Essential Fish Habitat 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

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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. At the Deer Park Operations Site (DPO Site), Rohm and Haas operates the Boiler House Unit under New Source Review (NSR) Permit No. 2165. This facility 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. 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) and Essential Fish Habitat (EFH) Assessment to evaluate the potential for the proposed Boiler House Unit Installation Project (Project) to affect designated EFH area and managed species within or near the Project Area.

URS 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 boilers are operational, concentrations of all regulated constituents will be below significant impact levels (SIL) outside the fence line of the DPO Site.

For the basis of this EFH, the Project Area was defined by the following parameters:

1) Areas where construction activities would occur which includes:

    a. **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.

b. **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**.**

2) 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 boilers will only contribute blowdown to the discharge in Outfall 001, and will not result in a change of the volume or chemical composition of the effluent discharge from the DPO Site. However, as Outfall 001 discharges into Buffalo Bayou and the Houston Ship Channel, which have been considered EFH (see Section 2.1); an evaluation of potential impacts of the existing effluent discharge on EFH was performed for the project.

A review of air emissions, dispersion modeling data, current literature, and publicly available data was conducted to determine the potential effect that the Project would have on EFH in the Houston Ship Channel including the eight listed Gulf of Mexico Fishery Management Council (GMFMC) managed species with potential for occurrence within the EFH. The Project will not change the structure of the EFH habitats, and the changes to runoff, emissions deposition, and wastewater discharge are expected to remain unchanged. Further, there is no preferred habitat for any of the eight species within EFH in the Project Area. Based on the aforementioned information, no adverse effects on EFH or on the eight listed GMFMC managed species with potential for occurrence within Houston Ship Channel segment are anticipated from the Project.

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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). At the Deer Park Operations Site (DPO Site), Rohm and Haas operates the Boiler House Unit under New Source Review (NSR) Permit No. 2165. This facility 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 and associated piping and equipment in South Plant. 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.

USEPA Region 6 has determined that issuance of this permit is subject to compliance and the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended. The MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect Essential Fish Habitat (EFH). As defined by 16 USC 1802(10), EFH constitutes those aquatic and associated land areas, specifically enumerated as the water way substrate, water column, and water properties required for any life cycle stage for aquatic organisms.

Rohm and Haas has retained the services of URS Corporation (URS) to prepare an EFH Assessment to evaluate the potential for the Project to affect designated EFH area adjacent to the DPO Site. URS' *Biological Assessment for the Rohm and Haas' Boiler House Unit Installation Project* dated July 2013, evaluated the Project's potential to effect federally-protected threatened and endangered (T&E) species and/or their potential habitat (URS 2013).

1.1 Project Location

The proposed boilers will be located entirely within the South Plant region of the DPO Site property, 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 new boilers will be constructed in the Boiler House Unit (Figure 2). The Boiler House Unit is located on the western property boundary adjacent to a landfill owned and operated by Clean Harbor Waste Management.

1.2 Project Purpose

The 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.

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 Section 1.3. 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 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 (2013). 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 has 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
- Carbon Capture and Storage (CCS).

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 Energy 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 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 Project 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.

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 2013. The new boilers are expected to be operational by September 2014.

1.4.1 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.

1.4.2 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

1.4.3 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 Project Area

For the basis of this EFH, the Project Area was defined by the following parameters:

3) Areas where construction activities would occur which includes:

   a. **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.

   b. **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**.**

4) 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 boilers will only contribute blowdown to the discharge in Outfall 001, and will not result in a change of the volume or chemical composition of the effluent discharge from the DPO Site. However, as Outfall 001 discharges into Buffalo Bayou and the Houston Ship Channel, which have been considered EFH (see Section 2.1); an evaluation of potential impacts of the existing effluent discharge on EFH was performed for the project.

The Project Area is approximately 6.87 acres. Land use and plant community types within the Project 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.

