.S. nesting activity occurs in south Florida, loggerheads nest along the Gulf and Atlantic coastlines from Texas to Virginia. Loggerheads are considered an occasional visitor to Texas (NMFS-USFWS 2008). Loggerhead sea turtles have been observed within Galveston Bay, which is approximately 12 miles downstream of the proposed project site, as recently as 2012. These sea turtles utilize the bay areas for seasonal foraging (GBEP 2007).

Blue Whale (*Balaenoptera musculus*)

The blue whale is the largest species of baleen whale. Blue whales can weigh up to 330,000 pounds and reach approximately 108 feet in length. The body is typically mottled with a gray color pattern that appears light blue through the water. Blue whales become sexually mature between 5-15 years of age (NOAA 2013b). Foraging habits are seasonal, and the diet almost exclusively consists of krill. Blue whales forage during the summer to build up energy reserves before migrating to their breeding and birthing grounds in the winter.

This species is found worldwide. Blue whales typically migrate between summering and wintering areas; however they are generally distributed where krill can be found in large concentrations. The two subpopulations (eastern north Pacific and western north Pacific) are separated by the ocean basins in which they are found. The eastern North Pacific is believed to spend winters near Mexico and Central America.

Even though whale hunting was banned in 1966 by the International Whaling Commission, poachers continued depleting blue whale populations. The increase in ocean noise due to water vessels and sonar fishing has impacted communication among this highly social species. Climate change concerns based on the increase in freshwater flow into the oceans also pose a threat to blue whales. There are only two records of stranded blue whales in the Gulf of Mexico (Davis and Schmidly 1997). One was identified as stranded near Sabine Pass, Louisiana in 1924, and the other was identified as stranded on the Texas coast between Freeport and San Luis Pass in 1940. Though these records are questionable, neither location is within ~15 miles of the Action Area.

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Fin Whale (*Balaenoptera physalus*)

The fin whale is the second largest species of baleen whale after the blue whale. Fin whales can weigh up to 160,000 pounds and reach approximately 85 feet in length (NOAA 2013b). The body is streamlined with a falcate dorsal fin and distinctive coloration patterns that are typically used by experts to identify individuals within a population. The dorsal and lateral sides of the body are black or dark brownish-gray with pale undersides. A V-shaped head distinguishes the fin wale from the blue whale (Davis and Schmidley 1997). Fin whales become sexually mature around 6-10 years of age. Foraging habits are seasonal and consist of krill, small schooling fish, and squid.

Fin whales are found in social groups of 2-7 whales. Typical habitat is in deep, offshore waters worldwide. This migratory species moves in and out of high-latitude foraging areas throughout the year.

As mentioned before, historical commercial whaling posed a major threat to whale populations. Current threats include vessel collisions, fishing gear entanglement, reduction in prey abundance, habitat degradation, underwater noise disturbance, and pathological conditions resulting from parasitic copepods, barnacles, and amphipods (NOAA 2013b). The only known Texas record involves an individual finback whale was found stranded on the beach at Gilchrist, Chambers County, Texas in 1951 (Davis and Schmidley 1997).

Humpback Whale (*Megaptera novaeangliae*)

Humpback whales are a species of baleen whale can weigh up to 80,000 pounds and reach approximately 60 feet in length (NOAA 2013b). The pectoral fins are a distinguishing feature that can extend approximately 15 feet. Humpback whales have stocky bodies with a hump and black dorsal coloration with varied patches of white on the pectoral fins and belly. Pattern variations on the tail fin, also known as a fluke, are sufficient indicators in identifying individuals. This species utilizes a variety of foraging techniques that enable them to capture and filter feed their seasonal diet of krill, plankton, and small fish.

Humpback whales migrate from summer feeding grounds near the poles to warmer winter breeding waters near the Equator. During migration, humpback whales can be found near the surface of the ocean. Feeding grounds are typically in cold, productive coastal waters. Calving grounds are near offshore reef systems, islands, or continental shores (NOAA 2013b).

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Historical whaling, fishing gear entanglement, ship strikes, whale watch harassment, habitat impacts, and current harvest have all posed as threats to humpback whale populations. Within the Gulf of Mexico, this species is typically observed near the coasts of Florida, Alabama, and northern Cuba. The only known Texas record involves an individual humpback whale observed swimming along the inshore side of Bolivar Jetty near Galveston in 1992 (Davis and Schmidley 1997).

Sei Whale (*Balaenoptera borealis*)

Sei whales are the third largest species of baleen whale can weigh up to 100,000 pounds and reach approximately 60 feet in length (NOAA 2013b). The body is dark gray with variable white undersides, usually limited to the throat grooves. A typical erect falcate, dorsal fin extends about two-thirds down the whale's back. The seasonal diet consists primarily of copepods, krill, small schooling fish, and cephalopods. Unlike most baleen whales' foraging techniques, the sei whales typically skim feed and gulp-feed (DEC 2013).

Sei whales are usually found alone or in small groups of 2-5 individuals. This species prefers subtropical waters, and are found in the Atlantic, Indian and Pacific Ocean. Sei whales are typically observed in deeper waters far from the coastline.

The distribution of this species ranges from the North Atlantic Ocean to the Venezuelan coast and northwest to the Gulf of Mexico. Historical threats included commercial hunting and whaling. Current threats include ship strikes and fishing gear entanglement. Based on available data, there have been no known sei whale strandings or observations in Texas. Infrequent observations within the Gulf of Mexico have occurred in the past. The closest observations were of two documented strandings: one stranding occurred in Fort Bayou, Louisiana in 1956 and another in Gulfport, Mississippi in 1973 (Mead 1977).

Sperm Whale (*Physeter macrocephalus*)

Sperm whales are the largest toothed whales, also known as odontocetes. This species is considered the most sexually dimorphic Cetacean. The males can weigh up to 45 tons and reach approximately 52 feet in length while females can weigh up to 15 tons and reach approximately 36 feet in length. The sperm whale is distinguished by its large head, which makes up 25-35% of the total body length (NOAA 2013b). The body is mostly dark gray in coloration with varied white patches along the belly. The flippers are paddle-shaped, and the fluke is triangular. The seasonal diet consists of large squid, sharks, skates, and fishes. While this species pursues its prey, dives have been known to last over and hour and reach depths over 3,280 feet.

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Sperm whales tend to reach sexual maturity around 9 years of age. Breeding grounds are located in tropical latitudes. This species is commonly found in areas with a water depth of approximately 1,968 feet and are uncommonly observed in shallow waters.

The distribution of this species is inclusive of all the oceans, and sperm whales are primarily found between 60oN and 60oS latitudes. Historical threats included commercial hunting and whaling. Current threats include ship strikes, fishing gear entanglement, underwater noise disturbance, and coastal pollution. Sperm whales are present in the Gulf of Mexico during all seasons (NOAA 2013b), and sightings near the Texas coast are regarded as common (Davis and Schmidley 1997).

Whooping Crane (*Grus americana*)

The whooping crane can approach 5 feet in height with a wingspan of 8 feet. Adults are snowy white with black primary feathers and a bare red face and crown. The bill is typically a dark olive-gray that becomes lighter during breeding season. Immature cranes have a reddish coloration that appears mottled by the growing white feather bases. Whooping cranes are insectivorous, carnivorous, and frugivorous.

Whooping cranes occupy saltmarshes during the winter and poorly drained wetlands in the summer. Whooping cranes migrate in September and reach wintering grounds in south Texas by October or November (USFWS 2013b).

Whooping cranes are monogamous and return to the same breeding territory. Adults reach sexual maturity at 4-5 years of age. Nests are constructed from sedges, bulrushes, and cattails. Females lay 1-3 eggs in April and May. Eggs incubate for 30 days. Typically, only one chick survives.

Whooping cranes are federally listed as endangered as a consequence of hunting, low genetic diversity, human disturbance and loss of critical wetland habitat. Colorado, Idaho, Kansas, Nebraska, New Mexico, Oklahoma, and Texas have been designated critical habitat. The historic range extended from the Arctic coast to south-central Mexico. Currently there are two distinct migratory populations (USFWS 2013b). One population winters along the southeastern United States and summers in central Wisconsin. The other group winters along the Gulf Coast of Texas at Aransas National Wildlife Refuge which is approximately 143 miles southwest of the DPO Site (Cornell Lab of Ornithology 2012). They summer in northwestern Canada. Small, non-migratory populations are located in central Florida and coastal Louisiana. TPWD reports

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indicate that there have been no recent sightings in Deer Park, Texas and were only observed migrating in Victoria, Austin, Waco, Fort Worth, and Wichita Falls (TPWD 2013b). According to TXNDD, there are no recorded sightings within an approximate 15 mile radius from the proposed project site.

Red-cockaded Woodpecker (*Picoides borealis*)

Red-cockaded woodpeckers can grow to 7 inches in length with a wingspan of about 15 inches. Typical coloration consists of a distinguished black cap and nape, large white cheek patches, and black barring with white horizontal stripes on the back (Audubon 2013). They are primarily insectivorous with the occasional consumption of fruits.

Red-cockaded woodpeckers occupy self-made cavities within mature, old-growth pine forests year-round with preference for longleaf pines (*Pinus palustris*). It takes approximately 1–3 years to fully excavate a cavity. A typical group territory ranges from 125–200 acres, which is related to habitat suitability and population density.

Red-cockaded woodpeckers are territorial, cooperative breeders. Only one pair will breed each year from a group of 3–9 members. They nest from April through June. Females generally lay 3–4 eggs, which incubate for 10–12 days. Nestlings will remain in the cavity for approximately 26 days.

