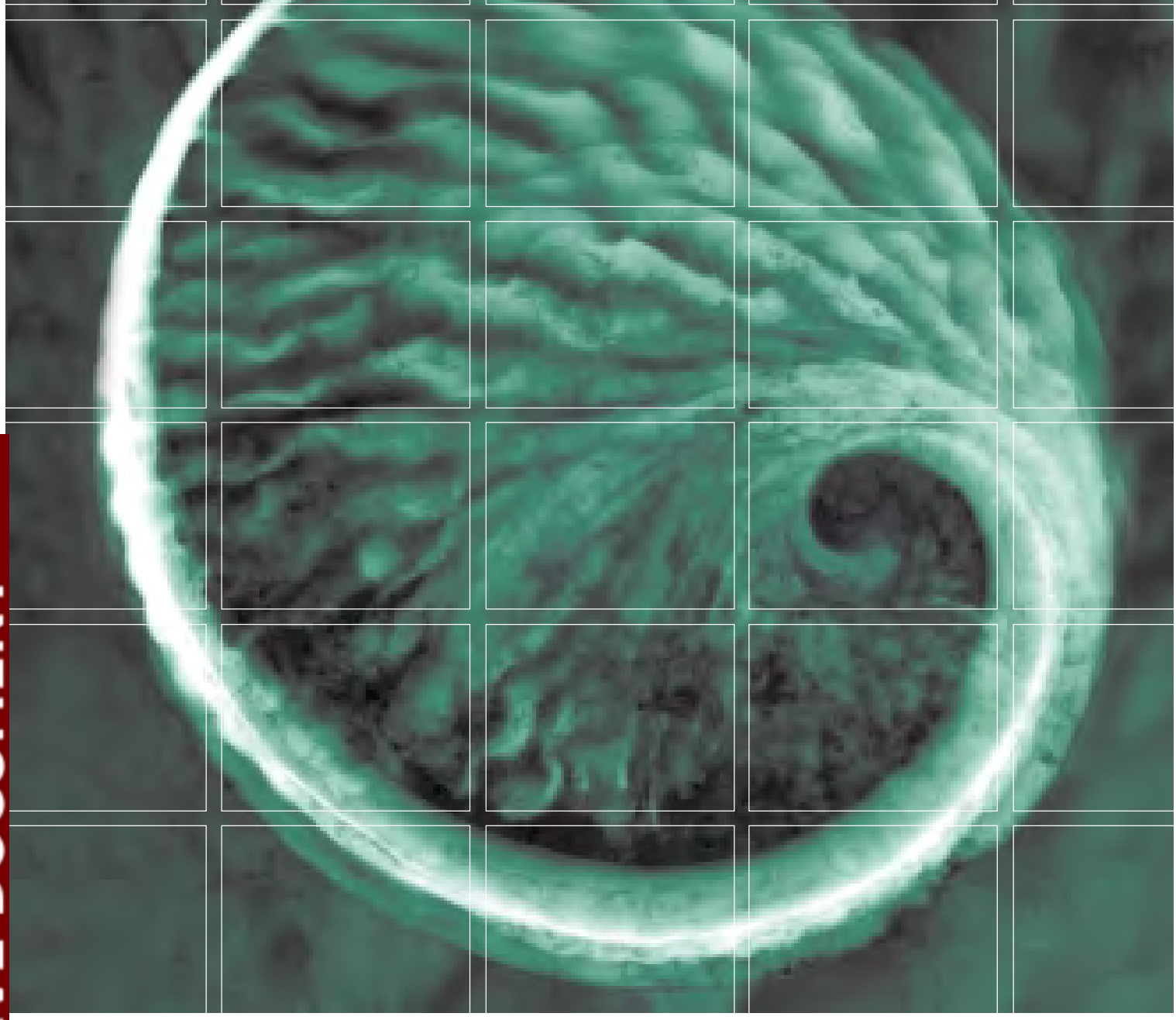

Biological Assessment Report

Air Liquide
Bayou Cogeneration Plant
Pasadena, Texas

June 18, 2013

www.erm.com

ERM

Air Liquide

Biological Assessment Report

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Project No. 0151579

Bayou Cogeneration Plant
Pasadena, Texas

Peter T. Belmonte, P.E.
Partner-in-Charge

Siddharth (Sid) Rajmohan
Project Manager

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
T: 281-600-1000
F: 281-600-1001

Texas Registered Engineering Firm F-2393

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ACRONYM GLOSSARY

BA	Biological Assessment
BACT	Best Available Control Technology
CAA	Clean Air Act
CO	Carbon Monoxide
ERM	Environmental Resources Management, Inc.
ESA	Endangered Species Act
GHG	Greenhouse Gas
HRSG	Heat Recovery Steam Generator
LAER	Lowest Achievable Emission Rate
NAAQS	National Ambient Air Quality Standards
NMFS	National Marine Fisheries Service
NNSR	Nonattainment New Source Review
NO_x	Oxides of Nitrogen
NSR	New Source Review
PBR	Permit By Rule
PM	Particulate Matter
PM_{10}	Particulate Matter less than 10 µm
$PM_{2.5}$	Particulate Matter less than 2.5 µm
PSD	Prevention of Significant Deterioration
SCR	Selective Catalytic Reduction
SIL	Significant Impact Level
T&E	Threatened and Endangered
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollution Discharge Elimination System
TPWD	Texas Parks and Wildlife Division
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

Environmental Resources Management, Inc. (ERM) completed a threatened and endangered (T&E) species survey and project impact effects determination for Air Liquide's Bayou Cogeneration Plant. Air Liquide Large Industries U.S., L.P. (Air Liquide) is developing a permit application to authorize the redevelopment of its cogeneration facility in Pasadena, Texas. The proposed project will involve the replacement of four (4) gas-fired turbines with similar units, the addition of three (3) new gas-fired boilers, and the subsequent removal of three (3) existing gas-fired boilers at the Bayou Cogeneration Plant.

A total of 12 federally listed species were evaluated to assess potential impacts by the proposed project on species that are protected under the Endangered Species Act. Based on this evaluation the Project will have **no effect** on the following listed T&E species: Texas prairie dawn-flower *(Hymenoxys texana)*, West Indian manatee *(Trichechus manatus)*, Houston Toad *(Anaxyrus houstonensis)*, Red-cockaded Woodpecker *(Picoides borealis)*, Whooping Crane *(Grus americana)*, Smalltooth sawfish *(Pristis pectinata)*, Louisiana black bear *(Ursus americanus luteolus)*, Red wolf *(Canis rufus)*, Green sea turtle *(Chelonia mydas)*, Kemp's Ridley sea turtle *(Lepidochelys kempii)*, Leatherback sea turtle *(Dermochelys coriacea*), and Loggerhead sea turtle *(Caretta caretta)*.

1.0 INTRODUCTION

Air Liquide Large Industries U.S., L.P. (Air Liquide) is submitting a permit application to authorize the redevelopment of its cogeneration facility in Pasadena, Texas (Bayou Cogeneration Plant), see Figure 1 (Appendix A). The proposed project will involve the replacement of four (4) gas-fired turbines with similar units, the addition of three (3) new gas-fired boilers, and the subsequent removal of three (3) existing gas-fired boilers at the Bayou Cogeneration Plant. The existing turbines and boilers at the facility are nearing end of life, and this project will ensure that the existing units are replaced by more efficient state of the art units. Overall, this project will result in a net reduction of oxides of nitrogen (NO_X) emissions from the Bayou Cogeneration plant.

Beginning on January 2, 2011, the U.S. Environmental Protection Agency (USEPA) began permitting greenhouse gases (GHGs) through the Prevention of Significant Deterioration (PSD) program of the Clean Air Act (the CAA). Most states directly issue GHG PSD permits, but USEPA currently retains authority to issue GHG permits in Texas. Because the USEPA retains authority to issue PSD permits, the requirements of the Endangered Species Act (the ESA) become part of the PSD permitting process. Section 7 of the ESA requires that federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) (collectively referred to as the Service) to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species.

Because Air Liquide is seeking authorization for GHG permitting under PSD for the Bayou Cogeneration Plant they are required to meet both the ESA requirements administered by the EPA. This Biological Assessment (BA) provides the results of an assessment of the potential effects of the proposed action on federally listed threatened or endangered species that are protected under the ESA. This BA is based on a review of the proposed project and relevant data, both current and historic, as well as field investigations to evaluate the project site and surrounding area to determine whether suitable habitat exists for protected species within the Action Area. Action Area is defined as all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action.

1.1 SITE LOCATION AND HISTORY

The Bayou Cogeneration Plant is located at 11400 Bay Area Blvd, Pasadena, Texas. The plant is in Harris County, which is part of the 8-county Houston-Galveston-Brazoria “severe” ozone non-attainment area.

The plant is comprised of approximately 51 acres bordered by industrial facilities on all four sides. Although there are scattered areas of undeveloped habitats adjacent to and in the approximate area, the plant is considered to be located in a highly industrialized area.

The plant has been in operation for over 27 years and consists of four turbine power blocks for power and steam generation, with each block consisting of a gas-fired GE Frame 7EA turbine, and a heat recovery steam generator (HRSG) which includes duct burners for supplemental firing. The plant also consists of three natural gas-fired boilers which produce steam for sale. The existing sources at the plant are currently permitted to operate under New Source Review (NSR) air permits, Prevention of Significant Deterioration (PSD) permits, one federal Title V operating permit, as well as various Texas Permits-by-Rule (PBRs).