2.0 Essential Fish Habitat

MSFCMA (16 United States Code [U.S.C.] 1801-1882) provided added measures to describe, identify, and minimize adverse effects on EFH (50 CFR Part 600). The Gulf of Mexico Fishery Management Council (GMFMC) retains the responsibility for management of EFH species in Texas, Louisiana, Mississippi, and Florida. As defined by 16 USC 1802(10), EFH constitutes those aquatic and associated land areas, specifically enumerated as the water way substrate, water column, and water properties required for any life cycle stage for aquatic organisms. "Waters" include aquatic areas and associated physical, chemical, and biological properties currently or historically utilized by the fisheries. "Substrate" includes any sediment, hard bottom, structures underlying the waters, and associated biological communities (GMFMC 1998).

2.1 EFH near the Project Area

The Project Area encompasses areas that will be directly affected by construction as well as areas where air and water quality may be affected by the construction and operation of the proposed boilers and the associated appurtenances. The DPO Site is adjacent to Buffalo Bayou's eastern reach, which is designated riverine EFH according to Hilary Young from NOAA (personal communication April 26, 2013; Figure 3). This reach of Buffalo Bayou has been channelized to aid in industrial navigation through the Port of Houston, forming the Houston Ship Channel. As the common name for this water body is more prevalent in the literature and permits, this reach of Buffalo Bayou will be referred to as the Houston Ship Channel for the remainder of this document. No additional ship traffic is anticipated as a result from the proposed Project.

The EFH mandate applies to all species managed under the GMFMC Fishery Management Plans, including the shrimp, reef fishes, and coastal migratory pelagic species that can occur within EFH near the Project Area. Table 1 provides a list of EFH designated species identified by the GMFMC in the Houston Ship Channel (NOAA-NMFS 2012). Specific habitat requirements for each of these species are described in Section 2.2 (GMFCA 2004).

Table 1 – Species with Essential Fish Habitat in the Houston Ship Channel

Category	Common Name	Species Name	Life-Stage
Gulf of Mexico Shrimp	Brown shrimp	*Penaeus aztecus*	Post Larval Juvenile
	White shrimp	*Penaeus setiferus*	Post Larval Juvenile
Gulf of Mexico Red drum	Red drum	*Sciaenops ocellatus*	Larval Post Larval Juvenile Adults
Gulf of Mexico Reef Fishes	Red snapper	*Lutjanus campechanus*	Juveniles
	Gray snapper	*Lutjanus griseus*	Juveniles
	Dog snapper	*Lutjanus jocu*	Juveniles
	Lane snapper	*Lutjanus synagris*	Juveniles
	Dwarf sandperch	*Diplectrum bivittatum*	Adults

2.2 Species Descriptions

2.2.1 Gulf of Mexico Shrimp

2.2.1.1 Brown Shrimp (*Penaeus aztecus*)

Brown shrimp are a common, commercially fished species found within the Gulf of Mexico. Adult tails are characterized by red, dark green, and on occasion light blue pigmentation and rounded uropods. The upper midline of the head and the lower region of the abdomen are broadly grooved. Eggs are demersal and approximately 0.27 mm in diameter. Post larvae are approximately 13 mm in length and maximum adult length is approximately 195 mm for males, 236 mm for females.

Brown shrimp are opportunistic omnivores that feed on algal species and small invertebrates. Brown shrimp utilize both estuarine and marine habitats during various life stages, but are especially dependent on near-shore estuaries and littoral zones. Brown shrimp populations thrive when associated with vegetated habitats, and as a result areas with extensive wetland systems will yield larger harvestable populations than areas with less wetland area. In addition to vegetated habitats, brown shrimp post larvae and juveniles can be found in areas with silty sand and non-vegetated mud bottoms. Post larvae and juveniles have been observed in estuaries ranging from 0 to 70 parts per thousand (ppt) in salinity. Sub-adults can be found across a wide range of habitat from estuaries to the continental shelf (Haas et al. 2004).Adult brown shrimp spawn offshore during flood tides in the spring and summer, with peak spawning in October and

November. Post larvae typically migrate during late winter and early spring to estuaries and remain there until spawning.