Red-cockaded woodpeckers are federally listed as endangered. There are approximately 6,000 groups left. They can be found in eleven states extending from Florida to Virginia and west to southeast Oklahoma and eastern Texas (USFWS 2013b). This is representative of approximately 1% of their historical range in the United States due to the harvesting of old-growth forests and the suppression of periodic fires. USFWS (2013b) has not identified critical habitat at this time. Mark Klym from TPWD reports that the closest known occurrence of Red-cockaded woodpeckers is located at the W.G. Jones State Forest in Conroe approximately 39 miles northwest of the DPO Site (personal communication April 9, 2013).

Red Wolf (*Canis rufus*)

The red wolf can reach 65 inches in length including the tail. Coloration is typically brown with some buff coloration and a black-tipped tail. This species can weigh between 45-80 pounds and are primarily carnivorous.

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The red wolf occupies wetlands, pine forests, upland shrub lands, and crop lands. Wooded areas are required for denning and pup rearing. Hunting corridors extend along edge interface habitat. A pack consists of 7 animals with an alpha pair. A specific home range is actively defended.

The red wolf becomes sexually mature after 2 years. Breeding season occurs from January to March. An alpha female will normally produce a litter size of 5 pups once a year. First emergence from the den occurs when the pups are at least 4 weeks old and begin to hunt after 12 weeks. Hybridization has occurred with coyote (*Canis latrans*).

The red wolf is federally listed as endangered and has been extirpated from the historical range from south central Texas to Florida, and north to central Maine. The current range extends from North Carolina to Tennessee and along the south eastern states. Predator control combined with fragmentation and loss of habitat has critically suppressed populations of red wolves. USFWS (2013b) has not identified critical habitat at this time.

Louisiana Black Bear (*Ursus americanus luteolus*)

The Louisiana black bear can reach 7 feet in height. Typically, males can weigh up to 400 pounds, and females weigh up to 200 pounds. They have long black hair and a short tail. Their muzzle is yellowish-brown with an occasional white patch on the lower throat and chest. They have a distinguishable long, narrow cranium and proportionally large molar teeth. Juveniles and adults are omnivorous.

Louisiana black bears occupy high-quality, productive bottomland forests. Important habitat characteristics include escape cover, travel corridors, den sites, and minimum human disturbance (USFWS 2008). During the winter, hollow trees, brush piles, and ground nests are utilized as den sites.

Females reach sexual maturity at around 3-5 years. Louisiana black bears give birth to 1-3 cubs in winter. Cubs have their first emergence from the den in spring, and they den with the mother through their first winter.

Louisiana black bears are federally listed as threatened and have been extirpated throughout much of their range (USFWS 2013b). USFWS designated 1,195,821 acres of critical habitat in Louisiana river basins, (74 FR 10350 10409). Human encroachment, habitat fragmentation, and hunting have contributed to the population decline. Within Texas, TPWD (2012c) has identified one established breeding population in the Big Bend area.

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Smalltooth sawfish (*Pristis pectinata*)

The smalltooth sawfish can grow to 20 feet in length. The long, flat snout lined with pairs of teeth is a defining characteristic. Smalltooth sawfish feed primarily on fish and occasionally on crustaceans.

The smalltooth sawfish typically inhabits sheltered bays and shallow banks of estuaries (NOAA 2013c). Lagoons, bays, mangroves, and shallow reefs are suitable habitat types. Habitat can include a wide range of salinity, temperature, and depth. The smalltooth sawfish reaches maturity after approximately 10 years. Females are ovoviviparous and produce litters of 17 pups.

The smalltooth sawfish is federally listed as endangered due to habitat loss and bycatch. This species has been extirpated from large areas of its range. The historical distribution in the United States extended along the shores from Texas to Florida (NOAA 2013c). Charlotte Harbor Estuary Unit and the Ten Thousand Islands/ Everglades Unit are designated critical habitat (74 FR 45353).

Houston Toad (*Bufo houstonensis*)

Houston toad adults can reach 3.5 inches in length. Their coloration can vary from light brown to gray and tend to show small dark spots on the ventral side. Males are identified by a darkened throat patch that can appear blue when inflated. Adults and juveniles are insectivorous.

Houston toad adults burrow in deep sandy soils that support loblolly pine (*Pinus taeda*), yaupon (*Ilex vomitoria*), post oak (*Quercus stellata*), blue jack or sandjack oak (*Quercus incana*), and little bluestem (*Schizachyrium scoparium*) during winter and summer seasons. Temporary pools of water must be available for breeding.

Houston toads breed from January to June. Males reach sexual maturity after 1 year, and females become sexually mature after 2 years. Females can lay several thousand eggs that are fertilized externally by males. Eggs hatch within 7 days. Toadlets are approximately 0.5 inch long and metamorphose within 15-100 days. Timing depends on the magnitude of predatory threat, water temperature and pond desiccation rates.

Houston toads are federally listed as endangered and have been extirpated across the Houston area (Harris, Brazoria, Fort Bend, and Liberty Counties) since the 1960s after undergoing severe drought and massive habitat loss (USFWS 2013b). According to TXNDD, the last known

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sighting was in 1976 approximately 10.3 miles southwest from the proposed project site. Bastrop and Burleson Counties have been designated critical habitat, 42 FR 27009 27011, since 1978.

2.2.3 Texas Natural Diversity Database Results

A review of the Texas Natural Diversity Database (TXNDD) was completed for the proposed project area and surrounding areas by the TPWD on March 28, 2013. The following USGS topographic quadrats were included in the review: La Porte, Highlands, Jacinto City, Pasadena, Morgan Point, and Mont Belvieu. Element of occurrence (EO) data for the areas within a 15 mile vicinity of the project site indicated two federally listed species were within the search radius. In Harris County, Houston toads were sighted approximately 10.3 miles southwest of the proposed project site in 1976, and the Texas prairie dawn was sighted approximately 7 miles southwest of the proposed project site in 2002 (Figure 7). Based on the TXNDD, no additional federally-protected species are recorded within a radius of approximately 15 miles of the proposed project site.

2.2.4 Protected Species Evaluated

The protected species evaluated in this document include threatened and endangered species listed by the USFWS and species listed as federally threatened or endangered by TPWD. Table 2 summarizes all the species considered in this BA.

Table 2 – Federally Protected Species Evaluated in the BA

Protected Species	USFWS Classification- Reason for Evaluation
Federal List of T&E Species	
Texas Prairie Dawn	Endangered
West Indian Manatee	Endangered
NOAA List of T&E Species	
Blue Whale	Endangered
Finback Whale	Endangered
Humpback Whale	Endangered
Sei Whale	Endangered
Sperm Whale	Endangered
State-Recognized List of Federal T&E Species	
Green Sea Turtle	Threatened
Atlantic Hawksbill Sea Turtle	Endangered
Kemp's Ridley Sea Turtle	Endangered
Leatherback Sea Turtle	Endangered
Loggerhead Sea Turtle	Threatened

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Protected Species	USFWS Classification- Reason for Evaluation
Whooping Crane	Endangered
Red-cockaded Woodpecker	Endangered
Red Wolf	Endangered
Louisiana Black Bear	Threatened
Smalltooth Sawfish	Endangered
Houston Toad	Endangered

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3.0 Protected Species Habitat Evaluation and Analysis

URS completed a protected species habitat evaluation on April 30, 2013 to determine if habitat within the Action Area was likely to support any of the federally protected species potentially occurring in Harris County. All habitats within the DPO Site are highly disturbed. Process areas and other filled portions of the facility would not provide habitat and were not included in the survey. The field evaluation included a pedestrian survey of the proposed Action Area within the DPO Site that could provide potential habitat. Data was collected to describe vegetation communities and assess the potential for occurrence of protected species. A photographic log of the DPO Site is provided in Appendix A.

3.1 Habitats Observed

A significant portion of the land within the Action Area has historically been constructed, manipulated, or otherwise impacted by industrial activities. Construction is proposed in an industrial process area. The project would utilize an existing construction laydown area for a boiler contractor laydown, fabrication area, and new equipment laydown. This previously converted laydown segment would be utilized only during the construction phase of the project. The National Land Cover Database (NLCD) classifies the proposed project area as Developed (Multi-Resolution Land Characteristics Consortium 2013). The existing process areas and boiler construction site do not possess habitat with the potential to support any federally-protected species and were not evaluated. The NatureServe database and URS' observations indicate the only observed habitat within the Action Area described below.

Maintained Grasses – Relatively small areas of maintained grasses are scattered throughout the property. Most of these areas appear to be mowed at least monthly or bi-weekly. This habitat was observed adjacent to the boiler construction site, within the control room construction site, and scattered throughout the property including the 2.63- acre SIL exceedance area. A soil analysis of the Action Area is detailed in Section 2.1.7. This habitat type is consistently manicured and does not possess the soil, vegetation, or water resources to support any federally protected species.

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4.0 Assessment of Air Quality

The air quality analysis to demonstrate compliance with NAAQS PSD Increments is performed using computer models to simulate the dispersion of the emitted pollutants into the atmosphere and predict ground level concentrations at specified receptor locations in the area around the source of emissions. If the modeled concentration for a given pollutant and averaging period is less than the EPA-specified SIL, the project is determined to have no significant impact on ambient air quality and no further analysis is required for that pollutant and averaging period. If the SIL is predicted by the model to be exceeded for a given pollutant, further modeling of the project emissions combined with existing emission sources in the area is required to estimate total ambient concentrations. The modeling must demonstrate that the total concentration, including an appropriate background, does not exceed the applicable NAAQS and PSD Increment.

4.1 Estimated Total Annual Emission Rate Overview

URS completed detailed pollutant emission calculations for the project in accordance with the Air Permit Application requirements. This Biological Assessment (BA) does not include detailed estimated emission rates. Estimated emission rates and descriptions of emission calculation methods have been provided to the U.S. EPA in both the GHG PSD permit application and the TCEQ NSR/PSD permit application.

