2.2 FLOODPLAINS

Due to existing low site elevations and proximity to bodies of water, much of Parcels A, B, and C and the surrounding land is within the 100-yr FEMA floodplain (Figure *3*). Development in a floodplain may require compensatory storage design to be included in the National Flood Insurance Program (NFIP), unless otherwise exempt from this criterion. Additionally, the existing elevations in these areas are lower and will require additional fill material to raise the site to suitable development elevations.

Parcels A, C, and the south area of Parcel B are heavily encumbered with areas below the 100-year FEMA floodplain. The land to the north and northwest of these parcels appear to have a lesser extent of floodplains and may be more suitable for development. To avoid floodplain impacts (such as adding fill material) that may require compensation, areas within these boundaries may be suitable pond locations. Siting ponds in these areas utilizes existing low points in the natural topography and does not diminish floodplain storage capacity.

Figure 3: FEMA Floodplain Map

2.3 TOPOGRAPHY

The map below (Figure *4*) represents existing topographic contours and elevations and is derived from Florida Department of Emergency Management (FDEM) LiDAR data. While this information does not provide design-level topographic survey data, this provides a valuable tool for analysis to determine existing drainage patterns and approximate elevations. The information shown is consistent with data gathered from the FEMA floodplain map and the wetland locations shown in the previous figures.

This topographic information shows that there are elevated tracts of land to the north and west of parcels B & C (average elevations at roughly 3'-4' NAVD88), whereas the eastern/southern portions of parcels B & C tend to have lower elevations (average elevations at roughly 2'-3' NAVD88). Parcel A ranges from roughly 2'-4' in upland areas, but contains numerous surface waters and depressions with lower elevations.

Import fill costs can vary widely depending on the availability and proximity of offsite material; however, recent project data for this area indicates roughly $30 per cubic yard of import fill, compacted and rough graded on the site. This equates to approximately $50,000 to raise one acre of land by 1 foot. This metric will be used to determine estimated earthwork costs for each of the alternatives proposed.

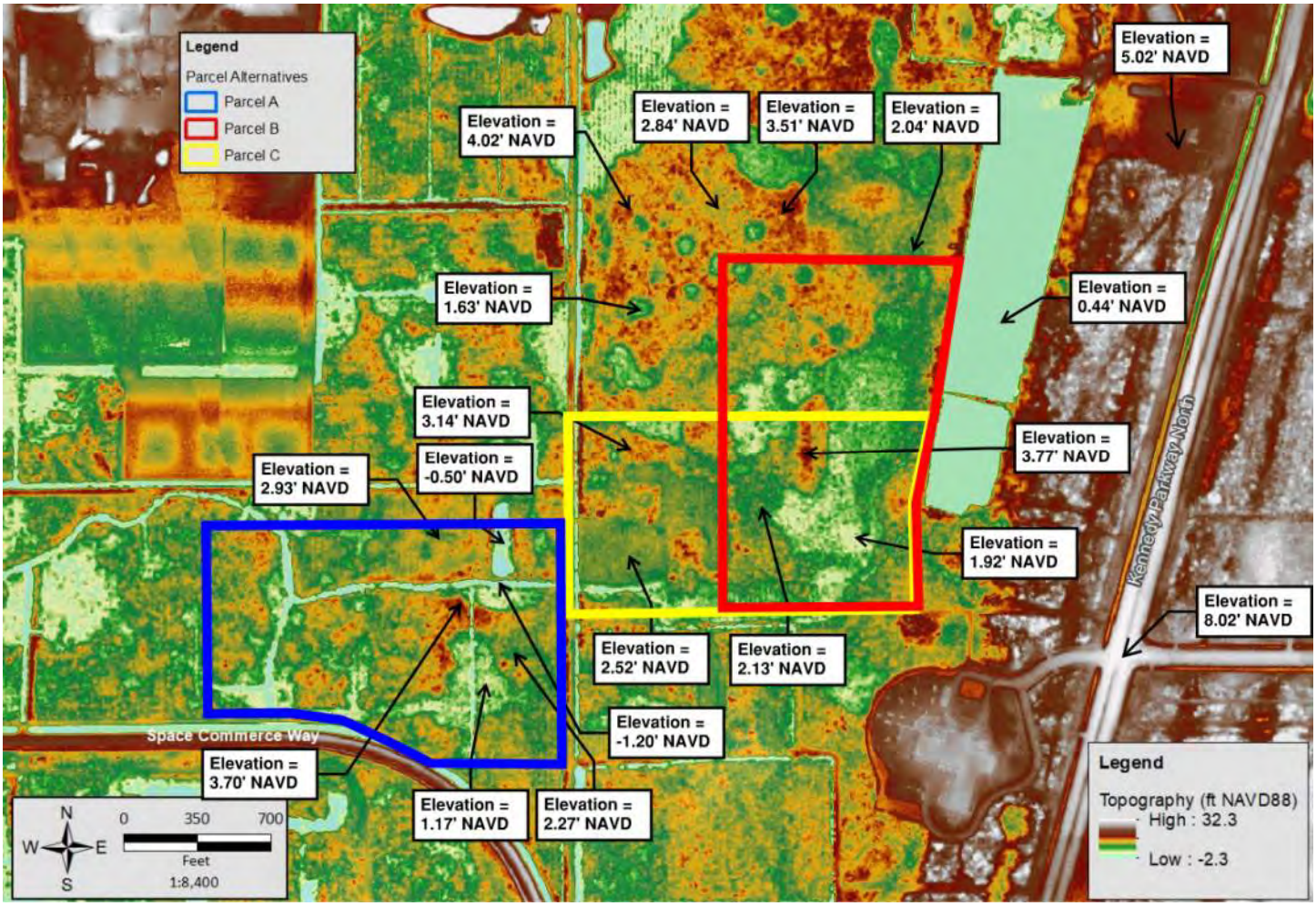

Figure 4: LiDAR Topographic Data

2.4 SOILS

According to the USDA NRCS Web Soil Survey, all three considered parcels are comprised of soils that fall within either the B/D or C/D hydrologic soil group. The following is a general description of hydrologic soil groups B, C, and D:

- **Soil Group B:** Soils having a moderate infiltration rate when thoroughly wet and having a moderate rate of water transmission.
- **Soil Group C:** Soils having a slow infiltration rate when thoroughly wet and having a slow rate of water transmission. These consist primarily of soils having a layer that impedes the downward movement of water, or soils of moderately fine texture or fine texture.
- **Soil Group D:** Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet and having a very slow rate of water transmission. These consist primarily of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only soils that in their natural condition are in group D are assigned to dual classes. Consistent with other observations regarding floodplains, topography, and wetlands, these areas soils are largely undrained, with nearby water table elevations between 2'-5' below existing grade; however, these soils are likely to still be suitable for reuse as fill material onsite. It is recommended that a geotechnical evaluation be obtained at the time of design to confirm soil suitability.

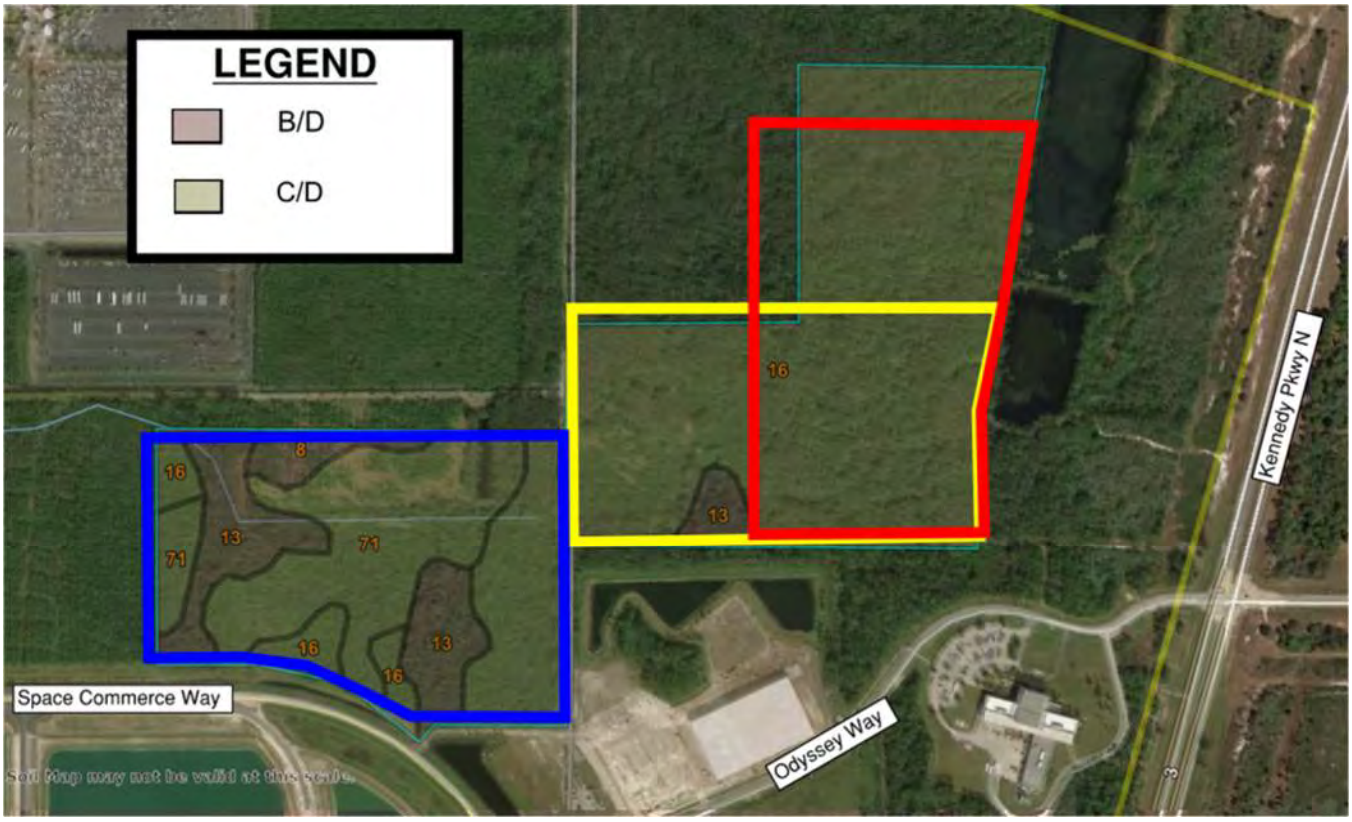

Figure 5: USDA Soils Map

2.5 UTILITIES

As shown on the Existing Utilities Map (Figure *6*), based on information provided by Space Florida, there are numerous utilities in the vicinity of the three parcels. Most existing utilities are available from NASA Parkway, Kennedy Parkway, and Odyssey Way. These utilities include water, sanitary sewer, electrical, communications, and some commodity gases. There is existing communications infrastructure along Range Road, which is the road extending north-south between Parcels A and C that connects the KSC Visitor Badging Office and Exploration Park. Range Road is currently unpaved and was historically used as a haul road/maintenance access road for Exploration Park with a utility berm, but may provide an opportunity for new looped utilities from Exploration Park Phase 1 and NASA Parkway to the north. Due to proximity to the badging station to the north, it is unlikely that this road would be paved for routine access from the north; however, this corridor could also be used for emergency access, if NASA requires.

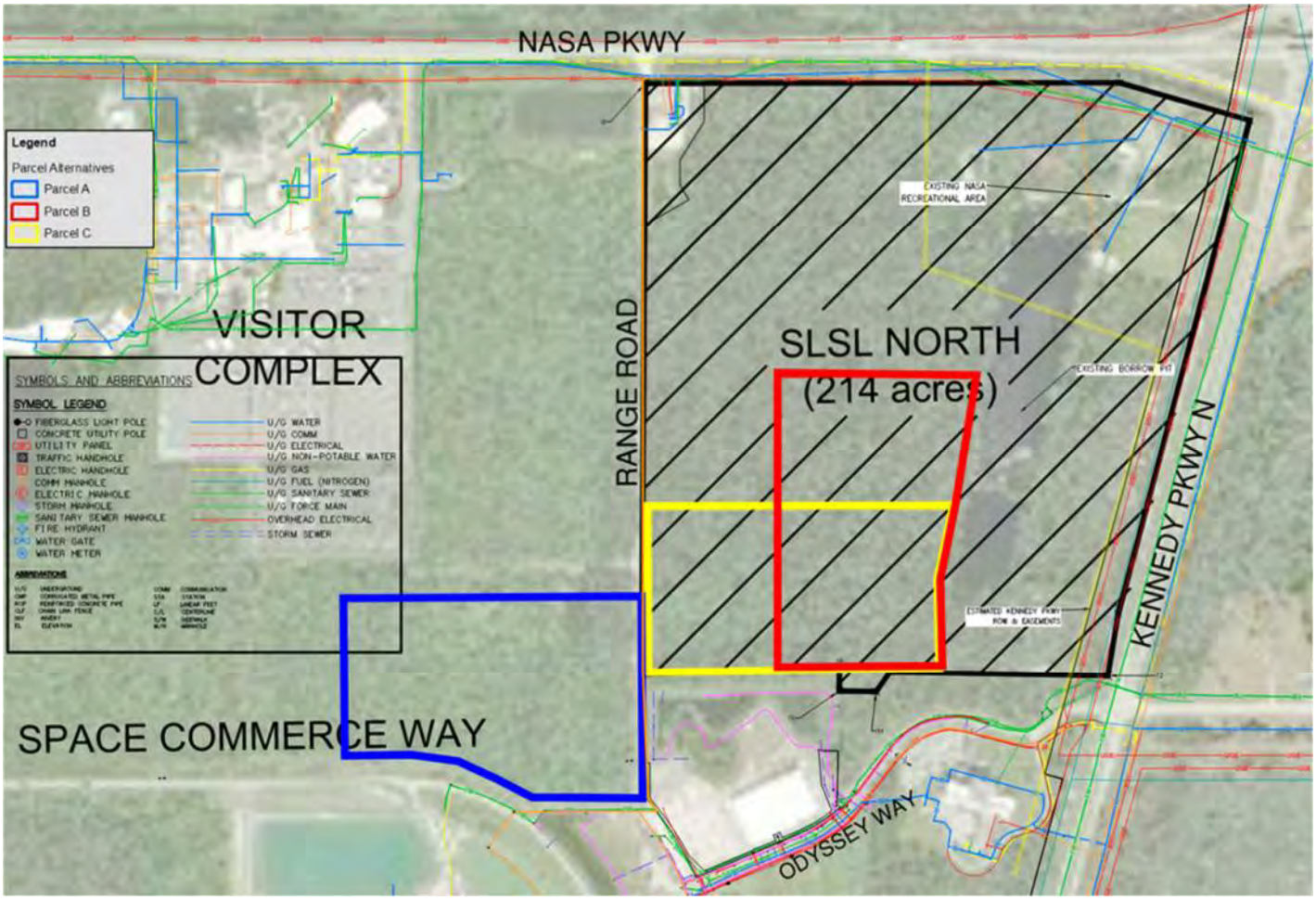

Figure 6: Existing Utilities Map

2.6 LISTED WILDLIFE SPECIES

Numerous State of Florida and Federally listed wildlife species are located at KSC. The following is a preliminary assessment of the primary federally listed species of concern that will need to be addressed in the Environmental Assessment.

2.6.1 Florida Scrub-Jay

KSC and CCAFS together support one of the largest remaining populations of Florida scrub-jay (Aphelocoma coerulescens), which is federally listed as Threatened and can only be found in Florida. Habitats occupied by Florida scrub-jays are typically Oak Scrub, Oak/Palmetto, and Coastal Scrub as well as disturbed areas in coastal regions. Suitable habitat is further to the east and has been documented by KSC staff (Figure 7).

Parcel A has been significantly impacted by past citrus grove activities, is dominated by Brazilian pepper and other invasive exotic vegetation and contains no native habitat. Parcels B and C are dominated by mesic upland and wetland hardwood forests which do not provide suitable habitat for Florida scrub-jay. As such, Parcels A, B, and C do not provide suitable habitat for Florida scrubs-jays and thus impacts to the Florida scrub-jay are not anticipated as a result of this project. Note that suitable habitat has been documented by KSC staff southeast of the parcels and is shown in Figure 7 below.

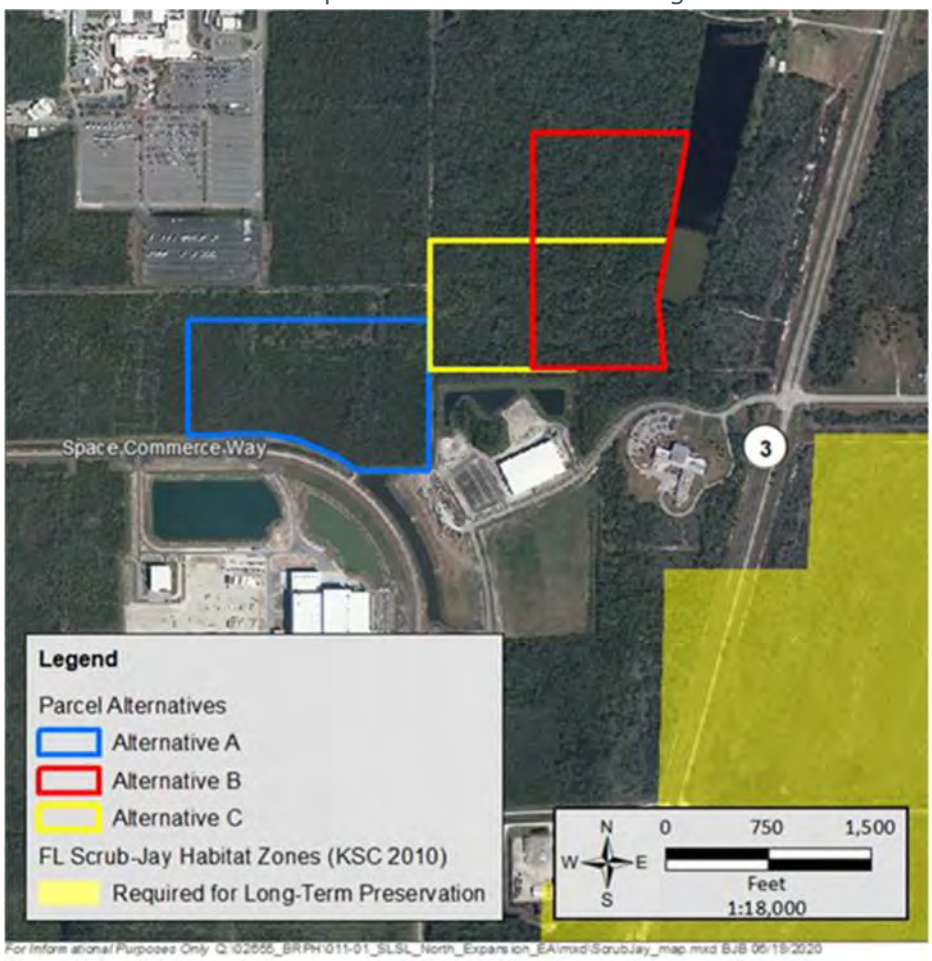

Figure 7: Florida Scrub-Jay Habitat Preservation Zone Location Map

2.6.2 Gopher Tortoise

The gopher tortoise (Gopherus polyphemus) is not federally listed but is listed by Florida as Threatened. The gopher tortoise is common throughout KSC. The gopher tortoise inhabits a diversity of upland habitats, typically well-drained, where it excavates burrows for shelter from climate, weather, fires, and predators. Canopy openings and an open understory are also required for gopher tortoises to thermoregulate, which provides herbaceous forage species.

The considered parcels consist of soil series which are poorly drained or very poorly drained, and the parcels are believed to have a very high water table (2'-5' below ground surface elevations). The only area thought to potentially be able to support the gopher tortoise is Range Road, which is mowed by KSC. No gopher tortoise burrows were observed along the southern portion of this road during the preliminary site assessment. As a result, no impacts to this species or commensals are expected as a result of this project.

2.6.3 Eastern Indigo Snake

Eastern indigo snakes (Drymarchon couperi) are federally listed as Threatened and have been documented on KSC, although actual population numbers are not available. Eastern indigo snakes have large home ranges and use a variety of habitat types that include uplands, wetlands, hammocks, and disturbed areas.

No eastern indigo snakes were observed during our limited field investigations, although a formal eastern indigo snake survey was not conducted. The eastern indigo snake commonly relies on gopher tortoise burrows for shelter. Based on existing vegetation communities and lack of gopher tortoise burrows, the area is unlikely to be used by eastern indigo snakes. Using the US Fish and Wildlife Service (USFWS) Eastern Indigo Snake Programmatic Effect Determination Key (January 25, 2010; August 13, 2013 Addendum), this project "May Affect but is not Likely to Adversely Affect" due to the following:

- Project is not located in open water or salt marsh,
- Permit will be conditioned for use of the USFWS Standard Protection Measures for the Eastern Indigo (August 12, 2013) during project site preparation and construction, and
- The project will impact less than 25 acres of xeric habitat (scrub, sandhill, or scrubby flatwoods) or less than 25 active and inactive gopher tortoise burrows, and
- Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be evacuated prior to site manipulation in the vicinity of the burrows. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an indigo snake, no work will commence until the snake has vacated the vicinity of proposed work.

2.6.4 Bald Eagle

USFWS removed the bald eagle (Haliaeetus leucocephalus) from the list of Endangered and Threatened Wildlife in 2007. Eagles use mature live pines and pine snags within the pine flatwood habitats and will occasionally build nests on man-made towers and structures. Active bald eagle nests can impact project construction schedules when they are within 660 feet of the project site as there are federal restrictions during the nesting season. However, based on KSC data, no bald eagle nests are within a 1-mile radius of the parcel alternatives.

2.6.5 Wood Stork

The project area is within Lake Poinsett – LEO's – CR524 wood stork (Mycteria americana) nesting colony core foraging area. A core foraging area consists of a 15-mile radius around the nesting colony. The on-site wetlands that will be impacted are dominated by a mature canopy of Brazilian pepper or mature trees that significantly limits forage opportunities. As a result, no impacts to this species is anticipated as a result of this project.

3.0 PROPOSED PROGRAM AND SITE LOCATION ALTERNATIVES

The initial development program includes an Astronaut Training Facility, Astronaut Accommodations, and Auxiliary and Support Facilities. The customer also plans to provide a reception area located outside of the proposed parcel, within the previously graded Exploration Park Phase I area, as well as a covered parking area adjacent to this reception facility equipped with a 1MW solar farm via roof panels. Future phases of the program may include additional training or accommodations facilities.

To host this program, the selected parcel requires at least 40 acres, with at least 15 contiguous acres available for development of buildings, internal roads, and parking facilities for each phase of development. Each 15-acre development area will consist of roughly 6 acres of building pad-ready area, another 6 acres for site amenities and circulation, and 3 acres for stormwater management. The remainder of the parcel will be used for buffers, greenspace, future expansion area, and undisturbed wetlands. The customer also anticipates potential expansion to this development in future phases, which may include an additional training facility and/or visitor accommodations building. This expansion will add approximately 15-20 acres to the desired parcel area, for a grand total of roughly 45-60 acres. The future phase is under consideration for long-term development, but is unlikely to occur within the next 5 years.

The location and views from the site are critical to the customer's envisioned program. The customer's objective is to create an experience for visitors that is secluded from other developments, incorporates water (either in the form of the existing water features or newly created ponds), and has a clear view of launches from both NASA and CCAFS. While achieving the program and vision of the client, NASA safety and security requirements also must be considered, and as such, the secured entrance gates must not be visible from the proposed buildings.

Within the vicinity of the three pre-identified parcels, BRPH has identified four viable site development areas that may be suitable for the proposed development. These locations have been selected to reduce environmental impacts and optimize development. Parcel B itself was not directly included in the evaluation, as the site is significantly encumbered by large, high quality wetland and floodplain areas, leaving little to no contiguous area available for development.

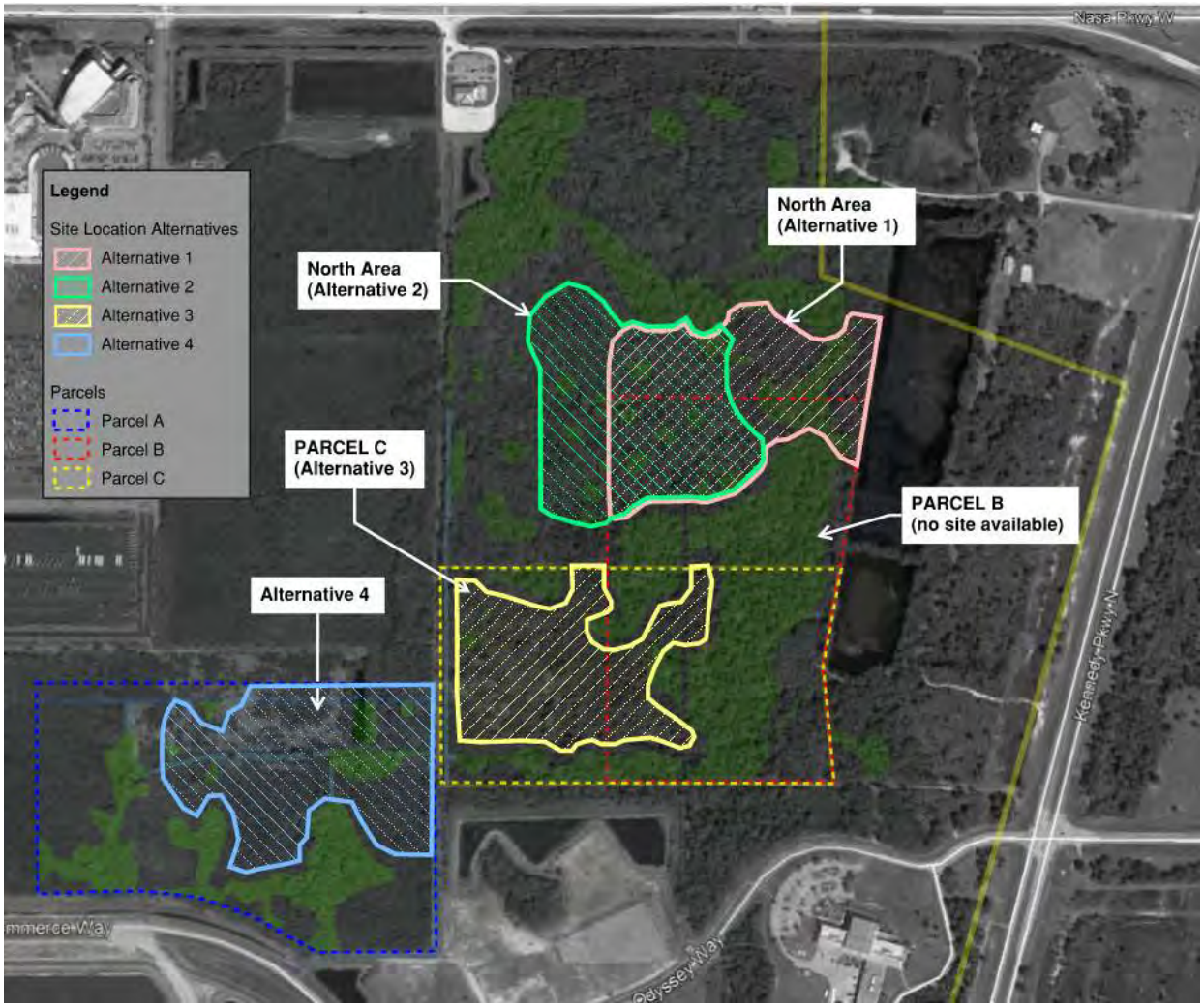

Figure 8: Site Location Alternatives Evaluated

3.1 ALTERNATIVE 1

Alternative 1 is located north of Parcel B, in an area that has fewer wetland and floodplain encumbrances and higher topography (Figure *9*). Development in this area would reduce the impacts of development and provide adjacencies to water (existing borrow pit) with prime launch viewing angles. The surrounding wetlands and environmental areas mirror the customer's desire to create a secluded space that is distinctly set apart from Exploration Park. This development area is approximately 16.6 acres in size, not including the borrow pit area that could be utilized for stormwater management.

In Alternative 1, a portion of the borrow pit could be excavated such that the pond frontage could be shaped to interact with the site and building layout. The buildings and other site features will need to be ***raised approximately 5.5 feet based*** on the topography of the existing area. Using the building pad area and adding an additional 30% for site features and access roads, the ***earthwork cost is estimated at $2.0 million***. The soil from this pond could also be used to elevate the site, which reduces the amount of import fill. Integrating the existing borrow pit into the stormwater system for the site may alleviate onsite space requirements for stormwater attenuation; however, onsite water quality treatment would still be required, and the incorporation of the borrow pit may trigger additional maintenance requirements to address wildlife, water quality, and ecological concerns.

To address KSC Security concerns regarding visibility of the KSC west gate (Gate 3), drone footage acquired by NASA of this area demonstrates that this option does not provide views of the gate or badging station at heights up to 125'. Common use utility infrastructure and access roads and will be needed. Utilities may be extended along the Range Road corridor to minimize additional environmental impacts.

Figure 9: Alternative 1

3.2 ALTERNATIVE 2

Alternative 2 is located northwest of Parcel B, shifted slightly further west than Alternative 1 (Figure *10*). This development area is approximately 16.5 acres in size with ample adjacent upland area if additional space is needed. This option allows the greatest minimization of wetland impacts and takes advantage of higher areas on the site as development areas, which optimizes the need for import fill; however, this option may not provide access to the existing site water feature (borrow pit). The majority of wetland impacts in this site location affect the smaller, hydrologically isolated wetlands, which may be less of a functional loss and risk than impacting the larger, high quality connected wetlands to the south, north, and east.

In this option, it is recommended that a separate pond system be created to serve the site independent of the existing borrow pit to minimize impacts to the adjacent wetlands. The buildings and other site features will need to be ***raised approximately 5 feet*** based on the topography of the existing area. Using the building pad area and adding an additional 30% for site features and access roads, the earthwork cost of this will be an ***estimated $1.8 million***. The soil from this excavated area could be used for elevating or filling the site and for grading purposes, which reduces the amount of import fill. Siting the facility further west would allow for readily accessible utility connections if mains are established along Range Road.

To address KSC Security concerns regarding visibility of the KSC west gate (Gate 3), drone footage acquired by NASA of this area demonstrates that this option does not provide views of the gate or badging station at heights up to 125'. The western areas of the site, closer to Range Road, may provide more visibility of the gate and badging station, and are less desirable locations for the taller accommodations facility. Common use utility infrastructure and access roads and will be needed. Utilities may be extended along the Range Road corridor to minimize additional environmental impacts.

Figure 10: Alternative 2

3.3 ALTERNATIVE 3

Alternative 3 is located within Parcel C (Figure *11*). The development area is approximately 13 acres in size. This area will also require onsite ponds, further reducing the available development area. Because of the need for additional onsite stormwater management and the reduced parcel size, the area unencumbered by wetlands shown below is not large enough to accommodate the entirety of the facility program and infrastructure. The area falls largely within a FEMA floodplain, which may require additional compensatory storage requirements. In general, as indicated by the floodplains and topography in this area, this site is lower in elevation and would require additional imported fill material. The buildings and other site features will need to be **raised approximately 5.5 feet** based on the topography of the existing area. Using the building pad area and adding an additional 30% for site features and access roads, the earthwork cost of this will be an **estimated $2.0 million.**

Due to the southerly location, visibility of the gates and badging station is not anticipated to be a concern in this alternative. Proximity to Exploration Park and Range Road may reduce the need for new infrastructure for utility and access connections; however, this site does not offer the remote location that is desired for the program. Common use utility infrastructure and access roads and will be needed. Utilities may be extended along the Range Road corridor to minimize additional environmental impacts. This location is situated closer to the existing utilities available in Exploration Park.

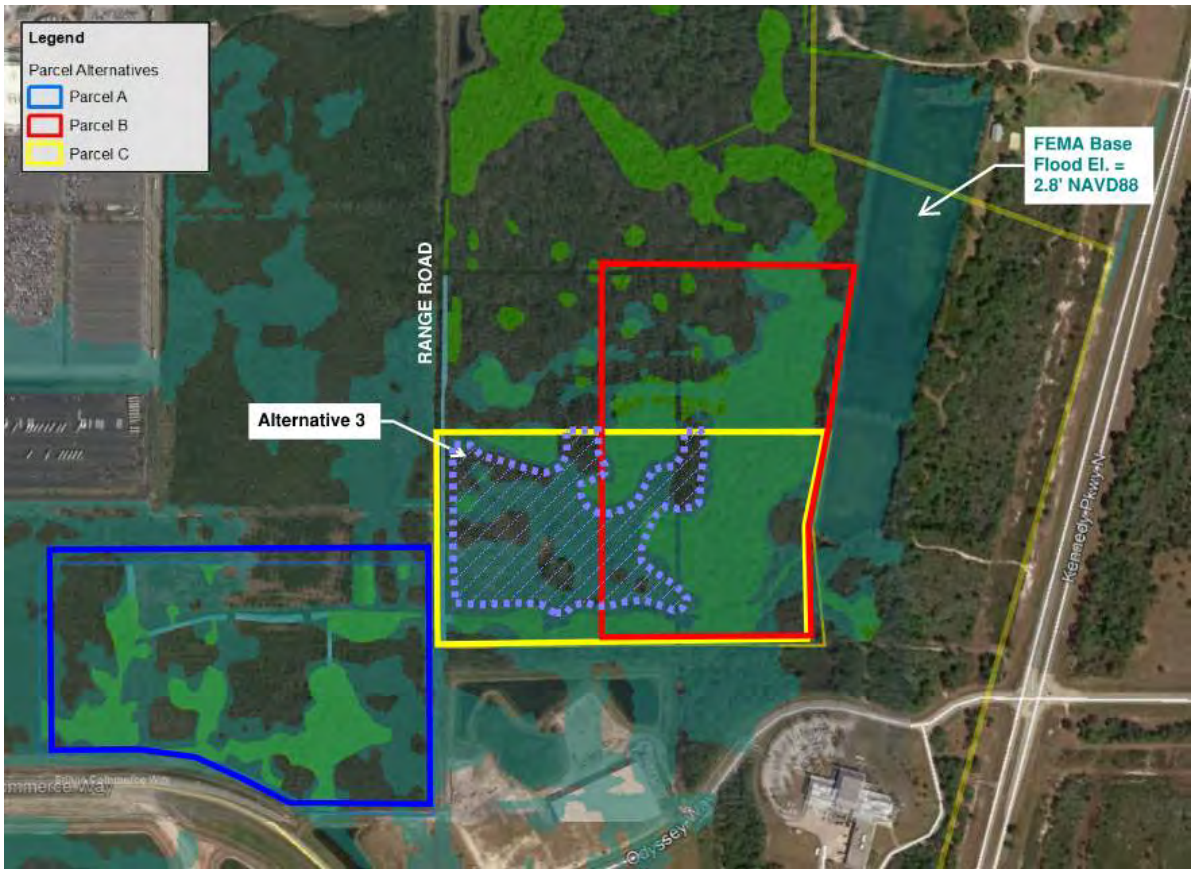

Figure 11: Alternative 3

3.4 ALTERNATIVE 4

Alternative 4 is located within Parcel A (*Figure 12*). The development area is approximately 15.4 acres in size, however, much of the space is non-contiguous as several ditches and wetlands cross this area. This area will also require onsite ponds, further reducing the available development area. Because of the need for additional onsite stormwater management and the reduced parcel size, the area unencumbered by wetlands shown below is not large enough to accommodate the entirety of the facility program and infrastructure. Portions of the project area fall within a FEMA floodplain and contain some wetlands, which would potentially require additional compensatory storage requirements and mitigation. The buildings and other site features will need to be **raised approximately 5.75 feet** based on the topography of the existing area. Using the building pad area and adding an additional 30% for site features and access roads, the earthwork cost of this will be an **estimated $2.1 million.** Proximity to Exploration Park and Range Road may offer reduced infrastructure for utility and access connections; however, this site does not offer the remote location that is desired for the program.