Brown shrimp range from Massachusetts to the Yucatan. This species is considered abundant throughout its range and typically have a high catch rate regulation. Brown shrimp are considered rare in the Houston Ship Channel (Seiler et al. 1991).

2.2.1.2 White Shrimp (*Penaeus setiferus*)

White shrimp are typically bluish white with black specks. The uropods are black near the base with bright yellow and green margins. White shrimp have longer antennae and rostra than brown or pink shrimp. Larvae are approximately 0.3 mm long, post-larvae are approximately 7 mm long, and maximum adult length is approximately 118 mm in males, 140 mm in females. White shrimp are omnivorous, with a diet that includes zooplankton and phytoplankton.

White shrimp utilize both estuarine and marine environments during their life and have been collected at depths up to 80 m in the Gulf of Mexico. They are most dependent, however, on estuaries and the inner littoral zone and prefer shallow, brackish wetlands. Post-larval and juvenile white shrimp inhabit primarily areas with mud or peat bottoms and relatively heavy amounts of decaying organic matter or vegetative cover; juveniles are also frequently found in tidal rivers and tributaries. Adult white shrimp prefer soft mud or silt bottoms, and their range extends offshore (GMFMC 1998). Offshore spawning occurs from March to September within the Gulf of Mexico. Eggs hatch within 10-12 hours. Upon hatching, white shrimp will go through several larval stages before entering the post-larval stage and migrating to estuarine nursery grounds in late May and June, approximately 2 weeks after spawning.

White shrimp are considered highly abundant throughout their range. Reports have indicated that adult white shrimp are rare to common in Galveston Bay, while juvenile white shrimp abundant (CCMA 2011). White shrimp have moderate habitat usage of the Houston Ship Channel (GMFMC 2004).

2.2.1.3 Gulf of Mexico Red Drum

Red Drum (*Sciaenops ocellatus*)

Red drums are large fish that can be identified by a single black spot on the upper part of the tail base and an overall coloration ranging from nearly black to silver. The Texas record weight for red drum is 59.5 pounds (TPWD 2012a). Red drum diet changes throughout their life cycle: Larvae primarily feed on detritus while juveniles and adults are predatory. Juvenile diet consists

of small crabs, shrimp, and marine worms, while adults consume larger crabs, shrimp, and small fish.

Red drum habitat is broad and includes both marine and estuarine areas along the coast. They are known to be found in areas with submerged vegetation and soft mud along jetties, and among pier pilings over a variety of substrates including mud, sand, and oyster reef (GMFMC 1998). Juveniles are typically limited to near-shore areas including bays, marshes, and intertidal zones and are preferential to shallow areas with grassy or muddy bottoms. Adults migrate and can be found further from shore in the Gulf of Mexico and are known to forage in shallow bay bottoms and oyster reefs (GMFMC 2004). In the Gulf of Mexico, spawning occurs from August to October near shorelines.

Red drum range includes the Atlantic Ocean and near-shore waters from Massachusetts to Mexico. Although adult and juvenile red drums are common in Galveston Bay and are virtually absent from the Houston Ship Channel (GMFMC 2004, Seiler et al. 1991).

2.2.1.4 Gulf of Mexico Reef Fishes

Red Snapper (*Lutjanus campechanus*)

Red snappers are a popular game fish that is distinguished by their first and second dorsal fins that appear continuous with a subtle notch connecting them (TPWD 2012b). Red snappers also lack the distinctive black spot located on the pectoral fins of the blackfin snapper. As adults, red snappers can reach 100 cm and can weigh up to 20 pounds. Juveniles can have blue bands appear on their sides. Adult body and fins possess a pink to red coloration with lighter underparts. This species typically has small red eyes and a pointed snout. Red snappers are carnivorous. Juveniles are associated with soft bottom water bodies which contain a food supply of invertebrates. Adult red snappers inhabit offshore habitats associated with hard bottom substrate with depths ranging from 7 – 146 m. Adults can be found near continental shelves, over deep reefs, banks.