1.2 PROJECT PURPOSE AND NEED

The redevelopment project at the Bayou Cogeneration Plant will consist of replacing the four existing gas turbines at the plant with similar new units. As such, only the gas turbines will be removed and replaced with new units; all existing connections of the power block, as well as the existing HRSGs and duct burners will remain unaffected by this project. The new units will be more efficient than the existing units which are nearing end of life. Air Liquide intended to perform an in-kind replacement of the four existing turbines; however, since the existing turbines are 27 years old, turbines with the exact same specifications are no longer available to Air Liquide. Therefore, Air Liquide will replace the existing turbines with new GE Frame 7EA gas turbines which are closest in specification to the existing turbines. The new 7EA units will be equipped with dry, low-NO_X burners and GE's closed loop emissions control technology to reduce NO_X emissions. The redevelopment project will also include the addition of three new 550 MMBtu/hr boilers to the Bayou Cogeneration Plant. Each new turbine is rated to produce 4 MW of electricity more than the existing turbines at the facility.

Air Liquide is proposing to establish an enforceable limitation of 10,769,647 MMBtu per year on the combined fuel heat input for the three new boilers. The new boilers will be controlled using Selective Catalytic Reduction (SCR) units for NO_X emissions.

The proposed project will be executed in three phases, as summarized below, spanning 24 to 30 months:

PHASE 1 (ANTICIPATED JUNE 2013 – DECEMBER 2013)

During this phase, three new boilers will be constructed at the facility. These new boilers will eventually replace the three existing boilers during Phase 3 of the project. Each of the three new boilers will be equipped with SCR systems to reduce NO_X emissions to the atmosphere. The existing turbines and boilers will

not be modified during this phase of the project and will continue to operate at current levels; therefore, the only construction activity during this phase of the project will be the construction of the three new boilers.

PHASE 2 (ANTICIPATED DECEMBER 2013 – DECEMBER 2015)

During this phase, the four existing turbines will be replaced one at a time with new GE 7EA units designed with the latest and most efficient combustion technology. During Phase 2, the new boilers will need to be operational and available to fulfill steam/thermal supply contractual obligations, in addition to the three existing boilers. Each of the four turbines will be decommissioned, removed, and subsequently replaced one at a time. As soon as the replacement of a given turbine is complete during Phase 2, it will be started up and commissioned. Phase 2 will end as soon as the fourth turbine is started up and commissioned. The existing boilers will continue to be available for operation during this phase to assist in fulfilling the steam/thermal supply contractual obligations, however, at no point will four new turbines, three new boilers, and three existing boilers operate simultaneously during Phase 2. The potential emissions during this phase will not exceed the potential emissions from the overall project. Additionally, Air Liquide will operate the equipment such that all emissions during this phase are less than the respective permit limits.

PHASE 3 (ANTICIPATED DECEMBER 2015)

During this phase, the three existing boilers will be retired and permanently shut down. This marks the completion of the project, and the four replaced gas turbines and three new boilers will become operational after this phase.
As outlined above, the three new boilers constructed in Phase 1 of the project will eventually replace the three existing boilers at the facility in Phase 3; however, the existing boilers will only be decommissioned after the replacement of the turbines in Phase 2, so that the new as well as existing boilers are available during Phase 2 to meet the steam/thermal supply contractual obligations.

For the purposes of this application, Air Liquide has not only evaluated the overall project from an NSR perspective (pre-project actual emissions to post project potential emissions), but has also independently evaluated Phase 2 of the project to ensure that pollutants that are not triggering PSD or Nonattainment New Source Review (NNSR) from an overall project standpoint are also not triggering PSD or NNSR for an individual phase of the project.

ESA Section 7 requires that federal agencies ensure that any activity an agency funds, authorizes, or carries out does not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of a listed species' designated critical habitat. Any federal permitting decision with the potential to impact a listed species requires consultation with the Service. Consultation is required only for actions that "may affect" a listed species or critical habitat. The BA provides a complete evaluation of the potential environmental impacts the proposed expansion project may have on federally-protected species and/or their potential habitat. Protected species evaluated in this document include threatened, endangered, marine mammals and essential fish habitats.

The ESA requires that agencies must file a BA that analyzes and determines whether a proposed project may affect relevant listed species (50 CFR 402). The BA will specify one of the following three possible determinations for each relevant species:

- **No effect**—"No effect" means there will be no impacts, positive or negative, to listed or proposed resources. Generally, this means no listed resources will be exposed to the action and its environmental consequences. Concurrence from the Service is not required.
- **May affect, but is not likely to adversely affect**—"May affect, but not likely to adversely affect" means that all effects are beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated. Discountable effects are those extremely unlikely to occur. These determinations require written concurrence from the Service. The federal action agency's written request for USFWS concurrence should accompany the BA/biological evaluation. *Note that with the conclusion of a finding of "may affect, but is not likely to adversely affect" by an action agency and the USFWS, consultation with the USFWS is considered complete. This is known as "informal consultation."*
- **May affect, and is likely to adversely affect—**"May affect, and is likely to adversely affect" means that listed resources are likely to be exposed to the action or its environmental consequences and will respond in a negative manner to the exposure. A written request for formal consultation should accompany the BA/biological evaluation. *Note that a conclusion or finding of "may affect, and is likely to adversely affect" by an action agency and the USFWS, or if USFWS does not concur with an action agency's finding of "not likely to adversely affect" determination, then "formal consultation" is required between the action agency and the USFWS. Formal consultation results in the USFWS issuing a biological opinion as to whether the action, as proposed, will jeopardize the continued existence of any listed species.*

In summary, if an agency determines that a proposed project will have "no effect" on a listed species, consultation with the USFWS or NMFS is not required. Alternately, if a federal agency determines that a proposed project "is not likely to affect" or is "likely to adversely affect" a listed species, consultation with USFWS or NMFS is required. Therefore, the present BA will conclude with recommendations on each of the federally protected species with potential for occurrence in the Action Area.

The following sections summarize the federal regulations that may be applicable under this review.

2.1 FEDERAL REGULATIONS

2.1.1 Federal Endangered Species Act

The ESA was passed by Congress in 1973 (50 CFR 17 and US Code Title 16, Chapter 35) to protect species of plants and animals which are in danger of extinction. The law provides protection from direct human threats such as killing and trapping as well as for ecosystems on which the species depend. Specifically, Section 9 prohibits taking any federally-listed species. The term *take* means "…to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm can include significant habitat modification if it results in death or harm to individuals of a listed species through impairment of essential behavior (e.g., nesting or reproduction).

Animals and plants that are listed as endangered or threatened by the Department of the Interior (i.e., USFWS) are protected by the ESA on both public and private lands.

3.0 IDENTIFICATION OF ACTION AREA

Federal rule defines the Action Area as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" [50 CFR 402.02]. The Action Area was determined by identifying the maximum area potentially impacted, either directly or indirectly, by the proposed action. Direct impacts to species and habitat within the property boundaries may result from the construction and operation of the new boilers and turbines due to land disturbance and vehicular traffic. Indirect impacts to species and habitat from construction and operation due to noise, light, and air emissions may result off property. No new wastewater discharges will be associated with the project; therefore, no impacts to species or their habitats within or outside of the property boundaries will occur as a result of this action. Evaluation of potential impacts determined that air emissions from operation of the boilers and turbines have the greatest potential impacts to species and habitat. As such, the Action Area is defined based on the extent of air quality impacts as demonstrated by ambient air quality dispersion modeling (Section 3.1). The dispersion modeling demonstrated that there are no significant off property impacts from air pollutants. Modeling was performed for plant configurations and requested operating limitations for all three phases. Based on these models the Significant Impact Level (SIL) was not exceeded beyond the fence line of the existing property boundary for any criteria air pollutant therefore, the Action Area is defined as the property boundary directly, see Table 3-1. To account for potential impacts on adjacent properties associated with construction and operation of the project an additional 1,000 feet surrounding the property boundary's was evaluated to account for indirect impacts from noise, lighting and incidental physical disturbance.

TABLE 3-1: SIL Analysis Results - PM10, CO, and SO2

Primary Emissions Scenario					
Polutant	**Averaging Period**	**SIL**	**SMC**	**Maximum Concentration**	**Compliance with SIL? Y/N**
		µg/m³	*µg/m³*	*µg/m³*	
PM_{10}	24 Hour	5	10	2.36	Y
	Annual	1	-	0.37	Y
CO	1 Hour	2000	-	38.57	Y
	8 Hour	500	575	27.95	Y
CO-MSS Scenario	1 Hour	2000	-	390.21	Y
	8 Hour	500	575	281.23	Y
SO_2	1 Hour	7.8	-	0.88	Y
	3 Hour	25	-	0.86	Y
	24 Hour	5	13	0.43	Y
	Annual	1	-	0.06	Y
Project Phase II Scenario					
Polutant	**Averaging Period**	**SIL**	**SMC**	**Maximum Concentration**	**Compliance with SIL? Y/N**
		µg/m³	*µg/m³*	*µg/m³*	
PM_{10}	24 Hour	5	10	2.41	Y
	Annual	1	-	0.36	Y
CO	1 Hour	2000	-	36.85	Y
	8 Hour	500	575	24.37	Y
SO_2	1 Hour	7.8	-	0.80	Y
	3 Hour	25	-	0.62	Y
	24 Hour	5	13	0.42	Y
	Annual	1	-	0.05	Y

The Action Area was established by the extent of significant air quality impacts as demonstrated by atmospheric dispersion modeling using the USEPA guideline model, AERMOD Version 12060. For the purposes of this study, the significance threshold for ambient air quality impacts was conservatively set at the "significant impact levels (SILs)" for criteria air pollutants triggering review under PSD under 40 CFR 52.21. The SIL is defined as the modeled ambient air concentration from project related sources that would cause or contribute to a violation of National Ambient Air Quality Standards (NAAQS) below which, the potential impacts from project emissions are considered trivial or insignificant.

The CAA requires the USEPA to establish NAAQS for seven pollutants, called criteria air pollutants, to be protective of human health and environment. Primary standards are established to protect public health by limiting exposure

to criteria pollutants below levels determined to have health impacts in sensitive human populations such as children, elderly and those with existing respiratory illness. Secondary standards protect public welfare by establishing limits that allow personal comfort, safeguard economic value such as soils and crops, and are protective of environmental receptors such as watersheds and wildlife.