Due to the southerly location, visibility of the gates and badging station is not anticipated to be a concern in this alternative. As Parcel A has been historically used as orange grove, with several ditches and swales crossing the site, development on this site will likely impact surface waters. Parts of this area may also be impacted by the expansion of Space Commerce Way and the Visitor Complex. Utilities may be extended along the Range Road corridor to minimize additional environmental impacts. This location is situated closer to the existing utilities available in Exploration Park.

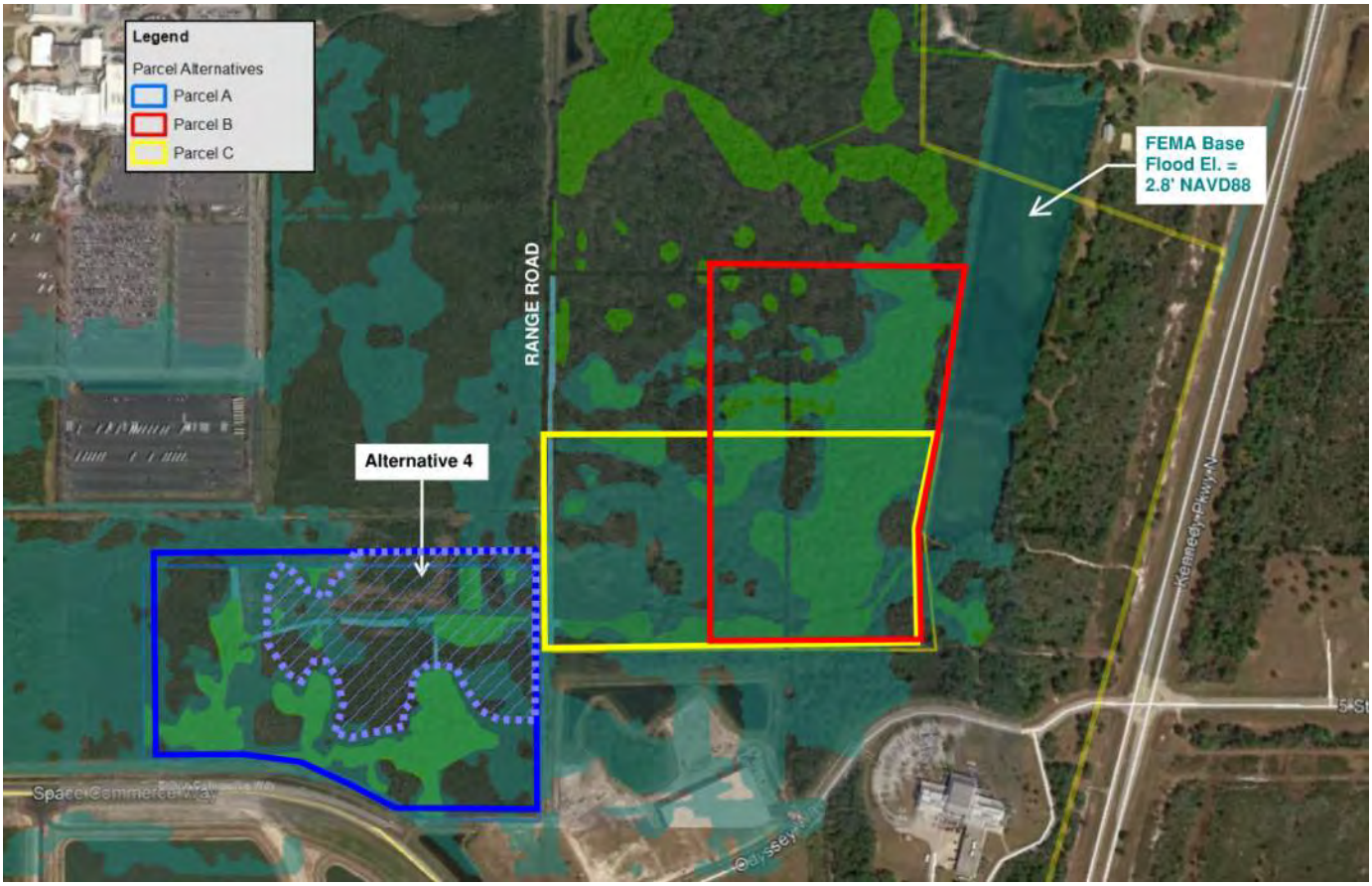

Figure 12: Alternative 4

4.0 CONCLUSION AND RECOMMENDATIONS

While the pre-identified parcel boundaries may have tracts that are viable for development, the area to the north presents greater development potential and fewer environmental impacts. Based on site constraints and the customer's envisioned facility program, BRPH recommends Alternative 2 as the optimal site to focus the proposed development, with auxiliary and future support areas in the Alternative 3 and 4 areas. The ranked comparison of each area with respect to the elements evaluated is summarized below.

To accommodate future development and supporting site access roads and auxiliary structures, the customer proposes the following approximately 60-acre parcel for land transfer and NEPA analysis (see Figure 13Summary Exhibit 2). This parcel will encompass the Phase I site, provide space for buffers and future expansion, accommodate the program requirements, reduce environmental impacts and development costs, and meet the customer's objectives.

Figure 13: Proposed Parcel and Concept Layout

	Land Cover		Wetlands		Floodplains		Listed Species		Topography (Fill Cost)		Soils		Security		Utilities & Access		Developable Area		**Weighted Avg**
Category Weight	1		3		2		2		2		1		3		2		3		
North Area Alternative 2	4	Most Desirable	4	2.5 ac	5	Least impact	5	N/A	4	$1.8 M	3	C/D	3	Least Desirable	2		5	16.5 ac	**3.9**
PARCEL C (Alternative 3)	2		5	0.3 ac	1	Most impact	5	N/A	3	$2.0 M	3	C/D	5		4		2	13 ac	**3.5**
PARCEL A (Alternative 4)	3		2	1.3 ac	3		5	N/A	2	$2.1 M	4	B/D	5	Most Desirable	5	Most Accessible	3	15.4 ac	**3.5**
North Area Alternative 1	3		2	2.6 ac	4		5	N/A	3	$2.0 M	3	C/D	4		1	Least Accessible	5	16.6 ac	**3.4**
PARCEL B	1	Least Desirable	1	6.3 ac	2		5	N/A	1	$2.3 M	3	C/D	4		3		1	7.5 ac	**2.3**

APPPENDIX A – Estimated Earthwork Calculations

Site Alternative	Avg Existing Site Elevation (NAVD)	Proposed Building Area (acres)	Adjustment for Circulation/etc. (+30%)	Avg New Site Elevation (NAVD)	Approx Fill Required (ac-ft)	Import Fill Cost - Delivered, placed, & compacted ($/ac-ft)	Estimated Cost
1	2.75	5.5	7.2	8.25	39	50000	**$ 1,966,250**
2	3.25	5.5	7.2	8.25	36	50000	**$ 1,787,500**
3	2.5	5.5	7.2	8	39	50000	**$ 1,966,250**
4	2.25	5.5	7.2	8	41	50000	**$ 2,055,625**
Parcel B	2	5.5	7.2	8.25	45	50000	**$ 2,234,375**

Appendix 3 Cultural Resource Assessment Survey

Draft Report
Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA
Brevard County, Florida

LG²ES Project Number
2020-152

Prepared for:
Kennedy Space Center

On Behalf of:
Space Florida

and
BRPH

and
Jones Edmunds

Prepared by:

LG² Environmental Solutions, Inc.

March 2021

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Draft Report
Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA
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Prepared for:
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March 2021

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EXECUTIVE SUMMARY

This report presents the results of a Cultural Resources Assessment Survey (CRAS) conducted in support of the proposed Exploration Park North Expansion EA at Kennedy Space Center in Brevard County, Florida. The survey was conducted by LG^2 Environmental Solutions, Inc. (LG^2ES) on behalf of Space Florida, BRPH, and Jones Edmunds to assist Kennedy Space Center in meeting its regulatory obligations under Section 106 of the National Historic Preservation Act (NHPA), as amended. All work was conducted in accordance with the NHPA and in compliance with the Archaeological Resources Protection Act and met or exceeded standards detailed in *Archaeological and Historic Preservation; Secretary of the Interior's Standards and* Guidelines 48FR, Part 44716-42, Vol. 48, No. 190, September 29, 1983 and guidelines developed by the Florida State Historic Preservation Office.

The Archaeological Area of Potential Effects (APE) is located on the *Orsino, Florida* 7.5-minute USGS quadrangle. It is situated within the Merritt Island National Wildlife Refuge in the northern portion of Brevard County. Specific locational information is available in **Appendix C**.

The CRAS was conducted December 7-9, 2020 and consisted of historic background research, pedestrian survey, and the excavation of 31 shovel tests probes (STPs) were excavated, all of which were negative for cultural material, and 13 "no dig" loci were documented across the project APE. "No dig" tests were written off due to inundation. Although all subsurface tests were negative for cultural material structural remains and a surface scatter were documented as 8BR04364, The Granite Rock Homestead, while a historic road documented in the southwestern portion of the Project APE, was recorded as 8BR04367, Howe Grove Road. Neither resource meets the minimum criteria for inclusion on the NRHP and both are recommended not eligible. No further archaeological investigation is suggested.

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LIST OF ACRONYMS

Abbreviation	Description
APE	Area of Potential Effect
ARPA	Archaeological Resource Protection Act
CMBS	Centimeters Below Surface
CRAS	Cultural Resource Assessment Survey
CRM	Cultural Resource Management/Manager
EA	Environmental Assessment
FMSF	Florida Master Site File
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information System
GPS	Global Positioning System
ICRMP	Integrated Cultural Resource Management Plan
IRL	Indian River Lagoon
KSC	Kennedy Space Center
LG²ES	LG² Environmental Solutions, Inc.
LC	Launch Complex
MINWR	Merritt Island National Wildlife Refuge
NAD 27	North American Datum 1927
NAD 83	North American Datum 1983
NASA	National Aeronautics and Space Administration
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedures
SOW	Scope of Work
SF	Space Florida
STP	Shovel Test Probe
USAF	United States Air Force
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

1.1 Project Description

In December 2020, LG^2 Environmental Solutions, Inc. (LG^{2}ES) conducted a Phase I Cultural Resource Assessment survey (CRAS) in support of the proposed Exploration Park North Expansion Environmental Assessment (EA) at Kennedy Space Center (KSC) on Merritt Island in Brevard County, Florida. The project area is wholly contained on the *Orsino, Florida* 7.5-minute quadrangle (USGS 1976) (**Figure 1.1**). It was conducted on behalf of Space Florida, BRPH, and Jones Edmunds (SF/BRPH/Jones Edmunds) to assist KSC in meeting its regulatory obligations under Section 106 of the National Historic Preservation Act (NHPA), as amended. Proposed project activities include the expansion of property at Exploration Park to support development and construction of commercial aerospace facilities.

All work was conducted following Section 106 of National Historic Preservation Act (NHPA) as amended; the Archaeological and Historic Preservation Act, as amended; the Advisory Council on Historic Preservation's revised regulations in 36 CFR, Part 800; Section 267.12, Florida Statutes; and Chapter 1A-46 of the Florida Administrative Code. All work was conducted in accordance with the Florida Division of Historical Resources' *Module Three Guidelines for Use by Historic Preservation Professional* and the Florida Division of Historical Resources' Performance Standards. All investigations were performed by professional archaeologists meeting the qualifications established in the Secretary of Interior's Standards and Guidelines.

1.2 Area of Potential Effects

The Area of Potential Effects (APE) for this investigation consists of the entire land transfer boundary from KSC to SF, an approximately 61.3 acres (ac) parcel (**Figure 1.1**). The project APE consists of the entire footprint of the Project's proposed impacts. The APE is relatively level with elevations ranging from 0.3 to 1.2 meters (m) above mean sea level (amsl). Vegetation in the APE primarily consists of Brazilian Pepper, with some dead orange trees in the southern half of the Project APE, while the northern half of the project APE consists of saw palmetto with random live oaks in the northwestern corner, and slash pine and saw palmetto across the rest of the northern portion.

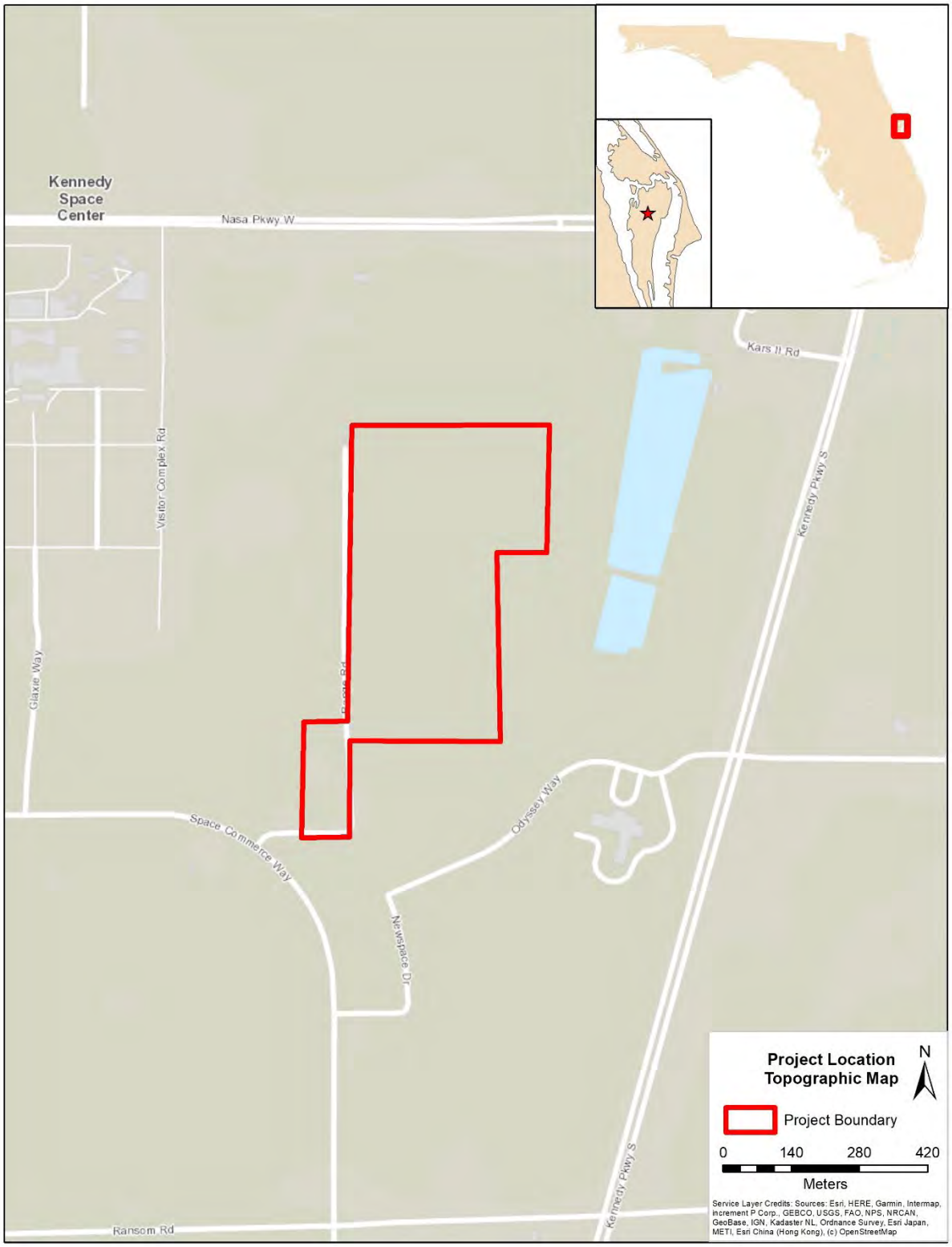

Figure 1.1 **Project Area Shown on the *Orsino, Florida* 7.5-Minute Quadrangle (USGS 1976).**

2.0 ENVIRONMENTAL CONTEXT

2.1 Physiographic Setting

Kennedy Space Center (KSC) is located on Merritt Island in Brevard County, Florida. Merritt Island is located within the Southern Coastal Plain region of the Atlantic Coastal Plain physiographic province, as is all of Florida. This portion of Florida is within the Eastern Florida Flatwoods ecoregion, described as nearly level and poorly drained with numerous ponds, lakes, swamps, and sloughs (Huckle et al. 1974; Griffith et al. 1994; Scott 2001; Scott et al. 2001). The physiographic setting of the project area suggests a low probability of encountering cultural resources within the APE.

2.2 Hydrology

KSC is located within the Indian River Lagoon (IRL) watershed. The IRL watershed stretches 251 kilometers (km) from Ponce Inlet in Volusia County to Jupiter Inlet in Martin County and is comprised of the Mosquito Lagoon, the Banana River, and the Indian River (SJRWMD 2016). The IRL watershed is an estuary that receives salt water from the Atlantic Ocean through inlets and fresh water from direct precipitation, groundwater seepage, surface water runoff, and discharges from tributary streams and canals (Penders 2012a). The ridge and swale topography of the barrier island also creates a reservoir for fresh water that could have been easily obtainable by previous occupants of the island (Cantley et al. 1994). In addition to the Banana River, which borders Merritt Island to the east, other surficial water resources include impoundments, drainage canals, borrow pits, freshwater wetlands, mangrove wetlands, and salt marsh wetlands (Penders 2012b).

2.3 Generalized Topography

The following is adapted from the KSC 2015 Environmental Resource Document, Revision F (KSC 2015:144-145). Merritt Island, as well as Cape Canaveral, form a barrier island complex of Pleistocene and recent age. Topography is characterized by a series of ridges and swales created from relict dunes, which were deposited as the barrier islands were formed. The western side of Merritt Island "has been reduced to a nearly level plain (KSC 2015:145). Elevations on Merritt Island range from sea level to approximately 3 m. The island is comprised of saline and freshwater marshes, flatwoods, and scrub. Within the APE, the land cover is characterized as Citrus to Brazilian Pepper (KSC 2015:150).

2.4 Climate

The following is adapted from the KSC 2015 Environmental Resource Document, Revision F (KSC 2015). The climate at KSC is classified as subtropical with short, mild winters and hot, humid summers and no recognizable spring or fall seasons. Summer weather begins in April and is prevalent for approximately nine months of the year. Average temperatures in this part of the year are in the 70s Fahrenheit (F) and temperatures usually rise into the 80s and 90s F during the day. Days are mostly sunny; however, afternoon thunderstorms are common. Although cool days can occur in November, winter weather begins in January and extends through March. Winter weather is marked by windy days and temperatures in the 40s F at night and the 70s during the day. May through October weather is characterized by southeast winds, traveling clockwise around the Bermuda High. These winds bring

"moisture and warm air, which help produce almost daily thundershowers creating a wet season" (KSC 2015:46). The dry season occurs between November and April and is characterized by cold continental air masses which cause uniformly distributed light rain, as opposed to the localized heavy thunderstorms of the wet season (KSC 2015).

2.5 Soils

Three soil types have been identified within the APE (**Table 2.1 and Figure 2.1**). The majority of the area (58.6 ac) contains Copeland-Bradenton-Wabasso complex, limestone substratum. This soil is found on flats and marine terraces and is described as poorly to very poorly drained. Chobee mucky loamy fine sand, depressional, is found in 2.8 ac of the south-central portion of the APE. This soil is found on depressions and marine terraces and described as very poorly drained and hydric. The northwest corner of the APE, approximately 0.5 ac, contains Bradenton fine sand, limestone substratum, described as poorly drained and found on flats and marine terraces.

Table 2.1 Soils within Project Area

NRCS Code	Name	Drainage	Hectares
16	Copeland-Bradenton-Wabasso complex, limestone substratum	Very poorly drained	58.6
13	Chobee mucky loamy fine sand, depressional	Very poorly drained	2.8
8	Bradenton fine sand, limestone substratum	Poorly drained	0.5

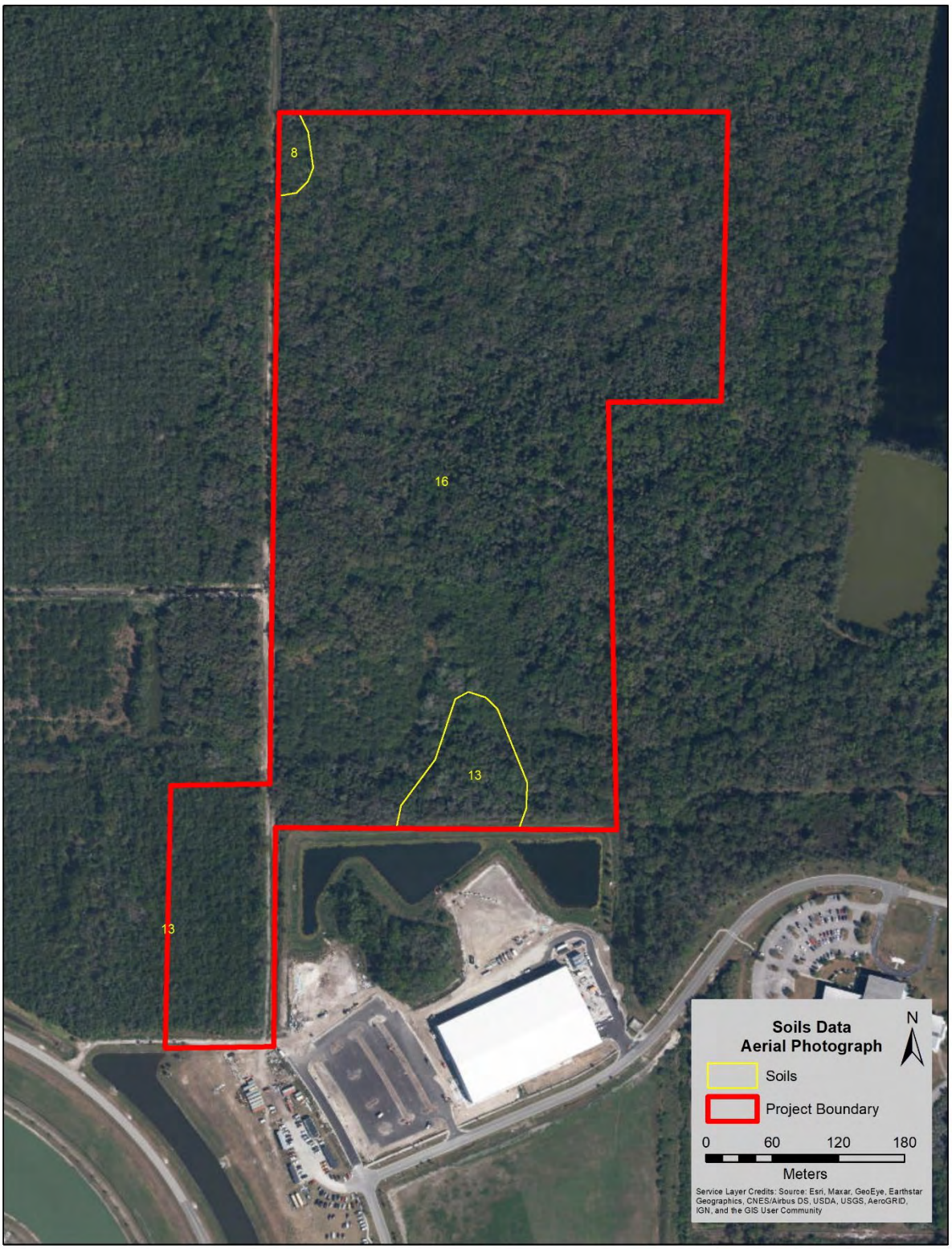

Figure 2.1 **Soil Types Mapped within the Exploration Park North Expansion Project APE.**

2.6 Vegetation

KSC is wholly contained within the Merritt Island National Wildlife Refuge (MINWR). The APE is situated in the southwestern portion of the refuge. Portions of the APE were once citrus farms and the vegetation throughout suggests prior clearing episodes. The APE is surrounded by development associated with KSC. Areas with established water control measures, such as drainage ditches, were used for citrus, truck crops, and rangeland. Natural vegetation incudes slash pine, cabbage palm, live oak, saw palmetto, laurel oak, wax myrtle, chalky bluestem, creeping bluestem, indiangrass, little bluestem, pineland threeawn, southern bayberry, sweetbay magnolia, water oak, sweetgum, and panicums. Vegetation within areas of very poorly drained soils may also include cabbage palmettos, maples, gums with an undergrowth of vines, pineland shrubs, and ferns. Blue flags, rushes, sedges, and lilies are commonly found in depressions.

2.7 Faunal Resources

Numerous species of mammals, birds, and reptiles are found within the MINWR. Mammals living within the refuge include armadillos, bobcats, manatees, river otters, white tailed deer, rabbits, squirrels, raccoons, and opossum. Birds observed within the refuge include birds of prey such as the osprey, red-shouldered hawk, bald eagle, and American kestrel; shorebirds such as the killdeer, lesser yellowlegs, Wilson's snipe, and ring-billed gull; migratory birds such as the blue jay, barn swallow, tufted titmouse, Carolina wren, American robin, and pine warbler; and wading birds and waterfowl such as blue heron, white ibis, great egret, great blue heron, and many species of ducks. Reptiles include the American alligator, lizards such as anoles and skinks, over 40 species of snakes, and numerous turtle species such as Peninsula cooter, chicken turtle, snapping turtle, striped mud turtle, stinkpot, and gopher tortoise. Endangered species within the MINWR include the eastern indigo snake, the Florida scrub-jay, the gopher tortoise, the southeastern beach mouse, the West Indian manatee, and the wood stork (FWS 2020).

3.0 CULTURAL CONTEXT

Cape Canaveral has a long record of human occupation, and this is reflected by the presence of numerous prehistoric and historic sites that are part of the area's rich archaeological heritage. Human occupation at Cape Canaveral spans from the first Native Americans of the Orange Period over 3,000 years ago, the colonizing Spanish, the failed attempts of the colonizing French and their associated survivor camps, Canaveral Town which included the area's only school and post office, the development of the US Space Program and US Air Force Space Wing during the Cold War, through to the present day.

3.1 Prehistoric Chronology

3.1.1 Paleoindian and Early Archaic (14,000 BP – 8,000 BP)

Florida has a rich Paleoindian history extending continuously from the late Pleistocene epoch into the early Holocene epoch (**Figure 3.1**). At early archaeological sites and isolated finds in Florida, there are diagnostic artifacts dating to the late Pleistocene, including the Clovis fluted points and later lanceolate types. Tools of this period were constructed from a variety of natural resources. These tools were made from carefully chipped-stone into bifacial and unifacial tools (Purdy 1981), from ivory into foreshafts (Hemmings 2004), from bone into double-pointed points (Waller 1976), and from wood and other organic materials. However, the Florida Paleoindian occupation lacks good radiocarbon dates.

The projectile point sequence: Clovis to Suwannee/Simpson to Bolen notched points have a bracketed age between 11,000 BP and 10,000 BP (with Clovis being oldest). Stylistically, Clovis and Suwannee/Simpson points are lanceolates (attached to a spear) although Clovis are fluted and Suwannee/Simpsons are not. At the end of the Paleoindian period, smaller notched points, including the Bolen and Greenbrier, replaced lanceolates (Austin 2006; Powell 1990). While Clovis remains as the earliest stylistically secure projectile point, "Pre-Clovis" occupation has been proposed for years at multiple sites in Florida, including Little Salt Spring (Clausen et al. 1979) and Page-Ladson (Dunbar and Hemmings 2004) as well as other sites in the Aucilla River in the Big Bend area (Dunbar 2006, 2007; Hemmings 2004).

There have been several studies in recent years examining genetic samples of modern Native Americans and ancient human skeletons indicating the occupation of the Americas occurred at least 1,500 years prior to the Clovis complex which has been confidently dated to ~13,000 calendar years before present (cal yr BP) (Halligan et al. 2016). However, until now, this interpretation had lacked actual archaeological evidence. The archaeological evidence of pre-Clovis occupation between 14,000 and 15,000 cal yr BP is very limited due to a number of factors but, as researchers have been saying for years, the two most important factors are the recognition and visibility of these sites. It is theorized that most of these sites are located in submerged areas, what underwater archaeologists refer to as drowned terrestrial sites. Recently, one suspected pre-Clovis site was revisited.

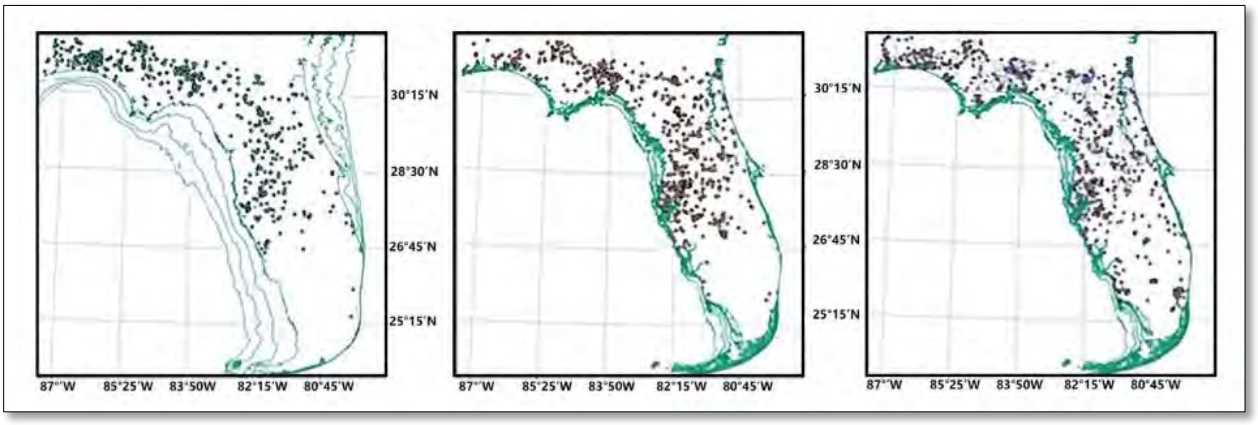

Figure 3.1 Culture Type Designations Queried from the FMSF: Paleoindian and Early Archaic Sites; Sites with Middle Archaic Designations; and Late Archaic with Middle Archaic Sites (Lydecker et al. 2011).

The Page-Ladson site located in the Aucilla River in Florida's Big Bend region has yielded remarkable findings. Archaeologists from several universities, governmental, and non-governmental organizations have worked together, led by researchers from Florida State University and Texas A&M University, to conduct new excavations at this unique site. This site is located under 9 m of water within a mid-channel sinkhole along a segment of the Aucilla River, about 11 km inland from the Gulf of Mexico. While this site has been suspected to contain a pre-Clovis component since the discovery and recovery of a Mastodon tusk that showed signs of butchering, no direct archaeological evidence had been found (Dunbar and Hemmings 2004). Recent publications have revealed the recovery of a biface knife in direct association with mastodon bones showing signs of blade marks from butchering (Halligan et al. 2016).

> "The findings prove that hunter-gatherers, butchered or scavenged a mastodon carcass at the sinkhole's edge next to a small pond at 14,500 cal yr BP. The record of human habitation of the Americas between ~14,000 and 15,000 cal yr BP is sparse but real. The rarity of these early sites along the Gulf Coastal Plan of North America is largely due to two factors: sediment preservation, and burial and submergence during the late Pleistocene transgression." (Halligan et al. 2016)

Both Little Salt Spring (8SO18) and Warm Mineral Springs (8SO19) are also unique submerged terrestrial sites located in Sarasota County. These two sites are spring-fed cenotes or sinkholes with anoxic subsurface environments located within 4.8 km of each other. The anoxic environment results in some of the best-preserved artifacts and ecofacts known in the southeast (Wentz and Gifford 2007). Both sites also have suspected pre-Clovis occupations. One such artifact recovered from Little Salt Spring is a fire-hardened wooden stake, which was recovered in the late 1970s by Charles Clausen from the 27 m ledge. This stake was found in situ with an extinct giant ground tortoise in direct association with charcoal of a campfire, which could be radiocarbon dated. Archaeologists have also uncovered artifacts and prehistoric tools never before seen due to the anoxic environment of the spring. One of the oldest artifacts from Little Salt Spring was recovered during excavations within the basin of the spring in 2004. A worked portion of a deer antler was recovered one meter below the sediment-water

interface. Radiocarbon dating of an ecofact directly associated with the object was determined to be Cal BP date of 10,560 to 10,253 (2 sigma; Claib Rev.6) (Gifford and Koski 2011). Investigations of these two sites have only scratched the surface. To date, only about five percent of Little Salt Spring has been excavated.

The transition from lanceolates to smaller notched points represents the end of the Paleoindian period (Austin 2006; Bullen 1975; Powell 1990), while lithic reduction strategies and contiguity from 10,000 BP to 9,000 BP represents a continuation of Paleoindian occupation of Florida (Lydecker et al. 2011:12). Early Archaic tool assemblages associated with Bolen points are well constrained stratigraphically and chronologically (10,000 BP to 9,000 BP) (Faught et al. 2003). However, unlike Clovis and Suwannee/Simpson lanceolates (Dunbar 1991; Thulman 2007), their spatial distributions have not been reconstructed for Florida. Numerous sites show at least semi-permanent occupation during this period (Faught et al. 2003) while other special activity sites and campsites in the Central Florida Highlands were used seasonally or to utilize a specific resource (Milanich 1994; Milanich and Fairbanks 1980).

Windover Pond is an Early Archaic mortuary pond located in Brevard County, Florida. The site has produced a large variety of artifacts including 7,000-year-old human tissue, bone, antler, wood, and fabric made of saw palmetto and sable palm preserved in a peat bog. There is evidence that their dead were buried underneath the peat deposits. The site has provided "unprecedented and dramatic" information about Early Archaic people in Florida (Milanich 1994).

3.1.2 Middle Archaic (8,000 BP – 5,000 BP)

In Florida, the Middle Archaic witnessed increased population growth and reliance on marine resources. Sites were expanded into the St. John's River area, along the Atlantic coastal strand, and along the southwest Florida coast into south Florida (Milanich 1995:20).

During the Middle Archaic, Florida's eastern lakes were settled for the first time and biface points were made with a stem for hafting rather than notching. Many archaic tools appear less carefully crafted and are expedient rather than consistent. New mortuary practices including the preservation of the skeleton in different positions were introduced, and populations grew much like those found at the Windover Pond site (Doran 2002). It was during this time span that the second occupation of Little Salt Spring appears in the evidence uncovered by researchers from the University of Miami. It is estimated somewhere between 100 and 1000 submerged burials are present at Little Salt Spring. While evidence of this burial practice has been seen elsewhere in the world, in North America these archaic mortuary ponds are unique to Florida. It is possible that there are sites of a similar nature to Warm Mineral Springs, Little Salt Spring, and Windover Pond preserved on the submerged paleo-landscape offshore.