Table 3 lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Table 3 – Potential to Emit Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lb/hour	TPY (4)
BH-2-5	Boiler No. 5	NO_x	5.15	27.07
		NO_x (MSS)	72.08	-
		CO	19.03	88.68
		CO (MSS)	97.85	-

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Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lb/hour	TPY (4)
		VOC	2.83	12.40
		PM	3.09	13.53
		PM_{10}	3.09	13.53
		$PM_{2.5}$	3.09	13.53
		SO_2	7.35	2.08
		H_2SO_4	0.45	0.10
		NH_3	3.90	5.27
BH-2-6	Boiler No. 6	NO_x	5.15	27.07
		NO_x (MSS)	72.08	-
		CO	19.03	88.68
		CO (MSS)	97.85	-
		VOC	2.83	12.40
		PM	3.09	13.53
		PM_{10}	3.09	13.53
		$PM_{2.5}$	3.09	13.53
		SO_2	7.35	2.08
		H_2SO_4	0.45	0.10
		NH_3	3.90	5.27
BLR-FUG2	Piping Fugitives (7)	CO	0.03	0.12
		VOC	0.70	3.07
		NH_3	0.10	0.44

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Emissions resulting from gasoline and diesel-fueled vehicles and equipment during construction and maintenance are considered negligible. The project will not require a significant increase in vehicle and equipment use compared to current daily emissions for the facility.

4.2 Area of Impact Dispersion Modeling

URS performed dispersion modeling of the proposed emissions of air pollutants from the proposed project in accordance with the PSD Permit requirements. According to the U.S. EPA, "dispersion modeling uses mathematical formulations to characterize the atmospheric processes that disperse a pollutant emitted by a source" (U.S. EPA 2007). This section provides the methods and results of the dispersion modeling. The dispersion modeling performed included areas on-site within and outside of the property boundaries. The results of the modeling are provided as a summary of the maximum predicted concentrations. The project is subject to PSD review for CO, NO_x, PM_{10}, and $PM_{2.5}$.

4.2.1 Methods

This section discusses air quality modeling, monitoring, presentation of these data, and how background concentrations were obtained. If the SIL was exceeded for a pollutant, a NAAQS and/or PSD Increment analysis was performed. The appropriate background concentrations presented in this section were added to the modeling results to demonstrate compliance with the NAAQS primary and secondary standards and PSD Increments considering SIL concentrations as shown in Table 4. The modeling methods were provided by URS.

Table 4 – Standards for Comparison with Modeling for Criteria Pollutants

Pollutant	Regulation	Averaging Period	Modeling *De minimis* (µg/m^3)	Standard (µg/m^3)
SO_2	Chapter 112	30-min	20.4	1021
	NAAQS	1-hr	7.8	195
		3-hr	25	1300
		24-hr	5	365
		Annual	1	80
	PSD Increment	3-hr	25	512
		24-hr	5	91

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Pollutant	Regulation	Averaging Period	Modeling *De minimis* (µg/m^3)	Standard (µg/m^3)
		Annual	1	20
	PSD Monitoring	24-hr	13	NA
NO_2	NAAQS	1-hr	7.5	188.7
		Annual	1	100
	PSD Increment	Annual	1	25
	Monitoring	Annual	14	NA
CO	NAAQS	1-hr	2000	40,000
		8-hr	500	10,000
	PSD Monitoring	8-hr	575	NA
PM_{10}	NAAQS	24-hr	5	150
	PSD Increment	24-hr	5	30
		Annual	1	17
	PSD Monitoring	24-hr	10	NA
$PM_{2.5}$	NAAQS	24-hr	1.2	35
		Annual	0.3	15
	PSD Increment	24-hr	1.2	9
		Annual	0.3	4
	PSD Monitoring	24-hr	4	NA

The model parameters specified for the modeled location, such as meteorological data, rural versus urban dispersion coefficients, and receptor grid are discussed below. Modeling was performed using the regulatory default options, which include stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. As per U.S. EPA requirements, direction-specific building dimensions are used in the downwash algorithms.

AERMOD

Modeling was performed using the AMS/EPA Regulatory Model (AERMOD) (version number 12345). The AERMOD model was chosen because it is approved by the EPA as a Preferred/Recommended model and is approved by the TCEQ modeling staff.

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AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD determines concentrations from multiple points, area, or volume sources based on an up-to-date characterization of the atmospheric boundary layer. The model employs hourly sequential preprocessed (AERMET) meteorological data to estimate concentrations (TCEQ 2012a). The AERMOD model is applicable to receptors on all types of terrain, including flat terrain, simple elevated terrain (below height of stack), intermediate terrain (between height of stack and plume height), and complex terrain (above plume height). In addition, AERMOD provides a smooth transition of algorithms across these different terrains. Therefore, AERMOD was selected as the most appropriate model for the air quality impact analysis for the proposed facility.

AERMAP

AERMOD uses advanced terrain characterization to account for the effects of terrain features on plume dispersion and travel. AERMOD's terrain pre-processor, AERMAP, imports digital terrain data and computes a height scale for each receptor from Digital Elevation Model (DEM) data files. A height scale is assigned to each individual receptor and is used by AERMOD to determine whether the plume will go over or around a hill.

Building Wake Effects

The emission sources are evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent.

Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models was determined using the U.S. EPA Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274. BPIP-PRIME is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

The output from the BPIP-PRIME downwash analysis lists the names and dimensions of the structures, and the emission unit locations and heights. In addition, the output contains a summary of the dominant structure for each emission unit (considering all wind directions) and the actual building height and projected widths for all wind directions. This information is then incorporated into the data input files for the AERMOD air dispersion model.

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Terrain

The terrain surrounding the DPO Site varies in elevation from 0 feet (0 meters) to 82 feet (25 meters) within 10 km of the Complex.

The analysis used terrain heights obtained from USGS Digital Elevation Models (DEM). The data extracted was 7.5 minutes for the Deer Park area. For the DPO Site, DEM files were obtained from Lakes Environmental Software (2008). AERMAP (AMS/EPA Regulatory Model Terrain Pre-processor) was used to process terrain data from the DEM files.

Receptor Grid

The analysis used a Cartesian receptor grid that extended 10-kilometers in all directions from the fence line. The 'on-property' receptors were included for action area analysis. The receptor spacing varied with distance from the facility as follows:

- Within the property-line (on-property), the analysis used 25-meter spacing;
- Along the property line and extending 100-meters beyond the property line, the analysis used 25-meter spacing;
- From 100 meters to 1,000 meters, the analysis used a 100 meter spacing;
- From 1,000 m to 5,000 m (5 km), the analysis used 500 meter spacing; and
- From 5,000 m to 10,000 m (10 km), the analysis used 1,000 meter spacing.

Meteorological Data

As mentioned before, the DPO Site is located in Deer Park, Texas, Harris County; therefore, for surface data, the Houston Hobby airport is more appropriate than Houston Intercontinental Airport. Based upon TCEQ guidance, the representative National Weather Service (NWS) meteorological stations are as follows:

- Surface data – Houston Hobby Airport (NWS 12918);
- Mixing Height data – Lake Charles Regional Airport (NWS 03937).

The analysis used five years (2006 - 2010) of processed meteorological data for PSD analysis (CO, NO_x, PM_{10}, and $PM_{2.5}$). The analysis used one year (2008) of processed meteorological data for non-PSD pollutants (SO_2). TCEQ meteorological data downloaded from TCEQ (2012a)

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website. The analysis did not modify meteorological data. The analysis used a profile base elevation for the Houston Hobby Airport of 14-meters (m) above sea level.

Several parameters are used to describe the character of the modeled domain, including surface roughness length, albedo and Bowen ratio. These parameters are incorporated into the surface meteorological data set used by AERMOD. TCEQ has developed three separate AERMOD-ready meteorological data sets for each county in the state. The different data sets correspond to three categories of surface roughness length:

- Category 1 – LOW: Appropriate for flat areas with surface roughness lengths of 0.001 m – 0.1 m.
- Category 2 – MEDIUM: Appropriate for rural/suburban areas with surface roughness lengths of 0.01 m – 1.0 m
- Category 3 – HIGH: Appropriate for urban/industrial areas with surface roughness lengths of 0.7 m – 1.5 m

AERSURFACE (version 13016) was run to estimate which land use category best describes the area around DPO Site. Based upon a 1-kilometer radius, a surface roughness length of 0.17 was calculated; therefore, the meteorological data set that utilized the Category 2 (medium) surface roughness length values for Harris County was selected.

4.2.2 Results

The proposed increase in emissions above the baseline conditions was modeled to determine whether the resulting off-property and on-property concentrations of criteria pollutants are greater than the *de minimis* SILs. As for all new construction projects, regardless of PSD-significant emissions (CO, NO_2, PM_{10} and $PM_{2.5}$) or non-PSD-significant emissions (SO_2), the proposed allowable emission rates were modeled for each source.

Since the Secondary NAAQS are designed to protect public welfare, they along with the respective SILs, were utilized to define the Action Area. In addition, the Primary NAAQS and respective SILs were also presented as additional information. The results of the Action Area modeling analysis as well as the associated SILs are summarized in Table 5 for off-property concentrations (beyond the property and at the fence line) and Table 6 for on-property concentrations (within the property). The reported concentrations for CO, NO_2, PM_{10}, and $PM_{2.5}$ correspond to the highest predicted concentration from any receptor over a 5-year period. For

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24-hr $PM_{2.5}$, both the highest predicted concentration from any receptor over a 5-year period for significance analysis associated with PSD Increment and the highest of the 5-year average concentration from any receptors for significance analysis associated with PSD NAAQS were evaluated. For SO_2, the highest concentration using 1 year meteorological data was predicted.

The SIL is a level set by the EPA, below which, modeled source impacts would be considered insignificant. The highest modeled concentration value is the maximum ground level concentration for both beyond of the Rohm and Haas Deer Park Complex property boundary (and at the fence line) predicted by the model for each pollutant and averaging period resulting from this project. If a highest modeled concentration value is less than the SIL, the modeled source impacts are considered insignificant and are not considered to cause or contribute to a violation of a NAAQS or PSD Increment for that pollutant and averaging period. If a highest modeled concentration is greater than the SIL, additional analysis is required to demonstrate that the project would not cause or contribute to a violation of the NAAQS or PSD Increment for that pollutant and averaging period.