In areas that comply with the NAAQS, a new or modified facility whose net emissions exceed annual significance thresholds must obtain a permit to construct under the Prevention of Significant Deterioration (PSD) program. As part of this application process, the applicant must demonstrate the project will not cause a violation of the NAAQS. The Air Liquide combined heat and power project exceeds significant emissions thresholds for carbon monoxide (CO), particulate matter (PM) less than 10 µm (PM_{10}) and PM less than 2.5 µm ($PM_{2.5}$).

Based on atmospheric dispersion modeling conducted as part of the PSD application process with the Texas Commission on Environmental Quality (TCEQ), the predicted ambient air concentrations from increased emissions from the project do not exceed the SIL for each of these pollutants. A copy of this dispersion modeling will be provided under separate cover. As stated previously, the SIL is a small fraction of both the primary and secondary NAAQS and represents *de minimis* potential impact and is a very conservative threshold for impacts to ensure protection of endangered species or critical habitat. The impacts from air emissions are not predicted to adversely affect endangered species or habitat outside the property boundary. The Action Area is defined as the area within the existing property boundary plus a 1,000 foot buffer to account for impacts not resulting from air emissions such as noise, light, and incidental physical disturbance, (see Figure 2 in Appendix A).

4.0 PROJECT DESCRIPTION

The proposed project is comprised of the approximately 51 acre Cogeneration Plant as well as by the Action Area established as part of the environmental review. The project is located within a large industrial area and is surrounded by other industrial facilities on all sides. There are no open habitats present within the project site and human disturbances are prevalent in most areas. There are concrete access roads that are used readily within the plant by both cars and transport bicycles. The project is closed in by security fencing with five access points.

The Action Area around the plant is comprised of industrial facilities, rights of way, forests, including forested wetlands, and open lands. There are no intermittent or perennial surface water connections associated with the site. There are a few managed surface water drainage ditches associated with existing roadways.

4.1 PROJECT LOCATION

USGS Mapping: League City and La Porte 24k Topographic Quad Map
Coordinates: 29.6222 N latitude, 95.0443 W longitude
Locality: Pasadena, Harris County, Texas

4.2 EMISSIONS CONTROLS

According to 30 Texas Administrative Code (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. In addition, §116.50(b) and (e) state that any major new or modified facility located in a nonattainment area must use emission controls capable of obtaining the lowest achievable emission rate (LAER) for pollutants subject to nonattainment review. For this project, neither NO_x nor volatile organic compounds (VOC) will trigger nonattainment requirements.

Predicted emissions rates from the Project are shown in Table 2-1 below:

TABLE 4-1: Maximum Emissions for all Pollutants Associated with the Project

Pollutant	Project Emissions Increases (tpy)	Contemporaneous Emissions Increases/ Decreases (tpy)	Net Emissions Increase (tpy)	PSD Major Modification Trigger (tpy)	NNSR Major Modification Trigger (tpy)	PSD Triggered? (Yes/No) [1]	NNSR Triggered? (Yes/No) [1]
NO_X	-24.20	-75.19	-99.39	---	25	---	No
CO	516.03	-47.09	468.94	100	---	Yes	---
VOC	22.84	-5.48	17.36	---	25	---	No
SO_2	11.69	-0.70	10.99	40	---	No	---
PM	68.77	-5.59	63.19	25	---	Yes	---
PM_{10}	60.65	-5.59	55.07	15	---	Yes	---
$PM_{2.5}$	44.95	-5.59	39.37	10	---	Yes	---
H_2SO_4	1.42	0	1.42	7	---	No	---
CO_2	1,084,898	-102,708	982,190.23			Yes	---
CH_4	17.06	-3.45	13.62			Yes	---
N_2O	1.71	-0.34	1.36			Yes	---
GHG (CO_2e)	1,085,785	-102,816	982,969	75,000	---	Yes	---
NH_3	16.27	--	16.27	--	--	--	--
Total HAPs	17.26	--	17.26	--	--	--	--

[1] Non Attainment New Source Review (NNSR) applicability analysis applies only to NO_x and VOC (precursors of ozone). Prevention of Significant Deterioration (PSD) applicability analysis applies to all other NSR regulated pollutants. PSD and NNSR permitting do not apply to NH_3 and Hazardous Air Pollutants (HAPs).

4.3 NOISE LEVELS

The site is located within a highly industrialized area surrounded by other industrial facilities. It is anticipated that noise levels will not exceed existing noise levels occurring during routine maintenance conditions at the site.

4.4 DUST

Construction activities for this project will take place entirely within the existing Air Liquide facility which is comprised of existing structures and concrete paving; therefore, dust mobilization will be at a minimum. To ensure no additional dust mobilization will occur, best management practices will be implemented according to current standards.

4.5 WASTEWATER

The wastewater discharge from the Air Liquide Bayou Cogeneration Plant is authorized by Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0004330000 (TX 0102296). Discharges from the existing facility are currently permitted through four outfalls. Outfall 001 is permitted to discharge steam condensate, maintenance washwater, fire equipment test water, and storm water. However, current operation at the facility has all wastewater from Outfall 001 going to Gulf Coast Waste Disposal Authority's treatment facility (POTW). Outfall 002 is authorized to discharge steam condensate and stormwater while Outfalls 003 and 004 are authorized to discharge steam condensate, fire equipment test water and storm water.

For this Project, there are no design plans to modify the cooling water system for the facility. No new or additional wastewater discharges will be associated with the project. Current permitted discharges will be through the existing outfalls in accordance with requirement established in the existing TPDES permit. Therefore, there are no anticipated impacts to T&E species or their habitats associated with wastewater discharges from this project.

5.0 ENVIRONMENTAL BASELINE

5.1 METHODOLOGY

Literature reviews of current and historical data as well as field surveys were used to evaluate the Action Area for the suitability of habitats to support federally- listed T&E species, including sensitive and critical habitats.

A review of listed species at the county level was performed using federally-listed species obtained from the USFWS website (USFWS, 2012) to determine potential species occurrences and their critical habitat in Harris County, Texas. Federally-listed species that may be found in Harris County according the Texas Parks and Wildlife Division (TPWD) website are also reviewed here. Additionally, the TPWD National Diversity Database was obtained to determine if any known occurrences of the identified species have been documented.

Field investigations were then performed by ERM biologists on August 30, 2012 to document habitat types and potential species occurrences within the Action Area. Surveys consisted of point intersect observations and non-transect surveys due to limited or no access to the adjacent properties. Observations at each of the data points included documenting vegetation communities and observing the area for species specific habitats and species occurrences. The point-intersect observations extended beyond project site boundaries to adjacent habitats within the Action Area. Project survey maps depicting the survey area are included in Appendix A.

5.2 FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT, AND OTHER PROTECTED SPECIES OF POTENTIAL OCCURRENCE IN THE ACTION AREA

The proposed project is located in Harris County, Texas. The current list of federal T&E species that potentially occur in Harris County, according to USFWS and TPWD, is presented in Table 5-1. The Table was generated by compiling the USFWS Southwest Region Ecological Services list (USFWS 2012) and TPWD's annotated lists for Harris County (TPWD 2011a). It is important to note that the TPWD's county lists include several species that are designated as federally listed; however, they are not considered listed by the USFWS. To address potential concerns from both agencies, all federally listed species identified in both agency lists are discussed below.

TABLE 5-1: Federally and State-Listed Species of Potential Occurrence in Harris County

Federally Listed Species of Potential Occurrence in Harris County		
Species Common Name *(Scientific Name)*	**USFWS Southwest Region County-by-County List**	**TPWD Annotated County List of Rare Species Federal Status**
Texas prairie dawn-flower *(Hymenoxys texans)*	Endangered	LE
West Indian manatee *(Trichechus manatus)*	Endangered	
Houston toad *(Anaxyrus houstonensis)*		LE
Red-cockaded woodpecker *(Picoides borealis)*		LE
Whooping crane *(Grus americana)*		LE
Smalltooth sawfish *(Pristis pectinata)*		LE
Louisiana black bear *(Ursus americanus luteolus)*		LT
Red wolf *(Canis rufus)*		LE
Green sea turtle *(Chelonia mydas)*		LT
Kemp's Ridley sea turtle *(Lepidochelys kempii)*		LE
Leatherback sea turtle *(Dermochelys coriacea)*		LE
Loggerhead sea turtle *(Caretta caretta)*		LT

5.3 FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES AND DESIGNATED CRITICAL HABITAT

A total of 12 federally listed species, were identified by USFWS and TPWD as potentially occurring in Harris County, Texas. The following sections provide an overview for each of those 12 species including identifying their habitat types, feeding and nesting habits, and potential locations or occurrences.

5.3.1 Texas Prairie dawn-flower (Federal Endangered)

The Texas Prairie dawn-flower *(Hymenoxys texana)* is a member of the sunflower family, but this small annual only reaches a height of seven inches and so is

often overlooked. This plant is found only in the open grasslands of the northern part of the Gulf Prairie region of Harris and Fort Bend Counties of Texas. In late winter its oblong, somewhat fleshy leaves cluster at the plant base and in late February to April a small (0.15-0.23 inch long) round head of yellow disk flowers appears. The minute ray flowers are concealed by the bracts. The plant sets seeds from April to May and dies before the bare ground dries and cracks in the summer heat. The seeds are cone-shaped and hairy. Prairie Dawn was first collected near Hockley in Harris County, Texas in 1889. Thought to be extinct, the plant was rediscovered north of Cypress in Harris County in 1981.