Red snappers are oviparous and spawn from June through August. Spawning occurs at depths of 60-120 feet over soft bottom areas. A single female can produce over 9 million eggs in one reproductive event. Eggs hatch approximately 24 hours. Larvae utilize shell beds for protection from predators. Adults generally stay in hard bottom habitats such as reefs. Red snappers range from Massachusetts to Brazil including the Gulf of Mexico.

2.2.1.5 Gray Snapper (*Lutjanus griseus*)

The gray snapper, also commonly known as the mangrove snapper, has two conspicuous canine teeth in the front of the upper jaw and dark or reddish borders outlining the dorsal fins. Young gray snappers typically have a black horizontal bar that extends from the snout through the eye. The soft dorsal fin is rounded and the caudal fin is marginate. Gray snappers can grow up to 35 inches in length and 40 pounds. Gray snappers are predatory fish with diets consisting of crustaceans and small fish. Adults are found both near-shore and offshore at depths between 90 and 600 feet over hard-bottomed substrates including rocks, ledges, wrecks, and coral reefs. Juveniles utilize estuaries with fluctuating salinity near tidal rivers or creeks, mangroves, and grass beds and are also known to be associated with physical structures such as docks, pilings, and jetties (GMFMC 2010).Juvenile gray snappers have been reported in freshwater lakes and rivers indicating that they can tolerate a broad range of salinity (FLMNH 2010). Gray snappers spawn offshore between June and August. Depending on size, a single female can produce up to 5.9 million eggs. Gray snappers range in the Atlantic Ocean extends from Massachusetts to Brazil. A robust, concentrated population can be found along the coast of Florida (FMNH 2010).

2.2.1.6 Dog Snapper (*Lutjanus jocu*)

Dog snappers are brown fish with lighter coloration along the sides. A single pair of canine teeth is notably enlarged and is visible even when the mouth is closed. Adults typically develop a pale triangle and a light blue interrupted line below the eye and can reach a weight of 30 pounds. Adult dog snappers feed on fish, mollusks, and crustaceans and inhabit offshore rocky areas and reefs at depths of 16 to 100 feet. Dog snappers spawn in early March, primarily in waters off Jamaica and the northeastern Caribbean (FLMNH 2010). Eggs and larvae are then dispersed by ocean currents towards estuaries and other near-shore areas where post-larvae will develop into juveniles. Juveniles inhabit estuaries and are known to occur in near-shore portions of freshwater rivers (FLMNH 2010). Juveniles gradually migrate toward coral reefs or rocky bottom habitats where they will remain as adults. Dog snappers range from Massachusetts to Brazil.

2.2.1.7 Lane Snapper (*Lutjanus synagris*)

Lane snappers have a rounded anal fin which distinguishes it from other related species. As adults, lane snappers can reach 60 cm in length. Coloration ranges from silver to reddish and lane snappers typically have a green dorsal surface with dark vertical bars. A series of 7 – 10 yellow horizontal stripes extend along the sides with diagonal yellow line above the lateral line. A softened black spot is present above the lateral line. Lane snappers are euryphagic carnivores and are preyed upon by humans, sharks, and other large fish. They typically inhabit waters that range

in temperature from 16.1 – 28.9°C. Juveniles inhabit vegetated estuaries with a fluctuating tidal cycle and could potentially be found in tidal canals or rivers. Adult lane snappers are found offshore in water with salinities of approximately 35 ppt. Adults can be found over all substrate types, but may have a preference for sandy or rocky bottoms (Vergara 1978).

Lane snappers spawn offshore from March to September. A single female can lay up to 990,000 eggs which take 23 hours to hatch. The eggs are pelagic and are approximately 0.03 inches in diameter.