Maritime adaptations become increasingly apparent from 7,000 BP. Shellfish resources first appear in the archaeological record during the Middle Archaic. Extensive shell middens along the coast and canal systems connecting mangrove swamps were constructed by humans utilizing the coastal zone. Middle Archaic sites, specifically shell middens, are plentiful and are found in a variety of locations in Florida (Milanich 1994). In at least three sites at Big Bend in Apalachee Bay, the shell middens continue offshore along relic river channels (Faught 1988, 2004).

Ground and pounded shell and limestone were increasingly used as raw materials to make tools during the Middle Archaic. In present-day Florida, evidence of lithic technology is meager during this period and pottery is absent from the record. On the other hand, excavations at the San Marco Island site found wood and plant fibers used for cordage and decorative items. The excellent preservation of these finds is due to unusual anoxic environment in wetland muck. Wood was certainly made into many items of daily use and has been previously found in submerged settings (Lydecker et al. 2011).

Excavated artifacts made from limestone include plummets, grooved pebbles, net sinkers, and hammer stones. Large shellfish, including whelks and conchs (*Busycon*, *Strombus* and *Pleuroploca*) were modified/manufactured to make picks, adzes, celts, chisels, awles, gouges, knives, scrapers, cups, saucers, dippers, and spoons while smaller shellfish are thought to have been used to make net weights, sinkers, and decorative beads (Kozuch 1992).

3.1.3 Late Archaic (5,000 BP – 3,000 BP)

The Late Archaic Period is characterized by greater cultural complexity after 5,000 BP (Milanich 1994). Extensive shell middens dating to the Late Archaic are found along the coast and inland waterways of Florida.

In the Late Archaic Period, middle Archaic assemblages, including the expedient chipped-stone assemblage, continued (Hemmings and Kohler 1974), while new technologies were introduced to the region. The earliest ceramics tempered with plant fibers appear about 4,050 BP (2000 BC). Varying by location in Florida, these ceramics are referred to as Mount Taylor, Norwood, or Orange. The Late Archaic also sees the use of steatite cooking vessels (Milanich 1994; Powell 1990; Sassaman 2003) and shell middens made into circular features known as “shell rings” (Russo 2004).

While appearing first in Middle Archaic assemblages, socketed base points such as Culbreath and Levy are also consistent with Late Archaic settings. Hemmings and Kohler (1974) report these chipped stone assemblages as extensions of the expedient Middle Archaic tool kit. Late Archaic sites indicate that humans were hunting, fishing, processing food, manufacturing marine shell tools, building fires, and living along the developing Everglades tree island landscape more than 5,000 years ago. Several Late Archaic sites overlay pre-existing layers of organic soil, sediment, faunal remains, and cultural material, suggesting an earlier occupation during the Middle Archaic (Schwadron 2010).

Coastal occupation during the Late Archaic is more extensive than previous periods. Features including fish weirs, canals, platforms, ponds, and sluices appear in the archaeological landscape for the first time (Schwadron 2010).

The transition from the Archaic to the Woodland period in Florida is marked by increasing regionalization and the development of specific ceramic styles and variations. To understand these different traditions, Florida has been divided into nine cultural regions by Milanich (1994). Brevard County is located within the East and Central region, in which is further separated into the Indian River Culture Area. This is a region that is centered on the Indian River and stretched from the northern boundary of Brevard County south to St. Lucie Inlet, a distance of some 190 km. From east to west, it extended from the Atlantic seaboard to the upper St. Johns River basin, an average distance of about 50 km (45 SW 2020).

3.1.3.1 Mt. Taylor Period (6,000/5,000 – 4,000 BP)

At the end of the Late Archaic, Milanich (1994) uses the Mt. Taylor Period to differentiate and define the beginnings of identifiable regionalism in east central Florida. In the Indian River Culture Area, the end of the Late Archaic period has been associated with the Mt. Taylor regionalism (Table 3.1). It is heralded by the emergence of steatite vessels and ground stone implements. The presence of these artifacts in this region indicates that a long-distance trading network was established during this time. Mt. Taylor is the final preceramic culture in Central Florida and dates to the Middle and Late Archaic though the exact date is subject to debate (45 SW 2020). The subsidence strategies for people during this time are more closely related to that of the Late Archaic, indicating that it is more closely related to the latter phase, rather than the Middle Archaic (Cantley et al. 1994). Fish was the main food source, along with mammals, reptiles, birds, and amphibians (45 SW 2020).

This period is also identified with the rise of monumental architecture. Previously, it was assumed that shell mounds along the St. Johns River could only have been constructed during the post-Archaic periods and were associated with later cultures which used ceramics. However, recent research at shell mounds have identified purposely constructed shell mounds (some containing burials) that are older than 2,000 BP (45 SW 2020).

Sites representative of the Mt. Taylor Period include the Mt. Taylor Site (8VO19), Max Hoeck Site (8BR205), and Tick Island (8VO24). The Mt. Taylor and Tick Island Sites indicate that these people used charnel houses for preparation and storage of their dead until mass burial plots could be constructed within shell middens (Cantley et al. 1994).

3.1.4 Orange Period (4,000 – 2,500 BP)

The introduction of clay pottery vessels emerges during the end of the Late Archaic Period during the Orange Period (45 SW 2020). This is the first pottery type to emerge in Central Florida and is typified by fiber-tempered pottery (Cantley et al. 1994). There is little evidence of subsistence pattern differences, therefore the period is defined by the changes in pottery technology, decoration, and manufacturing methods. Although the patterns did not change, there was an increase in the use of shallow dwelling fish, snails, and mussels from freshwater marshes (45 SW 2020).

The Orange Period is split into five different phases based upon pottery styles (Orange Period I-V) (Table 3.2). Orange Period I ceramics are characterized by plain, hand-molded, thin-walled, rectangular containers with occasional lug-like appendages. Orange Period II ceramics are very similar to the previous period in the exception that in addition to plain wares, they also began to exhibit exterior decorations, including incised, concentric, vertical diamonds with horizontal lines and spirals with background punctations. Orange Period III ceramics are distinguished by large, straight-sided and round-mouthed vessels with flat bottoms. The thickness varied, but the lips were always simple rounded or flattened. Exterior decorations are similar to the Orange Period II ceramics, with incised straight lines, some parallel and slanting, with occasional punctations or ticks. Orange Period IV ceramics had simple incised motifs, with sand and fiber tempers, constructed with hand molding (Cantley et al. 1994) and the first instances of coiling (45 SW 2020). Orange Period V (which is referred to as the Transitional Period to some researchers) ceramics exhibited both hand molded and coiled manufacturing methods with incised, pinched, and triangular punctated surface decorations. Sand and fiber ware was used as the tempering agents, like the ceramics of the previous Orange Periods. St. Johns chalky pottery is also associated with this phase, as well as Malabar I ware types (Cantley et al. 1994; 45 SW 2020).

Table 3.1 Prehistoric Culture Periods of the Indian River Culture Area (45 SW 2020)

Date BC/AD	Cultural Period	Cultural Traits	Diagnostic Artifacts
12,000-8,000 BC	Paleoindian	Small bands of migratory hunters and gatherers.	Fluted points: Clovis, Folsom, Dalton, Suwannee, and Simpson projectile points
8,000-2,000 BC 8,000 5,000 3,000	Archaic Early Archaic Middle Archaic Late Archaic Mount Taylor	Small groups of migratory hunters and gatherers living within smaller territories. Burials in ponds. Some evidence of aquatic resources exploitation early. Beginning of middens by Middle Archaic. Steatite vessels appear by Mt. Taylor. Regionalism begins.	Archaic stemmed points, steatite vessels
2,000-500 BC	Orange	First appearance of ceramics. Increased sedentism. Exploiting aquatic resources. Middens becoming commonplace.	Fiber-tempered pottery. Increased use of design motifs over time. Appearance of sand and mixed sand and fiber tempering late. Stemmed projectile points
500 BC-AD 900	Malabar I	Conditions similar to present. Continuation of hunter/gatherer/fisher subsistence. Villages with smaller special use camps. Burial mounds.	St. Johns Plan, Sand-Tempered Plan, Glades Plain, Sandy St. Johns, Dunns Creek Red (late)
AD [redacted]	Malabar II	First appearance of check-stamped ceramics. Large populations. Appearance of non-local objects. European artifacts 1513+. Wreck salvaging.	Stamped ceramics, Exotics (galena, copper, quartz crystals, etc.), European goods

Table 3.2 Orange Period Chronology (45 SW 2020)

Date BC	Cultural Period	Ceramic Attributes
2000-1650	Orange I	Hand-molded, flat-based rectangular shaped containers. They were undecorated with then walls and the rim treatment was simple rounded lips.
1650-1450	Orange II	First use of decorations on ceramics. The decorations include concentric vertical diamonds with horizontal lines and some use of incised spirals and punctuations. Vessel forms were similar to Orange I.
1450-1250	Orange III	Large straight wall, rounded vessels with smooth surfaces and flat bottoms. Fewer rectangular vessels are found. Decorations on the ceramics are incised straight lines and some punctuation.
1250-1000	Orange IV	Coiling first appears as a method of manufacturing ceramics. It also signified the end of hand molding. By the end of this period tempering begins to be a mix of sand and fibers (also known as semi-fiber tempered). Decorations on pots are simple incised motifs.
1000-500	Orange V	The end of the semi-fiber tempered ceramics and the appearance of chalky ware, which is typical of the Malabar Period. Also decorations and shapes of vessels are similar to Malabar Period wares.

3.1.5 Malabar Period (2,500 BP – 450 BP)

From the Orange Period, the Malabar Period evolved, which existed up until the arrival of the Spanish. Many researchers believe that several factors separate it from the St. Johns Culture Area to the north (45 SW 2020, Buchner et al. 2008, Cantley et al. 1994). The cultivation of corn is absent and there were differences in the linguistics, social activities, and religious customs (Buchner et al. 2008). The period is marked by an increase of sand-tempered pottery, although spiculate-tempered pottery (St. Johns) was still dominant from Orange Period V.

The prevalence of sand-tempered Glades pottery in the southern portion of the region and St. Johns ceramics in the northern portion indicate that the Indian River Culture Area was a transitional zone (45 SW 2020). Rouse (1951) was the first to describe the pre-Columbian cultures of the transitional Indian River area (Figure 3.2). This Malabar I period is coeval to the St. Johns I period. Malabar II, which is characterized by the appearance of St. Johns Check Stamped pottery, is temporally equivalent with St. Johns II (Penders 2012c).

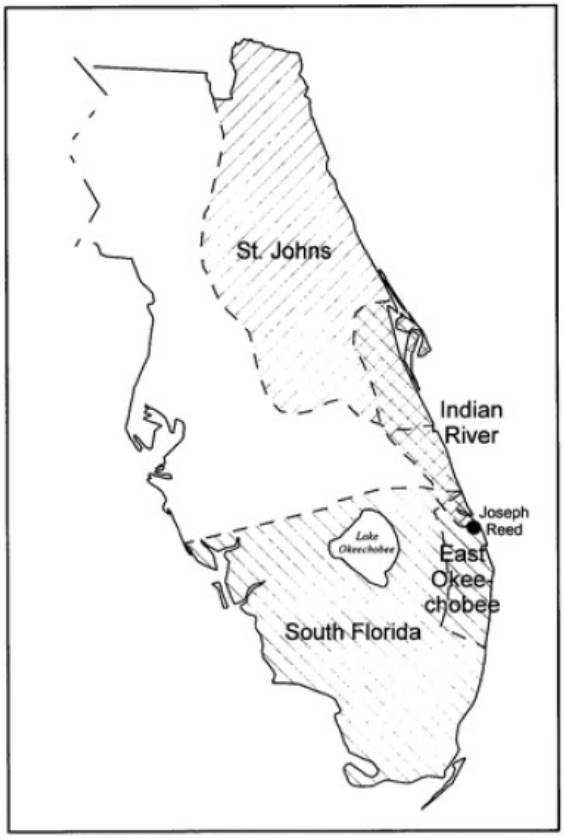

Figure 3.2 East and South Florida Culture Regions (St. Johns after Milanich 1994, Indian River after Rouse 1951, East Okeechobee after Carr and Beriault 1984, South Florida after Widmer) (Russo & Heide 2002:76).

A significant amount of undecorated pottery tempered with quartz sand also appears in the Indian River region. Indian River-region ceramic samples have shown that both the St. Johns and quartz-tempered pottery are made from local clay sources, suggesting that one group made both wares (Milanich 1994).

The Malabar Period is divided into two sub-periods or phases, Malabar I and Malabar II, which are further divided into Ib and IIb respectively (Table 3.3). In the past, the Malabar Period has been seen as temporally equivalent with St. Johns but recently the chronology has been further differentiated by research in the region (45 SW 2020).

3.1.5.1 Malabar I (2,500 BP-1,500 BP)

Malabar I is mainly defined by the presence of chalky, sponge spicule ceramics. Some fiber-tempered wares are present during this phase but is likely transitional from the prior period. The decorative motifs are linear and continue through Malabar II. Climate change from the Roman Warm Period, may have caused an occupancy shift to the Indian River Lagoon area and on the coastal barrier islands (45 SW 2020).

There appears to be some influence from the Weeden Island and Yent complexes, but the degree of influence seems to be minor. Exotic goods resulting from trades with other cultures is rare and comprise of a very small percentage of the archaeological record (45 SW 2020).

Malabar Ib is noted more by the brief presence of Dunns Creek Red ceramics rather than any other cultural identifier. During this short time span (1,500-1,100 BP) the ceramic appeared and disappeared. It is unclear what caused the short-lived pottery, but it is suggested that it may have to do with the climate shift to cooler and drier environments during the Vandal Minimum Period (45 SW 2020).

Table 3.3 Malabar Period Chronology (45 SW 2020)

Date BC/AD	Climatic Period**	Malabar Subperiod	Cultural Traits	Diagnostic Artifacts
500 BC-AD 900	Roman Warm Period (ca. 350 BC-AD500)	Malabar Ia	Conditions similar to present. Continuation of hunter/ gatherer/ fisher subsistence. Villages with smaller special use camps. Burial mounds.	St. Johns Plan, Sand-Tempered Plan, Glades Plain, Sandy St. Johns
AD500-900	Vandal Minimum Period (ca. AD 500-850)	Malabar Ib		Dunns Creek Red
AD900-1050	Medieval Warm Period (ca. AD850-1200)	Malabar IIa	Though check-stamped sherds appear as early as AD750, recent dates suggest a correlation between their widespread use and the start of the Mississippian Period. Large populations. Some non-local artifacts or local copies.	Check-stamped ceramics. Very few exotics (galena, copper, quartz crystals, etc.),
AD1050-1513	Little Ice Age (ca. AD 1200-1850)		European artifacts 1513+. Wreck salvaging. Populations were declining due to introduced diseases. Burial customs declined, and burials were placed in old existing mounds.	Some exotics of Native American origin early. European goods late.
AD 1513-1565		Malabar IIb		

*This revised chronology is based on Penders et al. 2009; Penders 2012a.

**The climate periods are from Marquardt and Walker 2012.

3.1.5.2 Malabar II (1,100 BP-450 BP)

Malabar II is indicated by a population growth and an increase in mounds and villages during the earlier portion of the Period. The phase is also hallmarked by the presence of check-stamped ceramics, which appeared in the St. Johns region in AD 750, but did not appear in the Indian River Culture area until 900 AD. This corresponds to the dawning of the Mississippian period and the Medieval Warm Period (45 SW 2020). In many nearby regions, this warmer weather resulted in the further cultivation of corn, but that did not seem to be the case in the IRCA. Instead, there was an increase in the consumption of shallow water fish within freshwater wetlands, which suggests a population increase.

Malabar IIb is largely distinguished archaeologically by the appearance of European goods, acquired either via trade or salvage of shipwrecks. The cooler and drier climate of the Little Ice Age during this time did not seem to have much of an effect on subsidence strategies. By the end of Malabar II, populations were decreasing, possibly due to the introduction of new diseases by the Spanish. By becoming proficient wreckers, the acquisition of European goods changed the socio-political network of the region. It could be speculated that the new trade network established by European goods was more far reaching than those established in the Mississippian Period (45 SW 2020).

3.2 Historic Chronology

3.2.1 Contact Period (CA. 1500 -1565)

The Florida peninsula first appeared in cartography in 1502 on the Cantio map and in 1507 on the Waldseemuller map (Lydecker et al. 2011:19) (**Figure 3.3).** While it is unknown when Europeans first made contact with Florida's native tribes, Juan Ponce de León made the first "authorized discovery" of Florida in 1513 (Griffin 1983:18; Turner 2013). Before that documented voyage, it is virtually certain that Spaniards were using Florida as a staging ground to capture slaves and possibly provision their ships, as had been practiced extensively in the Bahamas for some time. The exact location of Juan Ponce de León's initial landfall remains unknown but judging from the latitude recorded in his log the prior day it would have been somewhere close to present-day Ponte Vedra, north of St. Augustine. He claimed the "island" for Spain and named it La Florida, because it was the season of Pascua Florida ("Flowery Easter") and because much of the vegetation was in bloom. He then explored south along the coast, around the Florida Keys and north up the west coast of the peninsula, before returning to Puerto Rico.

It is likely that Ponce de León, like other conquistadors in the Americas, was looking primarily for gold, Indians to enslave, and land to govern under the Spanish crown. Accounts of the Ponce de Leon voyage describe interactions with the Ais Indians, the tribe occupying the Central East Coast of Florida at the time (Rouse 1951). Ponce de Leon attempted to land at the St. Lucie Inlet where he encountered the Surruque Ais (Davidson 2001). After Juan Ponce de León's journey, a series of increasingly ambitious Spanish expeditions led by Pánfilo de Narváez (1528), Vazquez de Allyon (1526), Hernando de Soto (1539-1540), and finally Tristán de Luna (1559) explored Florida and parts of the southeastern United States (Meide et. al 2010:19).

Figure 3.3 The New World as it First Appeared on the Waldseemuller Map in 1507 (Lydecker et al. 2011).

3.2.2 First Spanish Period (CA. 1565-1763)

By the mid-sixteenth century, Spain emerged as a leading power with its foundation being in trade and plunder from the Americas. The neighboring country of France noticed this rapid rise and sought a thriving empire of its own by setting sail to this new land. On May 1, 1562, an expedition of French protestant Huguenots under Jean Ribault's command found and explored a large deepwater river in northeast Florida. Two years later, the French successfully established Fort Caroline on the River May, present-day St. Johns River, with three hundred settlers under the command of René Goulaine de Laudonnière, establishing a large French presence in Florida (Bennett 2001:19-20; de Bry and Meide 2014).

By this time King Philip of Spain had already felt an acute need to establish a coastal stronghold in the territory he claimed as *La Florida*. This time Spanish forces would attempt to settle the Atlantic rather than the Gulf coast of Florida. A military outpost on the Florida coast could suppress piracy along Spain's Gulf Stream shipping routes while at the same time serve as a base for staging rescue and salvage operations for the increasing number of ships cast away on Florida's dangerous shoals. Don Pedro Menéndez de Avilés was charged with the task of establishing a Spanish foothold on Florida's Atlantic coast, and completely eradicating the French enterprise (Lyon 1976). Menéndez' fleet arrived almost simultaneously with a French re-supply ship led by Ribault, setting the stage for a rapid and bloody encounter between the two colonial powers. Ribault's fleet aimed to strike first but was ravaged by a hurricane which wrecked his ships to the south towards Canaveral. The survivors were put to the sword by Menéndez, who by this time had sacked Fort Caroline and ensured the survival of what would be the first Spanish settlement attempt in the U.S. to persist to this day, St. Augustine (Lyon 1976; Gannon 1983; de Bry and Meide 2014).

After the founding of St. Augustine, Menéndez also explored the west coast of the Florida peninsula, guided by Hernando de Escalante Fontaneda. Fontaneda had, at the age of 13 in 1549, survived a shipwreck on the southwestern coast of Florida. A concerted effort to document the Canaveral area and the Ais groups living there came in 1605, when Spanish soldier Alvaro Mexia traveled through the region with the goal of making allies with the native groups against the Dutch, French, and English (Dubcofsky 2011:34).

During the 1600s and 1700s, the Spanish, French and English continued to fight over territory and religion in Florida. The English, established in South Carolina by 1670 and thereafter in Georgia, attempted to push southward while the French moved eastward along the Gulf Coast from the Mississippi River valley. The Spanish would strengthen their hold in the Gulf with the founding of Pensacola and its fortifications beginning in 1698 but it remained tenuous, as evidenced by the inability of Spain to defend the Apalache mission system which was abandoned when attacked by Governor Moore from South Carolina in 1704 (Hann 1988:264-317). Forts and missions were established throughout La Florida extending in all directions with St. Augustine being the epicenter. (Hann 1988:326-327). However, the Ais's territory near Canaveral is conspicuously void of both forts and missions. The Ais Indians maintained control of the Cape Canaveral area throughout the First Spanish Period, their populations fluctuating throughout the decades.

At the close of the Seven Years War in 1763, in accordance with the Treaty of Paris, Spain ceded her Florida territory to the British and withdrew her garrisons from these remaining outposts along the Gulf of Mexico (Florida Department of State 2020a).

3.2.3 British Period (CA. 1763-1783)

Between 1754 and 1763, war ensued between the major powers of Europe, with the New World colonies of those powers serving as the predominant theaters for the war. The Seven Years' War, also called the French and Indian War in North America, concluded with Great Britain defeating the allied French and Spanish. Peace was signed with the 1763 Treaty of Paris, in which Great Britain gained control of significant land in the New World, including Florida. This transfer of power heralded a shift in the population of Florida, with many Spanish and allied native residents departing and being replaced by British colonists. Britain divided her new territory into two colonies, West Florida with its capital at Pensacola, and East Florida with its capital at St. Augustine (Schafer 2001).

Initially, the British viewed the Floridas as backwater colonies neither self-sufficient nor export-producing. Dismissive of Spanish colonial management, British authorities set out to transform their new possessions into profitable colonies. As successful as this effort was in the regions around St. Augustine and Pensacola, the British made little economic impact at the southern end of the peninsula.

During this time, the Creek Indian tribes of the Carolinas, Georgia and Alabama began to migrate to the Florida peninsula filling the void left when the Spanish were evacuated from Florida to Cuba. The departing Spanish had taken with them most of the original tribes native to La Florida. There is little information in the historical record from those who remained after the Spanish succession. The Creek peoples in Florida would eventually become known as Seminoles and Miccosukee.

The British would make notable efforts to map the region, and one result of this was the Anglicization of place names in the area. One government surveyor, Bernard Romans, conducted extensive surveys of the central and western areas of the peninsula between 1769 and 1772, producing detailed maps (Romans 1999[1775]:88, 338) (**Figure 3.4**).

Figure 3.4. Bernard Romans' General Map of the Southern British Colonies (1776) (Note the peninsula labeled as Cape Canaveral on the eastern coast).

British rulers promoted population growth in East Florida with large land grants. The largest British plantation to the project area was granted to Dr. Andrew Turnbull, a Scottish physician. Dr. Turnbull, with a grant of 60,000 acres and over 1,200 colonists from the Mediterranean region, attempted to establish an agricultural colony in 1768 at New Smyrna, at the north end of the Indian River above Cape Canaveral. The colony produced indigo, sugarcane, hemp and rum, but was ultimately unsustainable. Fleeing disease, overwork, and a lack of food, the roughly 600 remaining colonists abandoned New Smyrna for St. Augustine by 1777 (Tebeau 1971).

Realizing that citizens from the British Isles might have difficulty with the heat and humidity in Florida, Turnbull resolved to use Greeks, who were accustomed to such conditions and knew how to cultivate olives, cotton, madder,

and tobacco, as settlers. He had experience with the Greeks as his wife was Greek. He received large grants of land near the Ponce de Leon Inlet (near present day Daytona). His plans called for 500 Greek settlers to cultivate crops that would thrive in the Florida climate. He called his colony New Smyrna after the birthplace of his wife.

Turnbull recruited 1,403 colonists from the Mediterranean region, which included Greeks, Italians, and Minorcans to establish an agricultural town in New Smyrna, at the north end of the Indian River above Cape Canaveral. The group ran into problems almost immediately. A ship carrying supplies wrecked before it reached the colony. A total of 148 settlers died during the voyage from Minorca to New Smyrna. When the colonists finally reached their destination, they were met by mangrove swamps. The land had not been cleared, and food was scarce. The swamps had to be cleared and shelters built for the colonists. Although there was an abundance of food in the area the colonists were not allowed the time to gather, hunt, or fish. These conditions led to a minor revolt by about 300 colonists. They rioted, seized a ship, and sailed south. A British frigate captured the escapees and brought them to St. Augustine. Two of the rebels were executed and the rest were returned to New Smyrna. Life at the colony continued to be difficult. The work was hard, the food continued to be scarce, and malaria was rampant. In the first year of its existence an additional 450 colonists died (Tebeau 1971).

The colonists who were deemed not to be working to their capacity were beaten, confined in stocks, or chained to heavy iron balls. Some were chained to logs in the fields to continue their work. Turnbull used his overseers to enforce his judgements, and often they exceeded their master in severity. Despite this, New Smyrna was the most profitable indigo plantation in North America.

All the colonists had signed letters of indenture with Turnbull. They would work for a set number of years. At the end of that time, they would be released from the indenture and Turnbull would give them a small plot of land for their own. The more skilled such as blacksmiths and carpenters had shorter terms of indenture. As the terms of indenture ended for the more skilled of the colonists, they approached Turnbull for their discharge and land. Invariably they were imprisoned and forced to sign new indentures. Eventually the colonists were afraid to ask for their discharge.

In 1777, a group of Englishmen from St. Augustine came to New Smyrna to examine the colony. A young boy overheard these gentlemen say that if the colonists knew their rights, they would not suffer the slavery in which they found themselves. The boy told his mother, who discussed the matter with other colonists. They decided to see what they could do. On March 25, 1777 three of the men got permission to go to the coast to hunt for turtles. They were granted permission and went to the coast, but they turned north and went to St. Augustine where they sought an audience with Governor Tonyn asking for justice as their terms of indenture had expired. Governor Tonyn promised to protect their rights. Several factors came into play; the conditions at New Smyrna, the need for men to protect Florida because of the outbreak of the American Revolution, and antagonism between Tonyn and Turnbull, led Governor Tonyn to liberate the New Smyrna colonists. During May and June of 1777 most of the colonists migrated to St. Augustine and by July 17, 1777 Turnbull's attorneys had set all the colonists free. In its ten years of existence 964 colonists died at New Smyrna (Ancestry n.d.).

A map surveyed by William de Brahm and drawn by John and Samuel Lewis depicts several smaller land grants between the project area and New Smyrna. These grants of between 10,000 and 20,000 ac, were likely given to the grantees but never occupied. The grantees include Thomas Bradshaw, with 10,000 ac on the west bank of the Indian River, and Samuel Barrington, Captain John Jervis, William Henry Ricketts, and Colonel William Faucitt, each with 20,000 acres (Lewis and Lewis 1769). Bradshaw's grant was the closest to the project area, at a distance of 26.3 km.

Further north, in the vicinity of the present Haulover Canal, two grantees developed their grants into plantations. Robert Bissett received a 300-ac grant in 1768, which he named Mount Plenty. The grant wasn't settled until 1777 and was only inhabited and worked for two years before it was raided by a "Spanish privateer" and abandoned shortly after. The plantation was reported to include a dwelling, a storehouse, a kitchen building, a hen house, and a stable. Bissett also claimed to have enough houses to accommodate 70 slaves. "He claimed to have built three sets of indigo vats and cleared 143 acres" (Parker 2008:30). Bisset's claims made to the British government in hopes to receive compensation for losses suffered by virtue of evacuating the Floridas when Great Britain agreed to cede the Floridas back to Spain at the end of the American Revolution (Siebert 1929).

The second grantee of note in this area was William Elliot. Elliot's plantation was located "a few miles south of the Bissett grant" (Parker 2008:30) and was developed into the first sugar plantation in British Florida. It was, at the time, the "southernmost plantation along the Atlantic coast during the British occupation of Florida" (Parker 2008:30). Elliot hired John Ross, a native of Scotland to travel to Florida and "select and settle tracts of land in Florida." Ross selected a tract on the Halifax River approximately 85 miles south of St. Augustine. The land was called Stobs in honor of the Elliot family land in Great Britain. Elliot also ordered Ross to "purchase enslaved Africans in Georgia for his labor force" (Parker 2008:31). The slaves were to begin by constructing their lodging prior to clearing the land for "provision crops and indigo" (Parker 2008:31). These tasks were completed by the end of 1768. "Five years later, the Kings Road would be completed between St. Augustine and its southern terminus: Stobbs Farm" (Parker 2008:31). Following limited success with indigo, Ross began draining the wetlands at the plantation for the creation of sugar fields, and possibly rice fields. He also created a canal network to irrigate the indigo fields. In 1771, Ross constructed "'a complete sugar works: one large mill house, one boiling and curing house and twenty-eight Negro houses'" on a previously undeveloped 1,200 ac tract that abutted the western edge of Stobbs and extended to the marshes of the Indian River (Parker 2008:31). This would become the first sugar works in East Florida and the oldest standing sugar processing facility. The plantation was moderately successful throughout the 1770s and produced both sugar and rum for export back to England. As with Bissett's plantation, production ended with the raid of the "Spanish privateer in November 1779 (Parker 2008:31).

Ruins of the plantation, located just beyond the boundary of the Merritt Island National Wildlife Refuge, have been recorded as site 8Vo160. Excavations conducted in 2008 also recorded the Elliot Plantation Complex (8Vo9407), a multi-component archaeological site that includes nine separate sites consisting of the remains of the sugar mill (8Vo160, Ross Hammock Midden (8Vo130), Ross Hammock Indian Mounds (8Vo131), a salt evaporating plant (8Vo213), sugar factory village (8Vo9403), sugar factory canals (8Vo9404), Ross Hammock canals (8Vo9405),

and Plantation Road (8Vo9406). Three of the sites (8Vo130, 131, and 213) are contained in a multiple National Register listing (8Vo2569).

East Florida played a very small role in the American Revolution with the colony still so dependent on oversight and supplies from Great Britain. The last naval battle of the war took place off the coast of Cape Canaveral more than one month following the official end to the conflict.

3.2.4 Second Spanish Period (CA. 1783-1821)

The 1783 Treaty of Paris marked the end of the Revolutionary War and the beginning of the Second Spanish Period in Florida history, with the colony serving as a reward for Spanish efforts in aid of the United States. British loyalists, many of whom recently moved to Florida to escape revolution fervor in other British colonies, now had to leave again. The Spanish government attempted to populate their recovered territory the same way the English had, through land grants, but they could not keep up with the influx of American settlers moving south. During this period, Spanish leadership had some difficulty unifying and exercising control over the diverse groups then living in Florida: Spanish moving back in from other parts of the empire, Americans, Minorcans remaining from the British period, free blacks, and Seminole and Creek Indians, many of whom preferred the trading relationships they had developed with the British (Tebeau 1971).

The new Spanish governor in St. Augustine, Vicente Manuel de Zéspedes y Velasco, wrote that in 1785 Florida "was a province that has just died for England and is in the process of being reborn for Spain" (Lockey and Caughey 1949:728). After overseeing the evacuation of British subjects over an 18-month period (those who decided to leave and forfeit their property rather than stay and swear loyalty to Spain), Zéspedes' priority was to make Florida a secure, stable, and prosperous settlement. Florida was once again under Spanish control. However, Spain chose to keep the English divisions of the territory in place, leaving the state split into East and West provinces (Tanner 1989; Cusick 2000:173).

In many ways, the Florida colonies were once again a series of military outposts on the fringe of Spain's New World Empire. Numerous late 18th-century accounts make note of the military and backwater nature of East Florida's provincial capital, typified by this 1785 description: "All are either in service of the garrison, or live on a small liquor trade or other mercantile business of little consequence" (Lockey and Caughey 1949:481). This early characterization was no doubt to some degree the result of the massive population loss that occurred when the multitude of British subjects left the Floridas for the Bahamas or other British colonies (Poitrineau 1988).

To counter this population and economic loss, the Spanish government enacted a series of policies designed to encourage immigration and settlement of uninhabited areas. Tax exemptions, land grants, and subsidies were used to entice Catholic immigrants, and non- Catholics were for the first time allowed to own land. Many *Floridanos* (persons born in Florida under the first Spanish regime) returned from Cuba to either set up new plantation or acquire lands previously held by the British (Landers 2000a:121). Some new immigrants including the wealthy *Floridano* Francisco Xavier Sánchez, maintained large ranches with herds of cattle (Landers 2000b; Parker 2000). Other settlers who arrived as indentured servants were upwardly integrated into the new Spanish society, most

notably St. Augustine's substantial Minorcan community, who became landowners by investing in farming, fishing, business, and maritime commerce (Griffin 1991; Cusick 1993).

While the slave-based plantation economy was now firmly entrenched in Florida, Spanish authorities until 1790 continued to honor the 17th-century amnesty for runaways from adjacent territories willing to convert to Catholicism. The first to make the transition from slave to free subjects were the Africans brought by British loyalists during the Revolution, who subsequently escaped. Some 250 of these maroons were granted freedom, forming the nucleus of Florida's free black community in the Second Spanish Period. Among them were "skilled carpenters and masons, hostlers, hunters and fishermen, sailors and soldiers, ranch foremen, butchers, shoemakers and tanners, and field hands" (Landers 2000a:122). Florida's planters, laborers, merchants, hunters, and mariners formed a diverse community during the Second Spanish Period, and included Anglo-Americans, Creek or Seminole Indians, Minorcans, Greeks, Italians, Canary Islanders, African Americans, and, after 1800, French, Irish, Scottish, and Americans (Griffin 1983; Cusick 2000:179). Many U.S. citizens took advantage of the situation, pledging oaths of loyalty in order to gain fertile lands in Florida.

Both East and West Florida struggled to become the populated economic centers that the Spanish authorities intended. West Florida settlers enjoyed only limited success with staple crops and exports of tobacco, lumber, indigo, and cotton. One of the most important commodities in West Florida became deerskins. This trade, monopolized by the Panton, Leslie, and Forbes Company, provided various finished goods to the Creek Indians in exchange for the skins from the white-tailed deer, which were highly valued in the overseas market (Meide et al. 2010). Traders provided guns, knives, needles, cloth, liquor, cookware, and other manufactured goods in return for a seemingly endless supply of dressed deer pelts. Although lucrative for the company, this did not result in prosperity for the Floridas as a whole. Most of the Panton, Leslie, and Forbes employees lived as resident traders inside Indian villages and operated under the careful watch of Creek leaders.

Following the 1807 halt of slave importation to the United States, Florida became an unregulated epicenter for illegal trade. The first significant European incursions into modern-day Brevard County occurred during this time, with the Reyes Grant plantation (1804-1835) located on 1,000 acres at the north end of the Indian River and the Delespine Grant of 1817 including 40,000 acres around the Titusville area (45 SW 2020). An 1834 map by Henry Schenck Tanner and an 1845 map by Joseph Meyer (1845) illustrate Mosquito County, marking Delespines Grant inland from Cape Canaveral and Flemings Grant further south, both on the Indian River (**Figures 3.5 and 3.6**).

The United States increased pressure to acquire Florida during this period in several ways and for several reasons. Tensions were growing between American settlers and Seminole Indians along the northern border of the Florida territory. Spain became an ally with Great Britain against France in the Napoleonic Wars, and the fear was that Britain would use Florida to launch attacks against the United States. Slave owners in the southern states disliked having free blacks who owned guns living so close to home. The use of the port at Fernandina for smuggling goods and slaves into the United States was becoming a large problem for trade oversight (45 SW 2020; Tebeau 1971). Gaps in Spanish control of Florida became increasingly apparent through the Patriot War (1812-1814) and the War of 1812.