The prairie dawn grows within a narrow range of soil and site conditions in the open grasslands of the northern part of the Gulf Prairie region. Slick areas composed of fine-sandy compacted soil occur in seasonally wet depressions or saline swales at the periphery of low mounds termed mima or pimple mounds. The upper 7 inches of the soils, in the Narta soil series, are poorly drained and are powdery when dry and sticky and soft when wet. These soils are often saline and moderately alkaline. Little water is available to plant roots beyond the upper 7 inches. Plants endure soil conditions ranging from saturated during the winter to droughty in the summer. The prairie dawn also persists in the low areas of abandoned rice fields, vacant lots, and pastures where mima mounds have been bulldozed and natural vegetation has returned. Prairie Dawn does not colonize recently disturbed soils and is susceptible to competition.

5.3.2 West Indian manatee (Federal Endangered)

The West Indian manatee *(Trichechus manatus)* is a slow-moving mammal with a rounded body, gray to brown skin with fine sparse hair, small head, squarish snout with a deeply split upper lip, valvular nostrils, small eyes, flexible flippers, and a large rounded horizontally flattened tail. Adults usually are about 10-13 feet (300-400 cm) in total length. *Trichechus manatus* differs from *T. inunguis* of the Amazon Basin in larger size (maximum total length of *inunguis* is about 280 cm), less slender proportions, wrinkled skin rather than smooth skin, less elongate flippers, and presence of nails on the flippers (nails usually are lacking in *inunguis*).

This species exhibits a promiscuous mating system. Gestation lasts about 12-14 months. One young (rarely 2) is born in spring/early summer (usually). Newborn calves are about 3-4 feet (1 meter) long. Young are weaned in 1-2 years. The interval between successive births for an individual female is 3-5 years (though 2 years if the calf is lost early). Females are sexually mature at a minimum age of 4-5 years, though newly mature individuals often do not successfully rear young; most females breed successfully by 7-9 years. Males may be 9-10 years old before they breed, though they may attain physical maturity a few years earlier. Maximum longevity is several decades.

Habitat includes shallow coastal waters, estuaries, bays, rivers, and lakes; throughout most of the range, manatees appear to prefer rivers and estuaries over marine habitats. Manatees are not averse to traveling through dredged

canals or using quiet marinas. They apparently are not able to tolerate prolonged exposure to water colder than 20 C. In the north during October-April, manatees congregate in warmer water bodies (spring-fed rivers, outfalls from power plants). They prefer waters at least 1-2 meters in depth; along the coast manatees often are in water 3-5 meters deep, usually in areas lacking strong current. Except in the Greater Antilles, manatees are consistently associated with freshwater sources.

5.3.3 Houston Toad

The Houston toad *(Anaxyrus houstonensis)* is a 2- to 3-inch toad with (usually) a light middorsal stripe. Its general coloration varies from light brown to gray or purplish gray, sometimes with green patches. The pale undersides often have small, dark spots. Males have a dark throat, which appears bluish when distended.

Most breeding occurs February-April, when minimum air temperature is above 14 C. Breeding may occur from late January to late June, but usually earlier than May. Eggs and larvae develop in shallow water of roadside ditches, temporary ponds in residential areas and pastures, and other seasonally flooded low spots; for successful breeding, water must persist for at least 60 days. Larvae hatch in 4-7 days, metamorphose in 3-9 weeks, depending on water temperature. Males sexually mature in 1 year, females possibly in 2 years.. It migrates between breeding and nonbreeding habitats.

The Houston Toad is restricted to areas with soft sandy soils; pine forest, mixed deciduous forest, coastal prairie. It is associated with soils of the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations. Extant populations occur in sandy forested areas with pine. When inactive, it occupies burrows in soil or seeks refuge in leaf litter or under objects. Houston toads are nocturnal, spending daylight hours in burrows, buried in sand, or under leaf-litter, pine duff, or surface objects.

Bastrop County in central Texas has been designated as critical habitat for the Houston Toad. No critical habitat is listed in Harris County for the Houston Toad.

5.3.4 Red-Cockaded Woodpecker

The Red-cockaded Woodpecker *(Picoides borealis)* is a small, zebra-backed woodpecker (18-20 cm long, 35-38 cm wingspan) with black wings, a black cap, a dull white breast with small black spots, and a barred, black-and-white back; conspicuous large white cheek patch on each side of the head; red streaks ("cockades") on either side of the head of adult males barely are visible; small white spots arranged in horizontal rows along the back convey a "ladder-back" appearance. Juvenile males have a small, circular red patch on the top of the head that is visible until early fall; this is lacking in juvenile females.

Each member of a group usually has an exclusive roost cavity. Access to a cavity is critical to the nesting success of males, since the nesting cavity is almost always the cavity of the single breeding male. It takes many months to excavate a cavity. The importance of attaining a cavity, contrasted with the extended time required to excavate one, has led (in part) to different strategies among young birds for coping with the common situation wherein most suitable cavities are occupied by conspecifics. Almost all young females and most young males disperse and find an existing cavity with a new group. Another strategy, employed by 27 per cent of the young males, is to remain on the natal territory in hopes of inheriting the territory or another nearby territory. Only very rarely do young birds disperse to new areas and excavate new cavities.

Habitats associated with the Red-cockaded Woodpecker include mature pine forests where the trees are spaced wide enough to provide sufficient flyways and not overgrown with shrubs or smaller trees. In Texas, the Red-cockaded Woodpecker is commonly found in the Piney woods of the eastern part of the state.

5.3.5 Whooping Crane

The whooping crane *(Grus americana)* is a very tall, mainly white bird with a long neck, long legs, and red facial skin; black primaries are evident in flight; immatures are mainly white but have pale reddish-brown head and neck and similar color scattered elsewhere on the body. They migrate mainly through Great Plains from southern Canada and Dakotas south to Texas (arrives around mid-October). Introduced individuals migrate from Idaho (also Utah, Montana, and Wyoming) south primarily to central New Mexico (this population is headed for extirpation). Pairs or family groups begin northward migration early to mid-April. An 85,000 sq km area in Saskatchewan appears to serve as a premigratory staging area in fall.

Nesting occurs in dense emergent vegetation (sedge, bulrush) in shallow (often slightly alkaline) ponds, freshwater marshes, wet prairies, or along lake margins. Pothole breeding sites in Canada are separated by narrow ridges vegetated by black spruce, tamarack, and willow. The nest is a mound of marsh vegetation rising about 20-50 centimeters above the surrounding water level.

Habitats used during migration and winter include marshes, shallow lakes, lagoons, salt flats, grain and stubble fields, and barrier islands. Radio-marked migrants roosted primarily in palustrine wetlands, many of which were smaller than 0.5 hectares. Migration habitat includes mainly sites with good horizontal visibility, water depth of 30 centimeters or less, and minimum wetland size of 0.04 hectares for roosting.

In Texas, the Whooping cranes begin their fall migration south to Texas in mid-September and begin the spring migration north to Canada in late March or early April. Once they arrive in Texas, they spend the winter on the Texas coast at the Aransas National Wildlife Refuge.

5.3.6 *Smalltooth Sawfish*

The Smalltooth sawfish (*Pristis pectinata)* is a distinctive fish that grows to a length of 5.4- 7.6 m (18 - 25 feet). They are classified as rays, but are primarily shark-like in appearance, though the head, trunk, and pectoral fins are ventrally flattened as in rays. Pectoral fins have broad bases and straight hind margins. Body form is elongate, with the first and second dorsal fins tall and approximately equal in size. The origin of the first doral fin is set over the origin of the pelvic fins. Both the mouth and gill slits are located ventrally. The snout is elongated into a flattened rostral blade that measures approximately 1/4 of total body length and is armed along either edge with 24 - 32 transverse teeth. Body color is generally blue-gray to brown, with the ventral surface white. Both jaws have 10 - 12 rows of teeth, with 88-128 teeth in the upper jaw and 84 - 176 in the lower jaw. The teeth are rounded anteriorly and have a blunt cutting posterior edge. The skin has numerous dermal denticles that vary in size and shape (Bigelow and Schroeder 1948; NMFS 2000).

Sawfish species inhabit shallow coastal waters of tropical seas and estuaries throughout the world. They are usually found in shallow waters very close to shore over muddy and sandy bottoms. They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths. Certain species of sawfish are known to ascend inland in large river systems, and they are among the few elasmobranchs that are known from freshwater systems in many parts of the world.

In Texas, the Smalltooth sawfish is no longer known to occur in the coastal waters and the last known occurrence was in 1984 in Aransas Bay.

5.3.7 *Louisiana Black Bear*

The Louisiana black bear (*Ursus americanus luteolus*) is one of sixteen recognized subspecies of the American black bear *U. americanus*. This species was formerly widespread in North America, from northern Alaska, including Newfoundland, south to central northern Mexico. The Louisiana black bear is distinguished from other black bears by possessing a skull that is longer, more narrow, and flat, and by possessing proportionately large molar teeth. Black bears are huge, bulky mammals with long black hair. Although weight varies considerably, large males may weigh more than 600 pounds.

The Louisiana black bear is a habitat generalist and often overwinters in hollow cypress trees either in or along sloughs, lakes or riverbanks in bottomland hardwoods. These bears are mobile, opportunistic, largely herbivorous omnivores that exploit a variety of foods, including insects. The distribution and abundance of foods, particularly mast such as nuts and berries, largely affect their movements. Important elements of black bear habitat include hard and soft mast, escape cover, den sites, travel corridor sand minimum human disturbance.

There have been reliable black bear sightings in the following counties: Anderson, Angelina, Bowie, Cass, Fannin, Franklin, Harrison, Henderson, Hopkins, Jasper, Lamar, Marion, Morris, Nacogdoches, Newton, Panola, Polk, San Jacinto, and Shelby Counties.

5.3.8 Red Wolf

Red wolves *(Canis rufus)* are known for the characteristic reddish color of their fur most apparent behind the ears and along the neck and legs, but are mostly brown and buff colored with some black along their backs. Intermediate in size to gray wolves and coyotes, the average adult red wolf weighs 45-80 pounds, stands about 26 inches at the shoulder and is about 4 feet long from the tip of the nose to the end of the tail.