Table 5 – Maximum Predicted Concentrations at Off-Property Receptors

Pollutant	Averaging Period	Highest Modeled Off-Property Concentration beyond Dow DPO (µg/m^3)	Significant Impact Level (µg/m^3)	Significant?
CO	1-hour	38.17	2,000.0	No
	8-hour	33.44	500.0	No
NO_2	1-hour	2.57	7.5	No
	Annual	0.156	1.0	No
SO_2	1-hour	4.69	7.8	No
	3-hour	4.36	25.0	No
	24-hour	2.21	5.0	No
	Annual	0.0137	1.0	No
PM_{10}	24-hour	1.1977	5.0	No
$PM_{2.5}$	24-hour	1.1977	1.2	No
	Annual	0.80	0.3	No

Note: Pollutant and averaging periods associated with Secondary NAAQS were utilized to define Action Area, which are NO_2 (Annual), $PM_{2.5}$ (24-hour and Annual), PM_{10} (24-hour), and SO_2 (3-hour). The pollutant and averaging periods associated with Primary NAAQS were presented as additional information.

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Table 6 – Maximum Predicted Concentrations at On-Property Receptors

Pollutant	Averaging Period	Highest Modeled On-Property Concentration within DPO Site (µg/m^3)	Significant Impact Level (µg/m^3)	Significant?
CO	1-hour	38.42	2,000.0	No
	8-hour	33.43	500.0	No
NO_2	1-hour	2.57	7.5	No
	Annual	0.19	1.0	No
SO_2	1-hour	4.74	7.8	No
	3-hour	4.38	25.0	No
	24-hour	2.91	5.0	No
	Annual	0.02	1.0	No
PM_{10}	24-hour	1.25	5.0	No
$PM_{2.5}$	24-hour	1.25	1.2	**Yes**
	Annual	1.06	0.3	No

Note: Pollutant and averaging periods associated with Secondary NAAQS were utilized to define Action Area, which are NO_2 (Annual), $PM_{2.5}$ (24-hour and Annual), PM_{10} (24-hour), and SO_2 (3-hour). The pollutant and averaging periods associated with Primary NAAQS were presented as additional information.

4.2.3 Conclusions

The highest modeled concentration values are less than the SIL for the off-property areas, which are outside the DPO Site. Therefore, the source impacts are considered insignificant based on stringent limits set to protect the most sensitive human populations. Due to this predicted lack of significant impact to sensitive human populations, the source impacts are not expected to significantly impact federally-protected species outside of the DPO Site. Therefore, only impacts to protected species within the DPO Site from potential changes to air quality were considered. Further, there could be no impacts to aquatic protected species from increased air emissions.

Modeling was conducted to determine if any criteria pollutant might exceed SILs within the boundaries of the DPO Site as shown in Table 6. The model predicted concentrations for 24-hour $PM_{2.5}$ are greater than SIL as shown in Figure 3.

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5.0 Potential Effects of the Proposed Action

This section presents the results of the analysis of potential impacts to federally protected species and state-recognized federally threatened and endangered species and/or their potential habitats with the defined Action Area (as defined in Section 1.6) for the proposed project. This analysis is based on the total emissions, dispersion modeling data, field survey, background review data, literature review, and research of potential effects of known pollutants on flora and fauna provided by URS. The following impact sources are included in the analysis:

- Air Quality;
- Water Quality;
- Habitat/Vegetation Disturbance;
- Noise Pollution;
- Infrastructure-Related Disturbance;
- Human-Related Disturbance; and
- Federally-Protected Species and Habitat Effects.

5.1 Potential Air Quality Effects

5.1.1 General Emissions Effects

According to U.S. EPA's "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals," the data presented in Table 4 (Section 4.2.2) indicate the level, at or above which, airborne pollutant concentrations are known to cause significant impacts on flora and fauna. Concentrations at, or in excess of, any of the screening concentrations would indicate that the source emission may have adverse impacts on plants or animals. Pollutant concentrations predicted to be less than or equal to the SILs are not expected to have a significant impact on flora and fauna. None of the modeled pollutant concentrations would exceed the SILs at receptors located outside of the DPO Site; therefore, no significant impacts are anticipated from air pollution offsite.

Air pollution plays a key role in changing distributions and responses to such pollution are significantly different within animal and plant groups. In general, air pollution has a greater impact on simplistic life forms than more complex life forms (Dudley and Stolton 1996).

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Simplistic life forms that would likely be the first to be impacted would include lichens, bryophytes, fungi, and soft-bodied aquatic invertebrates. Impacts to complex life forms are typically the result of indirect impacts to the food chain and reproduction, with the exception of extreme exposure. Potential indirect impacts include acidification, changes in food or nutrient supply, or changes to biodiversity and competition. Plant communities are less adaptable to changes in air pollution than animals. Animals typically have the ability to migrate away from unfavorable conditions.

5.1.2 Carbon Monoxide

Most of the literature on the effects of CO is aimed at communicating the human health effects of overexposure to this chemical. CO preferentially binds to hemoglobin within the blood stream and prevents the transport of oxygen to essential organs within the body. Prolonged exposure at high concentrations can lead to death. This chemical is extremely dangerous to human health (U.S. EPA 2012). CO is colorless and odorless. Mammals and other living organisms that rely on oxygen transport via iron based carriers within the body will be susceptible to similar physiological ill effects if overexposure occurs.

Air modeling results indicate that the ground-level concentrations of CO will not exceed SIL within or outside of the fence line; therefore, no significant impacts from CO emissions on federally listed species are anticipated from the proposed project.

5.1.3 Nitrogen

The Nature Conservancy (Lovett and Tear 2008) and the National Park Services (2010) have published documents describing the known effects of airborne nitrogen and other airborne pollutants on various ecosystems in the US. Airborne nitrogen dioxide is known to be converted into acid particles or acid precipitation. Both forms are deposited onto soils, vegetation, and surface waters.

Effects of airborne nitrogen dioxide on terrestrial ecosystems are generally long-term effects as opposed to short-term effects. Many soils are buffered against acid inputs; therefore, biodiversity losses are not immediately evident. The deposition of nitrogen can result in nitrate leaching, which can cause acidification of soils and surface waters as well as the release of aluminum, calcium, and magnesium. Arthropods with high-calcium needs are some of the animals inhabiting the soil that can be impacted by soil acidification. The release of aluminum into soil water from nitrate leaching can harm plant roots. The leaching of aluminum into soils and

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surface waters can be toxic to plants, fish, and other aquatic organisms. The accumulation of nitrogen can impact plant species competition, thereby impacting community composition. Nitrogen accumulation can also lead to nitrogen saturation, which impacts microorganisms, plant production, and nitrogen cycling. Additional potential terrestrial ecosystem effects include reduced forest productivity and increased vulnerability to pests and pathogens.

The potential effects of airborne nitrogen dioxide on aquatic ecosystems include acidification and eutrophication. The effects of acidification on water quality, whether introduced by direct acid deposition or leaching from adjacent terrestrial ecosystems, include increased acidity, reduced acid neutralization capacity, hypoxia, and mobilization of aluminum. Stream and lake acidification can be chronic or episodic and both can be damaging. In general, larger aquatic ecosystems have a greater buffering capacity than smaller systems. Increased acidity can reduce dissolved organic carbon and increase light penetration and visibility through the water column. Increased light penetration can result in increased macrophyte and algal growth. Increased visibility can alter the predator-prey balance. Wetlands, estuaries, bays, and salt marshes are generally less impaired by acid deposition than other aquatic ecosystems. However, they are subject to eutrophication. Eutrophication is the over enrichment of nutrients into an aquatic system, which can result in excess algal growth. The decomposition of the excess algae can result in a decrease in dissolved oxygen, which can be harmful to fish and other aquatic organisms.

Air modeling results indicate that the ground-level concentrations of nitrogen will not exceed SIL within or outside of the fence line; therefore, no significant impacts from nitrogen emissions on federally listed species are anticipated from the proposed project.

5.1.4 Sulfur Dioxide

SO_2 is highly soluble in water and forms sulfuric acid which can alter the pH balance of water bodies, both by reacting with surface water and with rain water, forming acid rain (Oklahoma Department on Environmental Quality 2011). Acidification of water bodies can result in increased acidity, reduced acid neutralization capacity, hypoxia, and mobilization of aluminum. Acidification can be chronic or episodic. Larger aquatic ecosystems are less subject to impacts as they have a greater ability to buffer the changes. Increased acidity can result in decreased dissolved organic carbon and increased light penetration and visibility through the water column. Increased light penetration can result in increased macrophyte and algal growth. Increased visibility can alter the predator-prey balance.

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SO_2 may injure plant physiology when it is absorbed faster than it can be detoxified within an individual (Missouri Botanical Garden 2013). Once absorbed within a plant, SO_2 is oxidized which interferes with photosynthesis and energy metabolism. Tolerance varies widely between species and is dependent on the species ability to detoxify and dispose of the pollutant.

Air modeling results indicate that the ground-level concentrations of SO_2 will not exceed SIL within or outside of the fence line; therefore, no significant impacts from SO_2 emissions on federally listed species are anticipated from the proposed project.