Lane snappers are found in the Atlantic Ocean from North Carolina to Brazil. Robust populations of lane snappers are found by Antilles, Panama, and on the northern coast of South America. Reef fish have relatively low habitat usage in the Houston Ship Channel (GMFMC 2004).

2.2.1.8 Dwarf Sandperch (*Diplectrum bivittatum*)

Dwarf sandperch have a slender, elongate body. Coloration on the back and sides is typically pale yellow brown with white underparts. Irregular vertical bars are located on the lateral sides. Distinguishable blue lines transect the head. One group of spines extends from the angle of the preopercle. This species can reach 25 cm in length. Adult dwarf sandperch typically inhabit soft bottom habitats and can occasionally inhabit hard bottom areas as well. They have been found at depths ranging from 1-100m (GMFMC 2004). Juveniles are typically found in hard bottom areas. Dwarf sandperch range from Bermuda to Brazil excluding the Bahamas and West Indies. This species is commonly used as bait for commercial and recreational fishing in the Gulf of Mexico.

2.3 Habitat Areas of Particular Concern

Habitat Areas of Particular Concern (HAPC) are geographic sites that fall within the distribution of EFH for federally protected species. HAPCs are areas of special importance that may require additional protection from adverse fishing effects. Specific to fishery actions including recreational and commercial, HAPCs are areas within EFH that are rare and are either ecologically important, sensitive to disturbance, or may be stressed. According to the EFH Mapper, there are no EFH HAPCs identified within, or adjacent to, the Project Area (NOAA-NMFS 2012).

3.0 Air Quality Assessment

URS performed dispersion modeling of the proposed emissions of air pollutants from the proposed installation Project in accordance with U.S. EPA Prevention of Significant Deterioration (PSD) permit requirements. The objective of the modeling was to demonstrate that the total concentration, including an appropriate background, would not exceed the applicable NAAQS and PSD Increment. The Project is subject to PSD review for CO, NO_x, PM_{10}, and $PM_{2.5}$. 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. Air emissions resulting from the Project are discussed in detail in the URS' *Biological Assessment for the Rohm and Haas Boiler House Unit Installation Project* (URS 2013).

The highest modeled concentration value is the maximum ground level concentration as predicted by the model for each pollutant and averaging period resulting from this proposed Project. The highest modeled concentration was calculated for both within and outside of the DPO Site's property boundary. Table 2 and Table 3 show the maximum predicted concentrations due to the installation Project for each pollutant and averaging period. It should be noted these are not total ambient concentrations. These are predicted increases in ground level concentrations due to new emissions from the proposed Project.

Table 2 – 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

Pollutant	Averaging Period	Highest Modeled Off-Property Concentration beyond Dow DPO (µg/m^3)	Significant Impact Level (µg/m^3)	Significant?
$PM_{2.5}$	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 Project 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.

Table 3 – 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 Project 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.

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 EFH or managed species which are located outside of the DPO Site. EFH only exists outside of the DPO site; therefore, there would be no impacts to EFH or managed 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 3. The model predicted concentrations for 24-hour $PM_{2.5}$ are greater than SIL as shown in Figure 3.

3.1 Particulate Matter

The potential impacts to EFH from the increase in PM were considered. PM is not a single pollutant, but a heterogeneous mixture of particles differing in size, origin, and chemical composition. 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. 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). Other components of PM, such as dust, trace metals, and organics can at high levels affect plants and other organisms. The low concentration of PM over a relatively large volume of water would not be expected to cause changes in pH or eutrophication that would adversely impact to protected species using these habitats. Air modeling results indicate that all PM exceedances will be confined to a 2.63-acre area of maintained grass within the DPO Site which does not possess EFH habitat to support managed species. Therefore, no significant impacts from PM emissions on EFH or managed species will result from the proposed project.

3.2 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. No impacts to EFH or managed species are anticipated to result from fugitive dust emissions from construction phase of the proposed Project.

3.3 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.