The geographic range for the red wolf is Southeast and South Central United States. Historically, the Red wolf lived as far north as Pennsylvania, as far south as Florida and as west as central Texas. Typically found in temperate deciduous forests, it has also been known to occur in swamps, and coastal prairies, where it was an apex predator. In Texas, the Red Wolf is considered extirpated.

5.3.9 Green Sea Turtle

The Green Sea Turtle *(Chelonia mydas)* with a brown carapace, often with radiating mottled or wavy dark markings or large dark brown blotches; 4 costal plates on each side of carapace; first costal does not contact the nuchal; one pair of prefrontal plates between the eyes; limbs are flattened flippers; young are black to dark brown above, mainly white below, with a middorsal keel and two plastral keels, 4-6 cm at hatching; adult carapace length usually 90-122 cm (to 153 cm), mass 113-204 kg (to 295+ kg).

Feeding occurs in shallow, low-energy waters with abundant submerged vegetation, and also in convergence zones in the open ocean . Migrations may traverse open seas. Adults are tropical in distribution, whereas juveniles range into temperate waters. Hatchlings often float in masses of marine macroalgae (e.g., *Sargassum*) in convergence zones. Coral reefs and rocky outcrops near feeding pastures often are used as resting areas. Inactive individuals may rest on the bottom in winter in the northern Gulf of California. Basking on beaches occurs in some areas (e.g., Hawaii). Nesting occurs on beaches, usually on islands but also on the mainland. Sand may be coarse to fine, has little organic content; physical characteristics vary greatly in different regions. Most nesting occurs on high energy beaches with deep sand. At least in some regions, individuals generally nest at same beach in successive nestings, though individuals sometimes change to a different nesting beach within a single nesting season (has switched to beach up to several hundred kilometers away). Beach development and illumination often make beaches unsuitable for successful nesting.

In Texas, it is associated with the Gulf and local bay systems; shallow water seagrass beds, open water between feeding and nesting areas, barrier island beaches. Adults are herbivorous feeding on sea grass and seaweed while juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds. Nesting behavior extends from March to October, with peak activity in May and June.

5.3.10 Kemp's Ridley Sea Turtle

The Kemp's Ridley sea turtle *(Lepidochelys kempii)* has an almost circular carapace, olive green (adults) or gray (young) above, yellow below; 5 costals on each side of carapace, the first one touching the nuchal; usually 4 enlarged scutes on bridge, with a single pore at the posterior edge of each scute; usually there is an interanal scute at the posterior tip of the plastron; beak is somewhat parrotlike; young have 3 tuberculate dorsal ridges, four plastral ridges; limbs are flattened flippers; adult carapace length usually 58-70 cm (to 75 cm), mass 36-45 kg (to 50 kg); 3.8-4.4 cm at hatching.

Habitat of adults primarily includes shallow coastal and estuarine waters, often over sandy or muddy bottoms where crabs are numerous. Most adults stay in the Gulf of Mexico, and they are rare along the Atlantic coast of the northeastern United States. Apparently most activity is benthic. Post-hatchlings spend 1-4 years as surface pelagic drifters in weed lines of offshore currents in the Gulf of Mexico and Atlantic Ocean, then shift to benthic coastal habitats of various types, especially where crabs and other invertebrates are numerous. Nesting occurs on well-defined elevated dune areas, especially on beaches backed up by large swamps or bodies of open water having seasonal, narrow ocean connections.

In Texas, the Kemp's Ridley is associated with the shallow waters of the Gulf and local bay systems. They feed primarily on crabs, but also snails, clams, other crustaceans and plants, while juveniles feed on sargassum and its associated fauna. It nests from April through August.

5.3.11 Leatherback Sea Turtle

The Leatherback sea turtle *(Dermochelys coriacea)* is the largest of the marine turtles. The carapace has seven prominent longitudinal ridges, plastron has five ridges; no scutes on skin-covered carapace and plastron; carapace blackish or dark bluish, often with irregular whitish or pink blotches; plastron mainly whitish; the largest turtle, with adults usually 135-178 cm (to 189 cm) in carapace length, 295-544 kg (to 916 kg); young are black and white, covered with numerous small beady scales (later shed), carapace about 6-7.5 cm at hatching. No other sea turtle lacks scutes on the shell or has prominent dorsal longitudinal ridges.

Leatherback sea turtles live in the open ocean, often near edge of continental shelf; also seas, gulfs, bays, and estuaries. They are mainly pelagic, seldom

approaching land except for nesting, and concentrate in summer in waters mostly 20-40 m deep near Cape Canaveral, Florida. These turtles dive almost continuously, to depths of up to at least several thousand meters; may linger at the surface at midday but spends most of time submerged. Nests on sloping sandy beaches backed up by vegetation, often near deep water and rough seas. Largest colonies use continental, rather than insular, beaches. Absence of a fringing reef appears to be important. They deposits eggs in moist sand. Individuals sometimes change to different nesting beach between nestings during a single year; changed to sites 30-110 km away in West Indies.
In Texas it inhabits both the open Gulf waters and sometimes will move into the shallow bay systems. They are omnivorous, and have a preference for jellyfish. In the US portion of their western Atlantic nesting territories, nesting season ranges from March to August.

5.3.12 Loggerhead Sea Turtle

The Loggerhead sea turtle *(Caretta caretta)* is a reddish-brown sea turtle with a relatively large head; 5 or more costals (pleurals) on each side of the carapace; first costal always touches the nuchal; three (usually) or 4 large poreless scutes on bridge between shells; middorsal keel becomes inconspicuous in large individuals; limbs are flattened flippers; tail of adult male (extends past tips of back-stretched hind flippers) is much longer than that of adult female (barely reaches rear edge of carapace); young are brown or reddish-brown dorsally and have 3 dorsal keels and 2 plastral keels; adult carapace length usually 70-125 cm (to 122+ cm), mass 70-180 kg (to 227+ kg); hatchling shell length is 4-5 cm, mass about 20 g.

Loggerheads are found in the open sea to more than 500 miles from shore, mostly over continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers; mainly warm temperate and subtropical regions not far from shorelines. Off North Carolina, loggerheads inhabited waters of 13-28 C (available range 5-32 C). Adults occupy various habitats, from turbid bays to clear waters of reefs. Subadults occur mainly in near shore and estuarine waters. Hatchlings move directly to sea after hatching, often float in masses of sea plants (Sargassum); may remain associated with sargassum rafts perhaps for 3-5 years. In Chesapeake Bay, occurs mainly in deeper channels, usually at river mouths or in the open bay. Nesting occurs usually on open sandy beaches above high-tide mark, seaward of well-developed dunes. Nests primarily on high-energy beaches on barrier strands adjacent to continental land masses in warm temperate and subtropical regions; steeply sloped beaches with gradually sloped offshore approaches are favored. Renesting generally occurs at the same beach or within a few km; generally returns to the same area in subsequent years if habitat remains suitable. Individuals sometimes change to different nesting beach within a single nesting season; has changed to sites up to several hundred km away. Maximum hatching success and hatchling size occur when sand moisture level is about 25%.

In Texas, they prefer the Gulf and bay system primarily for juveniles and the adults are more pelagic and prefer open deep waters. They are omnivorous, shows a preference for mollusks, crustaceans, and coral. It nests from April through November.

5.4 CRITICAL HABITAT

Review of USFWS critical habitat data indicates there is no designated critical habitat for these species or other listed species within the Action Area.

6.0 EXISTING CONDITONS AND EFFECTS ANALYSIS

6.1 ENVIRONMENTAL SETTING

6.1.1 Overview and History

The Action Area for the project is located within the Gulf Coast Prairies and Marshes Natural Region of Texas. Vegetation types associated with the project region are historically comprised of the bluestem grassland communities. Review of aerial mapping indicates that the project area has been used primarily as farming land dating back to 1944. During the 1970's the region started to become industrialized with most of the farmlands being lost to the development. Soils for the Action Area are considered to be Bernard clay loam soils. The project site is located outside of the 100-yr floodplain but within the 500-yr floodplain. Habitats within the region are considered fragmented and disturbed and consist of mostly opportunistic tree, shrub, grasses and weed species.

6.1.2 Field Evaluation

ERM biologists investigated the project site and Action Area to document if any T&E species or sensitive habitats are present in the Action Area. The Air Liquide complex is comprised entirely of industrial land covered by buildings, structures, concrete and gravel. There is one area within the facility that consists of a sediment pond which has some fringing wetland plants along the containment levees. The Action Area evaluated included industrial use and undeveloped lands. Photos are included in Appendix B.

Four distinct land use types were identified including, industrial lands, mixed forests, forested wetlands, and open lands. Industrial lands were associated with the Air Liquide Facility and the adjacent other industrial plants in the area. The mixed forest communities were located partially within the Action Area located southwest, east, and north of the project. The forested communities are comprised of mostly of opportunistic tree and shrub species such as Chinese tallow trees (*Sapium sebiferum),* hackberry *(Celtis occidentalis)*, sea-myrtle (*Baccharis halimifolia*) and privets (*Ligustrum spp.).* The tallow tree and the privets are considered invasive species and are commonly managed for removal by local stakeholders. Additional understory species include seaside goldenrod (*Solidago sempervirens*), panic grasses (*Panicum spp.*) and rushes and sedges (*Cyperus spp*. and *Carex spp*.). One forested wetland community was identified using National Wetland Inventory maps and then verified by field observations. This wetland was located in the southwest portion of the Action Area and was part of the forested habitat previously described. Open lands areas were only identified north and south of the project site within the Action Area and were comprised of pipeline and rail road right of ways. The right of ways are covered by a variety of grass species including San Augustine (*Stenotaphrum secundatum*), coastal Bermuda (Cynodon dactylon), crabgrass (*Digitaria spp*.), carpet grass (Axonopus fissifolius), *Paspalum spp*. and panic grasses. These areas are routinely maintained (mowed) and are commonly used for vehicle traffic.