5.1.5 Particulate Matter

PM is not a single pollutant, but a heterogeneous mixture of particles differing in size, origin, and chemical composition. Since vegetation and other ecosystem components are affected more by particulate chemistry than size fraction, exposure to a given mass concentration of airborne PM may lead to widely differing plant or ecosystem responses, depending on the particular mix of deposited particles. Though the chemical constitution of individual particles can be strongly correlated with size, the relationship between particle size and particle composition can also be quite complex in effect making it difficult in most cases to use particle size as a surrogate for chemistry. PM size classes do not necessarily have specific differential relevance for vegetation or ecosystem effects (U.S. EPA 1996). Nitrates and sulfates are the PM constituents of greatest and most widespread environmental significance. Other components of PM, such as dust, trace metals, and organics can at high levels affect plants and other organisms. Particulate nitrates and sulfates, either individually, in combination, and/or as contributors to total reactive nitrogen deposition and total deposition of acidifying compounds, can affect sensitive ecosystem components and essential ecological attributes, which in turn, affect overall ecosystem structure and function (U.S. EPA 2005).

PM levels in the U.S. “have the potential to alter ecosystem structure and function in ways that may reduce their ability to meet societal needs” (U.S. EPA 2005). Currently, however, fundamental areas of uncertainty preclude establishing predictable relationships between ambient concentrations of PM and associated ecosystem effects. One source of uncertainty hampering the characterization of such relationships is the extreme complexity and variability that exist in estimating particle deposition rates. Since it is difficult to predict the rate of PM deposition, and thus, the PM contribution to total deposition at a given site, it is difficult to predict the ambient concentration of PM that would likely lead to the observed adverse effects within any particular ecosystem (U.S. EPA 2005).

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Chronic additions of reactive nitrogen are commonly a component of PM that tends to accumulate in ecosystems.

The U.S. EPA Criteria Document provides a comprehensive review of PM toxicity (U.S. EPA 2004). Potential direct air-to-leaf effects of PM on vegetation to some extent depend upon particle size and composition, although well-defined dose-response curves observed for gaseous phytotoxins (e.g., ozone and sulfur dioxide) have not generally been observed for PM. A notable exception has been adverse effects on foliation observed in the vicinity of cement production facilities, for which particulate emissions are highly caustic. For emissions from the proposed boilers, PM composition per se is not likely to harm plant species (with respect to direct foliar damage).

Air modeling results indicate that the ground-level concentrations of PM will exceed SIL within the fence line and will not exceed SIL outside of the fence line. All PM exceedances will be minor and confined to a 2.63-acre area of maintained grass within the DPO Site which does not possess habitat to support federally-listed species. Therefore, no significant impacts from PM emissions on federally listed species are anticipated from the proposed project.

5.1.6 Fugitive Dust

Dust will be emitted during construction of the furnaces. This emission will be minimal and will last a few days. Dust emissions are expected to be negligible after initial land-disturbing activities are completed.

5.1.7 Atmospheric Deposition over Surface Waters and Watersheds

Atmospheric deposition of airborne constituents is expected to be negligible and confined to a maintained grass area within the DPO Site. There are no surface waters that are contained within the area of SIL exceedance for $PM_{2.5}$. Emissions resulting from the proposed project will have no effect on water quality or aquatic habitats in areas within or outside of the facility. The terrestrial surface area that is contained within this area of SIL exceedance is located within the DPO facility and is expected to drain to detention ponds which will further minimize any potential impacts. Based on air modeling, this SIL exceedance will occur at a low frequency. Therefore, the source impacts are considered insignificant based on U.S. EPA's SIL limits.

Based on the background research described above in Section 5.1.1, the potential effects from PM emissions on surface waters involve changes in pH or eutrophication. The SIL exceedance

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area is located only on terrestrial terrain; therefore, effects on water quality and aquatic habitats due to atmospheric deposition are not expected to occur.

5.2 Habitat/Vegetation Disturbance

The boiler construction will take place on previously disturbed areas (Appendix A). The open water features are man-made detention ponds. The proposed project will not impact suitable habitat for listed species because none occurs within the DPO Site.

5.3 Noise Effects

Rohm and Haas project engineers estimate that noise levels during construction should be comparable to noise levels from maintenance activities that currently take place at the plant. The new equipment should not produce noise levels greater than 90 decibels or alter the pre-existing noise exposure at the site. No noise effects to wildlife are expected as a result of the infrastructure construction or operations of the installation project. Although sharp noises can alter the behavior of protected species, the DPO Site facility creates a steady noise that is unlikely to greatly alter behavior patterns.

5.4 Infrastructure-Related Effects

Construction of the proposed installation project involves the addition of two new boilers and associated appurtenances. The proposed project site is in an existing cleared area surrounded by industrial infrastructure and roadways. No vegetation or potential wildlife habitat will be directly impacted as a result of the infrastructure construction activities.

5.5 Human Activity Effects

Construction and operation of the proposed installation project will not require significant additional human activity compared to typical maintenance activities that occur at the plant on a regular basis. However, laydown, fabrication, and other temporary features associated with construction occur in a graded area that consists of a concrete surface. The previously disturbed laydown areas do not provide suitable habitat for federally listed species. No impacts to protected species are expected as a result of the increase in human activity associated with the proposed installation project.

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5.6 Potential Impacts to Federally-Protected Species

The following provides an assessment of the project's potential to affect listed species.

5.6.1 Federally-Listed Species

Texas Prairie Dawn

Potential Occurrence

Populations of Texas prairie dawn are known to occur only in western Harris County and extreme eastern Fort Bend County in a specific habitat described as small, sparsely vegetated areas associated with pimple (mima) mounds. Although the proposed project includes work in Harris County, no portion of the proposed project will be constructed in western Harris County. The TXNDD identified observations of Texas prairie dawn approximately 7 miles southwest of the proposed project site in 2002. No Texas prairie dawn habitat was observed within or near the proposed project site during the site surveys. Based on the soil analysis in Section 2.1.7, there are no suitable soils in the Action Area to support this species. Texas prairie dawn is highly unlikely to occur within or near the Action Area.

Potential Impacts

The construction laydown area is located in a previously disturbed area that consists of paved concrete and a small mowed grass area. Mima mounds are not known to exist in the area and were not observed within the grass area. The construction laydown area does not possess suitable habitat for Texas prairie dawn.

The construction area is a previously altered area that does not provide any suitable habitat for Texas prairie dawn. Additionally, no potential habitat was observed during site reconnaissance. Because the Texas prairie dawn is not known to occur in this region of Harris County and there is no potential habitat within the Action Area, the proposed project would have **no effect** on the Texas prairie dawn.

West Indian Manatee

Potential Occurrence

Riverine, estuarine, or open water areas, considered the manatee habitat, are not located within the Action Area. Therefore, there is no potential for the West Indian Manatee to occur within the Action Area.

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Potential Impacts

Because SIL models have indicated that air emissions will not impact water quality or aquatic habitats and there will be no significant changes to the quantity or quality of discharged water from the proposed boilers, the proposed project would have **no effect** on the West Indian manatee and this species was not evaluated further.

Sea Turtles

Available sea turtle occurrence records databases were searched to identify any sightings in the vicinity of the Action Area. The TXNDD and USACE's Sea Turtle Warehouse (USACE 2013) had no reports of sea turtles within the Houston Ship Channel. All recorded occurrences from these sources were identified in near Galveston Harbor approximately 12 miles downstream of the Action Area. The STSSN (NOAA 2013d) reports indicate occurrences of the green, Atlantic hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles within Harris County.

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on green, Atlantic hawksbill, Kemp's ridley, loggerhead, and leatherback sea turtles.

Green Sea Turtle

Potential Occurrence

Aquatic areas, considered sea turtle habitat, are not located in the Action Area. Therefore, there is no potential for the green sea turtle to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the green sea turtle and this species was not evaluated further.

Atlantic Hawksbill Sea Turtle

Potential Occurrence

Aquatic areas, considered sea turtle habitat, are not located in the Action Area. Therefore, there is no potential for the Atlantic hawksbill sea turtle to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the Atlantic hawksbill sea turtle and this species was not evaluated further.

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Kemp's Ridley Sea Turtle

Potential Occurrence

Aquatic areas, considered sea turtle habitat, are not located in the Action Area. Therefore, there is no potential for Kemp's ridley sea turtle to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the Kemp's ridley sea turtle and this species was not evaluated further.

Leatherback Sea Turtle

Potential Occurrence

Aquatic areas, considered sea turtle habitat, are not located in the Action Area. Therefore, there is no potential for leatherback sea turtle to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the leatherback sea turtle and this species was not evaluated further.

Loggerhead Sea Turtle

Potential Occurrence

Aquatic areas, considered sea turtle habitat, are not located in the Action Area. Therefore, there is no potential for loggerhead sea turtles to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect**

on the loggerhead sea turtle and this species was not evaluated further.

Blue Whale

Potential Occurrence

There is only one documented Texas record of a stranded blue whale near Freeport in 1940. Aquatic areas are required for this marine mammal, which are not located in the Action Area. Therefore, there is no potential for blue whales to occur within the Action Area.

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Potential Impacts

Because this species has never been seen in the vicinity (~15 miles) of the project site, there are no aquatic resources within the Action Area, the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the blue whales and this species was not evaluated further.

Fin Whale

Potential Occurrence

The only known Texas record involves a stranded finback whale on the beach at Gilchrist, Chambers County, Texas in 1951 (Davis and Schmidley 1997). Aquatic areas are required for this marine mammal, which are not located in the Action Area. Therefore, there is no potential for fin whales to occur within the Action Area.

Potential Impacts

Because this species has never been seen in the vicinity (~15 miles) of the project site, there are no aquatic resources within the Action Area, the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the fin whales and this species was not evaluated further.

Humpback Whale

Potential Occurrence

The only known Texas record involves a humback whale observed swimming at the inshore side of Bolivar Jetty near Galveston in 1992 (Davis and Schmidley 1997). Aquatic areas are required for this marine mammal, which are not located in the Action Area. Therefore, there it is highly unlikely for humpback whales to occur within the Action Area.

Potential Impacts

Because this species has never been seen in the vicinity of the project site (~15 miles), there are no aquatic resources within the Action Area, the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the humpback whales and this species was not evaluated further.