4.0 Potential Impacts

This section presents the results of the analysis of potential impacts to EFH and its potentially-occurring managed species within the Project Area.

4.1 Potential Impacts

This analysis for EFH and managed species in the Houston Ship Channel is based on the impacts by ground disturbance, changes in air quality resulting from the construction and operation of the boilers and associated appurtenances, and literature review. The following impact sources are included in the analysis:

- **Direct actions on Houston Ship Channel structure:** The proposed Project will not alter the structure of Houston Ship Channel, and no disturbance to the current substrate is anticipated.

- **Control of run-off during construction and operation:** The proposed boilers, or area of direct construction disturbance, which is located approximately 1.1 miles north of the Houston Ship Channel. Current best management practices (BMPs) will be utilized to prevent runoff including sediments or chemicals resulting from construction and operation.

- **Deposition of emissions from operation of the Project:** Atmospheric deposition of airborne constituents is expected to be negligible and have no effect on the water quality of EFH or other nearby aquatic habitats where ground-level SIL concentrations for regulated constituents are not exceeded. Modeling identified one minor SIL exceedance location that is confined to a maintained grass area within the DPO Site. Therefore, the proposed project will have no impact on EFH or managed species. Detailed information about the air emissions analyses can be found in the *URS' Biological Assessment for the Rohm and Haas' Boiler House Unit Installation Project* (2013).

There is no EFH or managed species that occur within the Project Area, which is solely terrestrial. Because the Project will not change the structure of Houston Ship Channel, and effects of runoff, wastewater discharge is expected to remain unchanged, and emissions deposition are expected to be negligible and restricted to land, ***no adverse effects*** to EFH or any of the managed species in the Houston Ship Channel are anticipated as a result of the proposed Project involving the Boiler House Unit installation.

5.0 Mitigation Measures

5.1 Air Quality

Rohm and Haas plans to utilize the Best Available Control Technology (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 RACT/BACT/LAER Clearinghouse (RBLC); and, are considered to be the top level of control available for the new and modified facilities.

5.2 Water Quality

Wastewater discharges will be subject to TPDES permit limitations, which have been designed to be protective of aquatic and marine species. The effluent resulting from the proposed Project will be regulated by permit limits. All other wastewater, including the process stream and dilution steam blowdown, will be treated before being discharged into the Houston Ship Channel Tidal Segment No. 1006. A current Stormwater Pollution Protection Plan (SWPPP) will be employed for further precaution.

All wastewater associated with construction and operation of the installation Project with the exception of the cooling tower blowdown and regeneration water will be treated onsite. The Project is not expected to produce a substantial wastewater impact. Stormwater runoff from within the cracking facility is directed through a series of onsite ditches and weirs.

6.0 Conclusions

A review of air emissions and dispersion modeling data, volume and chemical composition of the wastewater effluent, and a review of current literature and publicly available data was conducted to determine the potential effect that the Project would have on EFH in Houston Ship Channel including the eight listed GMFMC managed species with potential for occurrence within the EFH. The Project will not change the structure of the EFH habitat, and changes to runoff, emissions deposition, and wastewater discharge will remain unchanged. Further, there is no preferred habitat for any of the eight species within EFH near the Project Area. Based on the aforementioned information, ***no adverse effects*** on EFH or on the combined eight listed GMFMC managed species with potential for occurrence within the Houston Ship Channel are anticipated from the Project.

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The following individuals contributed to the preparation of this document and are listed below along with their associated role in this project.

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8.0 References

Center for Coastal Monitoring and Assessment (CCMA). 2011. Gulf of Mexico essential fish habitat: Texas. http://ccma.nos.noaa.gov/products/biogeography/gom-efh/tx.aspx

Dow Chemical Company, L.P. 2013. Dow in Texas- Deer Park: About Us. http://www.dow.com/texas/deerpark/about/index.htm Florida Museum of Natural History (FMNH). 2010. Biological Profiles. http://www.flmnh.ufl.edu/fish/Education/bioprofile.htm

Gulf of Mexico Fishery Management Council (GMFMC). 1998. Generic amendment for addressing essential fish habitat requirements in the following fishery management plans of the Gulf of Mexico. Tampa, Florida, USA.