6.2 *POTENTIAL OCCURRENCE AND DESIGNATION OF EFFECTS DETERMINATION*

The potential for federally-listed species to occur on or within the Action Area was evaluated based on the presence or absence of suitable habitat. The USFWS and the TPWD lists of species by county based on population distribution and occurrence data were used during this evaluation. Potential effects were determined and designated based on the criteria established in Section 2.0 of this report. Designated determination of effects are presented in Table 6.1 for federal listed T&E species that are known to occur or may potentially occur in Harris County.

TABLE 6.1: Summary of Designated Determination of Effects

Federally Listed Species	Listed Species of Potential Occurrence by Agency	Designated Determination of Effects
Red-cockaded Woodpecker	TPWD	No Effect
Whooping Crane	TPWD	No Effect
Smalltooth Sawfish	TPWD	No Effect
Texas Prairie Dawn-flower	USFWS/TPWD	No Effect
West Indian Manatee	USFWS/TPWD	No Effect
Louisiana Black Bear	TPWD	No Effect
Red Wolf	TPWD	No Effect
Houston Toad	TPWD	No Effect
Green Sea Turtle	TPWD	No Effect
Kemp's Ridley Sea Turtle	TPWD	No Effect
Leatherback Sea Turtle	TPWD	No Effect
Loggerhead Sea Turtle	TPWD	No Effect

6.2.1 *Texas Prairie Dawn-flower*

Potential Occurrence in the Action Area:
Based on the desktop analysis and field survey there is no preferred habitat associated with the Texas Prairie Dawn-flower within the Action Area. Habitats associated with the Texas Prairie Dawn include slick areas composed of fine-sandy compacted soil occurring in seasonally wet depressions or saline swales at the periphery of low mounds termed mima or pimple mounds. The upper 7 inches of the soils, in the Narta soil series, are poorly drained and are powdery when dry and sticky and soft when wet. The United States Department of Agriculture Natural Resources Conservation Service web soil survey was reviewed and did not show any soils indicative of the Texas Prairie Dawn habitat within the project area (Figure 3). In addition, no suitable habitats were observed during field surveys. These habitats and conditions necessary to support this species do not occur in the project site or the Action Area.

Potential Effects to Texas Prairie Dawn-Flower
As described above, there is no preferred habitat and no observations of the Texas Prairie Dawn-flower in the Action Area. Furthermore, wastewater

discharges, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Texas prairie dawn-flower habitat.

Determination of Effects
The proposed action will have no effect on the Texas Prairie Dawn-flower.

6.2.2 West Indian Manatee

Potential Occurrence in the Action Area: No observations of the West Indian Manatee were documented during the site investigation. There is no preferred habitat associated with the West Indian Manatee within the Action Area. The West Indian Manatee has no established populations within the Texas coastal waters and it is physically impossible for an individual of this species to occur within the Action Area due to no connectivity to estuarine habitats or surface waters that connect to these habitats.

Potential Effects to West Indian Manatee
As described above, there is no preferred habitat and no known documented occurrences for the West Indian Manatee in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore, no effects to tidal waters will occur and thus no effects could occur to the manatee or water resources associated with the species. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on West Indian Manatee or its habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the West Indian Manatee.

6.2.3 Houston Toad

Potential Occurrence in the Action Area: There is no preferred habitat (areas with soft sandy soils; pine forest, mixed deciduous forest, coastal prairie) associated with the Houston Toad within the Action Area. Additionally it is associated with soils of the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations which are not present or associated with the Action Area. There are no known populations for Houston Toad within the Harris County region and there have only been a few reported occurrences within 50+ miles of the Action Area. No observations of the Houston Toad were documented during the site investigation.

Potential Effects to Houston Toad
As described above, there is no preferred habitat for the Houston Toad in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Houston Toad.

Determination of Effects
The proposed action will have no effect on the Houston Toad.

6.2.4 Red-Cockaded Woodpecker

Potential Occurrence in the Action Area: No observations of the Red-Cockaded Woodpecker were documented during the site investigation. There is no preferred habitat associated with the Red-Cockaded Woodpecker within the Action Area. The Red-Cockaded Woodpecker requires older mature pine forests with intermittent open spaces and minimal shrub understory. Forested areas observed during field surveys included young stands of opportunistic and invasive species such as the Chinese tallow, hackberry, sea-myrtle and privets.

Potential Effects to Red-Cockaded Woodpecker
As described above, there is no preferred habitat for the Red-Cockaded Woodpecker in the Action Area. Furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Red-Cockaded Woodpecker.

Determination of Effects
The proposed action will have no effect on the Red-Cockaded Woodpecker.

6.2.5 Whooping Crane

Potential Occurrence in the Action Area:
No observations of the whooping crane were documented during the site investigation. There is no preferred habitat associated with the Whooping Crane within the Action Area. Whooping Cranes are known to exist in well-developed marshes, prairies and lagoons. Habitat in the Action Area consists of predominantly developed lands and highly disturbed habitats with no open areas or wetlands present. Habitat conditions associated with the crane do not exist in the project site or the Action Area. Furthermore, the current documented whooping crane flyway in Texas is known to occur more than 90 miles west of the site (Stehn and Wassenich, 2008), although a number of mapped siting's have occurred within approximately 15 miles west of Houston (USFWS, 2012).

Potential Effects to Whooping Crane
As described above, there is no preferred habitat for the Whooping Crane in the Action Area, and furthermore, wastewater discharges, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Whooping Crane.

Determination of Effects
The proposed action will have no effect on the Whooping Crane.

6.2.6 *Smalltooth Sawfish*

Potential Occurrence in the Action Area:
No observations of the Smalltooth Sawfish were documented during the site investigation. There is no preferred habitat associated with the Smalltooth Sawfish within the Action Area. Habitat conditions associated with the sawfish were not documented from the existing literature nor were they observed during the field surveys. Smalltooth Sawfish live in shallow coastal waters over a muddy substrate. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Smalltooth Sawfish
As described above, there is no preferred habitat for the Smalltooth Sawfish in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore, no effects to tidal waters will occur, and thus, no effects could occur to the sawfish or water resources associated with the species. Furthermore, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Smalltooth Sawfish habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the Smalltooth Sawfish.

6.2.7 *Louisiana Black Bear*

Potential Occurrence in the Action Area:
No observations of the Louisiana Black Bear were documented during the site investigation. There is no preferred habitat associated with the Louisiana Black Bear within the Action Area. Habitat conditions associated with the bear were not documented from the existing literature nor were they observed during the field surveys. Louisiana Black Bears use banks of rivers and lakes and bottomland hardwoods as their main habitats. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Louisiana Black Bear
As described above, there is no preferred habitat for the Louisiana Black Bear in the Action Area, and furthermore, wastewater discharges, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Louisiana Black Bear habitat.

Determination of Effects
The proposed action will have no effect on the Louisiana Black Bear.

6.2.8 *Red Wolf*

Potential Occurrence in the Action Area:
The Red Wolf is extirpated in Texas. There is no preferred habitat associated with the Red Wolf within the Action Area. Habitat conditions associated with

the wolf were not documented from the existing literature nor were they observed during the field surveys. Red wolves live in costal prairies and marshes. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Red Wolf
As described above, there is no preferred habitat for the Red Wolf in the Action Area, and furthermore, wastewater discharges, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Red Wolf habitat.

Determination of Effects
The proposed action will have no effect on the Red Wolf.

6.2.9 Green Sea Turtle

Potential Occurrence in the Action Area:
No observations of the Green Sea Turtle were documented during the site investigation There is no preferred habitat associated with the Green Sea Turtle within the Action Area. Habitat conditions associated with this sea turtle were not documented from the existing literature nor were they observed during the field surveys. Green sea turtles live in the ocean along sea grass beds, coral reefs, and near mangrove. These habitats and conditions do not exist in the project site or the proposed Action Area.

Potential Effects to Green Sea Turtle
As described above, there is no preferred habitat for the Green Sea Turtle in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore no effects will occur to tidal waters, and thus, no effects could occur to the sea turtle or water resources associated with the species. Furthermore, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Green Sea Turtle habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the Green Sea Turtle.

6.2.10 Kemp's Ridley Sea Turtle

Potential Occurrence in the Action Area:
No observations of the Kemp's Ridley Sea Turtle were documented during the site investigation. There is no preferred habitat associated with the Kemp's Ridley Sea Turtle within the Action Area. Habitat conditions associated with the sea turtle were not documented from the existing literature nor were they observed during the field surveys. Kemp's Ridley Sea Turtles prefer open ocean and gulf waters. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Kemp's Ridley Sea Turtle
As described above, there is no preferred habitat for the Kemp's Ridley Sea Turtle in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore no effects will occur to tidal waters, and thus, no effects could occur to the sea turtle or water resources associated with the species. Furthermore, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Kemp's Ridley Sea Turtle habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the Kemp's Ridley Sea Turtle.

6.2.11 Leatherback Sea Turtle

Potential Occurrence in the Action Area:
No observations of the Leatherback Sea Turtle were documented during the site investigation. There is no preferred habitat associated with the Leatherback Sea Turtle within the Action Area. Habitat conditions associated with the sea turtle were not documented from the existing literature nor were they observed during the field surveys. Leatherback Sea Turtles live in the open oceans. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Leatherback Sea Turtles
As described above, there is no preferred habitat for the Leatherback Sea Turtle in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore no effects will occur to tidal waters, and thus, no effects could occur to the sea turtle or water resources associated with the species. Furthermore, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Leatherback Sea Turtle habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the Leatherback Sea Turtle.