Following the War of 1812 between the United States and Britain, and the related Creek War (1813-1814) between the U.S. and Creek Indians in Alabama, armed parties of American slave owners began to cross the border into Spanish Florida in search of their runaway African American slaves. These maroons often joined with Creek or Seminole tribes in Spanish Florida, many of whom had fought against the U.S. during the Creek War and became known as Black Seminoles. Armed by British traders, the Seminoles and Black Seminoles continued to commit raids across the American side of the border. The cross-border raids by both sides became increasingly bold, and the United States Army under the command of General Andrew Jackson invaded Spanish Florida on multiple occasions between 1817 and 1818 to fight against the Seminole and their African American allies. Collectively, these battles came to be known as the First Seminole War (1816-1819). With the widespread burning of Creek towns and the capture and occupation of the Spanish Fort San Marcos, and later Fort Barrancas at Pensacola, it became increasingly obvious to Spanish authorities that they could not effectively defend their territories against American incursion. To make the best out of an inevitable outcome, Spain entered negotiations with the U.S. and by 1819 had tentatively agreed to transfer Florida to the United States under the terms of the Adams-Onís Treaty. The treaty was ratified in 1821, and Florida was surrendered to the jurisdiction of the United States (United States Department of State 2020).

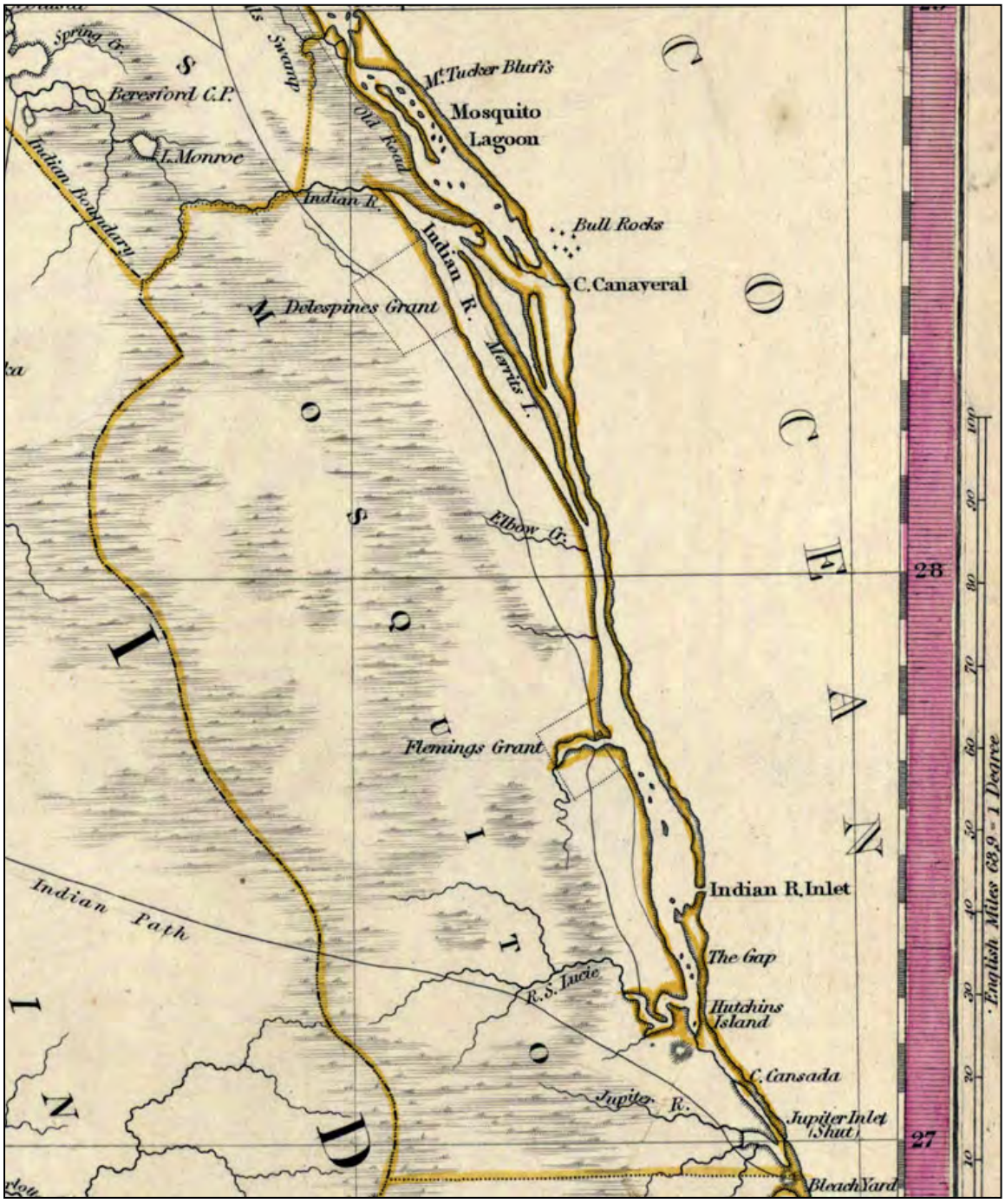

Figure 3.5 **1834 Map by Henry Schenck Tanner showing Delespine Grant and Flemings Grant (Map courtesy of the University of South Florida, Special Collections Department).**

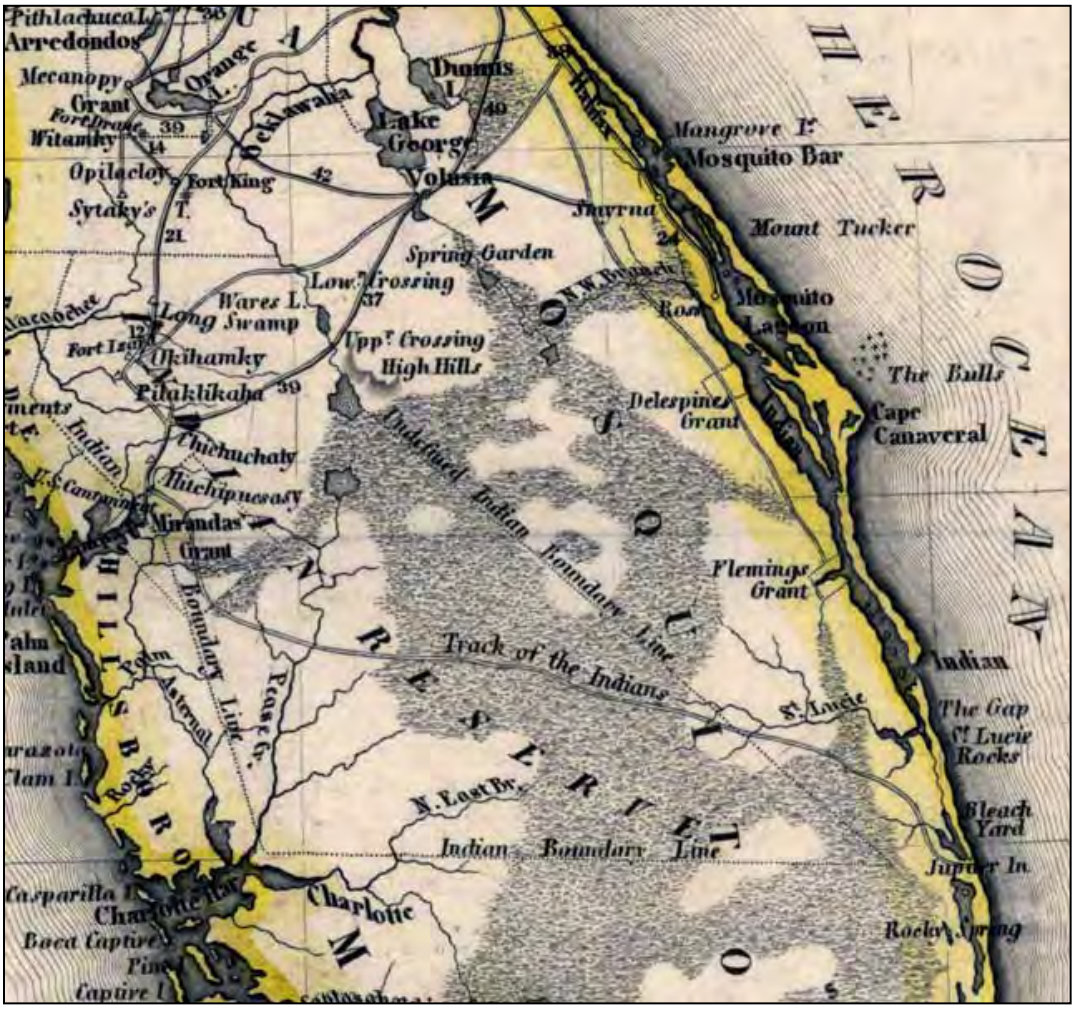

Figure 3.6 1845 Map by Joseph Meyer showing Delespine Grant and Flemings Grant (Map courtesy of the University of South Florida, Special Collections Department).

3.2.5 American Acquisition, and Settlement (CA. 1819 -1845)

Responsibility for establishing Florida's new government was given to Andrew Jackson. Within weeks, he had divided Florida into two counties. The area previously called West Florida became Escambia County, and the former East Florida became St. Johns County. Jackson established county courts and mayors in the former colonial capitals of St. Augustine and Pensacola and were joined with a new capital established at Tallahassee, a location halfway between St. Augustine and Pensacola. Job done, he appointed William Pope DuVal his successor as Florida's governor. Florida became an official territory of the United States on March 30, 1822 (Florida Department of State 2020b; United States Department of State 2020). New county divisions were created across the territory, and in coming decades, the Merritt Island area would go through several county designation changes (St. Johns, Mosquito, Orange, Volusia, and finally Brevard).

Florida's population grew quickly during this period, ballooning from under 8,000 in 1821 to 34,530 by the 1830s. Cotton, lumber, and the naval stores industry emerged as important economic forces in the territory, joining citrus, fishing, and other colonial period agricultural products (Gannon 2003).

Florida joined the Union as the 27th state in 1845, becoming a slave state balanced by the admission of Iowa as a free state. In the years between achieving statehood and joining the Civil War, significant energy in Florida was focused on economic and social development. Large numbers of schools, churches, and newspapers were established and formalized in new and growing cities, and the population of the state doubled between 1845 and 1860, with nearly half of that population being slaves (Gannon 2003).

3.2.6 The Second and Third Seminole Wars (CA. 1835-1865)

Around 5,000 Seminoles were living in Florida when it became a U.S. territory in 1821. The explicit position of the government was that these Indians should be removed to make way for anticipated waves of white settlers into the new territory. Sharing this motivation were politically powerful slave owners who wanted to eliminate the refuge for runaway slaves that the Seminoles provided. The first step was to confine the Seminoles to a 4,000,000-acre reservation taking up much of the central portion of Florida, south of present-day Ocala and east of the project area (Figure 3.8). This was accomplished through the Treaty of Moultrie Creek in 1823, though not all Seminoles complied, as the reservation did not suit the tribes' needs or their accustomed means of subsistence by the sea. Once vacated by the Seminoles, Tallahassee became the new territorial capital (Florida Center for Instructional Technology 2002).

In 1829, Andrew Jackson became President of the United States and pressed to have the Indian Removal Act passed by Congress, which would open the entire eastern U.S. for settlement by Americans and Europeans. It became law in 1830, mandating the forced migration of the Seminoles from Florida to Indian Territory in present-day Oklahoma. Its implementation would lead to the Second Seminole War in 1835 (Mahon 1967). One of the most vocal opponents to Indian Removal policy and a warrior leader of the resistance was Osceola. He plotted the attack known as Dade Battle near Bushnell, which made clear that war was the only means to force the Seminoles from Florida (Florida State Parks 2020).

The war devastated much of Florida, gathering national attention as plantations were burned to the ground amid devastating raids and slave revolts. In February 1836, a Baltimore newspaper lamented that "the whole of the country, south of St. Augustine, has been laid waste during the past week, and not a building of any value left standing. There is not a single house now remaining between this city and Cape Florida, a distance of 250 miles... [A]ll, all, have been burnt to the ground" (Niles Weekly Register 1836). In Mosquito County, which includes present day Brevard County, the area was "sparsely populated with mostly sugar plantations along the rivers near the coast. Seminoles ransacked or burned 16 of these plantations on the northern Mosquito Lagoon by January 1836" (Ericksen 1994:36).

Several forts were constructed in Eastern Florida in support of the war. These included Fort Ann, Fort Pierce, Fort Taylor, Fort Christmas, and Fort Bassinger. Fort Ann was constructed in December 1837 at the haulover on the Indian River side of the crossing. "The intent was to erect a fortified depot that would serve as a place to supply

troops continuing down the Indian River" (KSC ICEMP 2014:9-28). At the time of its completion, 900 troops were in place at the haulover. The fort was abandoned in 1838 but used again as a Union camp during the Civil War and as a station for the U.S. Schooner Beauregard to prevent trafficking on the inland waterway.

Devastation from the war, along with a postwar hurricane in 1848, caused many people to refrain from building homes or businesses outside the fort (McKay 1924). It was not until after the Civil War that the area saw significant growth again.

As regular army troops and state militias were mobilized and sent into action, the Seminoles were slowly forced to the south, seeking refuge in the swampy wilderness. Several pitched battles were fought in the Everglades region, most notably the Battle of Lake Okeechobee on Christmas Day 1837.

With most of its remaining Seminole inhabitants, perhaps 300-400, restricted to a 2,500,000-acre hunting and farming reserve in southwest Florida, the territory saw the passage by U.S. Congress of the Armed Occupation Act. Designed to stimulate white immigration and pressure the remaining Seminoles to leave the territory, the law provided men willing to settle on the Florida frontier 160 acres of land. Most of those taking the proffered lands engaged in agriculture, such as Robert Gamble who settled on the Manatee River in 1844 to grow sugar cane, and whose holdings eventually grew to 3,500 acres (Schene 1981:69-76). Thereafter economic development progressed rapidly in Florida. The population passed 54,000 by 1840, and soon after the war, on March 3, 1845, Florida's legislature applied for and was granted entry into the U.S. as the nation's 27th state. Over the next 15 years, St. Augustine was eclipsed by rapid economic growth in the Gulf Coast, particularly Apalachicola and St. Marks. Devastated by the Seminole War, many of the plantations around St. Augustine would never recover. Complicating the recovery were property claims from the Second Spanish Period while middle Florida (with equally rich agricultural land) benefited from a good infrastructure and readily available land.

With the increase in population, tensions inevitably grew amidst reports of "Indian Rebellions" in South Central Florida. Indian territories continued to be encroached upon and the almost inevitable Third Seminole War broke out in 1855. Also known as the Billy Bowlegs War, this conflict saw Indian troops pushed even further south, and eventually another 200 Indians surrendered and were removed to Oklahoma. Despite the defeat, a small group persisted in the swamps of south Florida, in land impassable for federal troops. The descendants of these unconquered warriors are the modern Seminoles and Miccosukee (Clement 2020).

Haulover Canal

The Haulover Canal is located at a narrow spot of Merritt Island that was used as a boat "Haul over" as early as the 1600s. Boats were moved overland from the Mosquito Lagoon to the Indian River using rollers and skids. The difficulty of this process caused residents and businessmen to discuss a canal and although recommendations for a canal were made as early as 1824, an appropriation was not passed until 1844 and the canal was completed in 1854. The canal was excavated by slave labor provided by a local citrus grower and measured 1/3 mile in length, 10-12 ft in width and 3 ft deep and allowed shallow draft vessels to cross from Mosquito Lagoon into the Indian River (Foster 2013b:18). "Within 15 years, the canal proved to be inadequate because of the shoals that accumulated at each end and the strong current. It was so narrow and shallow in places that only small boats could navigate it.

Waters of the Indian River were usually two or 3 feet higher than the lagoon, with a strong current thus making it difficult for vessels trying to move against it, some slumping occurred, and bigger boats had to be pulled through or 'hauled over' on rollers" (Foster 2013b:18). By the 1880s the canal was in disrepair and had shrunk to a length of 1,000 ft, width of 12 ft and a depth of only 18 inches. The Florida Coast Line Canal & Transportation Company attempted to improve the canal through dredging, beginning in 1885. They first had to clear enough area to accommodate the dredges and brought in Italian laborers for this purpose. The dredging project was unsuccessful, and portions of the canal were impassable within two months (Parker 2008:49). In 1888, the Old Haulover Canal was replaced by a new canal at Allenhurst, today's New Haulover Canal on the Atlantic Intracoastal Waterway (Parker 2008:49).

3.2.7 The Civil War, Reconstruction, and the Late Nineteenth Century (CA. 1865-1899)

Florida joined other Southern states in seceding from the Union on January 10, 1861. Union forces in Florida quickly focused on controlling the coast, taking many of the port towns, while Confederate forces sought to maintain control of the agricultural and cattle-producing interior of the state to supply food to its troops. The Cape Canaveral Lighthouse lamp was dismantled and removed by the Confederacy during the war to prevent benefit to Union naval forces. In addition, cattle, salt (for curing meat), and citrus (for medical treatment) produced in the Cape Canaveral area were important to the war effort (45 SW 2020).

While most Floridians were loyal to the Confederacy, the Union Navy largely controlled the seas. During the war, the interior of Florida remained firmly Confederate while Union forces occupied and controlled the coast. The Union took Fernandina and St. Augustine on the east coast, Tampa, Charlotte Harbor, Cedar Key and Pensacola on the west coast, Ft. Myers on the southwest coast, and held Key West for the duration of the war.

During the Civil War, the Union Navy had patrolled the Florida coastline but for the most part left the interior alone. Confederate soldiers in Florida served in the "cow cavalry," so named because their main duty was to round up cows. Tens of thousands of cattle roamed the central region of the Florida peninsula in Kissimmee Valley. Confederate army patrols gathered these cattle and drove them north into the heart of the Confederate States to provide troop provisions (FCIT 2009). After the war, soldiers who fought not only in the Civil War but the Second and Third Seminole Wars (and had first-hand knowledge of the southern frontier) remained in the region to settle.

While Florida did not see the major battles and extensive destruction of the Civil War experienced by other southern states, it did undergo many of the same changes as roughly 15,000 troops went off to fight, many of whom did not return unscathed, if at all, and the economic system of slavery responsible for much of the state's success to that point was abolished. As in the rest of the South, Reconstruction and the final decades of the nineteenth century in Florida would be marred by pervasive racial prejudice. But unlike its neighbors, Florida had few physical scars from the Civil War and adopted a laissez-faire approach to governance, and as a result it experienced significant economic growth and financial investment before the turn of the century (Gannon 2003).

Railroads were a major catalyst for and manifestation of this boom time in Florida. The state held 550 miles of railroad in 1881, and in just twenty years that number grew to 3,500 miles (Gannon 2003). William D. Chipley

constructed a rail line that connected the Florida Panhandle with the East Coast, Henry B. Plant linked the Atlantic and Gulf Coasts with a line between Jacksonville and Tampa, and Henry Flagler created the Florida East Coast Railroad, which ran the full length of Florida to Key West. With the railroads came easily transported building materials, development in previously impenetrable parts of the state, and scores of people seeking land, employment, and recreation.

3.2.8 Twentieth Century (CA. 1900-1999)

The boom of the late 1800s continued into the early 1900s, through hurricanes, citrus crop freezes, yellow fever, and influenza epidemics. Resort hotels anchored railroad hubs, and development promoting the tropical attractions and health benefits of Florida's climate drew tourists and seasonal residents in droves. A new economic force in Florida emerged with the advent of Prohibition in 1919. Florida's extensive and still largely undeveloped coastline, coupled with its proximity to rum distilleries in Cuba and the Bahamas, made it ripe for importing and transporting illegal liquor. A land boom took Florida by storm in the late 1910s, and by the Roaring '20s had grown into a "land delirium" (Gannon 2003).

By 1925, ambitious construction of splendidly furnished mansions and vast neighborhoods of stucco, Mediterranean-style homes gave way to the selling and reselling of vacant, unimproved lots, tied to dreams of future development that were only drawn in brochures. A dramatic bust to end the land boom came in September of 1926, when a devastating hurricane slammed into Miami. A fruit fly infestation crippled the citrus crop in early 1929, making the stock market crash the final nail in a coffin that was already shut. The Great Depression found Florida's economy in ruins.

Floridians found hope and improvement again in FDR's New Deal programs, which acted in the state predominantly through the Civilian Conservation Corps (CCC), the Public Works Administration (PWA), the Federal Emergency Relief Administration (FERA), and the Works Progress Administration (WPA), from 1933 to 1942. New industry came to the area in the form of paper mills, phosphate mining, mechanized factories for cigar making, fruit packing and canning, and sugar refining. Tourism began to pick up again, and by the start of World War II, Florida had new life.

3.2.9 History of Merritt Island and Kennedy Space Center

3.2.9.1 Merritt Island

One of the first settlers on Merritt Island was Douglas Dummitt, who moved to the area in the 1820s from Tomoka where he was the Postmaster and a sugar cane farmer. He began growing oranges on a "narrow stirp of high land with abundantly rich soil near the 'Haulover'" (Foster 2014a:18). Dummitt was the first to "bud" sweet orange trees onto the native sour-orange trees to create a hardier orange tree. "Because the bud union was at least 3 feet off the ground and the trees were budded and not seedlings, the Dummitt trees survived the devastating freese of 1835, thus establishing the famous Indian River Groves (Foster 2014a:19). Following the Second Seminole War, Dummitt transplanted his crop to Dummitt Grove and by 1859 was harvesting 60,000 oranges per year. "By 1869, his grove was referred to as the largest in Florida, with more than 1,300 bearing trees that produces over 70,000 oranges (Foster 2014a:21). Dummitt contributed to the growth of citrus farming by selling budwood to other growers to start new groves. He died "at his orange grove" in 1873 (FWS 2015; see also Kanaski 2015).

Another early settler of Brevard County was Captain Miles O. Burnham, the first lighthouse keeper on Cape Canaveral. The population of the county grew slowly, the 1850 census recorded a population of 139. Settlers formed communities on the east coast near rivers and the first settlement of any size occurred in 1856 when 30-40 families formed the community of Canaveral, where Cape Canaveral is today. Settlement did not increase until regular steamer service began on the Indian River in the 1880s (Huckle et al. 1974:2).

Merritt Island, while never heavily populated, was home to several small communities of citrus farmers and fishermen, especially along the Haulover Canal. "As recently as 1962, there were approximately 17 towns, settlements, and hamlets scattered across North Merritt Island and Canaveral, comprised of a reported 400 people, mostly farmers and citrus growers (Foster 2013a:20). The northernmost of these towns was Shiloh, located on the north end of Merritt Island and the southern end of Volusia County, at one time the county line ran through the center of town. The town was founded in the early 1880s by George Kuhl, who owned and operated the town store, named the town, and established the post office in 1885. The town eventually became a trade center for the Indian River area (Foster 2015a:18-30).

Clifton was located just south of Shiloh near the Haulover Canal. "The area around the canal was referred to as 'the Haulover' and was renamed Clifton in 1889" (Foster 2015b:21). It was populated primarily by citrus growers. This small town was the home of the Clifton Colored School, constructed for the children of two African American families, the Campbells and the Jacksons. The school was constructed in 1890 and 1891. The school operated for approximately 10 years, until the Campbell and Jackson children "were of the age to be out of school" (Foster 2016a:20-27). Foster reports that Clifton did not have electricity until 1928, however, Penders (2008:48) states that Clifton "no longer existed after 1928 and Eugenia Campbell supposedly returned to live in the building in 1924." The building ruins were overlooked by the US government when the area was purchased what would become the Kennedy Space Center. The schoolhouse was dismantled in 2004 by the North Brevard Heritage Foundation and moved to Titusville. Archaeological investigations conducted by the Indian River Anthropological Society in 2008 recorded the Clifton Schoolhouse Archaeological site (8BR2229) and the New Smyrna to Haulover Canal Road

(8BR2230/8VO8880) (Penders 2008). Additional excavations were recommended at the Clifton Schoolhouse site to determine its eligibility for the NRHP. The New Smyrna to Haulover Canal Road was recommended as eligible for he NRHP, under Criteria A and D.

The town of Allenhurst was founded in 1888 when the New Haulover Canal was opened. It "boasted a hotel, fishing camp and marina, and several homes (Foster 2016b:17). The Allenhurst Fishing Camp and Marina "offered 500 feet of free dock, free water, homemade bread, staple and fancy groceries at city prices, and launch supplies" (Foster 2016b:17). Allenhurst had a hotel, opened in 1913, "was visited by many dignitaries from all over the world" (Foster 2016b:17). The Indian River Company owned and operated the Fishing Camp and Marina and hotel and advertised throughout the eastern half of the United States.

Orsino, located within the current project area, was named for its first postmaster, Orsino Smith. The town had a school, post office, service station, grocery store, and several homes. "The Howes were a prominent family who had aspirations of making their community a modern city with all the latest conveniences—electricity, telephone and telegraphs. Stock was sold in the Orsino Telephone, Telegraph & Power Company in 1925, Walter H. Howe President" (Foster 2016b:27).

Courtenay, located just south of Orsino was settled in the late nineteenth century, primarily through land granted by the 1860 Homestead Act. Courtenay resident Edward Porcher contributed to the success of the citrus industry by founding the Indian River Orange Growers Association in 1891 and the Indian River and Lake Worth Pineapple Growers Association in 1895 (Foster 2017).

Indianola was a small rural community on central Merritt Island founded by the Field brothers of Macon Georgia in 1868. It was reportedly named for the Indian mounds in the area. Samuel Field opened the first post office in 1880 and the town became a shipping center for oranges, due to the narrow-gauge railway that "ran down the center of the dock which was used to transport heavy boxes of oranges from the packing houses to waiting boats (Foster 2017:30).

Several smaller, short-lived towns were also located on Merritt Island. Wilson, or Wilson's Corners, was located on north Merritt Island and "was known as one of the richest fishing grounds of this part of Florida" (Foster 2016b:23). The town, named for President Woodrow Wilson, was populated by fishermen, farmers, and fruit growers. Two trailer parks were constructed near Wilson in the late 1950s. Danenburg Trailer Park (with a convenience store), built by Coleridge Danenburg on his farm, and the Wallace Trailer Park, "just down the road." The construction of the trailer parks coincided with the beginning of the Space Center and helped to alleviate the housing shortage caused by the large influx of families employed there.

Other short-lived communities included Wisconsin Village, located approximately one mile south of Route 402, west of Wilson, which was populated by 10 families from Wisconsin. Mortonhurst, located south of Wilson, was established by George W. Morton and "faded away just prior to the turn of the century (Foster 2016b:25). Heath consisted of several homes located in the vicinity of the VAB, and Happy Creek, which consisted of the Happy Creek Hunting and Fishing Lodge, run by the Benecke family. The hunting and fishing lodge was created in the 1940s by a son of the original owners.

Hunting and Fishing Camps of Merritt Island

At the beginning of the twentieth century, following an increase in tourism as the railroad extended into the state, several hunting and fishing camps were established on Merritt Island and the surrounding area. These included the Indian River Haulover and Outing Club and the Canaveral Club. These were popularized by magazines such as Harper's New Monthly Magazine and pamphlets such as A Tourist and Hunter's Guide to Indian River Country, 1889-1890 and Dr. James A. Henshall's Camping and Cruising in Florida. Other camps included the Beacon 42 Fish Camp, which opened in 1939. The camp included 20 cottages, 40 boats, a 60-seat restaurant, an airstrip, and a hotel. Activities included duck hunting and fishing. The Beacon 42 Fish Camp advertised nationally in Fish and Stream and was featured in an article by Charles Elliott in Outdoor Life magazine (Foster 2016b).3.2.9.2 NASA and Kennedy Space Center

3.2.9.2 NASA and Kennedy Space Center

The National Aeronautics and Space Administration (NASA) was established on July 28, 1958 when President Dwight D. Eisenhower signed Public Law 85-568. The first NASA administrator was Dr. T. Keith Glennan, who was sworn in on August 19, 1958, and official operations began on October 1. Operations were initially centered at Cape Canaveral Air Force Station, but additional space was needed to support the Apollo Lunar Landing Program, prompting a search for a new space center. Merritt Island was chosen for the space center due to its proximity to Cape Canaveral and the 9,000-mile tracking network of the Atlantic Missile Range. Other areas under consideration included sites in the Bahamas, White Sands Missile Range in New Mexico, Christmas Island in the south Pacific, Hawaii, Texas, and Georgia (Benson and Faherty 1978:5-4). Merritt Island Launch Area (MILA) was created in 1961. In 1963, Launch Operations Center (LOC), and LILA were renamed the John F. Kennedy Space Center to honor the late President.

The first Master Plan for the space center was completed in September of 1961. This plan included locations for the early Saturn and Nova test rocket launch pads along the eastern shore of the island, a rail transfer system and canals to transport rocket stages, a vehicle assembly area, spacecraft checkout, and launch control areas. The Industrial Area "was placed near the town of Orsino to provide space for a wide variety of industrial and scientific support facilities such as the KSC Headquarters Building, cafeteria, hospital/dispensary, physical plant maintenance, vehicle maintenance, and spacecraft assembly and checkout buildings" (NASA 1972:n.p. in Price 2013a:22).

Once the planning was complete, the acquisition of land could begin. On September 1, 1961, NASA requested appropriations for initial land purchases on Merritt Island. Once the site was chosen, NASA began to purchase what would become 88,000 acres of land on Merritt Island. The agency also requested that the acquisition process be handle by the US Army Corps of Engineers (USACE). In addition to coordinating the purchase of the land, the USACE was also integral in the design and construction of the space center's early buildings and infrastructure. "Whether through direct purchase or condemnation, NASA and the USACE acquired all of the Merritt Island property by 1964, including nearly 1,500 properties containing scattered homes, businesses, and citrus groves" (Benson and Faherty 1978:5-7, 5-11 in Price 2013b:22). Although many people were displaced by the acquisition "three-fourths of the owners were absentee, three-fifths lived outside of Florida" (Benson and Faherty 1978:5-7).

"When MINWR was established, approximately 2,500 acres were managed as commercial citrus groves. Beekeepers were needed to support the citrus industry on the Refuge. However, active grove operations declined after the 1990s and in 2008 all grove leases at KSC expired. The phase out of commercial beekeeping went through extensive public review from 2002-2006 and all commercial beekeepers were notified in 2007 of the decision to phase out operations by Oct. 2016" (NASA Environmental Management Branch). Three private burial grounds with 19 graves were “fenced off by NASA” and visitation was allowed. A Baptist church was relocated, a second church was purchased by NASA and turned into an office and laboratory. Lastly, summer homes along the Atlantic beachfront were purchased and converted into offices and storage (Harris 1970:6). Active grove operations declined after the 1990s and in 2008 all grove leases at KSC expired (KSC-PLN-1911, Revision G:245). Beekeepers are no longer active at KSC.

Construction of launch facilities and support facilities began in 1962. “In the 1962-1963 fiscal year, NASA spent $162 million on roads, utilities, launch pads, towers, propellant depots, cables, and communication systems” (Price 2013b:22). Construction of the Vehicle Assembly Building, located approximately five miles north of the APE, began on August 20, 1963. This building, at the time the largest in the world was where the Saturn rockets were assembled before being transported to the launch pad. Construction of the Industrial Area, immediately east of the APE, began during this period as well. The major buildings in the Industrial Area were constructed between 1963 and 1966 (**Figure 3.7**) (Grinter 2007).

On August 28, 1963, “the Bureau of Sport Fisheries and Wildlife, later the United States Fish and Wildlife Service (FWS) entered into an interagency agreement with NASA to manage all lands within the KSC that are not currently being used for NASA/KSC operations. These lands, known today as the Merritt Island National Wildlife Refuge, provide habitat for more than 1,500 species of plants and wildlife (FWS 2015).

Figure 3.7 Construction Activity in the Industrial Area ca. 1965 (from Grinter 2007).

3.2.9.3 Land Acquisition within the APE

Much of the land within the APE was purchased by Walter H.J. Howe beginning in 1915 as part of the Three-Year Homestead Act of 1912. Howe had relocated to the Courtenay, Florida area from Poughkeepsie, New York in the 1910s, along with his wife Sara and son Karl. Howe was granted 154.48 acres from the United States Government in 1915. This acreage was comprised of lots 7 and 8-13 and 14 of NW ¼ 6-23-37 (BCDB 70/260; BLM 2020). Howe purchased two additional lots within 6-23-37 in 1919, from Ben Trauerman, (BCDB 13/349) and in 1935, from Myra G. Williams, (BCDB 12/472). In the 1920 census, Walter Howe is listed as a farmer on a "general farm." By 1930, he is listed as an "orange grower." He remained a citrus farmer until at least 1945 (US Census 1920, 1930, 1940; Florida State Census 1935, 1945). Additionally, Walter H.J. Howe was listed as a Justice of the Peace for District 20, Orsino in 1928 (Secretary of State of the State of Florida 1929: 362). Furthermore, as noted above, Walter Howe reportedly aspired to transform the little community of Orsino into a "modern" town, hoping to establish electricity, telephone, and telegraph lines (Sonnenberg 2020). In fact, Walter H.J. Howe established the ill-fated Orsino Telephone Telegraph & Power Company, however, it does not appear to have been a successful venture (Sonnenberg 2020).

Portions of five parcels are located within the APE (**Figure 3.8**). These parcels were purchased by the United States government between February and September 1963. Agreements for two of the parcels included citrus leases, both ending in June 1968.

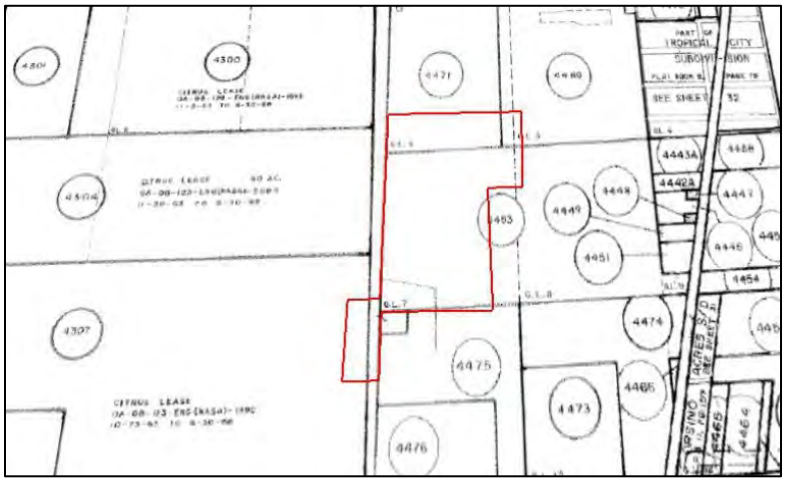

Figure 3.8 USACE Land Acquisition Maps of the Project Area (1967).

Parcel 4307: was owned by Charles F. Meyers, et ux. (and wife). This parcel is located in the extreme southwestern portion of the APE and was purchased by the USACE on July 31, 1963. According to the Final Project Map produced by the USACE in 1971, the parcel was purchased for $241.75 per acre and included a citrus lease.

Parcel 4453: was owned by Perry Nichols, as Trustee. This parcel is in the northern portion of the APE and was purchased by the USACE on September 19, 1963 for $78.09 per acre. No citrus lease is noted for this parcel.