Gulf of Mexico Fishery Management Council (GMFMC). 2004. Final environmental impact statement for the generic amendment to the following fishery management plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States Waters; Red Drum Fishery of the Gulf of Mexico; Reef Fish Fishery of the Gulf of Mexico; Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic; Stone Crab Fishery of the Gulf of Mexico; Spiny Lobster in the Gulf of Mexico and South Atlantic; Coral and Coral Reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council. Tampa, FL.

Gulf of Mexico Fishery Management Council (GMFMC). 2010. Gray/ Mangrove Snapper. http://www.gulfcouncil.org/fishing_regulations/regulations_matrix/Site/gray_mangrove.html.

Haas, H. L. K. A. Rose, B. Fry, T. J. Minello, and L. P. Rozas. 2004. Brown shrimp on the edge: Linking habitat to survival using an individual-based simulation model. Ecological Applications 14(4):1232-1247.

National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS). 2012. Essential fish habitat mapper v3.0. http://www.habitat.noaa.gov/protection/efh/habitatmapper.html

Seiler, R., G.J. Guillen, and A.M. Landry, Jr. 1991. Utilization of the upper Houston Ship Channel by fish and macroinvertebrates with respect to water quality trends. In: Proceedings of the Galveston Bay Characterization Workshop. GBNEP-6.

TPWD. 2012a. Red Drum (*Sciaenops ocellatus*). http://www.tpwd.state.tx.us/huntwild/wild/species/reddrum/.

TPWD. 2012b. Red Snapper (*Lutjanus campechanus*). http://www.tpwd.state.tx.us/huntwild/wild/species/redsnapper/

URS Corporation. 2013. URS' Biological Assessment for the Rohm and Haas' Boiler House Unit Installation Project. Deer Park, Texas. July 2013.