6.2.12 Loggerhead Sea Turtle

Potential Occurrence in the Action Area:
No observations of the Loggerhead Sea Turtle were documented during the site investigation. There is no preferred habitat associated with the Loggerhead Sea Turtle within the Action Area. Habitat conditions associated with the sea turtle were not documented from the existing literature nor were they observed during the field surveys. Loggerhead Sea Turtles live in warm oceans near islands and near coastal marshes. These habitats and conditions do not exist in the project site or the Action Area.

Potential Effects to Loggerhead Sea Turtle

As described above, there is no preferred habitat for the Loggerhead Sea Turtle in the Action Area. The proposed project will have zero discharge of additional wastewater, therefore no effects will occur to tidal waters, and thus, no effects could occur to the sea turtle or water resources associated with the species. Furthermore, emissions, noise and dust resulting from the planned construction and operation would not be expected to have any impact on Loggerhead Sea Turtle habitat due to the range of construction activities and the range of occurrence for this species.

Determination of Effects
The proposed action will have no effect on the Loggerhead Sea Turtle.

7.0 CONCLUSIONS

Air Liquide plans to utilize the BACT to control the project emissions and thus minimize impacts to the surrounding environment to the maximum extent practicable. The construction of the proposed project will have no direct or indirect impact on federally-protected species habitat. The predicted ambient concentrations of criteria pollutants are below the established levels of significance. No adverse off impacts are predicted to federally listed species or their habitats.

8.0 REFERENCES

8.1 ENVIRONMENTAL INVESTIGATORS

Ragatz, Amanda M. Environmental Resources Management, Environmental Scientist

Janusaitis, Kim R. Environmental Resources Management, Environmental Scientist

8.2 REFERENCE DOCUMENTS

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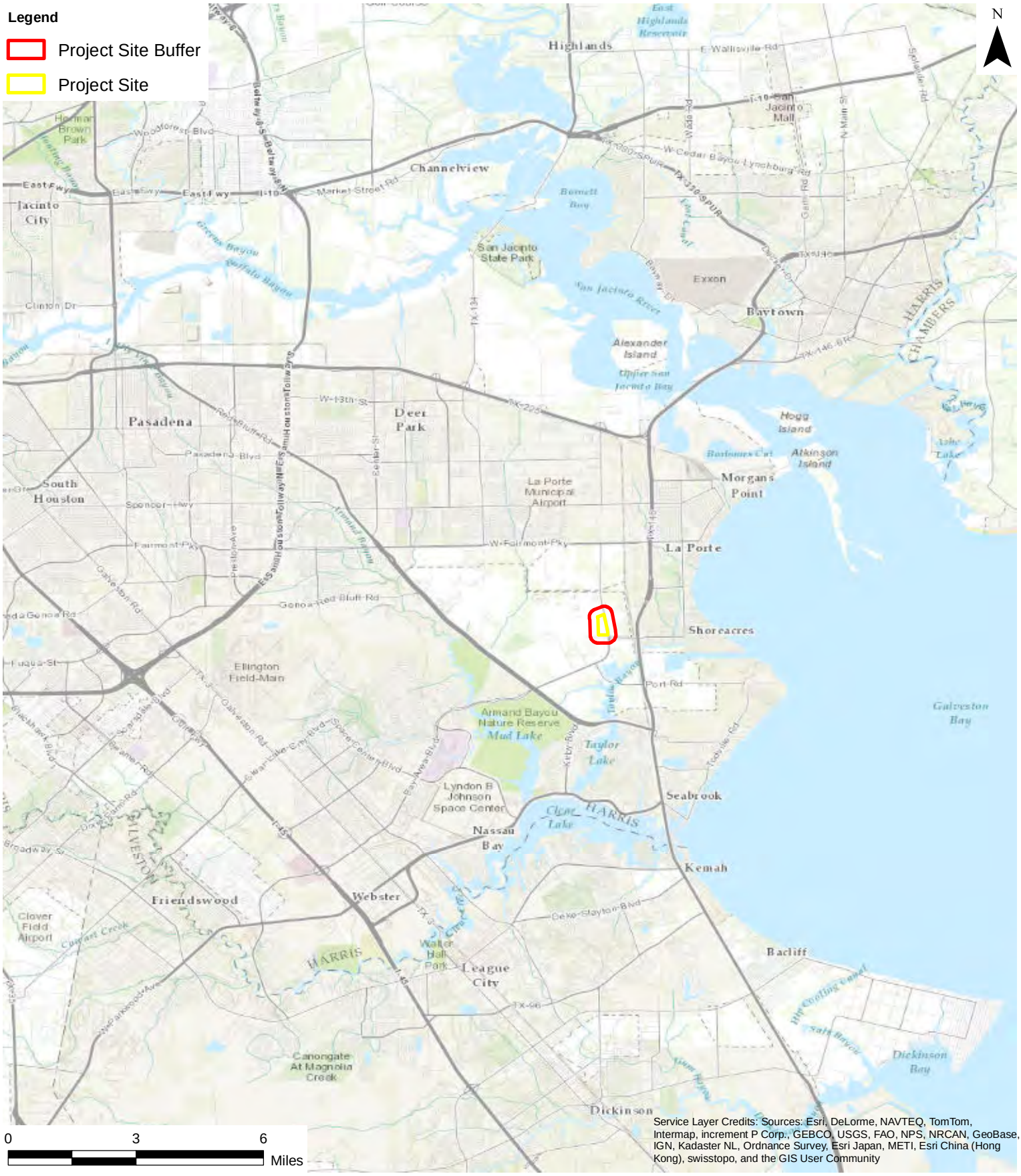
Figures

Appendix A

June 18, 2013
Project No. 0151579

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000



Environmental Resources Management

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FILE:	K:\GIS\AirLiquide\Bayport_PSD\MXD\BA\Vicinity_map.mxd				

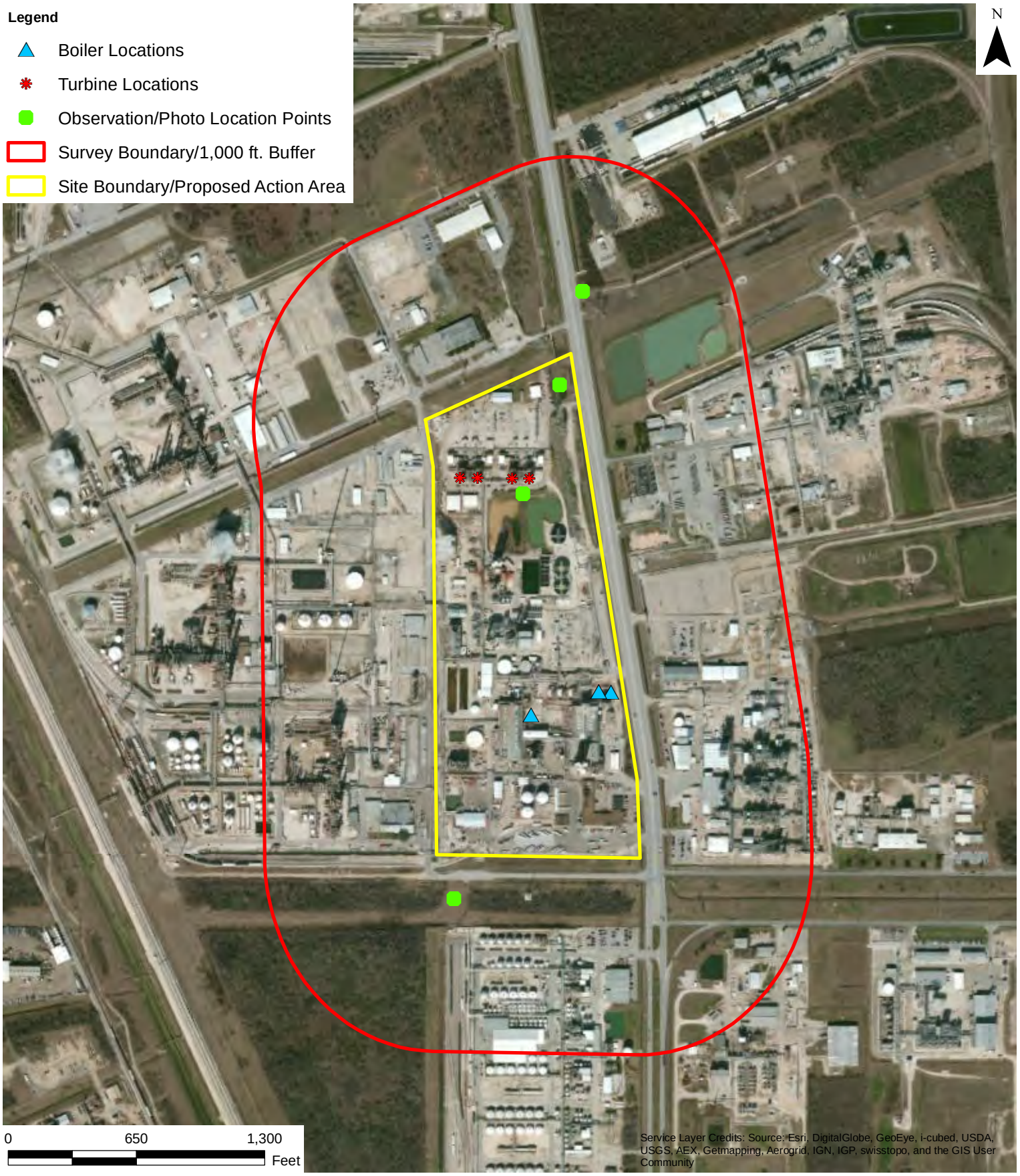
FIGURE 1
VICINITY MAP

Biological Assessment Report

Air Liquide Large Industries U.S., L.P.
Bayou Cogeneration Plant

Pasadena, Texas

ERM



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DATE:	5/24/2013	SCALE:	AS SHOWN	REVISION:	0