Parcel 4475: was owned by Basil L. Bodge and his wife Edna. This parcel is in the southern portion of the APE and was purchased by the USACE on September 19, 1963 for $21.32 per acre. Born in Sangerville, Maine in 1906, Captain Bodge was a career officer who joined the Army in 1923. After retiring in 1955, Captain Bodge moved to central Florida and purchased a citrus grove near Orlando. They lived there several years until Captain Bodge returned to work as a shift supervisor at the Cape (Orlando Sentinel 1965). This parcel had a citrus lease.

Parcel 4471: was owned by Joyce LaRoche Hensley, Guardian. This parcel is in the extreme northern portion of the APE and was purchased by the USACE on July 18, 1963 for $40.00 per acre. No citrus lease is shown for this parcel.

Parcel 4469: was owned by Zona Elliott Johnston, Executrix. This parcel is in a small portion of the northeastern corner of the APE and was purchased by the USACE on August 28, 1963 for $46.69 per acre. No citrus lease is shown for this parcel.

4.0 RESEARCH DESIGN

The purpose of this investigation was to identify and document cultural resources within the project area and to assess their potential for listing in the NRHP based on their historical, archaeological, or architectural value. Project methods generally included the following tasks: 1) background research, 2) field survey, and 3) analysis and documentation.

4.1 Background Research

Archival research began with a search of the Florida Master Site File (FMSF) database maintained by Department of Historic Research (DHR) of the Florida Department of State and a review of the material provided by the KSC Cultural Resources Manager (CRM). The records included in the FMSF provide relevant data regarding previous surveys, recorded archaeological sites, cemeteries, bridges, structures, and resource groups in the Cape Canaveral area. LG^2ES also used historic aerial photos (1943 to 1958), topographic maps, and historic maps to analyze the environmental character of the project area and to search for potential historic sites, non-standing historic structures, and historic roads. According to historical aerial photographs, the town of Orsino was located northeast of the APE, which contained orange groves and several structures, as shown on a 1936 map (see **Figure 4.3**). This indicated that historic-era cultural materials may be present in the study area.

The earliest archaeological investigations in Florida began in the late 1800s with Clarence B. Moore's investigation of numerous sites along the Florida Peninsula (Moore 1900). During the Depression era, Matthew W. Sterling conducted excavations at two Cape Canaveral sites (Doran et al. 2014:12). Unfortunately, funding for this project only covered excavation and collection; therefore, little of this data has been studied or published (ibid). In the 1940's, John Goggin and Irving Rouse surveyed the region (Rouse 1951). Rouse's report from this period is the only archaeological survey of the Indian River (Doran et al. 2014:12; Rouse 1951).

Seven cultural resource surveys have been conducted within a one-mile radius of the APE (**Table 4.1**). The earliest was a *Cultural Resource Assessment of Merritt Island National Wildlife* Refuge (Griffin and Miller 1978). While the assessment relocated seven previously identified sites, none of these was located within a one-mile radius of the current APE. Four previously recorded sites (sugar mill ruins, Fort Ann, Old Haulover Canal, and the Dummett homestead) were recommended eligible for the NRHP.

The closest survey, which includes a portion of the current APE, is a 1990 *Archaeological Survey to Establish Zones of Archaeological Potential in the VAB and Industrial Areas of KSC* by Archaeological Consultants, Inc. (Deming and Almy 1990). The survey included several discontinuous parcels throughout the Vehicle Assembly and Industrial Areas. The survey resulted in the relocation of the previously identified site 8BR206 and the identification of site 8BR582. A previously recorded site within the Industrial Area, 8BR207, was destroyed by construction of the Payload Hazardous Facility, located east of the APE. The entire Industrial Area is considered to have a low potential for encountering cultural resources and "It is the opinion of Archaeological Consultants, Inc. that land altering activities within all portions of the Industrial Area will have no adverse impact to significant cultural resources. The need for survey of individual parcels slated for development is not warranted" (Deming and Almy 1990:45-46).

Archaeological Consultants, Inc. conducted an *Archaeological Survey for Established Zones of Archaeological Potential (ZAPs) in the Launch Complex Area (Option 1) of the Kennedy Space Center* (Deming 1991). The survey included several discontinuous areas and resulted in the identification of eight new archaeological sites and the relocation of four previously identified sites. Approximately 5.4 acres of the survey area is located within a one-mile radius of the current APE. None of the previously identified or newly identified sites are located within one mile of the current APE.

An *Archaeological Survey to Establish Zones of Archaeological Potential (ZAPs) in the Shuttle Landing and KSC South Area (Option 2) of the Kennedy Space Center* was conducted by Archaeological Consultants, Inc. in 1991. During this survey, which included several discontinuous areas, one of which extends into the one-mile radius around the current APE, resulted in the identification of one new archaeological site and the relocation of 12 previously identified sites.

In 2012, Archaeological Consultants, Inc. conducted a *Historical Survey and Evaluation of the Jay Jay Bridge, Railroad System, and Locomotives, John F. Kennedy Space Center, Brevard County, Florida* (Berger and Deming 2012). The survey resulted in the recordation of 27 new historic structures.

Three historic structure surveys have been conducted in the vicinity of the APE. The surveys assessed and evaluated structures within KSC (**Table 4.1**).

Table 4.1 Previous surveys within one mile of the APE

Survey Number	Title	Date	Author	Sponsor
16263	Indian and Historic Sites Report, John F. Kennedy Space Center	1967	Long, George A.	NASA
260	Cultural Resource Reconnaissance of Merritt Island National Wildlife Refuge	1978	Griffin, John W. Miller, James J.	IAS
2471	Archaeological Survey to Establish Zones of Archaeological Potential in the VAB and Industrial Areas of Kennedy Space Center	1990	Deming Joan	NASA
2992	Archaeological Survey for Established Zones of Archaeological Potential (ZAPs) in the Launch Complex Area (Option 1) of the Kennedy Space Center	1991	Deming Joan	NASA
3447	Archaeological Survey to Establish Zones of Archaeological Potential (ZAPs) in the Shuttle Landing and KSC South Area (Option 2) of the Kennedy Space Center	1991	Archaeological Consultants, Inc.	NASA
19482	Historical Survey and Evaluation of the Jay Jay Bridge, Railroad System, and Locomotives, John F. Kennedy Space Center	2012	Berger, Christopher, and Joan Deming	NASA
5474	Survey and Evaluation of the Historic Facilities within the Industrial, Launch Complex 39 (LC-39), Vehicle Assembly Building (VAB) and Shuttle Landing Facility (SLF) Areas of the John F. Kennedy Space Center.	1998	Delahaye and Deming	NASA
20744	Architectural Survey and Evaluation of 45 Facilities that have reached the age of 45-50 years, John F. Kennedy Space Center, Brevard County, Florida	2013	Price, David L.	InoMedic Health Applications, LLC

No archaeological sites have been identified within a one-mile radius of the current APE. Few sites have been identified during the previously conducted archaeological surveys within KSC. To examine the potential for encountering archaeological sites within the current APE, the radius was broadened to five miles. Nine archaeological sites have been identified within five miles of the APE (**Table 4.2**). The prehistoric sites are all located west of the APE, near the Indian River. None of the sites has been recommended eligible for the NRHP.

Table 4.2 Archaeological Sites within a 5.0-mile radius of the APE

Site Number	Site Name	Site Description	Distance and Direction from APE	Eligible for NRHP
BR00062	Moore Mound	Prehistoric mound	3.57 mi northwest	Not Evaluated
BR00150	Oyster Creek Prong Mound	Prehistoric mound	2.38 mi northwest	Not Evaluated
BR00161	Cocoa Beach Mound	Prehistoric mound	3.62 mi northwest	Not Evaluated
BR00217	20th Century Historic Deposit	Historic dump site	1.72 mi southeast	Ineligible
BR00913	Landfill South	Prehistoric campsite	2.90 mi northeast	Not Evaluated
BR01872	Sam's Site	Multicomponent site Prehistoric: village Historic: 2 houses, 3 surface features, and buried cultural deposits	3.82 mi southwest	Not Evaluated
BR01890	Sam's Creek Fossil Site	Prehistoric: Paleoindian, Pleistocene megafauna, St. Johns period	3.56 mi southwest	Not Evaluated
BR 2350	Cross the Line	Multicomponent site Prehistoric: Archai, Malabar I-II Historic: 1878-2000	3.82 mi southwest	Not Evaluated
BR2351	Murray Parcel	Multicomponent site Prehistoric: Malabar I-II Historic occupation: 1878-2000	4.2 mi southwest	Not Evaluated

Eight historic structures have been recorded within a one-mile radius of the APE (**Table 4.3**). Only one, the NASA/Kennedy Space Center Railroad System Historic District (BR02932) has been determined eligible for the NRHP. No cemeteries have been recorded within a one-mile radius of the APE.

Table 4.2 Previously recorded historic structures within one mile of the project vicinity

Site ID	Address	Year Built	SHPO Evaluation
BR02932	NASA-Kennedy Space Center Railroad System Historic District	1978-2010	Eligible
BR02998	Spaceport Central	1967	Ineligible
BR02968	Electromagnetic Laboratory	1963	Ineligible
BR02959	Base Operations Building	1965	Ineligible
BR02960	Base Support Building (M & O Building)	1964	Ineligible
BR02964	Support Building	1965	Ineligible
BR02965	Propellants Shop	1966	Ineligible
BR02968	Transportation Storage Building	1966	Ineligible

4.2 Historic Map and Aerial Photograph Review

Historic maps and aerial photographs of the project area were analyzed to gain a better understanding of historic land use and development in the region. Historic maps, U.S. Geological Service (USGS) topographic quadrangles, and U.S. Department of Agriculture aerial photographs were studied to determine potential historic development within the APE. Maps consulted during this analysis include the original 1859 plat map for Section 6 of Township 23 South/Range 37 East and Section 1 of Township 23 South/Range 36 East plat maps, the 1912 Section 6 of Township 23 South/Range 37 East Subdivision map, 1936 Florida State Road Department map of Brevard County, the 1943 Orsino USGS topographic map. US Department of Agriculture (USDA) aerial photographs from 1943 and 1958 were also analyzed.

The earliest historic map to depict the project area is the original 1859 plat map for Section 6 of Township 23 South/Range 37 East and Section 1 of Township 23 South/Range 36. These maps indicate that the Project APE was situated within four parcels in 1859, two in Section 6 of T 23S and R 36E and two in Section 1 of T 23S and R37E (BLM nd) (**Figure 4.1**). The 1859 survey indicates the lower half of the larger eastern portion of the Project APE was designated as scrub, but no additional notes or features are depicted. In 1912, the General Land Office (GLO) resurveyed Section 6, subdividing the section into 16 tracts (**Figure 4.1, Table 4.4**). The 1912 resurvey includes no additional notes or features. General Land Office records show that the entire APE was within land granted to William H. Howe.

The next historic resource that depicts the project area with some detail is the 1936 Brevard County Forida State Road Department map (FSRD 1936) (**Figure 4.2**). This map illustrates an unimproved, unnamed road, oriented north-south from Orsino (to the north) ran along the Project APEs western boundary. Additionally, the map depicts a building located within the general area of the southern half of the Project APE. The structure is not to scale; however, it provides evidence that a building was present within the Project APE prior to 1936.

In 1943, the USDA utilized aerial photography to document the region. This resource indicates that the region was primarily comprised of orange groves, including the southern half of the Project APE (**Figure 4.3**). There are no structures clearly depicted in the photograph, a driveway or entrance is depicted in the central portion of the western boundary. Just north of the driveway and semi-circular orange grove are two large oak trees, possibly depicting the location of a structure. Furthermore, the 1949 Orsino USGS topographic map depicts a residential structure in the same area and two additional structures within the Project APE (**Figure 4.3**). Two of the structures are depicted as residential structures, while one is depicted as an outbuilding or barn. The Orsino (1949) topographic map also depicts drainage ditches west of the project area, likely facilitating drainage in the area necessary to establish orange lease tracts.

Figure 4.1 Original 1859 (BLM) plat maps (left) and the 1912 (BLM) Resurvey and subdivision of Section 6 (right).

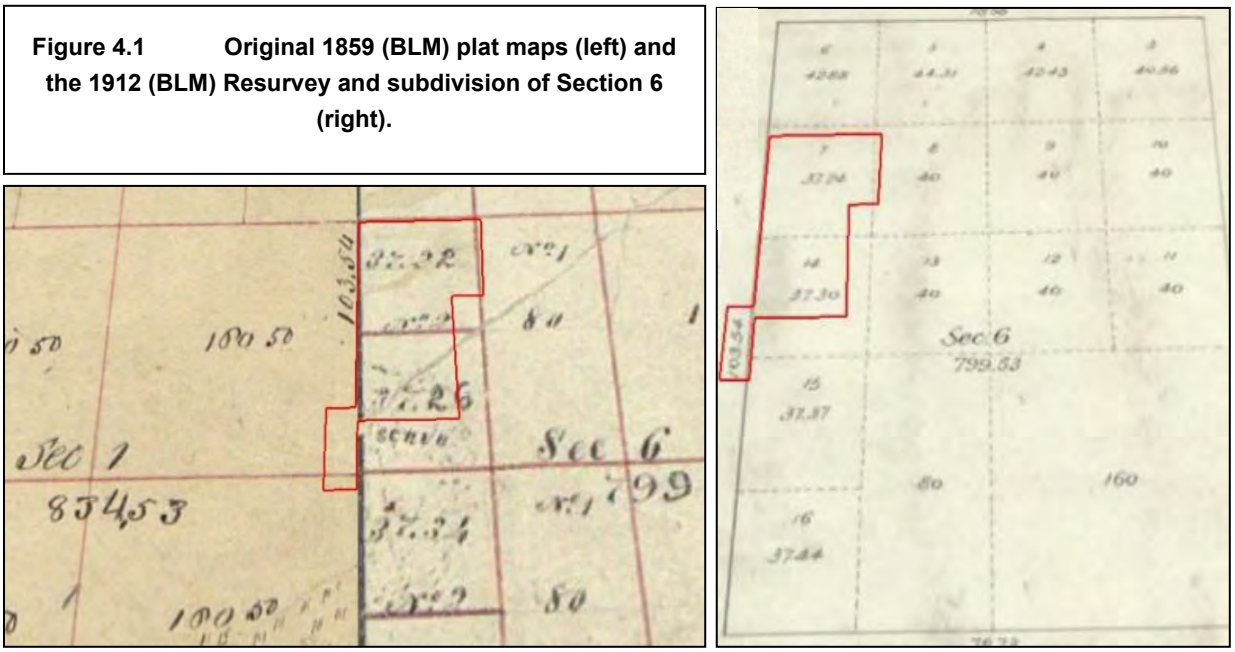

Table 4.4: Land Patentees in Section 6 within the Project Area

Patentee	Date	Acreage	Type of Grant	Location	Within APE
Walter J. Howe	April 5, 1915	154 48/100	Homestead	Lots 7, 8, 13, 14 or the NW ¼ of Section 6	Yes
Orsino T. Smith	Feb. 16, 1917	155 1/100	Homestead	N1/2 SE1/4 of Section 1 and Lot 2 of the SW 1/1 of Section 6	No
William Elliott	March 19, 1919	129 62/100	Homestead	Lots 4,5,6 of Section 6	No
Heinrich Dombrok	Dec. 5, 1921	80	Homestead	Lots 9 and 12 of Section 6	No
Heirs of Lillian Cloud	July 26, 1920	158 83/100	Homestead	NW ¼ NW1/4 Nw1/4, Lot 2 of Section 5 and Lot 10 of Section 6	No
Guido Carboni	Jan 3, 1920	160	Homestead	SE ¼ SW ¼ of Section 5 and SE1/4 SW ¼ Section 6	No
Charles David	Sept. 15, 1926	40 56/100	Homestead	Lot 3 of Section 6	No
Robert Godbey	June 8, 1927	160	Homestead	Lot 11, N1/2 SE ¼ NE1/4 SW1/4 of Section 6	No

Figure 4.2 1936 Florida State Road Department map showing the Project APE (FSRD 1936).

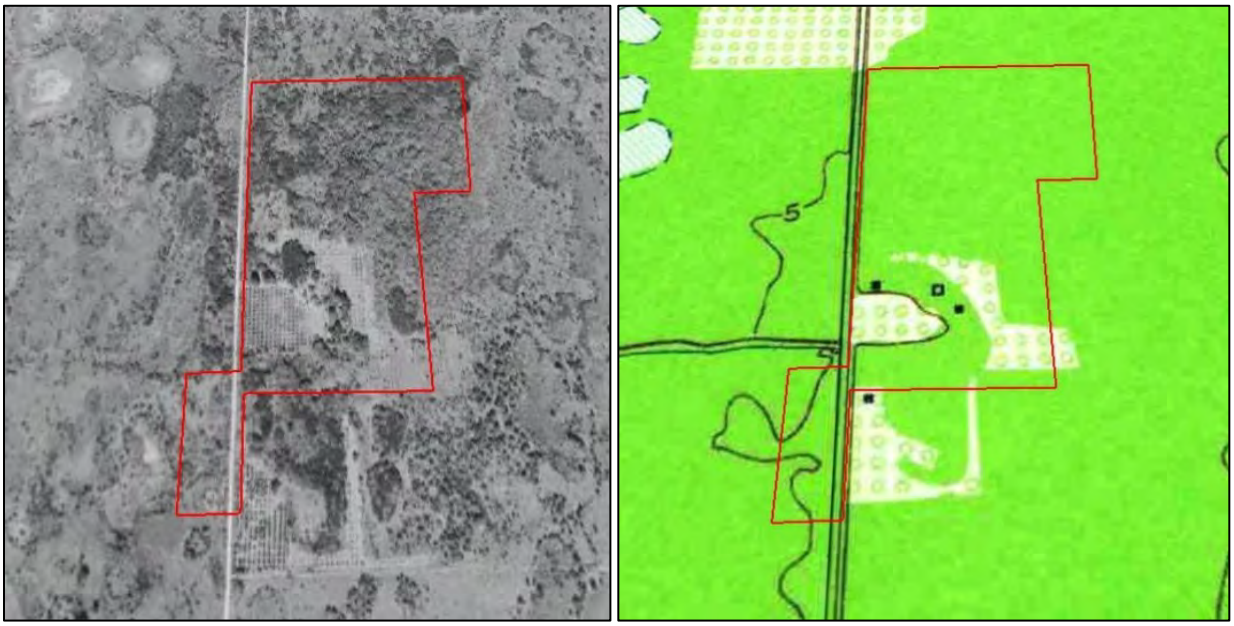

Figure 4.3 **The 1943 USDA aerial of the project area (left) and the 1949 Orsino topographic map depicting the Project APE (right).**

The 1958 USDA aerial photograph of the region clearly depicts two buildings just north of the semi-circular orange grove (**Figure 4.4**). Additionally, it depicts a drainage ditch west of the structures, outside the project APE.

Figure 4.4 **1958 USDA aerial photograph of the project APE. Inset highlights structures (circled) located north of semi-circular orange grove.**

4.3 Archaeological Research Expectations

For this Phase I CRA study, a review of the above information in conjunction with probability modelling based on proximity to natural, prehistoric, and historic resources was completed to determine if archaeological materials may be present. Due to the project area's proximity to previously recorded sites, aquatic environments, and historic roadways and towns, the overall project area is classified as having a low to moderate probability for containing archaeological sites. Nearly all the project area is situated within very poorly drained soils, which indicates the Project APE has a low probability for containing prehistoric cultural resources. Historic maps show structures within the APE, part of the town of Orsino. Based on this evidence, the Project APE has a high probability for encountering historic cultural resources. The Florida Department of Historic Resources' *Module Three* recommends 25 m interval coverage to provide adequate sampling for high probability areas., subsurface testing was conducted at 25 m intervals in the southwest APE.

4.4 Field Survey

The archaeological survey included a systematic inspection of the project area in a manner consistent with The Historic Preservation Compliance Review Program of the Florida Department of State, Division of Historic Resources. All work was performed in compliance with the requirements set forth in the updated Cultural Resources Management Standards Operational Manual (2002) published by the Florida Division of Historical Resources.

Survey areas were determined and located with the use of geospatial information system (GIS) background files depicting the APE boundary overlain with an east/west oriented transect grid. These files were uploaded onto a handheld Trimble Nomad device for reference during fieldwork.

As stated above, most of the APE is located within an area of high probability which requires testing at 25 m intervals. Where permitted, subsurface testing was carried out, and all shovel tests that produced cultural materials were delineated with additional shovel tests at 12.5 m intervals on a grid oriented along cardinal directions (i.e., north, south, east, and west) to define site boundaries. Additional shovel tests were excavated until two consecutive negative tests were encountered in each cardinal direction. As such, every positive test was bound by additional tests in each cardinal direction until at least two negative tests were reached. All shovel test unit locations excavated for purposes of boundary definition were planned and documented using a hand-held GPS unit (as stated above) with a minimum accuracy of three meters.

All shovel tests were excavated to a minimum width of 50 cm and a minimum depth of one meter (100 cm) unless water was reached prior to the planned complete depth. All excavated soil was screened through 1/4-inch mesh for standardized collection of any artifacts present. Shovel test logs were maintained and provide information on the size, depth, soil conditions, and contents of all excavation units. The Munsell Soil Color Chart was used to describe the color of all soil layers. During the shovel test survey, no cultural features or phenomena were identified within the shovel test walls or floors. All shovel test excavations were backfilled after documentation, and all areas were restored to their previous condition to the greatest extent possible.

4.5 Laboratory Analysis

Artifacts were processed in compliance with 36 CFR 79 and KSC CRM. Artifacts were collected and given Field Specimen numbers (FS number) in the field. Collected artifacts were taken from the field to the laboratory at LG^2ES in Jacksonville, Florida for cleaning, analysis, conservation, and temporary storage. When necessary, artifacts were hand washed or gently cleaned with a soft-bristled brush. Once dry, each artifact was counted, weighed, given a catalog number, and placed in a 4-mil polyethylene, zipper-seal archive-quality bag. A catalog/inventory of all artifacts by specific provenience number, including all summary information and identification generated during analyses is presented in **Appendix B**. Artifacts will be prepared and include accompanying documentation for in-perpetuity curation at the SEAC facility in Tallahassee, Florida (KSC 2014).

4.6 Procedures to Address Unexpected Discoveries

Although the project area has received a complete cultural resource assessment survey, it is impossible to ensure that all cultural resources have been discovered. This section of the report has been developed as a mechanism for clients and agencies to treat archaeological finds that were not identified and assessed for eligibility for listing in the NRHP during survey on the property.

Unexpected discoveries consist of types of archaeological remains not typically encountered during a project. Examples of such discoveries include human skeletal remains and associated funerary objects (AFOs). If an unexpected discovery is encountered, all work within a 100 m buffer must cease and all reasonable efforts must be made to avoid and minimize the impacts (KSC 2014). If unexpected cultural resources or suspected cultural resources are discovered, the following steps should be taken:

1. All work within 100 m of the discovery should cease and reasonable efforts should be made to avoid and minimize impacts.
2. The KSC CRM must be contacted immediately and should evaluate the nature of the discovery.
3. The KSC CRM will the notify the SHPO, State Archaeologist located at the Florida Bureau of Archaeological Research (BAR) as stated in FS 872.05, and the Seminole and Miccosukee THPOs as stated in NAGPRA
4. Work cannot commence in the area until written permission from the KSC CRM has been received.

If unexpected finds are encountered at any point in construction, the point of contact for KSC is:

Jeanne Ryba – KSC Cultural Resources Manager

4.7 NRHP Site Evaluation Criteria

The archaeological significance of a site is determined using criteria defined in 36 CFR 60.4, in coordination with the State Historic Preservation Office (SHPO). The significance of a site, as established by 36 CFR 60.4, may be in history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects may be eligible for listing in the NRHP if they possess "integrity of location, design, setting, materials, workmanship, feeling, or association" and meet one of the following criteria (from http://www.gpo.gov):

A. Be associated with events that have made a significant contribution to the broad patterns of our history, or
B. Be associated with the lives of persons significant in our past, or
C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values or that represent a significant and distinguishable entity whose components may lack individual distinction, or
D. Have yielded or may be likely to yield, information important in prehistory or history.

Under Criterion D, 'importance' is based on the likelihood that a site possesses configurations of artifacts, soil strata, structural remains, or other features that allow it to: 1) test a hypothesis about events, groups or processes in the past, 2) support or strengthen currently available information suggesting that a hypothesis is true or false, or 3) reconstruct the known archaeological sequence for an area (National Register Bulletin 1995: 21). While the evaluation of archaeological sites usually fall under Criterion D, historic buildings and structures are typically evaluated for significance under Criteria A, B, and C.

NRHP-eligible districts must possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. NRHP-eligible districts and buildings must also possess historical significance, historical integrity, and historical context.

4.8 Archival Research

Archival research began with a search of the FMSF database maintained by DHR of the Florida Department of State. The site file forms at the FMSF provide relevant survey data from previous surveys at Cape Canaveral and show the location of previously recorded archaeological sites, cemeteries, bridges, structures, and resource groups.

Archival research uses a range of historical and human resources. Previously, LG^2ES staff contacted staff at the Florida Historical Society to identify and examine the historical documents for the Artesia Post Office which had been located south of the project area during the early twentieth century. Numerous available historic period resources for the Cape Canaveral area were consulted at the Central Brevard Library and Reference Center, the Genealogy Room at the Brevard Library, the Brevard County Historical Commission, the Florida Historical Society, and the Library of Florida History. In addition, digitized historical resources were consulted through online repositories including the Bureau of Land Management's General Land Office, the Florida Memory Project, the University of Florida Maps and Imagery Library, the University of South Florida's Special Collections Department, and the University of North Florida's Florida History Online.

5.0 RESULTS

Between December 7-9, 2020, LG^{2}ES conducted a Phase I CRAS of an approximately 61.4-acre parcel in support of the proposed Exploration Park North Expansion EA at Kennedy Space Center on Merritt Island in Brevard County, Florida.

5.1 Archaeological Survey

The field survey began with a pedestrian survey to locate a potential historical site based on historic maps and an aerial. Although inundated drainage ditches occur along the southern and western boundaries of the project study area, a potential driveway was observed near the central western portion of the APE. The potential driveway provided access to the project area and was located within a portion of the study area considered to have a moderate probability for encountering cultural resources. Two new archaeological sites were recorded during the Phase I survey. The Granite Rock Homestead site (8BR04364) was identified based on the presence of the remains of two historic buildings and a large historic artifact scatter. The site area is also mapped as a moderate ZAP and Historical Area with four structures on KSC GIS layers. The second site, Howe Grove Road (8BR04367) is a historic road. Subsequently, 31 shovel tests probes (STPs) were excavated, all of which were negative for cultural material, and 13 "no dig" loci were documented across the project APE. The FMSF survey log is included as **Appendix A** and artifact tables are included in **Appendix B**. For specific locational information, see **Appendix C**. Archaeological Site Forms are included in **Appendix D**.

5.2 Current Environmental Conditions

The current environmental conditions documented within the APE is characterized by three patterns of vegetation. The southern and southwestern APE is characterized as an overgrown orange grove with impenetrable Brazilian pepper (*Schinus terebinthifolius*) plants, which accounts for approximately 50 percent of the Project APE; the northwestern corner of the APE is characterized by dense saw palmetto (*Serenoa repens*) with scattered live oaks (*Q. virginiana*), which accounts for approximately 20 percent of the Project APE; and the western and much of the northern APE is characterized as swamp with standing water, heavy vegetation, and several large hog wallows, which accounts for approximately 30 percent of the Project APE (**Figure 5.1**). The areas adjacent to the swamp exhibit a high degree of hog rutting. Overgrown and dead orange trees predominate much of the APE, while a canopy of swamp laurel oaks (*Quercus laurifolia*) covers much of the very poorly drained portions of the study area.

Figure 5.1 Representative Environmental Photographs across the Project APE. (Left to right) the Southern and Southwestern APE; the Northeastern APE and the Western and Northern APE.

Mapped soils within the APE consist entirely of very poorly drained classifications, with Copeland-Bradenton-Wabasso complex, limestone substratum comprising approximately 97 percent of the study area. STPs indicate that soil documented across the Project APE falls within the range of characteristics for Copeland series soils. Copeland series soils exhibit moderate permeability but tend to be frequently flooded due to the water table, which is at or near the surface, and a regolith (R) horizon is generally encountered as a compact limestone bedrock (Soil Survey Staff). The Project APE exhibits two distinct soil profiles based on location. STPs excavated in the northern half of the APE exhibit two strata. Stratum I is described as black (10YR 2/1) muck from 0-10 centimeters below surface (cmbs), while Stratum II is described as black (10YR 2/1) muck and clay. Most STPs in the north and western portions of the APE terminated at the water table, which was generally encountered between 15-30 cmbs. STPs excavated in the southern half of the APE generally exhibit two strata. Stratum I is described as very dark gray (10YR 3/1) muck documented variably between 15-30 cmbs, while stratum II is described as very dark gray (10YR 3/1) clay. Many of these tests exhibit friable limestone within the clay or were terminated at the limestone bedrock (**Figure 5.2**). “No dig” testing locations documented across the APE exhibited standing water and are best characterized as swamp (see **Figure 5.2**).

Figure 5.2 Representative Shovel Test with Limestone Base.

5.3 Archaeological Resources

8BR04364, The Granite Rock Homestead

Setting: Hydric Hammock
Soils/Drainage: Copeland-Bradenton-Wabasso complex, limestone substratum; Very Poorly Drained
Survey Methodology: Shovel testing at 50-meter intervals and pedestrian survey
Site Type: Historic Homestead
Site Size: 7,769 m^2
Depth of Deposit: Surface
Cultural Periods: American-20th Century

Discussion: Although the probability for encountering prehistoric cultural resources was considered low across the entire APE, historic aerial photographs (USDA 1943 and 1958) and a historic topographic map (USGS 1949) indicated a moderate probability for encountering historical cultural resources based on the presence of three buildings illustrated on the maps but were not documented during land acquisition sales in the 1960s. As a result of the pedestrian survey, two buildings, one large bottle dump, three smaller bottle dumps, remains of a possible outbuilding, and ornamental vegetation were documented as 8BR04364, The Granite Rock Homestead. Archaeological site 8BR04364 was named "The Granite Rock Homestead" due to the inclusion of a large granite

or marble rock incorporated into the front elevation of the main vernacular block building. Site 8BR04364 represents an early- to mid-twentieth century Florida farmstead.

STPs were excavated at 50 m intervals across the southwestern portion of the Project APE, east of the drainage canal due to a moderate probability for encountering historical cultural resources. A total of nine STPs were excavated within proximity to the structures and bottle dumps, and although a generally large historic scatter was documented during the pedestrian survey, all subsequent STPs were negative for cultural material. A phone call was placed to FL DHR to determine the level of effort required to properly delineate the boundaries 8BR04364. Because all STPs were negative and the general site is situated on a slight elevation change, DHR determined in lieu of reducing the testing interval, site boundaries could be determined using the documented surface scatter and building remains as site boundary. Therefore, the site boundary includes the two historical buildings and the entire historic surface scatter, which generally corresponds to a slight landform situated west of the lower inundated areas in the eastern portion of the Project APE. The site boundary for 8BR04364 is amorphous, measuring approximately 7,769 m^2.

Soil profiles for STPs excavated within site boundaries consists of two strata. Stratum I is described as very dark gray (10YR 3/1) muck documented variably between 25-35 cmbs, while stratum II is described as very dark gray (10YR 3/1) clay. Excavation was terminated once 10 cm of clay was encountered. Although no positive subsurface tests were encountered during the documentation of 8BR04364, mapped soils across the site are very poorly drained, which likely influenced the decision to construct the house off-grade. Site soils fall within the range of characteristics for Copeland series soils, which tend to be seasonal flooded or inundated for about six months a year (Soil Survey Staff).

Site 8BR04364 consists primarily of four loci: the buildings, the bottle dumps, possible outbuilding, and an area exhibiting ornamental vegetation. The buildings, which includes a house and a smaller outbuilding or workshop, are situated in the western portion of the site in proximity to a driveway that crosses the western drainage ditch. The bottle dumps exhibit concentrations of historic artifacts that primarily consisted of glass bottles, that occur in four general loci north and northeast of the buildings. The third area, the possible outbuilding, was identified by the presence of corrugated metal roofing and a small historic artifacts scatter, located in the northeast portion of the site. The fourth area exhibits ornamental vegetation and was documented in the eastern portion of the site, approximately 100 m east of the buildings and about 50 m south of the possible outbuilding. Each of these four areas will be discussed in further detail below.

The Buildings

The "buildings" consist of two structures located approximately 45 m east of the access road (west of the drainage ditch) (**Figure 5.3)**. An earthen driveway over a corrugated metal culvert provided a bridge over the inundated drainage ditch to the front (west side) of the primary building, which seems to be the remains of an off-grade concrete block house. The 1936 State Road Department map and the 1949 Orsino (USGS) topographic map depict a building at the approximate location of The Granite Rock Homestead, indicating that the house predates the mid-1930s. The structures are located on Parcel 4453, which was owned by Perry Nichols, as Trustee, and purchased by the USACE on September 19, 1963 for $78.09 per acre. The land acquisition documents do not mention buildings, suggesting the house may have been in ruins by the 1960s. Furthermore, the entire Project APE is located with property once owned by Walter H.J. Howe. Howe relocated from Poughkeepsie, New York sometime in the 1910s, and purchased the land within the APE beginning in 1915. An influential member of the community, Walter Howe was the Justice of the Peace for the community of Orsino, and an orange farmer at least until 1940. Although there is no direct evidence, it is likely the structures documented as 8BR04364, The Granite Rock Homestead, are associated with Walter Howe. The 1936 Florida State Road Department road map indicates a structure was present in the mid-1930s, when Walter H.J. Howe, the initial landowner, was listed as an orange farmer. An aerial photograph of the project area from 1958 (USDA) indicates two structures in the approximate area of the structures documented at 8BR04364, and the structures appear to have roofs intact (**Figure 5.4**).

The dimensions of the "house" are approximately 8 m (east-west) by 6 m (north-south), with a porch located on the southwest half of the building measuring 2.5 m (east-west) by 3 m (north-south). The house faces west towards a historic unnamed north-south oriented road that is no longer in use. The structural remains of the house consist of the concrete block walls, an off-grade concrete block front porch with a poured concrete porch floor, the poured concrete floor of the building, and concrete footers, presumably for a side porch or car port.

Evidence indicates that construction of an off-grade building with a poured concrete floor was facilitated by laying a single course of concrete blocks, two blocks in height; then filling the interior of the structure with soil to build-up the ground surface; and then pouring the concrete foundation. Although there is no longer evidence, the roofing system would have been comprised of wood frame rafters and may have had a metal roof. Additionally, asbestos siding fragments indicate that the exterior fabric was likely comprised of asbestos siding, a fibrous light-weight fire-proof material comprised of asbestos and Portland cement. Asbestos siding, introduced just after the turn of the twentieth century, peaked in popularity in the 1940s and although primarily replaced by asphalt-based products in the 1950s due to health risks associated with asbestos fibers, asbestos products, primarily home insulation, were manufactured in the U.S. into the 1980s (NPS 1999; Strahn 2005).

Extant features of the interior of the house include an open floorplan with five windows and three doors. The west elevation has a "front" door (≈90 x 210 cm) and a vertical rectangular window (≈90 x 120 cm), the north elevation has a vertical rectangular window (≈80 x 60 cm) and a door (≈80 x 210 cm), the east elevation has a clay wall flue thimble to the left side of a "back" door (≈80 x 210 cm) and a horizontal rectangular window (≈100 x 60 cm), and the south elevation exhibits two square picture windows (≈130 x 130 cm).