Sei Whale

Potential Occurrence

Based on available data, there are no known sei whale observations in Texas (Davis and Schmidley 1997). Aquatic areas are required for this marine mammal, which are not located in the Action Area. Therefore, there is no potential for sei whales to occur within the Action Area.

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Potential Impacts

Because this species has never been recorded in the vicinity (~15 miles) of the project site, there are no aquatic resources within the Action Area, the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the sei whales and this species was not evaluated further.

Sperm Whale

Potential Occurrence

Sperm whales are present in the Gulf of Mexico during all seasons (NOAA 2013b), and sightings near the Texas coast are regarded as common (Davis and Schmidley 1997). This species requires deep water and is highly uncommon in shallow water areas. Aquatic areas are required for this marine mammal, which are not located in the Action Area. Therefore, there is no potential for sperm whales to occur within the Action Area.

Potential Impacts

Because this species has never been seen in the vicinity (~15 miles) of the project site, there are no aquatic resources within the Action Area, the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge, the proposed project would have **no effect** on the sperm whales and this species was not evaluated further.

Whooping Crane

Potential Occurrence

Wetlands, open water features, or aquatic habitats, considered whooping crane over-wintering habitat, are not located within the Action Area. Even though the project is located on the outer fringe of the migration corridor, TXNDD does not identify any observations of whooping cranes in the vicinity (~15 miles) of the project site. . The designated critical habitat for whooping cranes in Texas is the Aransas National Wildlife Refuge, which is located approximately 143 miles from the Project site. Preferred over-wintering habitat for both adults and juveniles includes estuaries marshes, bays, and tidal flats, which are not found within the Action Area. Therefore, there it would be highly unlikely for whooping cranes to occur within the Action Area.

Potential Impacts

Based on the lack of habitat in the Action Area, the unchanged wastewater discharge, and the terrestrial SIL exceedances that will not impact water quality or aquatic habitats, the proposed project would have **no effect** on the whooping crane.

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Red-cockaded Woodpecker

Potential Occurrence

Open, mature, old-growth pine forests, considered Red-cockaded woodpecker habitat, are not located within the Action Area. According to TXNDD, no sightings have occurred within an approximate ~15 mile radius of the Action Area. Red-cockaded woodpeckers prefer open, mature, old-growth pine forests which occur in East Texas. Suitable cavity trees are needed for nesting. The Action Area consists of maintained grasses and concrete roadways. No old-growth forests are located within the area. Therefore, there is no potential for Red-cockaded woodpeckers to occur within the Action Area.

Potential Impacts

Due to the lack of habitat and potential occurrence in the Action Area, the proposed project would have **no effect** on the Red-cockaded woodpecker and this species was not evaluated further.

Red Wolf

Potential Occurrence

Wetlands, crop land, dense shrub areas, or forests, considered red wolf habitat, are not located within the Action Area. The TXNDD does not identify any observations of red wolves in the vicinity (~15 miles) of the project site, and no designated critical habitat is located within or near the Action Area. The action site and surrounding areas have been developed; rendering the DPO Site undesirable habitat for this species. Therefore, there is no potential for red wolves to occur within the Action Area.

Potential Impacts

Due to the lack of habitat and potential occurrence in the Action Area, the proposed project would have **no effect** on the red wolf and this species was not evaluated further.

Louisiana Black Bear

Potential Occurrence

Bottomland forests, considered black bear habitat, are not located within the Action Area. The TXNDD does not identify any observations of Louisiana black bears in the vicinity (~15 miles) of the project area, and no designated critical habitat is located within or on the Action Area. Therefore, there is no potential for Louisiana black bears to occur within the Action Area.

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Potential Impacts

Because this species has been extirpated from the area and no potential habitat exists within or near the Action Area, the proposed project would have **no effect** on the Louisiana black bear and this species was not evaluated further.

Smalltooth Sawfish

Potential Occurrence

Lagoons, reefs, and other aquatic habitats, considered smalltooth sawfish habitat, are not located in the Action Area. Therefore, there is no potential for the smalltooth sawfish to occur within the Action Area.

Potential Impacts

Because the SIL exceedances will not impact water quality or aquatic habitats and there will be no changes to the wastewater discharge the proposed project would have **no effect** on the smalltooth sawfish and this species was not evaluated further.

Houston Toad

Potential Occurrence

Sandy forests and temporary ponds, considered Houston toad habitat, are not located in the Action Area. This species has also been extirpated from Harris County since the 1960s and are only known to exist within their critical habitat. There have been no reported observations of Houston toads in the vicinity of the project site since the 1976 which was approximately 10.3 miles southwest of the project site. Houston toads prefer sandy forests of blackjack oak, yaupon, and little bluestem with temporary pools required for breeding, which are not found within the Action Area. Therefore, there is no potential for Houston toads to occur within the Action Area.

Potential Impacts

Because Houston toads have been extirpated from the area and there is no suitable habitat or potential occurrence in the Action Area, the proposed project would have **no effect** on the Houston toad and this species was not evaluated further.

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6.0 Conclusions

This section is a summary of URS' recommended determination of effect for all federally-protected species, a description of any interdependent and interrelated actions, and a description of any anticipated cumulative effects resulting from the proposed project.

Direct permanent impacts to protected species from construction will not occur; there is no suitable habitat in the area proposed for new construction of the boilers. No indirect impacts resulting from air emissions on protected species and their habitats are anticipated.

Determination of Effect

The recommended determinations of effect for all federally-protected species with the potential to occur within habitat located within the Action Area are summarized in below.

Table 7 – Determination of Effect Summary

Protected Species	USFWS/NOAA Classification- Reason for Evaluation	Determination of Effect
Federal List of T&E Species		
Texas Prairie Dawn	Endangered	No effect
West Indian Manatee	Endangered	No effect
Blue Whale	Endangered	No effect
Finback Whale	Endangered	No effect
Humpback Whale	Endangered	No effect
Sei Whale	Endangered	No effect
Sperm Whale	Endangered	No effect
State-recognized List of Federal T&E Species		
Green Sea Turtle	Threatened	No effect
Atlantic Hawksbill Sea Turtle	Endangered	No effect
Kemp's Ridley Sea Turtle	Endangered	No effect
Leatherback Sea Turtle	Endangered	No effect
Loggerhead Sea Turtle	Threatened	No effect
Whooping Crane	Endangered	No effect
Red-cockaded Woodpecker	Endangered	No effect
Red Wolf	Endangered	No effect
Louisiana Black Bear	Threatened	No effect
Smalltooth Sawfish	Endangered	No effect
Houston Toad	Endangered	No effect

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6.1 Interdependent and Interrelated Actions

The proposed project is limited to the construction and operation activities of the construction of the boilers as outlined in Section 1.1. No additional interdependent or interrelated actions are proposed at this time.

6.2 Cumulative Effects

The proposed project site is located within an industrial area. Multiple industrial facilities have historically been and continue to be operational within Deer Park and Harris County, Texas. The area is likely to experience additional industrial development over time. As such, the project will contribute to cumulative impacts from industrial use in the area.

As with the proposed installation project, any new proposed developments may have the potential to impact federally-protected species. However, URS is not aware of any specific projects planned for this area at this time. No additional actions with the potential to impact federally-protected species are planned for the Boiler House Unit installation at this time.

6.3 Conservation Measures

The construction of the proposed installation project will likely have no direct or indirect impact on federally-protected species habitat.

Rohm and Haas plan to utilize the BACT to control emissions and thus minimize impacts to the surrounding environment to the maximum extent practicable. The proposed emissions of each pollutant subject to PSD review are consistent with both the TCEQ BACT guidance and the most stringent limit in the RBLC; and, are considered to be the top level of control available for the new and modified facilities.

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Figures

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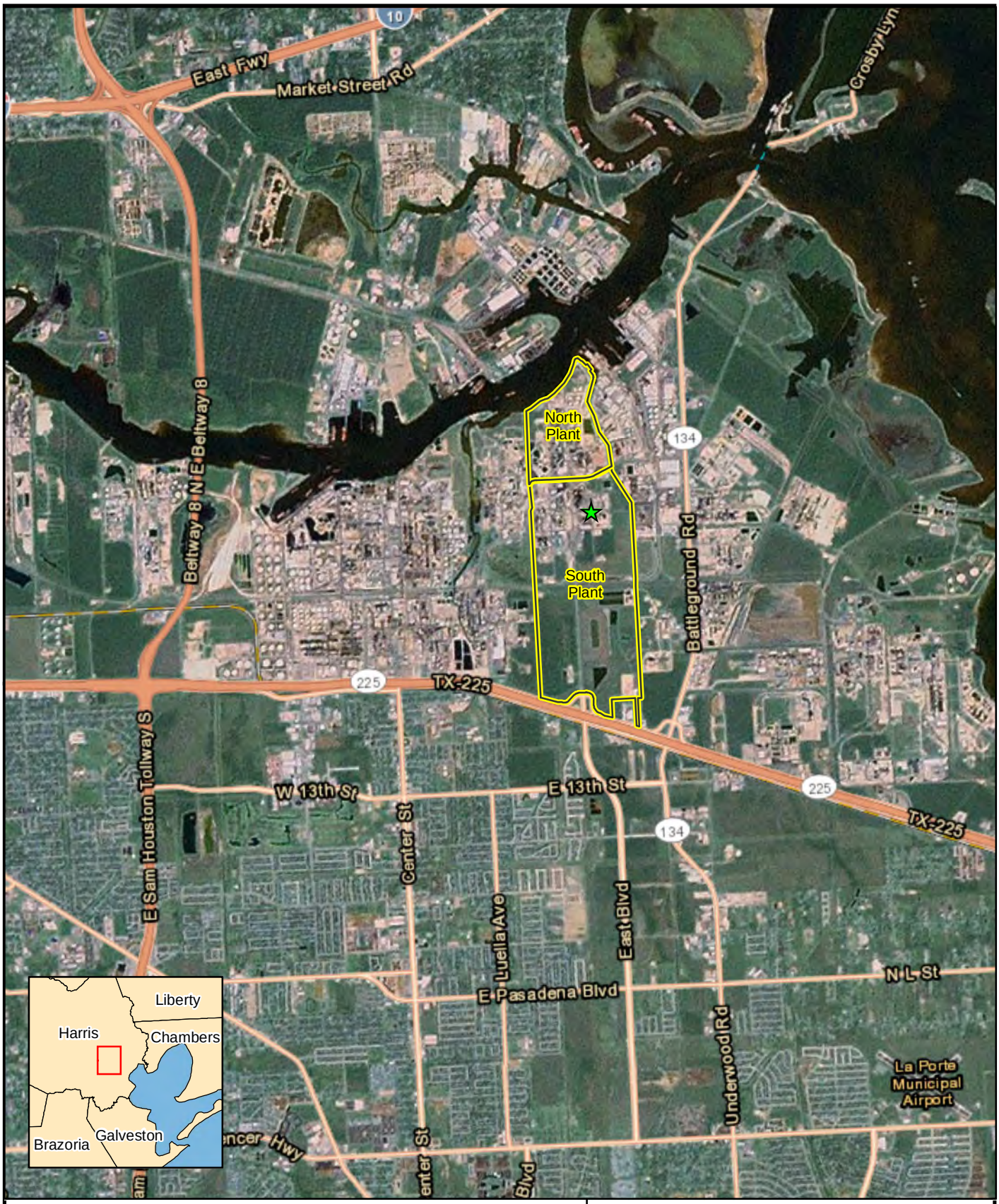