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FIGURE 2
SITE MAP

Biological Assessment Report

Air Liquide Large Industries U.S., L.P.
Bayou Cogeneration Plant

Pasadena, Texas

ERM

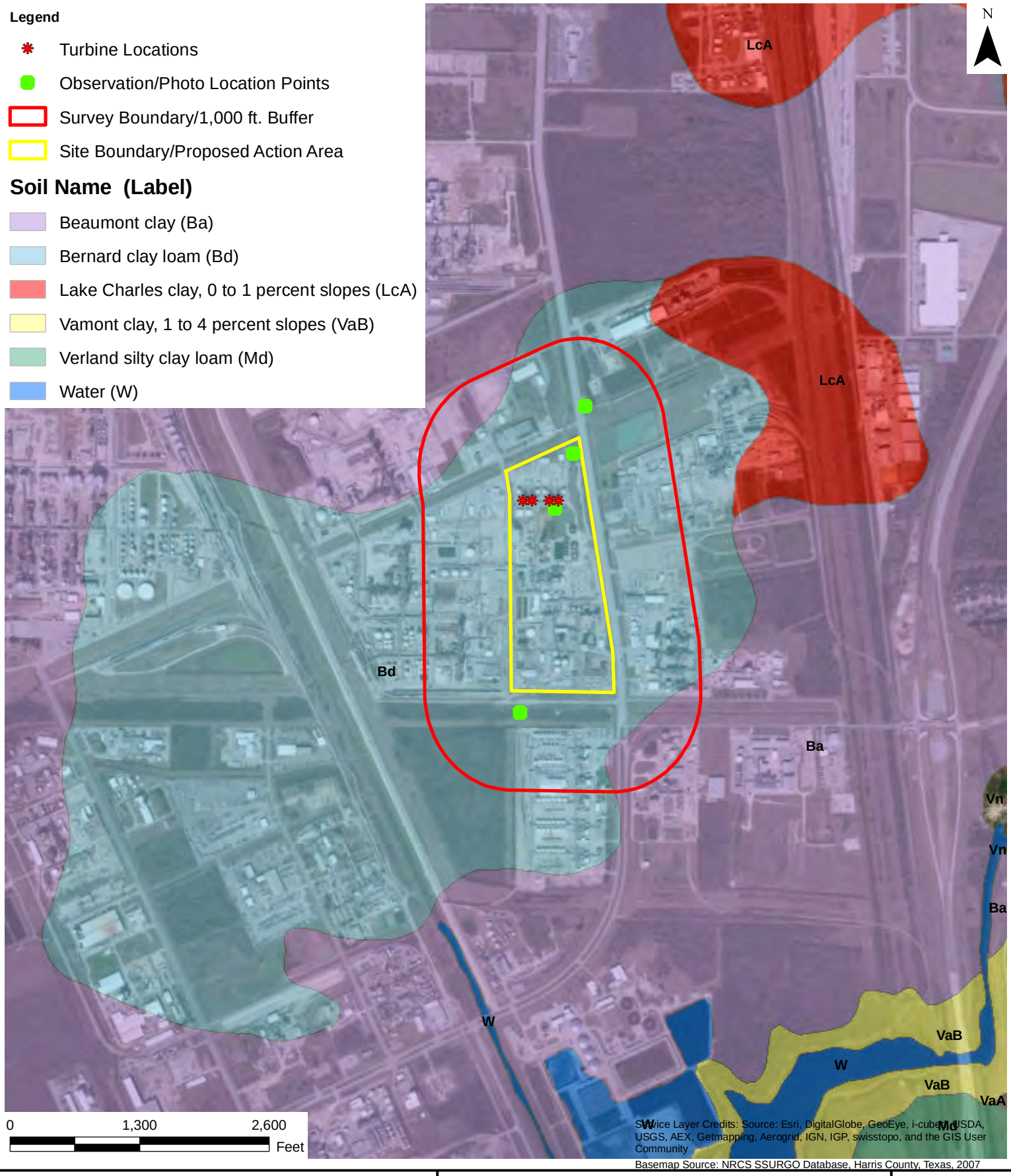

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FIGURE 3
SOILS MAP

Biological Assessment Report

Air Liquide Large Industries U.S., L.P.
Bayou Cogeneration Plant

Pasadena, Texas

ERM

Initial Site Investigation Photos

Appendix B

June 18, 2013
Project No. 0151579

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 1	Date: 08/30/12
Direction Photo Taken: SW	
Description: cultural aquatic habitat, Sedimentation pond	

Photo No. 2	Date: 08/30/12
Direction Photo Taken: E	
Description: cultural aquatic habitat, Sedimentation pond	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 3	Date: 08/30/12
Direction Photo Taken: E	
Description: cultural aquatic habitat, Sedimentation pond	

Photo No. 4	Date: 08/30/12
Direction Photo Taken: SE	
Description: cultural aquatic habitat, Sedimentation pond	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 5	Date: 08/30/12
Direction Photo Taken: NW	
Description: cultural aquatic habitat, Sedimentation pond	

Photo No. 6	Date: 08/30/12
Direction Photo Taken: S	
Description: cultural aquatic habitat, Sedimentation pond	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 7	Date: 08/30/12
Direction Photo Taken: N	
Description: Right of way (taken from inside complex)	

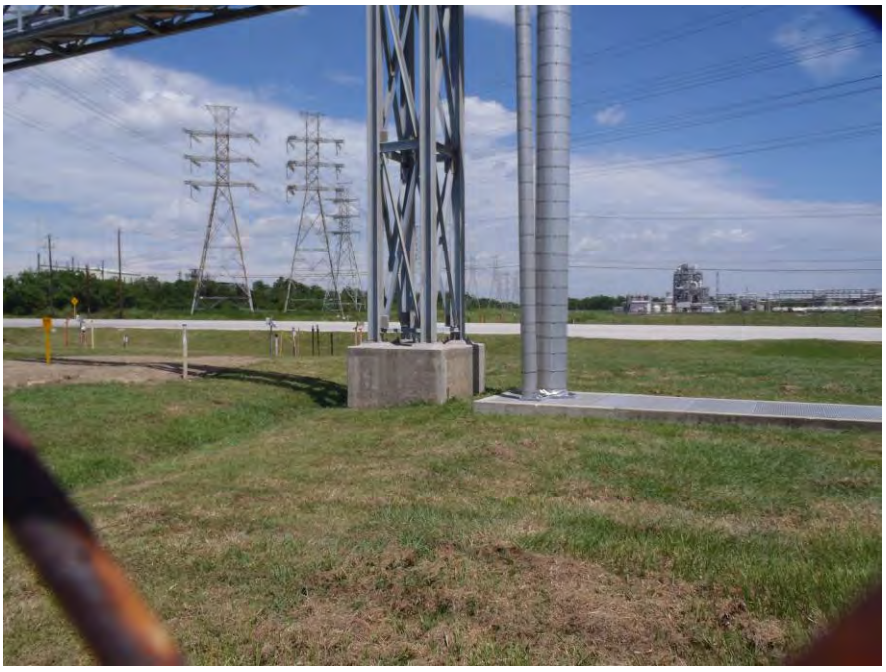
Photo No. 8	Date: 08/30/12
Direction Photo Taken: N	
Description: Right of way (taken from inside the complex)	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 9	Date: 08/30/12
Direction Photo Taken: N	
Description: Right of way (taken from inside the complex)	

Photo No. 10	Date: 08/30/12
Direction Photo Taken: N	
Description: Right of way (taken from inside the complex)	



PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 11	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 12	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 13	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 14	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 15	Date: 08/30/12
Direction Photo Taken: SW	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 16	Date: 08/30/12
Direction Photo Taken: SW	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 17	Date: 08/30/12
Direction Photo Taken: SE	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 18	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 19	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 20	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 21	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 22	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 23	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 24	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 25	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 26	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 27	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 28	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 29	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 30	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 31	Date: 08/30/12
Direction Photo Taken: S	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 32	Date: 08/30/12
Direction Photo Taken: SW	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 33	Date: 08/30/12
Direction Photo Taken: SW	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 34	Date: 08/30/12
Direction Photo Taken: NE	
Description: Right of way (outside of complex)	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 35	Date: 08/30/12
Direction Photo Taken: NE	
Description: drainage ditch, outside Air Liquide complex	

Photo No. 36	Date: 08/30/12
Direction Photo Taken: NE	
Description: drainage ditch, outside Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 37	Date: 08/30/12
Direction Photo Taken: NE	
Description: Right of way and potential wetland (outside of complex)	

Photo No. 38	Date: 08/30/12
Direction Photo Taken: N	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 39	Date: 08/30/12
Direction Photo Taken: E	
Description: : drainage ditch, outside Air Liquide complex	

Photo No. 40	Date: 08/30/12
Direction Photo Taken: E	
Description: forest/forested wetlands, wetland, Right of way outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 41	Date: 08/30/12
Direction Photo Taken: E	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 42	Date: 08/30/12
Direction Photo Taken: NE	
Description: forest/forested wetlands outside of Air Liquide complex	

PHOTOGRAPHIC LOG

Client Name: Air Liquide	Site Location: Bayou Cogeneration Plant	Project No. 0151579

Photo No. 43	Date: 08/30/12
Direction Photo Taken: NE	
Description: forest/forested wetlands outside of Air Liquide complex	

Photo No. 44	Date: 08/30/12
Direction Photo Taken: E	
Description: possible wetland near Right of way outside of Air Liquide complex	

List of Biological Assessment Report Preparers

Appendix C

June 18, 2013
Project No. 0151579

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000

Appendix C
ERM List of Biological Assessment Report Preparers

Kim Janusaitis – Environmental Scientist
Kurtis Schlicht – Senior Consultant
Amanda Ragatz – Environmental Scientist