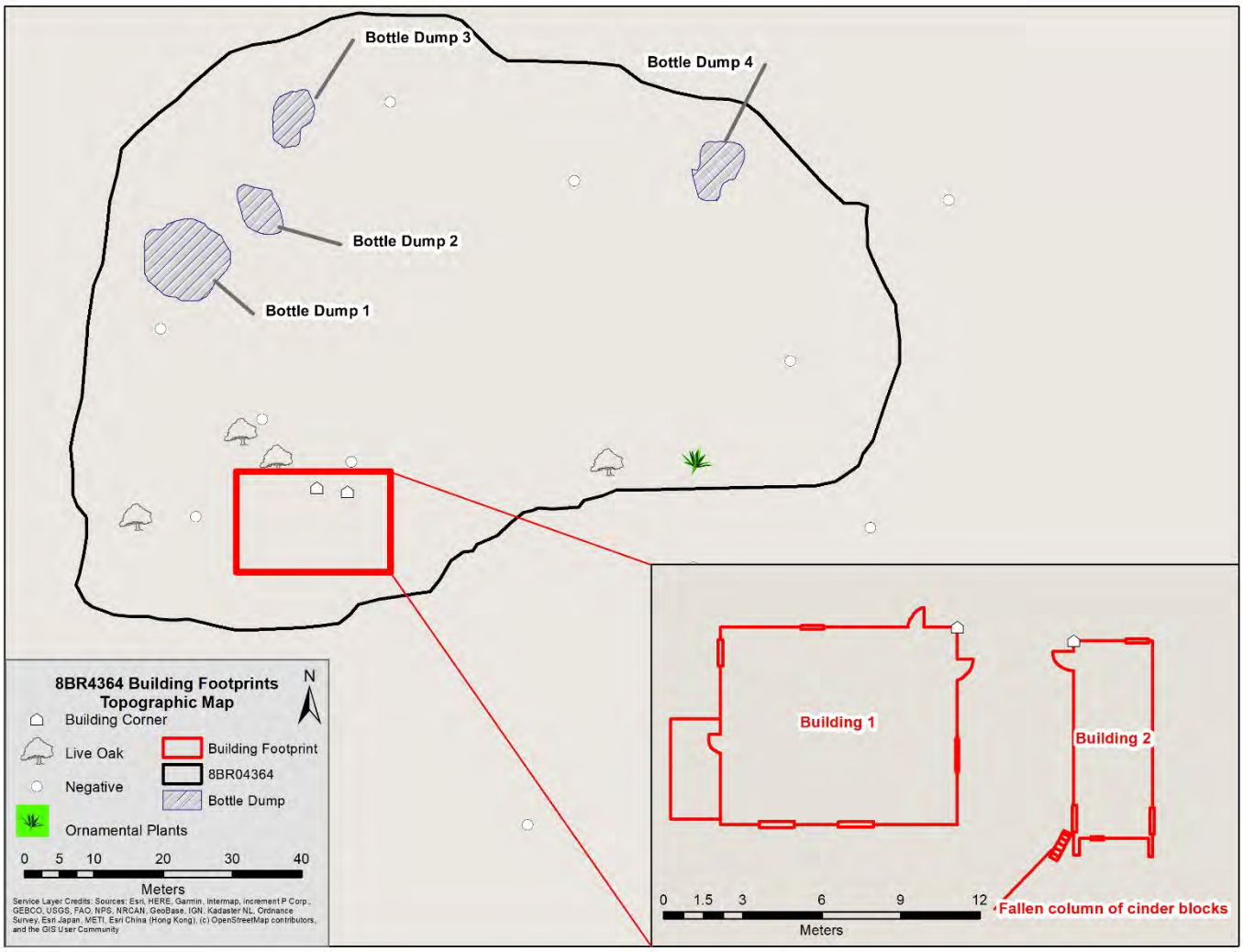

Figure 5.3 Site 8BR4364 Showing the Locations of Features.

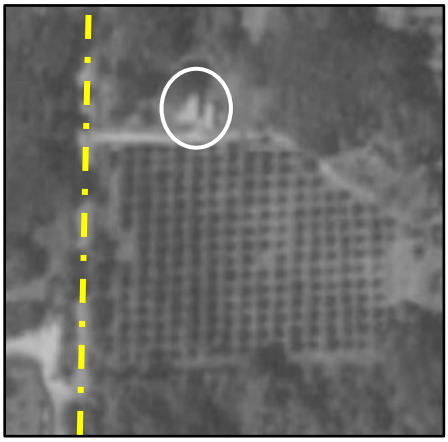

Figure 5.4 1958 USDA Aerial Depicting the Two Structures Documented at 8BR04364.

The most remarkable feature exhibited by the vernacular structural remains is the application of a large granite stone (≈40 x 20 cm) incorporated into the front exterior elevation of the house (west side), just left of the main door (**Figures 5.5 and 5.6)**. Structurally, it appears a small hole was placed in a concrete block and the granite stone was cemented into the structure, left protruding from the building approximately 25 cm. The granite rock is a nonlocal lithic resource that was likely brought to the site by the owners of the house as a reminder of the home they left behind.

The east side of the house likely represents the kitchen area of the building, based on the presence of a clay wall flue thimble and a metal pipe in the east wall (**Figure 5.7**). Clay wall flue thimbles are commercial construction products designed to accommodate stove pipes for cast iron stoves, which were implemented into the wall of concrete structures to provide a port to the exterior to exhaust smoke. The application of clay wall flues protects the structural fabric from degradation resulting from repeated heating and cooling. The metal pipe observed beneath the window in the east wall likely provided a source of water for the structure.

Figure 5.5 Structural Remains of the House at 8BR04364. (Top row) Front Elevation (north) of House with Off-Grade Porch and Granite Rock (circled) Incorporated into the Structure Near the Front Door; (2nd row) left: North Elevation of the structure, right: Rear (east) elevation; (3rd and 4th rows) Interior Layout.

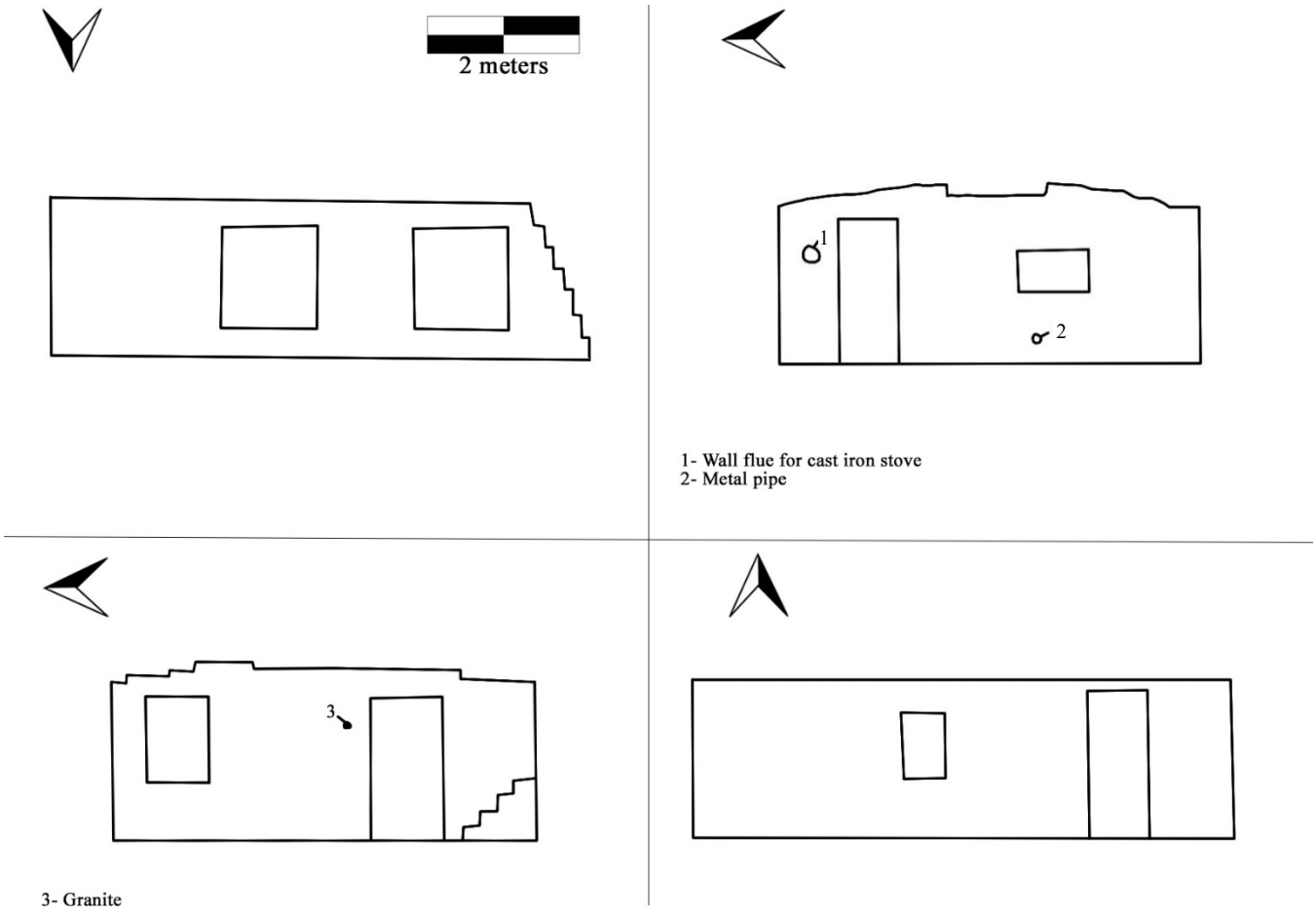

Figure 5.6 **Hand-Drawn Building Elevations for the Primary House Structure.**

Figure 5.7 **Kitchen Area (second photo from left) with a Clay Wall Flue, Thimble for Stove Pipe (left), and Metal Pipe-Interior and Exterior (right).**

Poured concrete footers indicate a wooden porch or carport extended from the northeast corner of the building (**Figure 5.8**). Approximately 10 m north of the structures is a patch of Giant Taro plants. Giant Taro (*Alocasia macrorrhiza*), also known as elephant ear, is an ornamental plant intentionally planted during the occupation of the site. Behind the house structure, approximately four m east, is the remains of a small rectangular block building. The block building was built on-grade, unlike the house, and may represent the remains of a small outbuilding or workshop. Building No. 2 measures approximately 6 m (north-south) by 3 m (east-west). Building No. 2 has one door and one window on the west elevation, a small vent or window in the south elevation, one window on the east elevation, and one window on the north elevation. The window on the east elevation of Building No. 2 is the only one onsite that still exhibits a window frame. The frame is a single hung metal frame. Although the small window did not have a window frame, it was covered with metal mesh screen.

Figure 5.8 Poured Concrete Footer for Porch.

Figure 5.9 Post-1929 Radio Part, "Bradleyleak" Radio Grid Leak and Condenser.

Cultural material collected from Building No. 2 and in proximity to the northeast corner of Building No. 1 consists of one intact clear bottle, one clear vial, one capacitor, two UID electrical parts, one UID plastic knob or dial (**Table 5.1**). Cultural material that was observed but not collected includes a segment of a rubber hose for an air compressor and two clear glass canning jars. Most of the collected assemblage in proximity to the structures included radio components or parts. Radios were the primary medium of broadcasting popular entertainment programs before being superseded in many U.S. homes by the television in the 1950s. The capacitor, two UID electrical parts, the UID knob/dial, and the radio gridleak and condenser (**Figure 5.9**) are likely associated with a radio dating to the 1920-1930s (radiomuseum.com n.d.). The Owens-Illinois clear bottle represents a sample of the bottles observed at the site with the Owens-Illinois makers mark (ca. 1915-1966) (SHA 2020). **Figure 5.10** provides a floorplan drawing of the buildings documented at 8BR04364, while **Figure 5.11** provides overview photographs of the interior and exterior of Building No. 2.

Table 5.1 Artifacts Collected from the Ground Surface near Building Nos. 1 and 2.

Artifact Type	Count	Weight (g)	Comments
Clear, bottle	1	374.1	Square bottle; screw top; Owens-Illinois Glass Co. (ca.1915-1966)
Clear, vial	1	64.0	Threaded collar, no neck, slightly flared base embossed "571-D"
Capacitor	1	42.6	Electric component mostly in audio; Sprague (ca. 1926-1987)
UID electrical part	1	266.7	Cylindrical, dial-shaped; possible radio part; heavily oxidized/rusted; includes iron, lead, and brass components
UID electrical part	1	173.8	Possible autotransformer; Variac General Radio Co. Type 200-C, 115v50-60~5a (ca. 1915-2001)
UID knob/dial	1	45.0	Markings 0 to 180 may be degrees (half a circle); plastic
Radio Gridleak and condenser	1	33.1	Allen Bradley Co, gridleak and condenser (ca.1920s); ceramic

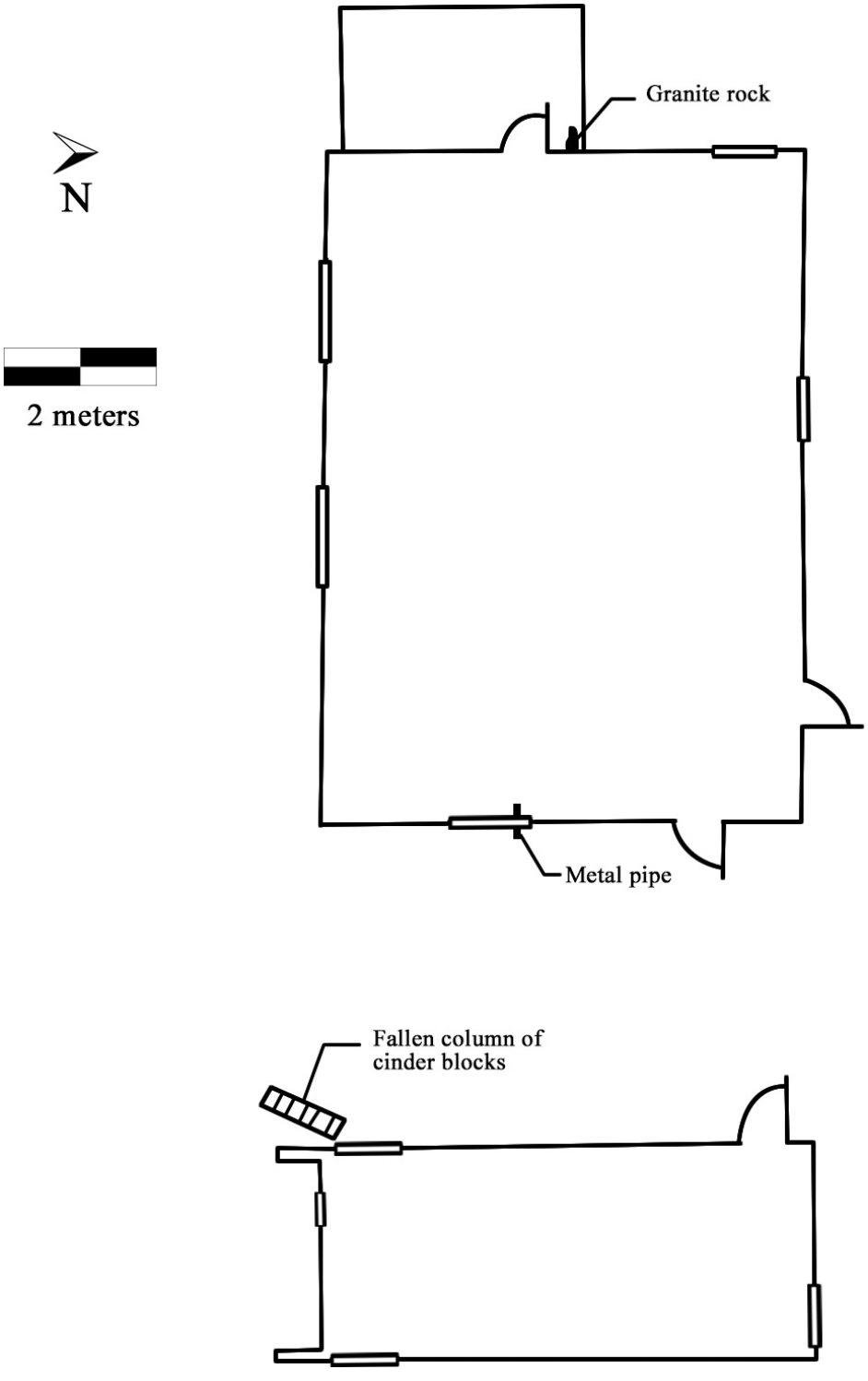

Figure 5.10 Floorplan Drawing of the Building Remains at 8BR04364.

Figure 5.11 Building No. 2 at 8BR04364. (Top left) overview of building, facing southeast; (top right) looking to the house from Building No. 2, facing west; (middle row) Interior of Building No. 2 facing south (left) and north (right); close-up of vent window and single hung metal window frame.

The Bottle Dumps

During the initial pedestrian survey of the southwestern APE, bottle dumps of variable sizes were recorded north of the buildings. In total, four distinct groupings of cultural material were documented as Bottle Dumps Nos. 1-4 within 9BR04364. Cultural material primarily included intact glass bottles, approximately 300-400 bottles in total. Cultural material observed in all four bottle dumps were contemporaneous and consistent, suggesting that the refuse areas were constructed during the same date range. Bottle types primarily included fruit and canning jars, condiment bottles, beverage bottles, medical/chemical bottles, and alcohol bottles. Subsequent STPs excavated in proximity to the bottle dumps were all negative for subsurface cultural material.

Bottle Dump No. 1 was encountered in a low wet area approximately 90 m northwest of the house. This bottle dump measures approximately 15 m (north-south) by 20 m (east-west) and consists almost entirely of intact glass bottles and jars that exhibit external threads or lug style threaded finish (**Figure 5.12**). External threaded bottle finishes

Figure 5.12 Overview of Bottle Dump 1.

generally date to the twentieth century, becoming widely used after 1930 (SHA 2020). In addition to various glass bottles, portions of two galvanized metal pails, two metal buckets, one galvanized metal tub (approximately 30 gallon), several blue transfer-printed whiteware fragments, a portion of a rose-colored Fiestaware saucer, and three structural clay tiles were documented but not collected. Approximately 170-230 bottles are associated with Bottle Dump No. 1. A sample of artifacts were collected to help determine the approximate age of the bottle dump. A total of seven artifacts were recovered for further analysis at the LG²ES Lab. This material includes one radio tube bulb, one light bulb, two clear glass Tabasco bottles, one lime green (possible) depression glass fragment, and two blue transfer-print whiteware fragments (Table 5.2).

Table 5.2 Artifacts Collected from the Ground Surface at Bottle Dump No. 1.

Artifact Type	Count	Weight (g)	Comments
Radio tube "bulb"	1	36.8	E.T. Cunningham, Inc., Harrison, New Jersey (CX112A) (ca. 1915-1920)
Light bulb	1	32.6	General Electric; 60w 120v; possibly modern
Tabasco dashing bottle	2	152.8	McIlhenny Co, Tabasco, New Iberia, Owens-Illinois Glass Co. (ca. 1915-1966)
Green dessert bowl	1	45.1	possibly depression glass; dessert or nut bowl; lime green
Whiteware, blue transfer-print	2	35.1	Willow pattern transfer-print

The sample of collected material consisted of a radio tube "bulb" manufactured by E.T. Cunningham, Inc. between 1915-1920; two clear glass Tabasco "dashing" bottles manufactured by Owens-Illinois Glass Co. for McIlhenny Co, between 1915-1966; and a lime green glass fragment that is likely Depression glass, which generally dates to between 1929-1939 (SHA 2020; radiomuseum.org n.d.). Diagnostic cultural material identified in Bottle Dump No. 1 (**Figure 5.13**), but not collected, includes: A rose-colored Fiestaware saucer fragment, which is no longer in production; however, according to the factory website the rose (pink) plates were manufactured during two production runs, 1951-1959 and 1986-2005 (Fiesta n.d.); numerous clear one-pint whiskey flasks embossed with "FEDERAL LAW FORBIDS SALE OR RE-USE OF THIS BOTTLE", which, with few exceptions, date between 1935 and 1964 (SHA 2020); several distinct glass bottles represent Joy dish washing soap, which was packed in these bottles from introduction in 1949 to 1956, when the packaging was changed to an aluminum can (Joysuds.com n.d.). Additionally, many of the bottles exhibited an early Owens-Illinois mark with a superimposed "O" that extends beyond the top and bottom of the diamond, which date between 1931-1954 (SHA 2020). Cylindrical milk bottles, which generally date between 1880-the early-1950s when rectangular bottle forms increase in popularity (SHA 2020). Tall, narrow, wide-mouth styles predominated olive bottle styles between 1900 to the early 1930s, furthermore, lug type external threads (exhibited on the olive jars) were introduced in 1906 but proliferated in use after 1930 (SHA 2020). Several Heinz ketchup bottles with the distinctive octagonal body were identified in the scatter; however, Heinz began production of the bottles in 1895 and are still produced. Embossed numbers on the bottle corresponding to maker's codes can be diagnostic, but no numbers were recorded in the field, so the Heinz ketchup bottles in the scatter are not diagnostic to a particular time period.

Figure 5.13 Diagnostic material documented at Bottle Dump 1. (Left) Joy dish soap and Fiestaware plate fragment; (middle) cylindrical milk bottles; (right) wide-mouth style olive bottle.

Figure 5.14 Overview of Bottle Dump 2.

Bottle Dump No. 2 is a moderate-density bottle scatter that was documented approximately 30 m northeast of Bottle Dump No. 1. This bottle dump measures approximately 10 m (north-south) by 5 m (east-west) and consists almost entirely of intact glass bottles and jars (**Figure 5.14**). Bottle types primarily include fruit and canning jars, condiment bottles, beverage bottles, and medical/chemical bottles. Bottle types are like those documented at Bottle Dump No. 1, so no samples were collected from Bottle Dump No. 2. Approximately 50-60 bottles are associated with Bottle Dump No. 2.

Dump No. 3 is a moderate-density bottle scatter that was documented approximately 40 m north-northeast of Bottle Dump No. 2. This bottle dump measures approximately 7 m (north-south) by 5 m (east-west) and consists primarily of intact glass bottles and jars; however, additional cultural material included a radial tire with no visible sidewall markings, a fragment of a large stoneware crock, an unidentifiable (UID) radio component, blue on white transfer-printed ceramic fragments, two metal (rusted) 5-gallon buckets, a galvanized metal pail, and a 3-tier high voltage ceramic electric insulator (**Figure 5.15**). Bottle types primarily include alcohol/spirits bottles and beverage bottles, but also include fruit and canning jars, condiment bottles, and medical/chemical bottles. Bottle types are like those documented at Bottle Dump No. 1, so no samples were collected from Bottle Dump No. 3. Approximately 60-80 bottles are associated with Bottle Dump No. 3.

Figure 5.15 Overview of Bottle Dump 3. Inset shows 3-tier high voltage ceramic insulator, and the photograph on the right shows large stoneware crock fragment, unmarked radial tire, and ceramic sherd.

Dump No. 4 is a low- to moderate-density bottle scatter that was documented approximately 195 m east of Bottle Dump No. 2. This bottle dump measures approximately 5 m (north-south) by 7 m (east-west) and consists entirely of glass bottles and jars (**Figure 5.16**). Bottle types primarily include fruit and canning jars and alcohol and/or spirits bottles, but also includes beverage bottles, and medical/chemical bottles. A sample of bottles with diagnostic elements was collected to help determine the approximate age of the bottle dump. A total of five artifacts were recovered for further analysis at the LG²ES Lab. This material includes one clear glass vial, one clear glass cleaning bottle, one clear citrate magnesia bottle, and one aluminum threaded bottle cap (**Table 5.3).**

Figure 5.16 Overview of Bottle Dump 4.

Table 5.3 Artifacts Collected from the Ground Surface at Bottle Dump No. 4.

Artifact Type	Count	Weight (g)	Comments
Clear, vial	1	115.3	Threaded colar with no neck Owens-Illinois Glass Co. (Makers Mark: A-S(above) 12(left) 7(right) 3(below) (ca. 1954-1980)
Clear, cleaning supplies bottle	1	277	"Texize" embossed on shoulder, threaded finish (ca. 1940s-1950s)
Clear, whiskey bottle	1	252	Owens-Illinois Glass Co. upside down horseshoe embossing; probable Schenley Reserve, half pint (ca. 1954-1964)
Clear, citrate magnesia bottle	1	341.4	Embossed with decorative patterns; Makers mark: National Magnesia Co Inc. (ca. 1920s?)
Threaded bottle cap	1	1.1	Aluminum

Diagnostic cultural material includes a clear vial with an Owens-Illinois Glass Company maker's mark and embossed bottle codes that indicate the bottle was manufactured and used between 1954 and 1980; a half pint whiskey bottle with an upside-down horseshoe embossing, probably Schenley Reserve, with an Owens-Illinois Glass Co. maker's mark that indicates the bottle was manufactured and used between circa 1954-1964; clear cleaning supplies bottle embossed with the word "Texize" dating to between the 1940s and 1950s; and a clear glass citrate magnesia medicine bottle with a National Magnesia Company Inc. maker's mark dating to the 1920s (SHA 2020). The bottle types observed and collected at Bottle Dump No. 4 are similar in type and brand as bottles observed at Bottle Dumps No. 1-3. Approximately 20-30 bottles are associated with Bottle Dump No. 4.

Possible Outbuilding

During systematic subsurface testing in the northeast portion of the moderate probability area, the possible remains of an agricultural structure or outbuilding was encountered. Initially identified by the presence of corrugated metal roofing at the base of a large oak tree, a small historic artifact scatter was documented approximately 1-2 m north of the metal roofing (**Figure 5.17**). A subsequent STP placed within the artifact scatter was negative for cultural material. Due to the low-density nature of the artifact scatter, a sample of diagnostic cultural material was collected. Recovered artifacts include one aqua-colored glass pony insulator and an oxidized beer can with two triangular holes in the top (**Table 5.4**). Beer cans required a can opener with an angled triangular point, referred colloquially as a "church key".

Figure 5.17 Corrugated metal roofing in northeast corner of 8BR04364.

Table 5.4 Artifacts Collected from the Ground Surface at the Possible Outbuilding

Artifact Type	Count	Weight (g)	Comments
Aqua pony insulator	1	185	Hemingray Glass Co. (Makers mark: Hemingray-9) (ca.1950s-1960s)
Aluminum beer can	1	82.7	Oxidized/rusted; two triangle holes in top from can opener; ca. 1935-1967

Glass "pony" insulators were generally utilized on low-voltage telephone lines. The one recovered near the Possible Outbuilding was manufactured by Hemingray Glass Company circa 1950s-1960s (Hemingray n.d.). Aluminum beer cans that required a can opener were introduced in 1935 and utilized primarily until 1967 (rustycans.com n.d.). In addition to the possible structural remains and artifact scatter, a large, hardened pile of resin was identified approximately 3 m southeast of the corrugated roofing, further suggesting this area is associated with an outbuilding rather than a domestic structure. No structures or features were indicated in this area of the Project APE on historic topographic maps or aerial photographs, suggesting the structural elements were redeposited from another location. It is likely the corrugated metal roofing is associated with the outbuilding depicted on the 1949 Orsino USGS topographic map, which illustrated a barn or outbuilding approximately 50-meters to the south.

Ornamental Vegetation

During systematic subsurface testing in the northeast portion of the moderate probability area, a patch of Turk's Cap hibiscus (*Malvaviscus penduliflorus*) was encountered approximately 50 m south of the possible outbuilding and about 100 m east of the buildings (**Figure 5.18**). Turk's Cap hibiscus is a non-native ornamental plant originating in Mexico, with downward pointing red pendant flowers about 2.5 in (6.35 cm) long (UF IFAS). The

Turk's Cap hibiscus was planted approximately 10 m east-northeast of a large oak tree and approximately 5 m southwest of a stand of five cabbage palm trees (*Sabal palmetto*). Although a pedestrian survey of the area yielded no evidence of a structure, the location of the Turk's Cap hibiscus roughly corresponds to the location of a building depicted on the 1949 aerial of the Project APE. Shovel tests conducted within the area were negative for cultural material, and a pedestrian inspection of the ground surface, conducted within a 50 m diameter of the structure's mapped location, yielded no evidence of a structure or artifact scatter.

Figure 5.18 A Patch of Non-Native Turk's Cap Hibiscus Northeast Corner of 8BR04364.

Interpretation: Site 8BR04364 represents an early- to mid-twentieth century Florida homestead. The concrete block buildings are located on Parcel 4453, which was owned by Perry Nichols, a Trustee, in 1963 and purchased by the USACE on September 19 of that year for $78.09 per acre. The land acquisition documents do not mention buildings, suggesting the concrete block structures were in ruins by then. It is likely the block structures represent the remains of the Walter H.J. Howe residence; however, it is uncertain when the buildings were constructed. Walter Howe began purchasing property in the Project APE in 1915, and in the 1940 US Census he was listed as an orange grower. Furthermore, 1936 road map indicates two structures located east of the unnamed north-south oriented road from Orsino; however, the structures are not to scale and merely suggest the possibility for a structure located in the southern half of the project APE prior to 1936 (FSRD 1936). A general temporal range for the occupation of the structure is between 1915, based on the earliest date that Howe began purchasing the property and, 1963 when the property was acquired by the federal government. Laboratory analysis of a sample of artifacts collected from across the site suggest an occupation dating between the 1920s and mid- to late-1950s. Bottle types primarily included fruit and canning jars, condiment bottles, beverage bottles, medical/chemical bottles, and alcohol bottles, which are indicative of a domestic occupation.

Based on the distance between the Turk's Cap hibiscus and the Granite Rock House, it is likely the ornamental vegetation, documented approximately 100-meters west of the buildings, was associated with another residential structure depicted on the 1949 topographic map (USGS 1949). The ornamental vegetation appears to be the only evidence left of this unknown historical occupation. Subsequent testing in the area in conjunction with a pedestrian survey was made difficult due to dense Brazilian Pepper. Based on the location of the mapped structure in relation to the main road, approximately 120-meters to the west, and due to evidence, that suggests both residential structures depicted on the 1949 Orsino USGS map used the same driveway to cross the drainage ditch (east of the road), it is likely the structure associated with the ornamental vegetation was occupied by an orange grove laborer.

Evaluation: Site 8BR04364 represents an early- to mid-twentieth century Florida farmstead. This site consists of two concrete block structures, four bottle dumps, possible remains of a barn or outbuilding, and ornamental vegetation. This site lacks integrity and is not associated with important events or influential people and therefore does not meet the minimum requirements for inclusion on the NRHP. Therefore, LG²ES recommends 8BR04364 not eligible for the NRHP, and no further archaeological consideration is suggested.

8BR04367, Howe Grove Road

Setting: Hydric Hammock
Soils/Drainage: Copeland-Bradenton-Wabasso complex, limestone substratum; Very Poorly Drained
Survey Methodology: Pedestrian survey
Site Type: Linear Resource
Site Size: 1.1 km (0.68-mi) (15 x 1,100 m)
Depth of Deposit: Surface
Cultural Periods: American-20th Century

Discussion: 8BR04367, now known as Range Road, was an unimproved, unnamed road located along the western boundary and intersecting the project study area in the southwestern corner of the Project APE. Howe Grove Road was selected as the resources name based on sources indicating that Walter J. H. Howe, who settled in the region around the turn of the twentieth century, began purchasing property within the Project APE in 1915, eventually becoming an orange farmer. The earliest depiction of this road is on the 1936 Florida State Road Department map, which indicated that the road was unimproved (**Figure 5.19**). The road was north-south oriented and ran along the borders between Sections 1 and 12 and Section 6 and 7 of T 23S-R 36E and T 23S-R 37E, respectively. Howe Grove Road connected State Road 219 (Courtenay Parkway) in the south and Orsino Road, present-day NASA Parkway West to the north.

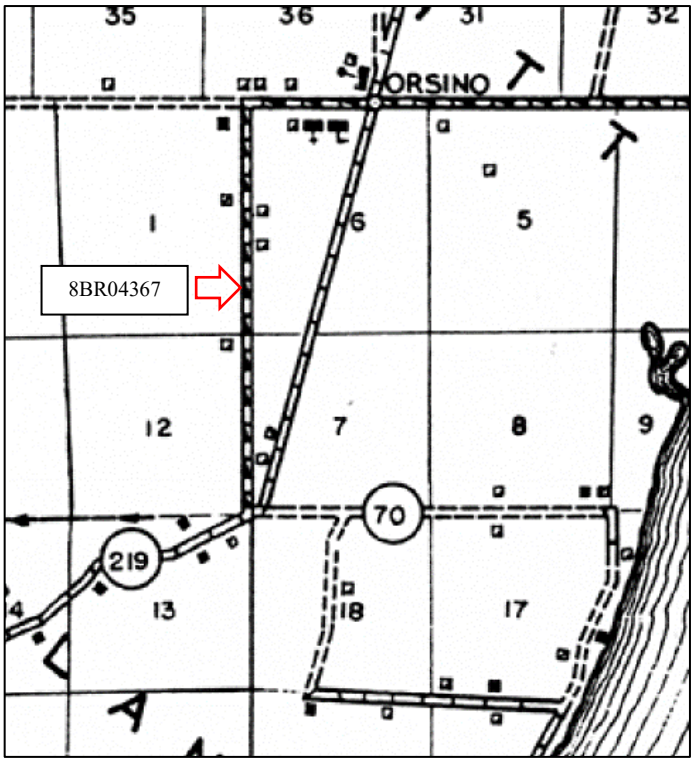

Figure 5.19 1936 Florida State Road Department State Road Map Depicting an Overview of the Road from Orsino to SR 219.

The road has since been altered due to development in the area. Space Commerce Way utilized much of the right-of-way of the unnamed north-south oriented road now documented as Howe Grove Road. The road adjacent to the Project APE, as it exists today, is an access road along the western boundary of the Project APE (**Figure 5.20**). A drainage ditch was excavated along the east side of the road, which likely facilitated drainage of the area, allowing for the construction of the road. It is likely the drainage ditch dates to the same time as the road construction, which is presumably prior to 1915.

Figure 5.20 (Left) Current View of the Road and Drainage Ditch, Facing North Along the Project APE, and (Right) Current Aerial of Intact Portion of 8BR04367 in Relation to the Project APE.

Interpretation: Site 8BR04367 represents an early- to mid-twentieth century unimproved road. The earliest depiction of this road is on the 1936 Florida State Road Department state road map, which also depicts a building situated within a land tract owned by Walter H.J. Howe beginning in 1915 (FSRD 1936). This suggests that the road was likely constructed prior to 1915. A portion of the access road between the south end of the badging office parking lot and the north side of the parking lot retains much of its integrity, including integrity of location, integrity of design, integrity of setting, and integrity of feeling.

Evaluation: Site 8BR04367 represents an early- to mid-twentieth century unimproved road that likely dates to before 1915. Although the portion of 8BR04367 adjacent to the western Project boundary, approximately .68-miles (1.1-kilometers) in length, retains integrity of location, integrity of design, integrity of setting, and integrity of feeling, it does not meet the minimum criteria for inclusion on the NRHP. Therefore, LG²ES recommends 8BR04367 not eligible for the NRHP, and no further archaeological consideration is suggested.