Legend

- Project Site
- Plant Boundaries

N

0 2,500 5,000 Feet

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Project:	Boiler House Unit Installation Project
Client:	Rohm and Haas Texas, Incorporated
Drawn by: CW	Date: 6/4/2013
Project No.: 41569414	Figure 1

Path: K:\ENV\ENV30\41569125\GIS\MXD\VicinityMap.mxd

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Legend

- Outfall
- Wastewater Treatment Plants
- Proposed Construction (Ground Disturbance)
- Boiler House Unit
- N-Area Unit
- Laydown Area (Ground Disturbance)
- Plant Boundaries

N

0 250 500 Feet

URS

Title:	Site Layout
Project:	Boiler House Unit Installation Project
Client:	Rohm and Haas Texas, Incorporated
Drawn by: CW	Date: 7/8/2013
Project No.: 41569414	Figure 2

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URS

Legend

- Boiler Site Construction
- Laydown Area
- Significant Impact Level Exceedance 24-hour $PM_{2.5}$
- Action Area
- Plant Boundaries

N

0 250 500 Feet

Title:	**Action Area**
Project:	**Boiler House Unit Installation Project**
Client:	**Rohm and Haas Texas, Incorporated**
Drawn by: **CW** / Date: **7/10/2013** / Project No.: **41569414**	**Figure 3**

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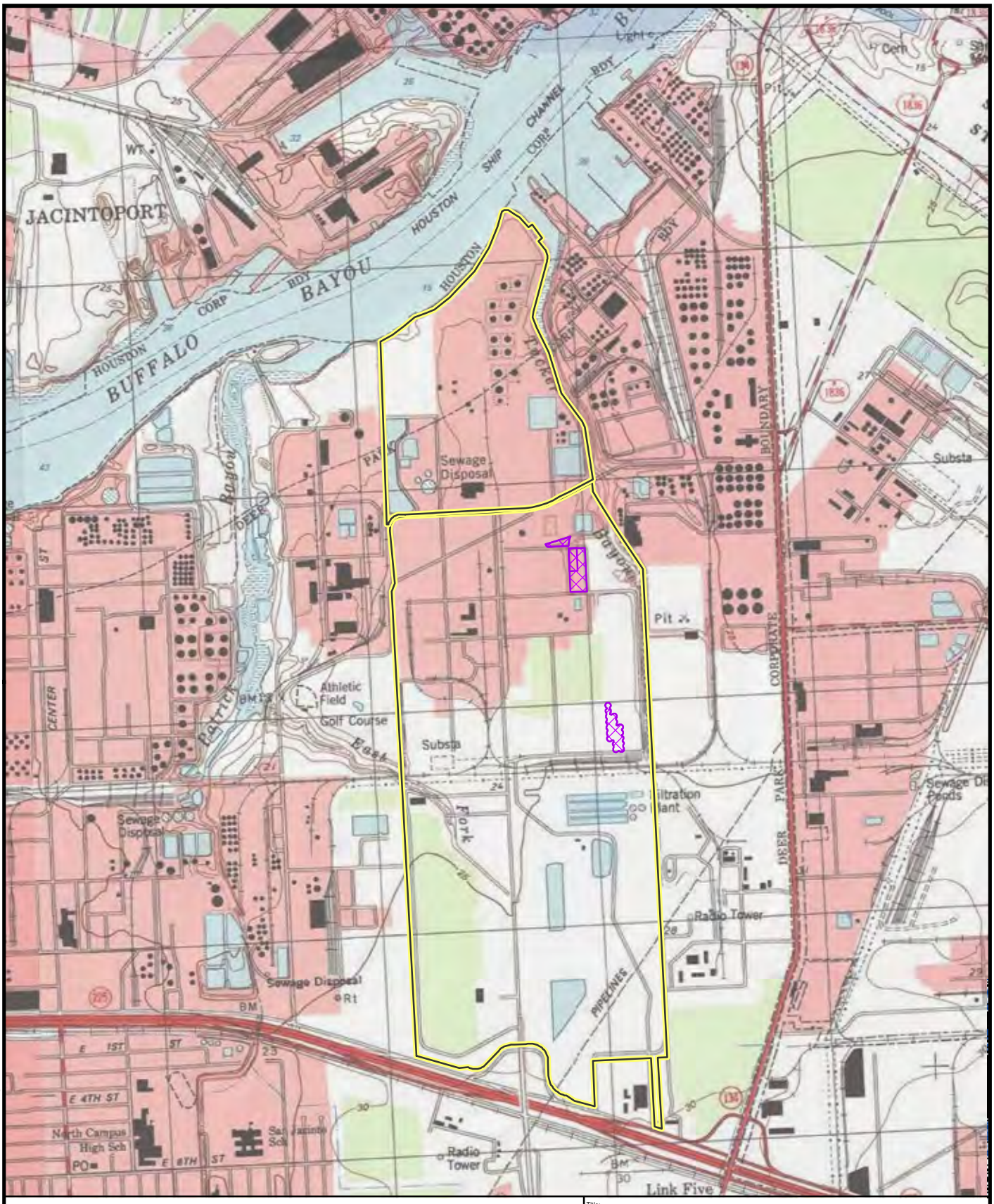


Legend

- Action Area
- Plant Boundaries

N

0 1,000 2,000 Feet

Title:	Topographic Map
Project:	Boiler House Unit Installation Project
Client:	Rohm and Haas Texas, Incorporated
Drawn by: CW	Date: 7/9/2013
Project No.: 41569414	Figure 4

Path: K:\ENV\ENV30\41569125\GIS\MXD\Topo.mxd

US EPA ARCHIVE DOCUMENT

URS

Legend

- 100-Year Floodplain
- Action Area
- Plant Boundaries

N

0 1,000 2,000 Feet

Title: **FEMA 100-Year Floodplain Map**

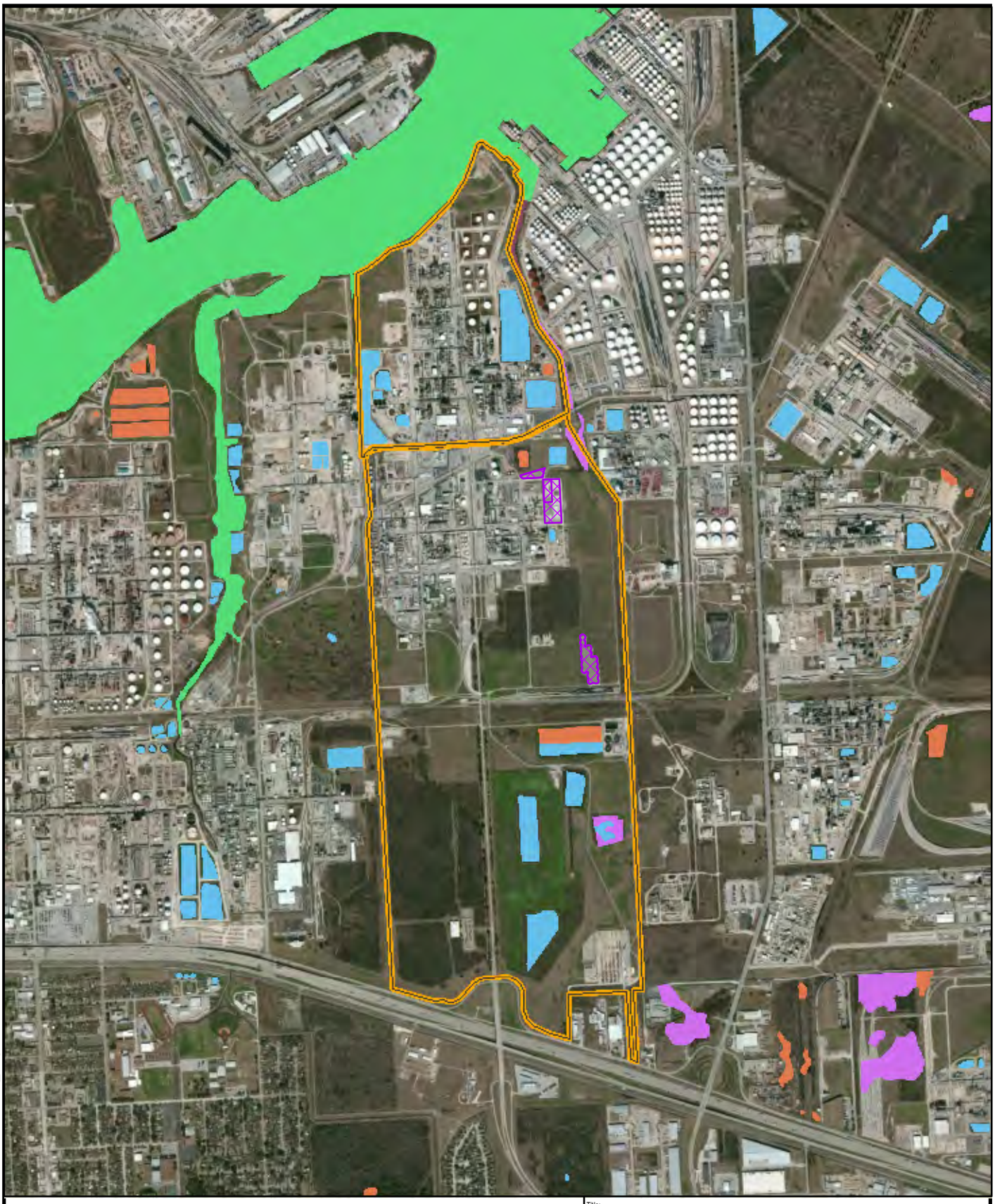
Project: **Boiler House Unit Installation Project**