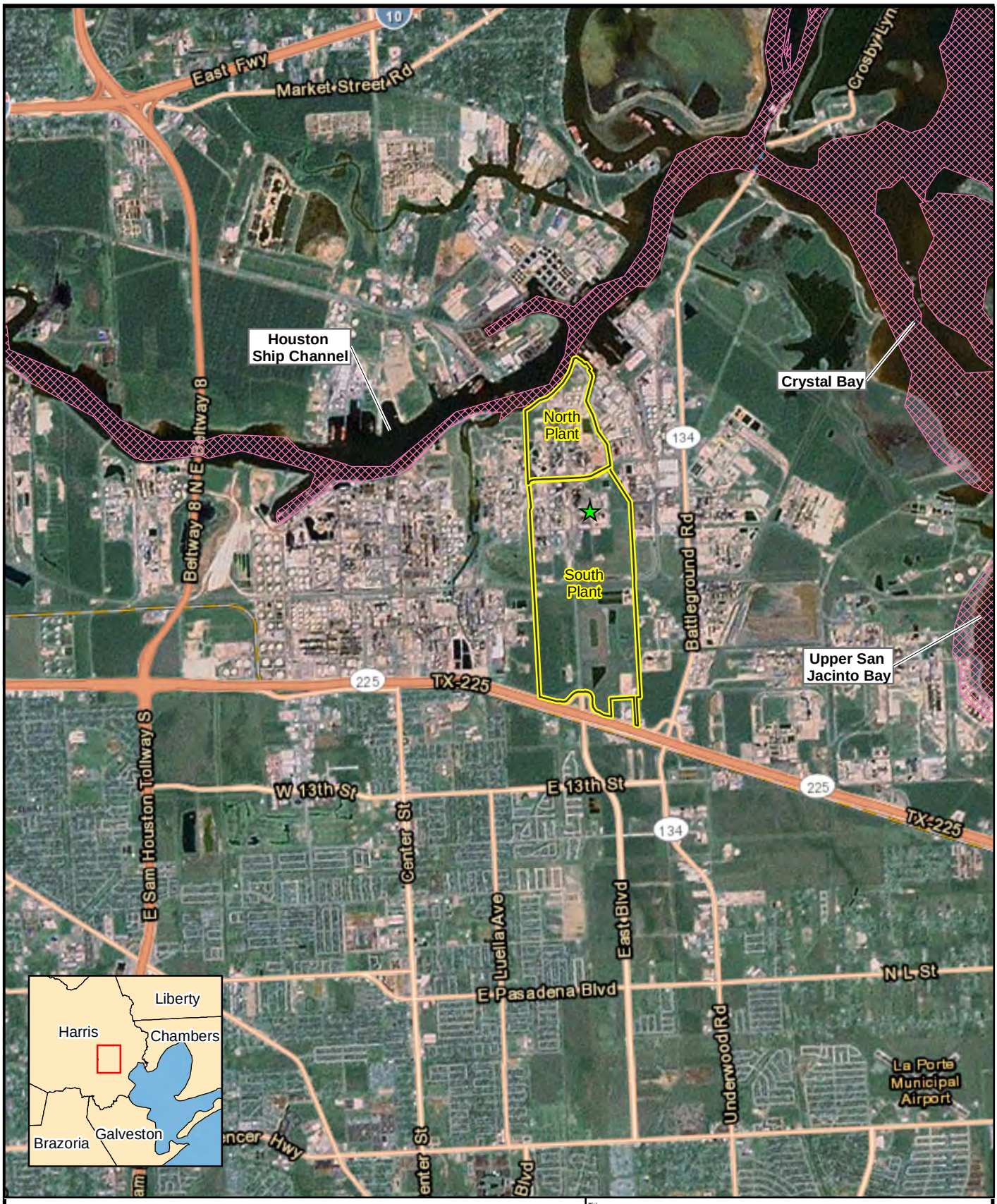
United States Environmental Protection Agency (U.S. EPA). 1996. Air quality criteria for particulate matter. Research Triangle Park, NC: National Center for Environmental Assessment-RTP Office; report nos. EPA/600/P-95/001aF-cF. 3v.

U.S. EPA. 2005. Review of the National Ambient Air Quality Standards for Particulate Matter, Policy Assessment of Scientific and Technical Information, OAQPS Staff paper. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. EPA-452/R-05-005. http://www.epa.gov/ttn/naaqs/standards/pm/data/pmstaffpaper_20050630.pdf

U.S. EPA. 2013. Glossary of Climate Change Terms. http://www.epa.gov/climatechange/glossary.html#C

Vergara, R. 1978. Lutjanidae. W. Fischer (ed.) FAO species identification sheets for fishery purposes. Western Central Atlantic (Fishing Area 21). Volume 3. FAO, Rome.

Figures



Legend

- Project Site
- Plant Boundaries
- Essential Fish Habitat

N

0 2,500 5,000 Feet

URS

Title:	Vicinity Map
Project:	Boiler House Unit Installation Project
Client:	Rohm and Haas Texas, Incorporated

Drawn by:	Date:	Project No.:	
CW	6/4/2013	41569414	Figure 1

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

Legend

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

N

0 250 500 Feet

URS

Title:	Site Layout
Project:	Boiler House Unit Installation Project
Client:	Rohm and Haas Texas, Incorporated

Drawn by:	Date:	Project No.:	
CW	7/8/2013	41569414	Figure 2

Path: K:\ENV\ENV30\41569125\GIS\MXD\SiteLayoutEFH3.mxd

Legend

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

N

0 250 500 Feet

URS

Title: **Project Area Map**

Project: **Boiler House Unit Installation Project**

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

Drawn by:	Date:	Project No.:	
CW	7/10/2013	41569414	Figure 3

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