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6.0 CONCLUSIONS

Between December 7-9, 2020, LG^{2}ES conducted a Phase I CRAS of an approximately 61.4-acre parcel located approximately 400-m east of the KSC Visitor Complex in support of the proposed Exploration Park North Expansion EA at Kennedy Space Center on Merritt Island in Brevard County, Florida. The project area is contained to the *Orsino, Florida* 7.5-minute quadrangle (USGS 1976). This survey was conducted on behalf of Space Florida, BRPH, and Jones Edmunds (SF/BRPH/Jones Edmunds) to assist KSC in meeting its regulatory obligations under Section 106 of the NHPA, as amended. Proposed project activities include the expansion of property at Exploration Park to support development and construction of commercial aerospace facilities.

The Archaeological Area of Potential Effects (APE) is situated within the Merritt Island National Wildlife Refuge in the northern portion of Brevard County, approximately 952 m southwest of the intersection of NASA Parkway and Kennedy Parkway, 637 m southeast of the Kennedy Space Center Visitor Complex, and 425 m northeast of Space Commerce Way. The APE is comprised of a wooded area measuring approximately 61.4 acres.

The CRAS was conducted December 7-9, 2020 and consisted of historic background research, pedestrian survey, and the excavation of 31 STPs were excavated, all of which were negative for cultural material, and 13 "no dig" loci were documented across the project APE. "No dig" tests were written off due to inundation. Although all subsurface tests were negative for cultural material structural remains and a surface scatter was documented as 8BR04364, The Granite Rock Homestead, while a historic road documented in the southwestern portion of the Project APE, was recorded as 8BR04367, Howe Grove Road. **Table 6.1** summarizes the documented cultural resources and NRHP recommendations resulting from this CRAS.

Table 6.1 Sites Documented during the Phase I CRAS with NRHP Recommendations

Site Number	Site Name	Site Type	NRHP Recommendation
8BR04364	The Granite Rock Homestead	Early- to mid-20th homestead	Not Eligible
8BR04367	Howe Grove Road	Linear resource/road	Not Eligible

Site 8BR04364, The Granite Rock Homestead, consists of the structural remains of two concrete block structures, four bottle dumps, and ornamental vegetation. While a 1936 Florida State Road Department state road map indicates a structure was present in the Project APE in the mid-1930s, the artifact assemblage, consisting primarily of intact glass bottles, generally dates to the mid-1950s, suggesting this is when the structure was abandoned. This site does not retain integrity and does not meet the minimum criteria for inclusion on the NRHP. No further archaeological investigation is recommended.

Site 8BR04367, Howe Grove Road, represents an early- to mid-twentieth century unimproved road that likely dates to before 1915. Although the portion of road, approximately 1.1 km in length, adjacent to the western project boundary retains integrity of location, integrity of design, integrity of setting, and integrity of feeling, it does not meet the minimum criteria for inclusion on the NRHP. No further archaeological investigation is recommended. The proposed Exploration Park North Expansion project at Kennedy Space Center will not impact cultural resources eligible for, or already listed on the NRHP. Therefore, no additional archaeological investigation is recommended.

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APPENDIX A: FMSF Survey Log Sheet

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Ent D (FMSF only)_____

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only) _____

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) Phase I CRAS of approximately 61.4-acre parcel located approximately 400-meters east of the KSC Visitor Complex

Report Title (exactly as on title page) Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA Brevard County, Florida

Report Authors (as on title page, last names first) 1. Lombardi, Kathryn 2. Nelson Blue 3. _____ 4. _____

Publication Date (year) 2020 **Total Number of Pages in Report** (count text, figures, tables, not site forms) _____

Publication Information (Give series, number in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)

Lombardi, Kathryn and Blue Nelson 2021 Phase I Cultural Resources Assessment Survey of Exploration Park North Expansion EA Brevard County, Florida. Project No. 20-152

Supervisors of Fieldwork (even if same as author) Names Blue Nelson

Affiliation of Fieldworkers: Organization _____ City Jacksonville

Key Words/Phrases (Don't use county name, or common words like *archaeology*, *structure*, *survey, architecture, etc.*)

1. Orsino 2. Orange Grove 3. KSC 4. Kennedy Space Center 5. Walter Howe 6. _____ 7. _____ 8. _____

Survey Sponsors (corporation, government unit, organization or person directly funding fieldwork)

Name Space Florida, BRPH, and Jones Edmunds Organization _____

Address/Phone/E-mail _____

Recorder of Log Sheet Blue Nelson **Date Log Sheet Completed** 12-10-2020

Is this survey or project a continuation of a previous project? ☒ No ☐ Yes: **Previous survey #s (FMSF only)** _____

Mapping

Counties (List each one in which field survey was done; attach additional sheet if necessary)

1. Brevard 2. _____ 3. _____ 4. _____ 5. _____ 6. _____

USGS 1:24,000 Map Names/Year of Latest Revision (attach additional sheet if necessary)

1. Name ORSINO Year 2018
2. Name _____ Year _____
3. Name _____ Year _____
4. Name _____ Year _____
5. Name _____ Year _____
6. Name _____ Year _____

Description of Survey Area

Dates for Fieldwork: Start 12-7-2020 End 12-9-2020 **Total Area Surveyed** (fill in one) _____ hectares 60 acres

Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each) **Width:** _____ meters _____ feet **Length:** _____ kilometers _____ miles

Survey Log Sheet

Survey #_____

Research and Field Methods

Types of Survey (check all that apply): ☒archaeological ☐architectural ☒historical/archival ☐underwater ☐damage assessment ☐monitoring report ☐other(describe): _____

Scope/Intensity/Procedures 50 m intervals in mod prob, 10 percent of the low prob, and a pedestrian survey. Although a large surface scatter was encountered, all STPs were negative.

Preliminary Methods (check as many as apply to the project as a whole)

☐Florida Archives (Gray Building)	☐library research- *local public*	☒local property or tax records	☒other historic maps
☐Florida Photo Archives (Gray Building)	☐library-special collection - *nonlocal*	☒newspaper files	☒soils maps or data
☒Site File property search	☐Public Lands Survey (maps at DEP)	☐literature search	☐windshield survey
☒Site File survey search	☐local informant(s)	☐Sanborn Insurance maps	☒aerial photography

☐other (describe): _____

Archaeological Methods (check as many as apply to the project as a whole)

☐Check here if **NO** archaeological methods were used.

☐surface collection, controlled	☐shovel test-other screen size	☐block excavation (at least 2x2 m)
☐surface collection, **un**controlled	☐water screen	☐soil resistivity
☒shovel test-1/4"screen	☐posthole tests	☐magnetometer
☐shovel test-1/8" screen	☐auger tests	☐side scan sonar
☐shovel test 1/16"screen	☐coring	☒pedestrian survey
☐shovel test-unscreened	☐test excavation (at least 1x2 m)	☐unknown

☐other (describe): _____

Historical/Architectural Methods (check as many as apply to the project as a whole)

☐Check here if **NO** historical/architectural methods were used.

☐building permits	☐demolition permits	☐neighbor interview	☐subdivision maps
☐commercial permits	☒exposed ground inspected	☐occupant interview	☐tax records
☐interior documentation	☒local property records	☐occupation permits	☐unknown

☒other (describe): historic land deeds

Survey Results (cultural resources recorded)

Site Significance Evaluated? ☒Yes ☐No

Count of Previously Recorded Sites 0 **Count of Newly Recorded Sites** 2

Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8". Attach additional pages if necessary.) N/A

Newly Recorded Site #'s (Are all originals and not updates? List site #'s without "8". Attach additional pages if necessary.) BR04364, BR04367

Site Forms Used: ☐Site File Paper Form ☒Site File Electronic Recording Form

*****REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPY OF USGS 1:24,000 MAP(S)*****

SHPO USE ONLY **SHPO USE ONLY** **SHPO USE ONLY**

Origin of Report: ☐872 ☐CARL ☐UW ☐1A32 # _____ ☐Academic ☐Contract ☐Avocational ☐Grant Project # _____ ☐Compliance Review: CRAT # _____

Type of Document: ☐Archaeological Survey ☐Historical/Architectural Survey ☐Marine Survey ☐Cell Tower CRAS ☐Monitoring Report ☐Overview ☐Excavation Report ☐Multi-Site Excavation Report ☐Structure Detailed Report ☐Library, Hist. or Archival Doc ☐MPS ☐MRA ☐TG ☐Other: _____

Document Destination: _____ **Plotability:** _____

Kennedy
Space
Center
Nasa Pkwy W
Visitor Complex Rd
Space Commerce Way
Odyssey Way
Kennedy Pkwy S
Project Location
Topographic Map
N
Project Boundary
0
140
280
420
Meters
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap

APPENDIX B: Artifact Catalog

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Exploration Park North (8BR4364)
[Phase ??] Artifact Collection

Lot	Count	Weight (g)	Artifact Description	Note
1.001	1	374.1	Owens-Illinois Glass Co. clear glass bottle (ca.1915-1966)	Square bottle; screw top
1.002	1	64.0	Clear glass vial	Threaded collar, no neck, slightly flared base; embossed "571-D" on base
1.003	1	42.6	Sprague capacitor (ca. 1926-1987)	used as an electric component mostly in audio; (maker's mark: Sprague)
1.004	1	266.7	Metal electronic component	Cylindrical, dial-shaped; possible radio part; heavily oxidized/rusted; includes iron, lead, and brass
1.005	1	173.8	Variac General Radio Co. electronic component (ca. 1915-2001)	Possible autotransformer; (Makers' mark: Variac General Radio Co. Type 200-C, 115v50-60~5a
1.006	1	45.0	Plastic dial	Half circle, marked 0-180 degrees
1.007	1	33.1	Allen Bradley Co. radio ceramic gridleak and condenser (ca. 1920s)	
2.001	1	36.8	E.T. Cunningham, Inc. radio tube bulb (ca. 1915-1920)	Harrison, New Jersey (Makers' Mark: CX112A)
2.002	1	32.6	General Electric light bulb	60w 120v; possibly modern
2.003	1	86.8	McIlhenny Co. Tabasco clear glass dashing bottle (ca. 1915-1966)	New Iberia, Owens-Illinois Glass Co.
2.004	1	66.0	McIlhenny Co. Tabasco clear glass dashing bottle (ca. 1915-1966)	New Iberia, Owens-Illinois Glass Co.
2.005	1	45.1	Green glass dessert bowl	Possible depression glass; dessert or nut bowl; lime green
2.006	1	17.7	Blue willow pattern whiteware saucer	Transfer print
2.007	1	17.4	Blue willow pattern whiteware cup	Transfer print

Lot	Count	Weight (g)	Artifact Description	Note
3.001	1	115.3	Owens-Illinois Glass Co. clear glass vial (ca. 1954-1980)	Threaded collar with no neck (Makers Mark: A-S(above) 12(left) 7(right) 3(below)
3.002	1	277.0	Clear glass Texize cleaning bottle (ca. 1940s-1950s)	"Texize" embossed on shoulder, threaded finish
3.003	1	252.0	Owens-Illinois Glass Co. clear glass whiskey bottle (ca. 1954-1964)	Upside-down horseshoe embossing; probable Schenley Reserve, half pint
3.004	1	341.4	National Magnesia Co Inc. clear glass citrate magnesia bottle (possible ca. 1920s)	decorative patterns; (Makers mark: National Magnesia Co Inc.)
3.005	1	1.1	Aluminum threaded bottle cap	Aluminum
4.001	1	185.0	Hemingray Glass Co. aqua pony glass insulator (ca.1950s-1960s)	(Makers mark: Hemingray-9)
4.002	1	82.7	Aluminum beer can (ca. unknown-1967)	Oxidized/rusted; two triangle holes in top from can opener

Flood Risk Map: Cameron County Coastal Project Area, Texas

Willacy County

Hidalgo County

Cameron County

Mexico

12110208

13090002

Arroyo Colorado

Rio Grande

Cameron County Unincorporated Areas

Town of Bayview

Town of Laguna Vista

City of Port Isabel

City of South Padre Island

City of Brownsville

Laguna Madre

South Bay

Gulf of Mexico

Residential Flooding

Image showing field, rural flooding, and some residential flooding, near FM 1847 in northeast Cameron County in 2008.
Source: NOAA
http://www.srh.noaa.gov/bro/?n=2008event_dollyphotogallery5

Flash Flooding

Image showing flash flooding in Brownsville, October 22, 2014. The result of 4 to 7 inches of precipitation within Greater Brownsville.
Source: NOAA
http://www.srh.noaa.gov/bro/?n=2014event_lateoctoberrain

Severe Beach Erosion

Image showing coastal overwash during Hurricane Ike in 2008. Large swells and very high seas resulted in severe coastal erosion and coastal flooding.
Source: NOAA
http://www.srh.noaa.gov/bro/?n=2008event_ikereport

N

0 2.5 5

Miles

MAP SYMBOLOGY

Base Data

- Corporate Limits
- State Boundary
- US Highways
- State Highways
- Railroad

Flood Data

- Restudy Area
- New SFHA
- Seclusion Area[1]
- Coastal Surge Influenced Area

Flood Risk[2]

- Very Low
- Low
- Medium
- High
- Very High

Areas of Mitigation Interest

- Past Claims Hot Spot
- Other

[1]Risk determined by potential flood losses to existing structures. Due to presence of identified Special Flood Hazard Areas, flood risk could become high if future development occurs. For more information see the Flood Risk Report and Flood Insurance Rate Map.

[2]Depth grids for the Cameron County coastal project area extend into the seclusion zone along the Arroyo Colorado. In this study, no loss calculations were made for depth grids within the seclusion area.

COUNTY LOCATOR

Risk Mapping, Assessment, and Planning (Risk MAP)

FRM FLOOD RISK MAP

CAMERON COUNTY COASTAL PROJECT AREA, TEXAS

HUC-8 Watersheds: 12110208, 13090002

FEMA

For more information of data used for this non-regulatory map, please consult the Cameron County Coastal Project Area Flood Risk Database and Flood Risk Report.

RELEASE DATE
9/30/2015

From: Gardiner, Dawn
To:
Cc: Orms, Mary; Ardizzone, Chuck CA; Zee, Stacey (FAA)
Subject: Fw: [EXTERNAL] Authorization Update for SpaceX"s Starship Prototype Program - Boca, Chica TX
Date: Friday, February 19, 2021 12:40:50 PM

Jacob, the U.S. Fish and Wildlife Service does not believe SpaceX/FAA is in compliance with the Endangered Species Act or NEPA as the activities being carried out were not analyzed or consulted on. We continue to work with Stacey Zee and SpaceX to update these regulatory needs.

From: Perez, Chris <
Sent: Friday, February 19, 2021 12:34 PM
To: Winton, Bryan < Gardiner, Dawn < Orms, Mary < delaGarza, Laura <
Subject: Re: [EXTERNAL] Authorization Update for SpaceX's Starship Prototype Program - Boca, Chica TX

So basically, he's saying FAA will authorize SN10 to flight status by COB today?

From: Winton, Bryan <
Sent: Friday, February 19, 2021 12:19 PM
To: Gardiner, Dawn < Orms, Mary < Perez, Chris < delaGarza, Laura <
Subject: Fwd: [EXTERNAL] Authorization Update for SpaceX's Starship Prototype Program - Boca, Chica TX

Get Outlook for iOS

From: Cantin, Jacob (FAA) <
Sent: Friday, February 19, 2021 11:22:25 AM
To: 9-AWA-AJR-Space Ops (FAA) < Freeburg, Andrea S (FAA) < Velayos, Andy (FAA) < Perez, Eddie (FAA) < Berquist, Krista (FAA) < Fussell, Lorrie (FAA) < Polchert, Michael (FAA) < Westover, Michelle (FAA) < Chong, Raul (FAA) < Leis, Scott (FAA) < Madden, Ty (FAA) <
< <
< <
< Brunnemann, Eric J
< Garza, Rolando L <

<
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< <
< Winton, Bryan <
Perez, Sonny <
Cc: Cushman, Anna (FAA) < Collins, Ansel (FAA) <
Puri, Rachita (FAA) < Perez, Karen (FAA) < Smith,
Matthew C (FAA) < Murray, Daniel (FAA) <
Searight, Howard (FAA) < Zee, Stacey (FAA) <
Subject: [EXTERNAL] Authorization Update for SpaceX's Starship Prototype Program - Boca, Chica TX

Hello,

I am the SpaceX Starship licensing lead for the Federal Aviation Administration (FAA). On behalf of the FAA's Office of Commercial Space Transportation (AST), I am alerting our government partners of the current authorization status of SpaceX's Starship launch license. SpaceX remains authorized to conduct ground operations on its Serial Number 10 (SN10) and SN11 vehicles, including wet dress rehearsals, pressure tests, and static fires, under its current license at their Boca Chica, TX site. The FAA is projecting a determination by COB today, February 19, 2021, on SpaceX's request for license modification for flight of SN10. This notification is intended to facilitate personnel and asset management. Please plan accordingly with SpaceX per your respective signed agreements. Any changes to this status will be communicated to this list.

Best,
Jacob

--
Jacob Cantin
Aerospace Engineer
Safety Authorization Division (ASA-100)
Office of Operational Safety, Commercial Space Transportation
Federal Aviation Administration
Cell: (904)
Email:

From: Winton, Bryan
To: Orms, Mary; Gardiner, Dawn; delaGarza, Laura; Reyes, Ernesto
Cc: Perez, Sonny; Perez, Chris
Subject: Fw: [EXTERNAL] Location
Date: Thursday, February 4, 2021 11:11:28 AM
Attachments: 35kV Double Circuit.kmz
Underground.kmz

Mary:

I spoke with Magic Valley Electrical Cooperative staff this morning about a small line relocation project at Boca Chica but learned from them that Space-X has made their initial payment for materials to support a larger power line to traverse HW4 to their site. I know this is something that came up during 2014 EIS and we instituted that no above ground line would be allowed through the flats beyond where poles and line exist now. However, this line must cross a 10.2 mile section on HW 4 where FWS owns the land beneath the road and TxDOT has an easement for road purposes only which is how and why there has been little development out at Boca Chica. We need to communicate to Space-X that this is not likely going to be found compatible in a ROW application which is necessary in order to proceed with what they want. Can you let us know how ES would propose we proceed, interject, etc.?

bryan

From: Domitilo Cantu <[redacted]
Sent: Thursday, February 4, 2021 11:43 AM
To: Winton, Bryan <[redacted]
Subject: [EXTERNAL] Location

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Bryan,

I attached the kmz files for the proposed new overhead and underground for your review. Let me know what would be required of them to be able to build during birding season so I can add it on to their costs. We can build starting at any end first if it helps at all. Let me know your thoughts.

Also, I touched base with the contractor that did the underground, apparently my inspector had been on their case about it. They will go and smooth out the surface at the latest next week. I will personally follow up and keep you updated.

Domi Cantu

cell
office

From: Perez, Chris
To: Truitt, Yvette; Gardiner, Dawn; Perez, Sonny; Winton, Bryan; delaGarza, Laura; Orms, Mary
Cc: Vazquez, Anibal
Subject: Fw: [EXTERNAL] SpaceX Starship/Super Heavy at Boxa Chica - Scoping Report Available!
Date: Thursday, March 18, 2021 9:17:17 AM
Attachments: FWS lands near SpaceX control Site.JPG

FYI...see Anibal's comments below. I of course, believe they have no business with an EA...This is EIS level stuff...now there's a planned city "Starbase" that should be included in the mix as well as whether or not that 3-phase power line plays a role in facilitating this development. Another thing that came up yesterday during our site visit of Boca Chica tract is that we need to verify where they are draining stormwater and how are they processing and discharging wastewater since this is a very large facility with alot of people 24/7...Our land is right on the northwestern border with SpaceX Control and Assembly site so we need to see if they are discharging stormwater and wastewater on FWS lands into the South Bay wetland complex?

In fact, judging by the boundaries of our Boca Chica Tract, I think we should get it re-surveyed there and our boundaries re-marked because we need to determine if they're not constructing on our lands...It's very, very close! See attached pic.

From: Vazquez, Anibal <
Sent: Thursday, March 18, 2021 9:51 AM
To: Perez, Chris <
Subject: Re: [EXTERNAL] SpaceX Starship/Super Heavy at Boxa Chica - Scoping Report Available!

Good Morning Chris,

It looks like it is a real thing. FR Notice Cornell

I had no idea they were planning so much on that little site. If they do a mitigated FONSI they'll be on the hook to enforce any conditions that reduce the impacts below "significant". I wonder if they'll have any more luck then ES has had. If they choose that option, it is something that should definitely be brought up during the public comment period

Thank You

Aníbal Vázquez
Natural Resource Planner

From: Perez, Chris <
Sent: Thursday, March 18, 2021 8:09 AM
To: Vazquez, Anibal <

Subject: Fw: [EXTERNAL] SpaceX Starship/Super Heavy at Boxa Chica - Scoping Report Available!

Good morning Anibal! Have you ever heard of a "mitigated FONSI" option? Is that consistent with NEPA regs?

From: SpaceX Boca Chica Launch Site Project <
Sent: Thursday, March 18, 2021 9:01 AM
To: Perez, Chris <
Subject: [EXTERNAL] SpaceX Starship/Super Heavy at Boxa Chica - Scoping Report Available!

Greetings,

The FAA's public scoping period for its environmental review of SpaceX's Starship/Super Heavy at Boca Chica proposal ended on January 22, 2021. The FAA received 321 comment submissions. Click here to view a copy of the Scoping Summary Report. We have also posted a copy on the project website. The report provides an overview of the FAA's scoping process for the project and the comments received during the public scoping comment period.

The FAA is determining the scope of issues for analysis in the Draft EA and will consider comments received during scoping. The FAA will supervise SpaceX's preparation of the Draft EA. Cooperating and participating agencies will also participate in its development. Once the Draft EA is complete, the FAA will provide the Draft EA for public review and comment.

The EA allows the FAA to determine the appropriate course of action. These

determinations may include:

- preparation of an Environmental Impact Statement (EIS) because the proposed action's environmental impacts would be significant,
- issuance of a Finding of No Significant Impact (FONSI), or
- issuance of a "Mitigated FONSI" providing for mitigation measures to address the proposed action's environmental impacts.

If the FAA determines the potential environmental impacts of the proposed action would be significant based upon the Draft EA, and those impacts cannot be properly mitigated to less than significant levels, the FAA would publish a Notice of Intent to prepare an EIS and conduct additional public scoping. The FAA may make this determination regarding the course of action at any time, including after the Draft EA has been shared for public review and comment.

Please send any questions to:

Kennedy NASA Procedural Requirements

Effective Date: **March 6, 2017**

Expiration Date: **March 6, 2022**

Responsible Office: **Spaceport Integration and Services**

Kennedy Space Center Environmental Requirements

National Aeronautics and Space Administration

John F. Kennedy Space Center

Change Log

Date	Revision	Description
2/20/14	C	SIGNIFICANT CHANGES: • Scanned the entire document to remove any Space Shuttle Program-specific references or requirements. • In Chapter 3, The National Environmental Policy Act Implementation, added hyperlinks to all KDPs and KSC Environmental Checklist form. • In Chapter 4, Pollution Incident Reporting and Cleanup, updated the pollution incident reporting procedure. Clarified whether the NASA KSC EPA Waste ID Number is to be used on waste manifests when a NASA contractor or 3rd party (such as a fuel delivery company) is responsible/liable for remediating a spill. Added details of items needed from the organizations to document the pollution incident. Clarified reporting threshold for refrigerant system discharges. • In Chapter 5, Spill Prevention, Control, and Countermeasures, clarified when a professional engineer certification is required for SPCC Plan changes. • In Chapter 6, Air Compliance, updated the language pertaining to KSC deregistered Risk Management Plan. • In Chapter 7, Water Conservation and Consumptive Use, removed water conservation from this chapter and combined with energy management in Chapter 28. • In Chapter 8, Drinking Water, clarified the potable water line break reporting and sampling requirements, roles, and responsibilities. • In Chapter 10, Stormwater, restructured the content into a more orderly sequence of requirements for permit coverage. • In Chapter 11, Domestic Wastewater, clarified the domestic wastewater release reporting and cleanup requirements, roles, and responsibilities. • In Chapter 13, Hazardous and Controlled Waste, rewrote, reorganized, and expanded text. Expanded and clarified the Hazardous Waste Disposal in Process (HWDIP) label use requirements and identified a maximum number of days for each step on the HWDIP label. Clarified the definition of “weekly inspections” for 90-day hazardous waste sites to ensure that inspections occur no more than seven calendar days apart. Ensured that inorganic zinc paint/primer aerosol can disposal requirements were consistent between sections. Discussed the new web-based Waste Management System. Added a section for ordnance waste disposal requirements. Updated the flex hose section with the latest requirements/fact sheet text and referenced these requirements in Chapter 27. • In Chapter 16, Blood Borne Pathogen and Exposure Control, eliminated text and referenced KSC-UG-1904, *NASA Employee Exposure Control Plan for Bloodborne Pathogens*.

		• In Chapter 17, Storage Tanks, removed duplicate language for secondary containment stormwater. • In Chapter 24, Natural Resources, updated Environmental Resource Permit (ERP) process for wetlands to mirror ERP process for stormwater. Provided links for wildlife management plans. • In Chapter 25, Cultural Resources, updated list of historic facilities. • In Chapter 26, Pollution Prevention, Solid Waste Diversion, Recycling, and Green Purchasing, corrected the painted concrete sampling and acceptance criteria for the Diverted Aggregate Reclamation and Collection Yard. Clarified which NASA and contractor organizations shall input the data into the NASA Environmental Tracking System. Clarified the implementation of the Recycling Program. Updated several Federal green purchasing web addresses. • In Chapter 27, clarified compressed gas cylinder disposal/recycling requirements.
7/21/2014	C-1	Added KSC-PLN-8553, Kennedy Space Center Sustainability Plan
7/27/2015	C-2	Administratively changed Center Operations to Spaceport Integration and Services due to recent re-organization
3/6/2017	D	• Updated document to reflect change in contract from Medical and Environmental Services Contract (MESC) to Kennedy Environmental and Medical Contract (KEMCON) • Updated document to reflect change for new EPA rule, Central Accumulation Area (CAA) for 90-day to CAA/90-day. • In Chapter 3, The National Environmental Policy (NEPA) Act Implementation, revised requirement to resubmit KSC Environmental Checklist for projects not implemented within six months of issuance of the Record for Environmental Consideration. • In Chapter 6, Air Compliance, clarified reporting requirements for potential to emit calculations for new emission sources and the maintenance of site specific monitoring plans. • In Chapter 7, Water Consumptive Use, removed the consumptive use permit requirements since we no longer have that permit, removed the references to regulatory agency forms, and streamlined the description of the processes to obtain an environmental permit. (Added water conservation goals – moved to Chapter 28) • In Chapter 8, Drinking Water, removed the references to regulatory agency forms, removed references to specific contractors, streamlined the description of processes to obtain an environmental permit, and defined the roles and responsibilities of KSC organizations operating the water system and providing sampling support. Transitioned the permit application fee payment responsibility from Environmental Office to initiating organization or contractor.

		• In Chapter 9, National Pollutant Discharge Elimination System, added from Chapter 10 the specifics of each NPDES permit program, removed the references to regulatory agency forms, and streamlined the description of the processes to obtain an environmental permit. Transitioned the permit application fee payment responsibility from Environmental Office to initiating organization or contractor. • In Chapter 10, Stormwater, removed sections detailing the NPDES program requirements and moved them to Chapter 9, removed the references to regulatory agency forms, streamlined the description of processes to obtain an Environmental Resource Permit, and removed references to the Total Maximum Daily Load (TMDL) program. Transitioned the permit application fee payment responsibility from Environmental Office to initiating organization or contractor. • In Chapter 11, Domestic Wastewater, removed the references to regulatory agency forms, removed references to specific contractors, streamlined the description of processes to obtain an environmental permit, and defined the roles and responsibilities of KSC organizations operating the wastewater system. Transitioned the permit application fee payment responsibility from Environmental Office to initiating organization or contractor. • In Chapter 12, Industrial Wastewater, removed the references to regulatory agency forms, removed references to specific contractors, streamlined the description of processes to obtain an environmental permit, added language to define the industrial wastewater evaluation process, and defined the roles and responsibilities of NASA and KSC organizations. Transitioned the permit application fee payment responsibility from Environmental Office to initiating organization or contractor. • In Chapter 13, Hazardous and Controlled Waste, provided clarification on who needs training to manage 90-Day hazardous waste storage areas and satellite accumulation areas (SAA), established same container labeling requirements for 90-Day and SAA locations, clarified labeling requirements of empty containers to be picked up for recycling, and affirmed KSC policy to manage universal pharmaceutical waste under full range of hazardous waste regulations instead of state of Florida rules. • In Chapter 17, Storage Tanks, removed ambiguity between petroleum and non-petroleum storage tanks. • In Chapter 18, Pesticides, changed the recordkeeping requirements for pesticide applications. • In Chapter 19, PCB Management, added requirements for temporary storage of PCB items. • In Chapter 23, Emergency Planning and Community Right-to-Know Act, changed the reporting requirements for covered

		chemicals for which the Occupational Safety and Health Administration requires a safety data sheet. • In Chapter 24, Natural Resources, added short descriptions of management plans for gopher tortoise, osprey, terns and skimmers, and exterior lighting, and added descriptions of the Florida Scrub-Jay Compensation Plan and the Advanced Ecological Mitigation Plan. • In Chapter 25, Cultural Resources, expanded the descriptions of regulatory requirements, added to the list of Federal and state regulations and executive orders, expanded the requirements for controls, and added mitigation measures. • In Chapter 26, Pollution Prevention, Solid Waste Diversion, Recycling, and Green Purchasing, clarified the definitions of items for recycling and non-recyclable materials, and expanded Green Purchasing to now include Sustainable Acquisition. • In Chapter 28, Energy and Water Management, added water conservation goals and requirements, and clarified the use of utility rebates.

TABLE OF CONTENTS

PREFACE

P.1 PURPOSE

Requirements listed within this document are to ensure National Aeronautics and Space Administration (NASA) Kennedy Space Center (KSC) maintains compliance with Federal, state and local environmental laws and regulations. This document details responsibilities of the KSC Environmental Assurance Branch (EAB), the KSC Environmental Management Branch (EMB), and other KSC organizational elements.

P.2 APPLICABILITY

a. These requirements apply to all KSC organizational elements, including contractor organizations. Requirements for KSC Partner organizations (for example, commercial partners, other Federal agencies, and tenants) are specified in the respective real property agreements and in subsequent administrative modifications.

b. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms “may” or “can” denote discretionary privilege or permission, “should” denotes a good practice and is recommended, but not required, “will” denotes expected outcome, and “are/is” denotes descriptive material.