Client: **Rohm and Haas Texas, Incorporated**

Drawn by:	Date:	Project No.:	
CW	7/9/2013	41569414	Figure 5

Path: K:\ENV\ENV30\41569125\GIS\MXD\FEMA_Map2.mxd

US EPA ARCHIVE DOCUMENT



Legend

- Action Area
- Plant Boundaries
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N

0 1,000 2,000 Feet

URS

Title: **National Wetlands Inventory Map**

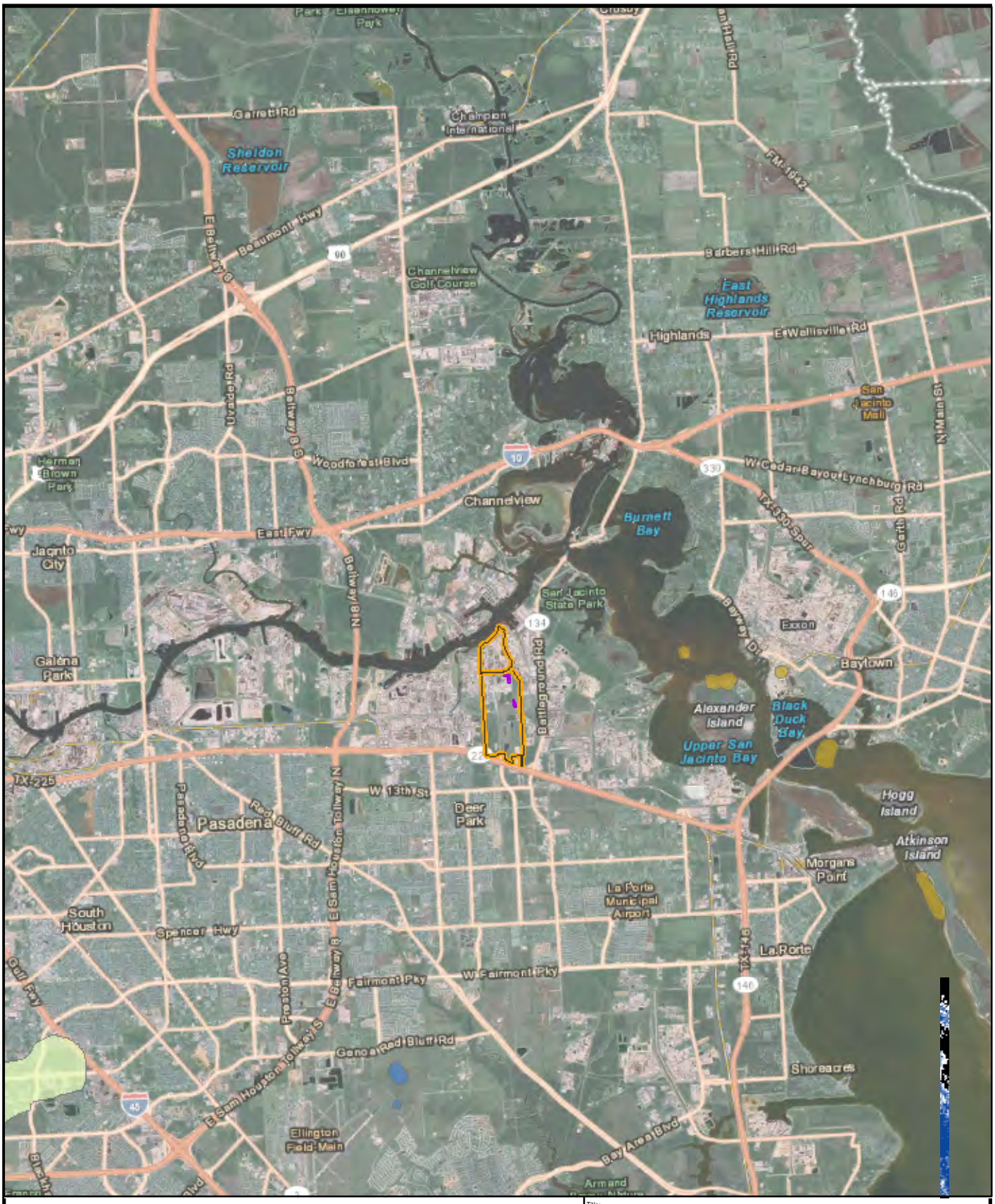
Project: **Boiler House Unit Installation Project**

Client: **Rohm and Haas Texas, Incorporated**

Drawn by:	Date:	Project No.:	
CW	7/9/2013	41569414	Figure 6

Path: K:\ENV\ENV30\41569125\GIS\MXD\NWI_Map.mxd

US EPA ARCHIVE DOCUMENT



Legend

- Action Area
- Plant Boundaries
- Houston toad
- Rookery
- Texas prairie dawn

N

0 1.25 2.5 Miles

Title: **Texas Natural Diversity Database**			
Project: **Boiler House Unit Installation Project**			
Client: **Rohm and Haas Texas, Incorporated**			
Drawn by: **CW**	Date: **7/9/2013**	Project No.: **41569414**	**Figure 7**

Path: K:\ENV\ENV30\41569125\GIS\MXD\TNDD_Map.mxd

Appendix A

Photographic Log

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

URS

N

0 250 500 1,000 Feet

Title: Photo Log			
Project: Boiler House Unit Installation Project			
Client: Rohm and Haas Texas, Incorporated			
Drawn by: CW	Date: 04/16/2013	Project No.: 41569414	Figure 2

Path: K:\ENV\ENV30\41569125\GIS\MXD\Photo_log.mxd

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	1

Direction Photo Taken:

S

Description:

Boiler 4 is located in the background along with the existing control room.

DSCN5981.JPG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	2

Direction Photo Taken:

N

Description:

A concrete-lined drainage ditch is located north of Boilers 3 & 4 and west of the proposed boiler location. This drainage ditch appears to only channel surface water runoff.

DSCN5982.JPG

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Proposed Boiler Site	DRS220021-22350-1

Date:	Photo No.
4/30/2013	3

Direction Photo Taken:

NE

Description:

The proposed location for the new boilers is currently housing portable contractor trailers. The area is adjacent to maintained grass areas and pipeline headers.

DSCN5983.JPG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Proposed Boiler Site	DRS220021-22350-1

Date:	Photo No.
4/30/2013	4

Direction Photo Taken:

NE

Description:

The proposed location for the new boilers is currently housing portable contractor trailers. The area is adjacent to maintained grass areas and pipeline headers. A concrete lined ditch is west of the proposed project site and appears to only channel surface water runoff.

DSCN5984.JPG

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	5

Direction Photo Taken:

SE

Description:

A DI pond is located south of the proposed boilers and east of the existing boilers. This area is surrounded primarily be crushed gravel and asphalt. This area is intended to detain all boiler blowdown that is not being recycled through the units.

DSCN5985.JPG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	6

Direction Photo Taken:

SE

Description:

A mixed woodland habitat was observed south of the DI pond.

DSCN5986.JPG

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	7

Direction Photo Taken:

E

Description:

A landfill owned and operated by (XXX) is located east of Boiler House Unit. This company currently receives various waste products from different companies and disposes it in this area.

DSCN5987.JPG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Proposed Boiler Site	DRS220021-22350-1

Date:	Photo No.
4/30/2013	8

Direction Photo Taken:

W

Description:

The proposed boiler location is currently a concrete-paved area with contractor vendor trailers that will be translocated for the project.

DSCN5988.JPG

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Proposed Boiler Site/ Construction Laydown	DRS220021-22350-1

Date:	Photo No.
4/30/2013	9

Direction Photo Taken:

SE

Description:

The southern portion of this concrete lot is expected to be the location of the construction laydown area. It consists of paved concrete.

DSCN5989.JPG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Adjacent to Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	10

Direction Photo Taken:

NE

Description:

Battleground owns a man-made pond within the DPO Site. This open water feature is located north of the proposed boiler units and east of the proposed control room area.

DSCN5991.JPG

PHOTOGRAPHIC LOG

Client Name:	Site_Location:	Project No.
Rohm and Haas	DPO Site: Adjacent to Boiler House Unit	DRS220021-22350-1

Date:	Photo No.
4/30/2013	11

Direction Photo Taken:

N

Description:

Proposed area for the new control room that will be constructed with the new boilers. This control room will replace the existing control room located to the south. The area is a currently maintained grass area near a earthen ditch and man-made pond.