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 AUTHORITY

a. NASA Policy Directive (NPD) 8500.1, NASA Environmental Management

b. NASA Procedural Requirements (NPR) 8553.1, NASA Environmental Management System

c. Kennedy NASA Policy Directive (KNPD) 8500.1, KSC Environmental Management

P.4 APPLICABLE DOCUMENTS AND FORMS

a. 7 United States Code (USC) § 136 et seq., Federal Insecticide, Fungicide, and Rodenticide Act

b. 16 USC § 1531 et seq., Endangered Species Act

c. 15 USC § 2601 et seq., Toxic Substances Control Act

d. 54 USC § 300101 et seq., National Historic Preservation Act of 1966

e. 16 USC §§ 1451-1464, Coastal Zone Management Act of 1972

f. 33 USC § 1251 et seq., Clean Water Act

g. 42 USC §§ 4321-4347, National Environmental Policy Act of 1969

h. 42 USC § 4901 et seq., Noise Control Act of 1972

i. 42 USC § 6901 et seq., Resource Conservation and Recovery Act

j. 42 USC § 7401 et seq., Clean Air Act

k. 42 USC § 8259b et seq., Federal Procurement of Energy Efficient Products

l. 42 USC § 9601 et seq., Superfund Amendments and Reauthorization Act or Comprehensive Environmental Response, Compensation, and Liability Act.

m. 42 USC § 11011 et seq., Emergency Planning and Community Right-To-Know Act

n. 42 USC § 13101 et seq., Pollution Prevention Act of 1990

o. Public Law 103-329

p. Federal Acquisition Regulation (FAR) Subpart 23.1, Sustainable Acquisition Policy

q. Executive Order (EO) 11988, Floodplain Management

r. EO 11990, Protection of Wetlands

s. EO 13693, Planning for Federal Sustainability in the Next Decade

t. EO 11593, Protection and Enhancement of the Cultural Environment

u. EO 13007, Indian Sacred Sites of 1995

v. EO 13175, Consultation and Coordination with Indian Tribal Governments

w. EO 13287, Preserve America

x. 14 Code of Federal Regulations (CFR), Chapter V, NASA, Parts 1200-1299

y. 29 CFR, Chapter XVII, Occupational Safety and Health Administration

z. 32 CFR, Part 989, Environmental Impact Analysis Process

aa. 36 CFR, Part 800, Protection of Historic Properties

bb. 36 CFR, Parks, Forests and Public Property

cc. 36 CFR 79, Curation of Federally-owned and Administered Archaeological Collections

dd. 40 CFR, Protection of Environment

ee. 49 CFR, Transportation

ff. 50 CFR, Part 402, Wildlife and Fisheries

gg. NASA Standard 8719.12 Safety Standard for Explosives, Propellants, and Pyrotechnics

hh. NASA Procedural Requirement (NPR) 1441.1 NASA Records Program Management Requirements

ii. NPR 4200.1, NASA Equipment Management Procedural Requirements

jj. NPR 4200.2, Equipment Management Manual for Property Custodians

kk. NPR 8510.1, NASA Cultural Resources Management

ll. NPR 8530.1, NASA Sustainable Acquisition

mm. NPR 8553.1, NASA Environmental Management System

nn. NPR 8580.1, NASA National Environmental Policy Act Management Requirements

oo. KNPD 1150.24, KSC Councils, Boards, and Committees

pp. KNPD 1860.1, KSC Radiation Protection Program

qq. KNPD 8710.1, KSC Emergency Management Program Policy

rr. Kennedy NASA Procedural Requirements (KNPR) 1840.19, KSC Industrial Hygiene Program

ss. KNPR 1860.1, KSC Ionizing Radiation Protection Program

tt. KNPR 1860.2, KSC Nonionizing Radiation Protection Program

uu. KNPR 4000.1, Supply and Equipment Systems Manual

vv. KNPR 8553.1, NASA KSC Sustainable Environment Management System

ww. KNPR 8715.2, Comprehensive Emergency Management Plan

xx. KNPR 8715.3, KSC Safety Procedural Requirements

yy. Kennedy Customer Agreement (KCA) 1285, Environmental Management, Pollution Control, and Spill Response Activiites

zz. Kennedy Customer Agreement (KCA) 4185, Programmatic Agreement (PA) for the Management of Historic Properties at KSC

aaa. Kennedy Documented Procedures (KDP)-KSC-P-1449, Use of Recycling Funds for Center-wide Projects

bbb. KDP-KSC-P-1728, KSC Pollution Incident Report

ccc. KDP-KSC-P-2236 Ordnance Life Cycle

ddd. KDP-KSC-P-3008, Hazardous Materials Emergency Response

eee. KDP-P-1726, Environmental Assessment

fff. KDP-P-1727, Environmental Checklist

ggg. KDP-P-1733, Review of Potential Effects to Historic Properties

hhh. KDP-P-3235, Land Withdrawal from Fish and Wildlife Services To Support NASA Missions

iii. KSC-PLN-1733, NASA KSC Integrated Cultural Resources Management Plan

jjj. KSC-PLN-1911, Environmental Resources Document

kkk. KSC-PLN-1919, Spill Prevention, Control, and Countermeasures Plan

lll. KSC-PLN-1920, Appendix B, KSC Site-Specific Spill Prevention, Control, and Countermeasures Plan

mmm. KSC-PLN-8553, Kennedy Space Center Sustainability Plan

nnn. KSC-UG-1904, NASA Employee Exposure Control Plan for Bloodborne Pathogens

ooo. EAP-REF-0001, KSC/Schwartz Road Landfill Class III Operations Plan

ppp. EVS-P-0001, Waste Management and Sampling Plan

qqq. American National Standards Institute (ANSI) Z358.1, American National Standard for Emergency Eyewash and Shower Equipment

rrr. Florida Administrative Code (FAC) Chapter 5E, Pesticides

sss. FAC Chapter 40C-2, Permitting of Consumptive Uses of Water

ttt. FAC Chapter 40C-4, Environmental Resource Permits: Surface Water Management Systems

uuu. FAC Chapter 62-550, Drinking Water Standards Monitoring and Reporting

vvv. FAC Chapter 62-555, Permitting, Construction, Operation, and Maintenance of Public Water Systems

www. FAC Chapter 62-602, Water or Domestic Wastewater Treatment Plant Operators and Distribution System Operators

xxx. FAC Chapter 62-699, Treatment Plant Classification and Staffing

yyy. FAC Chapter 62-701, Solid Waste Management Facilities

zzz. FAC Chapter 64E-8, Drinking Water Systems

aaaa. FAC Chapter 62, Department of Environmental Protection

bbbb. FAC Chapter 64-E6, Standards for Onsite Sewage Treatment and Disposal Systems

cccc. Florida Statutes (FS), Chapter 388, Florida Mosquito Control Law

dddd. FS Chapter 403, Environmental Control

eeee. FS Chapter 482, Florida Structural Pest Control Act

ffff. FS Chapter 487, Florida Pesticide Law

gggg. American Indian Religious Freedom Act of 1978

hhhh. Archaeological Resources Protection Act of 1979

iiii. Native American Graves Protection and Repatriation Act of 1990

jjjj. National Environmental Policy Act of 1969

kkkk. KSC Form 4-295, Hypergol Fuel Partial Decontamination Verification Tag

llll. KSC Form 4-296, Hypergol Oxidizer Partial Decontamination Verification Tag

mmmm. KSC Form 7-49, Purchase Request (Supplies/Equipment or Property Turn In)

nnnn. KSC Form 21-555, Pollution Incident Reporting and Notification

oooo. KSC Form 21-608, KSC Environmental Checklist

pppp. KSC Form 26-551, Process Waste Questionnaire

qqqq. KSC Form 28-366, Asbestos Danger Label

rrrr. KSC Form 28-809, Waste Support Request

ssss. KSC Form 28-825, Waiver for Sustainable Acquisition Product/Services

tttt. KSC Form 28-1019, Waste Aerosol Can Container Labels

uuuu. KSC Form 28-1020, Waste Aerosol Cans Only Label

vvvv. KSC Form 28-1084, NASA-KSC/Schwartz Road Landfill Non-Friable Asbestos Landfill Disposal Verification Form

wwww. KSC Form 28-1088, Petroleum Contact Water Label

xxxx. KSC Form 28-1117, Spent Blast Media Disposal Certification

yyyy. KSC Form 29-759, Label, Hazardous Waste Determination In-Progress

zzzz. KSC Form 29-1096, Ammonia Partial Decontamination Verification Tag

aaaaa. KSC Form UW05, KSC Universal Waste Label

bbbbb. KSC Form WM8P, KSC Hazardous Waste

ccccc. AF Form 813, Request for Environmental Impact Analysis

ddddd. Florida Department of Environmental Protection (FDEP) Form 62-257.900(1), Notice of Demolition or Asbestos Renovation

eeeee. FDEP Form 62-620.910(17), No Exposure Certification for Exclusion From National Pollutant Discharge Elimination System Stormwater Permitting

fffff. FDEP Form 62-701.900(1), Solid Waste Management Facility Permit

ggggg. St. Johns River Water Management District (SJRWMD) Form 40C-4.900(1), Joint Application for Environmental Resource Permit, Authorization to Use State Owned Submerged Lands Federal Dredge and Fill Permit

hhhhh. SJRWMD Form 40C-4.900(3), Construction Commencement Notice

P.5 MEASUREMENT/VERIFICATION

Compliance with the requirements contained in this KNPR will be verified through normal surveillance, audit, and assessment activities performed by the NASA Spaceport Integration and Services organization. Refer to Section 2.9 of this KNPR for details about inspection, monitoring, testing, and reporting performed by NASA environmental personnel or their designees.

P.6 CANCELLATION OR SUPERSESSION

This revision supersedes KNPR 8500.1, Rev. C-2, KSC Environmental Requirements.

/original signed by/

Nancy P. Bray
Director, Spaceport Integration and Services

Distribution: TechDoc Library

CHAPTER 1. KENNEDY SPACE CENTER ENVIRONMENTAL REQUIREMENTS

1.1 Goal

The goal of this KNPR is to provide consistent direction for implementation of environmental requirements in support of the Center's operations.

1.2 Objective

The objective of this KNPR is to document Center environmental requirements and implement procedural direction unique to KSC by effectively and efficiently conveying those requirements to employees, customers, and the public.

1.3 Responsibilities

1.3.1 The heads of primary organizations, contract managers, and contract technical representatives are responsible for ensuring compliance with the provisions of this KNPR on the part of civil service and contractor personnel who support programs for which they have primary responsibility.

1.3.2 Partner organizations are responsible for ensuring all operations, activities, equipment, and facilities are in compliance with all Federal, state of Florida, and local environmental laws, statutes, regulations, and ordnances. Partners are commercial entities using KSC facilities. Unless stated otherwise in their agreement, the Partner is solely responsible for compliance with aforementioned environmental regulatory requirements including environmental permits. The Partner shall be considered an independent entity responsible for its own actions for the purpose of environmental compliance and permitting matters.

CHAPTER 2. GENERAL ENVIRONMENTAL RESPONSIBILITIES

2.1 Boards and Committees

2.1.1 The EAB and EMB, collectively referred to as the Environmental Branches, represent the Center's environmental interests on the following internal and external boards and committees:

a. NASA Environmental Management Panel

b. NASA Energy Efficiency Panel

c. Space Coast Environmental Solutions Tier I Partnering Team

d. Space Coast Environmental Tier II Partnering Team

e. Space Coast Water Quality Tier I Partnering Team

f. Space Coast Waste Trackers Tier I Partnering Team

g. Space Coast Air Tier I Partnering Team

h. KSC Energy Working Group (EWG)

i. KSC Sustainable Environment Management System (SEMS) Steering Committee

j. KSC SEMS Core Teams

2.1.2 Contractor and organizational environmental points of contact are expected to participate in the above working groups when requested by the NASA EAB or EMB.

2.2 Principal Center for Recycling and Sustainable Acquisition

The NASA Principal Center for Recycling and Sustainable Acquisition (RSA) program resides at KSC and is an Agency resource, providing RSA leadership and expertise to all NASA facilities. The NASA EMB provides contract and project management for the Principal Center. This program is carried out through compliance with EO 13693, Planning for Federal Sustainability in the Next Decade, and the Affirmative Procurement Program and Plan for Environmentally Preferable Products document, NPR 8530.1, NASA Sustainable Acquisition.

2.3 Sustainable Environment Management System

2.3.1 EO 13693 and NPR 8553.1, NASA Environmental Management System, require NASA Centers to implement and maintain an Energy Management System (EMS) and KSC's EMS is entitled Sustainable Environment Management System (SEMS). KSC's SEMS, as described in KNPR 8553.1, NASA KSC Sustainable Environment Management System, is in conformance with NPR 8553.1 and KSC documents this conformance through annual management reviews and declaration of conformance. The KSC SEMS addresses the sustainable practice areas and goals stated in EO 13693 and KSC-PLN-8553, Kennedy Space Center Sustainability Plan.

2.3.2 Contractors, tenants, and concessionaires shall support the KSC SEMS via data input, reporting, and external and internal audits if required to do so by their contracts or KSC partnership agreements.

2.4 Preparing Documentation

2.4.1 The initiating organization shall be responsible for preparing all documentation mandated by applicable environmental requirements for the organization's actions or operations. This includes signing and sealing of permit applications, design drawings, and other correspondence by a professional engineer (PE) when required.

2.4.2 The NASA Environmental Branches are available for consultation to assist the initiating organization in compiling any necessary documentation. The NASA Environmental Branches are responsible for reviewing all documentation and submitting it to the appropriate regulatory agency.

2.4.3 For agencies accepting electronic submittals, NASA may request contractors submit electronic copies of permit applications to regulatory agencies and pay associated submittal fee(s). When contractors pay permit application fee(s) they shall provide to the NASA EAB documentation of payment.

2.4.4 Organizations responsible for maintaining onsite documentation (as established by regulation or permit condition) shall ensure the proper documentation is readily available for internal or regulatory inspections.

2.4.5 The NASA Environmental Branches are responsible for providing copies of all permits and other applicable documentation from sources external to KSC to the appropriate KSC organizations. The NASA Environmental Branches shall maintain a centralized official file for this documentation.

2.5 External Communications

2.5.1 The NASA Environmental Branches are the Center's single interface for official communications with environmental regulatory agencies and other organizations external to KSC regarding environmental issues. Some examples of official communications include negotiating permit conditions, enforcement orders, compliance agreements, regulatory inspections, and discussions that affect KSC programs and operations or have multi-organization implications.

2.5.2 Establishing the NASA Environmental Branches as a single interface is intended to ensure consistency of application of environmental program requirements across the Center, to present a consistent position to parties external to the Center, and to meet Office of Federal Procurement Policy and NASA Headquarters' (HQ) mandates regarding inherently governmental functions. Activities that require the exercise of discretion in applying Governmental authority, or the making of commitments that bind the U.S. to take some action, either by contract, policy, regulation, authorization, order, monetary payment, or otherwise, are considered inherently Governmental and shall be performed by Government employees.

2.6 Interpreting Regulation and Establishing Kennedy Space Center Requirements

2.6.1 The NASA Environmental Branches shall provide requirements and guidance on environmental issues at KSC using the following methods:

a. Evaluate and maintain current knowledge of all environmental requirements.

b. Develop appropriate KSC procedures and controls and enable access by all Center organizations to help ensure compliance.

2.6.2 When environmental requirements necessitate interpretation, the NASA Environmental Branches shall provide a response to KSC organizations based on in-house expertise or negotiated agreements with regulatory agencies.

2.6.3 When required, the NASA Environmental Branches shall:

a. Request clarification from and negotiate new agreements with the appropriate regulating agencies and elicit input and participation from KSC organizations when preparing the Center's position on a subject or when meeting with regulatory personnel.

b. Provide the new agreements or clarifications to KSC organizations when they are finalized.

2.7 Implementing Policy and Regulations

2.7.1. All KSC organizations (NASA, tenant, and contractor) shall ensure all actions taken under their authority and funding meet the applicable requirements of all Federal, state, and local environmental laws and regulations including obtaining all required environmental permits.

2.7.2 Each organization shall ensure that controls on employee, contractor, and subcontractor activities are established and maintained to prevent noncompliance.

2.8 Inspection, Monitoring, Testing, and Reporting

2.8.1 Each KSC organization shall ensure the appropriate requirements of the regulations are fulfilled for operations and activities under their control. Testing, inspection, monitoring, and reporting required to comply with environmental regulations are the responsibility of each KSC organization.

2.8.2 Inspections

a. Facility managers or qualified personnel shall perform routine inspections of facilities or operations as required by regulations, permits, and this KNPR. All persons performing inspections will be qualified to do so in accordance with (IAW) required education, training, or experience. Examples of required routine inspections include monthly inspection of secondary containment of registered storage tanks and weekly inspection of hazardous waste storage facilities.

b. The NASA Environmental Branches and the KSC environmental support contractor shall perform periodic inspections of KSC programs and projects. The purpose of internal inspections is to ensure activities are in compliance with their respective permits or with the

regulations governing their operations. These inspections will not assess punitive damages such as those assessed by the regulatory agencies. The purpose is to identify compliance concerns so they can be corrected in a timely manner by the responsible operating organization.

c. The NASA Environmental Branches shall serve as the KSC point of contact and accompany the regulator at all times while on KSC property. Environmental regulatory agencies that are authorized to inspect may do so at any time for any permitted or regulated facility or activity at KSC. The regulatory agency may give verbal or written notice of an impending inspection or the inspection may be unannounced.

d. The KSC organization responsible for the facility or activity being inspected shall attend the inspection. Regulators can also perform sampling or monitoring on any substance or parameter at any KSC facility to determine compliance with a permit. Regulatory inspection findings are provided to operational personnel and the management of the organization.

2.8.3 Monitoring

a. Environmental monitoring of operational areas at KSC shall be performed to determine if permitted activities are operating IAW the general and specific conditions listed in a permit.

b. Permit-related sampling and analysis shall be performed by the KSC Environmental Sampling, Analysis, and Monitoring (ESAM) Office, operational personnel, or designated representatives.

c. Monitoring results shall be transferred to the appropriate report forms and transmitted to the operating organization.

d. The operating organization shall:

(1) Review the data provided by the KSC ESAM or operational personnel to ensure no transcription errors have occurred.

(2) List items of noncompliance and explain the reason for noncompliance in a report.

(3) Transmit the monitoring reports to the NASA Environmental Branches. An exception applies for KSC Partners with their own permits who submit operating reports directly to the regulatory agency.

e. The Chief of the NASA EAB shall sign the monitoring reports as the owner, operator, or authorized representative.

NOTE: An exception applies for reports that require the signature of a licensed operator as in the case of the Monthly Operating Reports for drinking water treatment or when KSC partners have their own permits.

2.8.4. Testing:

a. Any operational testing required by permit or regulation shall be performed by the operator or installer, as applicable. Examples of testing are:

(1) Tightness tests for storage tank installations to certify the integrity of a tank before it is placed in service.

(2) Leak tests on containment to determine the integrity of the containment system.

b. Any reports of testing results shall be maintained onsite and a copy forwarded to the NASA Environmental Branches through the operating organization for submittal to the proper agency, if required.

2.8.5 Reporting

a. All required regulatory reports shall be submitted to regulatory agencies through the NASA Environmental Branches, except for reports associated with permits held by KSC Partners.

b. The operating organization shall make certain the required reports are submitted to the NASA Environmental Branches in sufficient time to ensure the reports reach the regulatory agency in the time period listed in the applicable permit or regulation.

c. The NASA Environmental Branches shall review the submittal for completeness and accuracy.

d. The operating organization shall be notified of any deficiencies and be responsible for correcting deficiencies.

e. The NASA Environmental Branches shall submit the report to the appropriate regulatory agency.

f. Copies of the correspondence transmitted to the regulatory agency shall be kept by the NASA Environmental Branches.

g. The NASA Environmental Branches shall be the listed point of contact for all monitoring report submittals and coordinate inquiries from regulatory agencies concerning monitoring and testing data.

2.9 National Aeronautics and Space Administration Environmental Tracking System

2.9.1 The NASA Environmental Tracking System (NETS) is an information management tool (central database) for assisting NASA and contractor personnel in the collection, maintenance, and reporting of environmental data related to KSC operations.

2.9.2 The NETS environmental database is maintained for the Agency by Glenn Research Center. KSC civil servants and contractors are granted access to the system as required for data input. NASA Environmental Branches shall consolidate the information and submit it to NASA HQ through NETS.

2.9.3 Online NETS training is available and NASA Environmental representatives are available for guidance during training and report generation periods.

2.10 Training

2.10.1 KSC organizations shall ensure personnel receive proper training prior to engaging in activities that could potentially have environmental impacts. Mandatory training is specifically set forth in state and Federal regulations for certain activities and operations.

2.10.2 KSC organizations shall maintain training records for compliance purposes.

2.11 Public Involvement

2.11.1 Public involvement through public notice, comments, or input shall be required at times to support environmental actions at KSC. Actions include permit applications and modifications, EAs, and Environmental Impact Statements (EIS). Public involvement also occurs through workshops, public meetings, public hearings, and administrative hearings.

a. The workshop is an informal meeting to inform the public of the status of a specific topic and to answer any questions the public might have.

b. The public meeting is an informally structured meeting to discuss a specific topic and receive the public's input.

c. A public hearing is a formally structured meeting run by the interested Government agency and is part of the public record.

d. An administrative hearing is a legal proceeding run by a hearing officer. It is conducted after an Intent to Issue Permit has been challenged and is attended by lawyers for the challenging and the defending parties.

2.11.2 The NASA Environmental Branches shall develop the content and implement the public involvement activities.

2.11.3 The responsible organization shall support the technical aspects of the meetings and coordinate the details with the NASA Environmental Branches, including date, time, and place of meetings, press releases, and fact sheets.

2.12 Permit Compliance and Violations

2.12.1 Each KSC organization shall develop instructional procedures to ensure compliance with permit requirements within their organization and be responsible for reporting apparent permit violations to the NASA Environmental Branches.

2.12.2 The NASA Environmental Branches shall report apparent permit violations to the appropriate state or Federal agencies, and negotiate compliance requirements in cooperation with the lead organization.

2.12.3 The KSC partners shall negotiate resolution and corrective actions with the regulatory agencies for violations identified during regulatory inspections at their facilities.

CHAPTER 3. THE NATIONAL ENVIRONMENTAL POLICY ACT IMPLEMENTATION

3.1 Kennedy Space Center Environmental Checklist

3.1.1 The National Environmental Policy Act (NEPA) of 1969 requires Federal agencies to prepare an environmental analysis of any action undertaken that could affect the environment. Implementation of the NEPA is detailed in NPR 8580.1, NASA National Environmental Policy Act Management Requirements. The KSC Environmental Checklist (EC) process, KDP-P-1727, initiates the initial environmental review of projects and actions processes under this requirement. All NASA organizations and KSC tenants (Air Force [AF], partners, and contractors) must comply with this KDP when their projects are on KSC property, or when NASA activities are implemented on AF property.

3.1.2 The KSC EC aids in early identification of environmental issues and requirements associated with proposed work and activities.

3.1.3 The project lead or requester for a project or action shall complete KSC Form 21-608, KSC Environmental Checklist, at the earliest possible time in the project schedule.

3.1.4 The checklist shall be submitted for review to the NASA EMB with all supporting documentation, including but not limited to, design drawings and maps. The form and detailed instructions for its completion are available on the KSC EMB NEPA Web page.

3.1.5 If the proposed action is categorically excluded (CATEX) from further NEPA review based on the evaluation of the checklist and project information, NASA EMB will mark the appropriate space on the Record of Environmental Consideration (REC). The REC will be sent to the project proponent and NASA EMB will keep a copy. Specific activities are listed in 14 CFR 1216.304(d) as normally being CATEX from the requirements for an Environmental Assessment (EA) or an Environmental Impact Statement (EIS).

3.1.6 The REC lists all of the project's known environmental requirements based on the EC submittal. Requirements identified in the REC include permits, outside agency consultations, and special procedures or processes used during project implementation. The REC is valid for six months from the REC signature date. The project proponent shall maintain REC validity by providing NASA EMB with any project scope changes, and notification if the project has not commenced within six months of REC issuance. The proponent can update the original KSC EC to NASA EMB via e-mail. EMB will update and reissue the REC.

3.1.7 Based on the checklist information provided, if the NASA EMB determines CATEX does not apply to the proposed action, a formal EA is required. The REC identifies the EA requirement and the project proponent must prepare the EA using project funds. Refer to the process of conducting EAs in KDP-P-1726, Environmental Assessment. If an EA does not support a "finding of no significant impact," an EIS is required. EIS preparation shall be coordinated between NASA EMB and HQ, and with support of the primary organization having programmatic responsibility.

3.2 Use of Air Force Form 813 for Cape Canaveral Air Force Station Projects

3.2.1 When a new operation, facility, or project involving construction or facility structure modification on Cape Canaveral Air Force Station (CCAFS) is proposed, both KSC Form 21-

608, KSC Environmental Checklist, and Air Force (AF) Form 813, Request for Environmental Impact Analysis, are required.

3.2.2 AF Form 813 shall be completed IAW 32 CFR 989, Environmental Impact Analysis Process, using information gathered during submittal of the KSC EC. See Section 3.1 of this KNPR).

3.2.3 The project proponent shall forward the signed AF Form 813 and supporting documentation to the CCAFS Environmental Office.

3.3 Environmental Resources Document

IAW NPR 8580.1, NASA National Environmental Policy Act Management Requirements, NASA EMB shall prepare and update the KSC Environmental Resources Document (ERD), KSC-PLN-1911, required by 14 CFR Subpart 1216.3. The ERD should be used by preparers of EA and EIS as a reference to avoid restating similar material. It should also be used to cover areas prescribed in 14 CFR 1216.3. The ERD will be reviewed annually and updated as needed with a complete revision every five years.

CHAPTER 4: POLLUTION INCIDENT REPORTING AND CLEANUP

4.1 Pollution Incident Reporting to 911

4.1.1 All hazardous material releases to air, water, soil, or pavement shall be reported immediately IAW the requirements in KDP-KSC-P-3008, Hazardous Materials Emergency Response.

a. At KSC, emergency services can be reached from a desk phone by dialing 911 (or 321-[redacted] from a cell phone).

b. At CCAFS, KSC operated facilities can reach emergency services from a desk phone by dialing 911 (or [redacted] from a cell phone).

c. At Patrick AF Base (PAFB), KSC operated facilities can reach emergency services from a desk phone by dialing 911 (also 911 from a cell phone – state to the operator that you are located at PAFB).

4.1.2 If the caller is unsure whether or not the release is non-emergency or emergency, the call will be treated as an emergency. The KSC Spill Response Team will not respond to a release unless 911 has been notified.

4.1.3 A release is defined as the spilling, leaking, discharging, emitting, escaping, pouring, dumping, draining, leaching, seeping, injecting, placing, or disposing of a material.

4.2 Pollution Incident Reporting to National Aeronautics and Space Administration Environmental Assurance Branch

4.2.1 Organizations and contractors shall immediately report all substance releases (intentional and unintentional) listed below to the NASA EAB by e-mailing the details to ksc-dl-nasa-[redacted] or by calling the dedicated pollution incident release reporting number [redacted]

a. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) list of hazardous substances in 40 CFR 302.4.

b. EPCRA list of extremely hazardous substances in 40 CFR 355 Appendix A.

c. EPCRA toxic chemical listing in 40 CFR 372.65.

d. Department of Transportation (DOT) hazardous materials table in 49 CFR 172.101.

e. Clean Air Act (CAA) list of regulated toxic substances for accidental release prevention in 40 CFR 68.130.

f. Class I ozone depleting substances (ODS) listed in 40 CFR 82 Appendix A.

g. Class II ODS listed in 40 CFR 82 Appendix B.

h. Domestic waste water or untreated sewage.

i. Oils, fuels, greases, and other petroleum products.

4.2.2 The NASA EAB shall determine if the released substance exceeds a reportable threshold and report the release to the appropriate offsite authorities and regulatory agencies.

4.3 Pollution Incident Documentation

4.3.1 All releases shall be documented IAW KDP-KSC-P-1728, KSC Pollution Incident Report, unless the release meets the exemptions listed in Section 4.4 of this KNPR.

a. Organizations and contractors shall complete and submit a Pollution Incident Report (PIR) and Notification to the NASA EAB within three working days after the release.

b. The PIR shall be submitted to the NASA EAB via the PIR reporting Web site. If unable to access the PIR Web site, submit a KSC Form 21-555, Pollution Incident Reporting and Notification, to the NASA EAB within three working days after the release by e-mailing it to ksc-dl-[redacted] gov. The PIR form and instructions for completing the form are available on the KSC Electronic Forms Web site. The notification must include the following information:

(1) A map of appropriate scale showing the location of the discharge area(s)

(2) General dimensions of affected area

(3) Photos, if available

c. The NASA EAB shall review the submitted PIR form, contact the submitter for additional information (if required), and provide direction to the submitter regarding follow-on actions (if required).

d. Organizations and contractors shall also ensure that PIR forms are submitted for the following types of releases:

(1) Any process water releases, cooling tower water releases, or industrial wastewater releases not covered by an existing permit or discharge authorization

(2) Intentional and unintentional releases of halons

(3) Unintentional releases of ODS not associated with a refrigerant system.

(4) Refrigerant system discharges over 50 pounds

4.4 PIR Reporting Exemptions

4.4.1. Organizations and contractors do not have to complete and submit PIR forms to the NASA EAB for the following releases:

(a) Small amounts (four fluid ounces or less) of materials released inside a facility on impervious surfaces that are immediately cleaned up, do not migrate out of the facility, and do not reach soil, sediment, groundwater, or surface water. Floors with cracks, expansion joints,

drains, etc., are not considered “impervious surfaces.” This exemption does not apply to spills or releases requiring assistance from the KSC Spill Response Team.

(b) Release of materials (four fluid ounces or less, or vapor) that occur during normal operations or scheduled activities (e.g., drips from a hose disconnection) as long as they are immediately cleaned up and do not reach soil, sediment, groundwater, or surface water. This exemption does not apply to spills or releases requiring assistance from the KSC Spill Response Team.

(c) Discharges or releases covered by a permit or discharge authorization as long as the release meets the permit or discharge authorization conditions or limits.

(d) Discharges of refrigerant system less than 50 pounds.

(e) Any releases of major atmospheric gases (nitrogen and oxygen) or non-radioactive isotopes of noble gases (helium, neon, argon, etc.).

(f) Potable water or sewage releases. The Institutional Services Contract (ISC) contractor shall submit malfunction reports to the NASA EAB and FDEP for accidental releases associated with the KSC potable water and domestic wastewater systems.

4.4.2 The NASA EAB shall maintain an electronic database of submitted PIR forms to evaluate incidents, track cleanup status, perform trend analysis, and respond to data calls from NASA HQ. The database is also used to support environmental planning, property transfers and leases, site assessments, and environmental remediation efforts.

4.5 Cleanup

4.5.1 Organizations and contractors shall take measures to stop, minimize, contain, and clean up releases (with trained onsite personnel) provided those actions do not pose health or safety risks to personnel.

4.5.2 Once the release has been deemed a non-emergency or the emergency response activity is complete, organizations and contractors shall be responsible for ensuring proper cleanup of release and may request support from the KSC Spill Response Team.

4.5.3 If the contamination or cleanup is beyond the scope or capability of the KSC Spill Response Team (such as large-scale contamination, contamination reaching the groundwater table, contamination that is inaccessible due to utilities or structures, contamination where cleanup threatens to undermine a structure, or contamination where conditions are unsafe for KSC Spill Response Team members), the responsible organization or contractor shall complete the cleanup.

4.5.4 All releases shall be cleaned up according to the criteria in Chapter 4.6 of this KNPR.

4.5.5 Organizations and contractors shall coordinate all cleanups involving releases to environmental media (soil, sediment, surface water, or groundwater) with the NASA EAB.

4.5.6 The NASA EAB shall notify and correspond with regulatory agencies, if required, regarding cleanups involving releases to environmental media (soil, sediment, surface water, or groundwater).

4.5.7 Organizations and contractors shall submit sampling results, cleanup reports, and other information documenting the cleanup to the NASA EAB.

4.6 Cleanup Criteria

4.6.1 Spills and releases to pervious surfaces (includes soil, sediment, surface water, or groundwater) outside the boundaries of a Solid Waste Management Unit (SWMU) or Potential Release Location (PRL) shall be cleaned up to the following standards:

a. Soil, surface water, and groundwater cleanup levels shall meet residential criteria as stated in FAC 62-777.

b. Sediment under fresh waters shall meet the *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Water*, published by FDEP in January, 2003.

c. Sediment under marine waters shall *meet Approach to the Assessment of Sediment Quality in Florida Coastal Waters*, published by FDEP in November, 1994.

d. Sediments with contaminants not addressed under the fresh water or marine water guidance above shall meet the Environmental Protection Agency (EPA) Region 4 Waste Management Division Sediment Screening Values for Hazardous Waste Sites.

4.6.2 Spills and releases to pervious surfaces (includes soil, sediment, surface water, or groundwater) within the boundaries of an SWMU or PRL shall be cleaned up to standards provided by the NASA EAB for all environmental media based on the release details and the location of the release in relation to known contamination within the SWMU or PRL.

4.6.3 Spills and releases to impervious surfaces shall be cleaned until there is no visible contamination left. Surfaces with cracks, expansion joints, sumps, drains, or other potential routes to environmental media (soil, sediment, surface water, or groundwater) are not considered impervious surfaces.

4.6.4 For cleanups involving releases to environmental media (soil, sediment, surface water, or groundwater), post-cleanup sample(s) shall be collected and analyzed to confirm that all contamination has been sufficiently removed to meet the cleanup standard.

4.6.5 For cleanups involving releases to environmental media (soil, sediment, surface water, or groundwater), sampling locations and cleanup areas shall be recorded with a global positioning system unit that is accurate to one meter.

4.6.6 Any deviation or exception to the cleanup criteria listed above shall be approved in writing by the NASA EAB Chief.

4.7 Financial Responsibility for Cleanup

4.7.1 When environmental contamination of soil, sediment, surface water, or groundwater results from failure to follow established procedures, failure to comply with existing regulatory requirements, deferred maintenance, obsolescence or failure to maintain a facility or

containment, or failure to implement sound environmental management controls, the culpable organization or contractor shall be financially responsible for all cleanup costs.

4.7.2 At the discretion of the NASA EAB Chief, the responsible contractor or organization shall not be held financially responsible for cleaning up environmental contamination caused by events which are not foreseeable and are outside of human control (such as natural disasters) and which are in no way related to a lack of due diligence as described in the previous paragraph.

CHAPTER 5. SPILL PREVENTION, CONTROL, AND COUNTERMEASURES

5.1 Background and Regulatory Requirements

5.1.1 Oil pollution prevention regulations (commonly referred to as Spill Prevention, Control, and Countermeasures [SPCC] regulations), found in 40 CFR Part 112, are designed to prevent discharges of oil from reaching the navigable waters of the U.S. and to ensure proactive and effective measures are used in response to an oil discharge.

5.1.2 SPCC regulations require the preparation and implementation of formal SPCC plans for all non-transportation related facilities that store oil in excess of specific quantities (an aggregate above ground container capacity greater than 1,320 gallons [only containers greater than or equal to 55 gallons are counted], or completely buried storage capacity greater than 42,000 gallons) and that have discharged or could reasonably be expected to discharge oil into navigable waters of the U.S. or its adjoining shorelines.

5.1.3 Since KSC stores more than 1,320 gallons of oil above ground and a discharge could reach navigable waters, KSC is subject to the SPCC regulations and must develop and maintain an SPCC plan.

5.1.4 IAW SPCC regulations, the NASA EAB shall maintain a complete copy of the KSC SPCC Plan onsite and make it available to EPA personnel upon request.

5.2 Spill Prevention, Control, and Countermeasures Plan

5.2.1 The KSC SPCC Plan consists of two documents: KSC-PLN-1919, Spill Prevention, Control, and Countermeasures Plan and KSC-PLN-1920, Appendix B: KSC Site-Specific SPCC Plans.

a. KSC-PLN-1919 contains general requirements and procedures for the prevention, response, control, and reporting of oil discharges at KSC. The plan serves as a guide for personnel and organizations responsible for ensuring that all measures are taken to prevent and contain discharges and leaks of oil IAW all applicable Federal and state regulations.

(1) IAW SPCC regulations, the NASA EAB shall review and update KSC-PLN-1919 every five years (or sooner if needed) to incorporate changes in SPCC regulations, KSC requirements, guidance, organizations, and contractors.

(2) KSC-PLN-1919 shall contain the following information:

(a) A general description of the installation as it pertains to oil spill prevention, control, and response.

(b) An inventory of the storage, handling, and transfer facilities that could potentially produce a discharge of oil to navigable waters or adjoining shorelines.

(c) Roles and responsibilities for discharge detection and prevention for all organizations that use or store oil.

(d) Roles and responsibilities for personnel and organizations involved in coordinating and participating in the response to discharges of oil.

(e) SPCC training requirements for oil handling personnel.

(f) Reporting procedures and recordkeeping requirements for spills.

(g) A PE certification for all technical amendments to an SPCC Plan.

b. KSC-PLN-1920, Appendix B, KSC Site-Specific Spill Prevention, Control, and Countermeasures Plan contains site-specific SPCC plans detailing the location, oil storage quantity, spill routes, spill prevention, and spill response measures for all KSC locations where oil is stored in containers with a capacity of at least 55 gallons.

(1) The operating organizations and contractors shall develop, maintain, and implement site-specific SPCC plans for their oil storage activities.

(2) Site-specific SPCC plans shall comply with SPCC regulations and with the requirements in KSC-PLN-1919.

(3) Site-specific plans in KSC-PLN-1920 shall contain the following information:

(a) A description of the oil stored, handled, or transferred at that location (facility number, material name, number of containers, container type, container capacity, transfer methods, etc.).

(b) Spill routes and a detailed description of countermeasures and equipment available for diversion and containment of discharges.

(c) Site-specific requirements for spill prevention, response, and control.

(d) A PE certification for all technical amendments to an SPCC Plan.

(4) Since SPCC regulations require that SPCC plans be updated within six months of a change in oil storage activity, NASA EAB shall send out a data call and update KSC-PLN-1920 semi-annually (or sooner if needed).

(5) During the semi-annual update, organizations and contractors shall submit site-specific SPCC plan updates, amendment logs, and PE certifications to the NASA EAB by the due date identified in the data call letter.

5.3 Spill Prevention, Control, and Countermeasures Compliance, Discharge Reporting, and Recordkeeping

Operating organizations and contractors shall:

5.3.1 Ensure that all oil storage activities are in compliance with SPCC regulations, KSC-PLN-1919, Spill Prevention, Control, and Countermeasures Plan requirements, and KSC-PLN-1920, Appendix B, KSC Site-Specific Spill Prevention, Control, and Countermeasures Plan, site-specific plans.

5.3.2 Immediately report oil discharges according to the requirements in Chapter 4 of this KNPR.

5.3.3 Maintain SPCC compliance records (such as training, inspection, and maintenance records) for a minimum of three years.

CHAPTER 6. AIR COMPLIANCE

6.1 Background and Regulatory Requirements

6.1.1 The CAA is the law for protecting and improving the nation's air quality and stratospheric ozone layer. The EPA's implementing regulations for the CAA are located in 40 CFR (Protection of Environment) 50-99.

6.1.2 The CAA requires Federal facilities to "comply with all Federal, state, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of air pollution in the same manner, and to the same extent as any non-Governmental entity." Therefore, KSC is subject to all CAA requirements and implementing regulations.

6.1.3 The EPA has delegated its air permitting authority under the CAA to the FDEP. Therefore, the FDEP issues and enforces air permits at KSC.

6.1.4 The CAA regulations are complex and cover thousands of pollutants and emission sources. Additional regulatory requirements and emissions restrictions can apply to a facility when the ambient air concentration in the area for one or more of the six criteria pollutants exceeds certain standards. The six criteria pollutants are sulfur dioxide, nitrogen oxides, carbon monoxide, particulate matter, lead, and ground-level ozone. Areas of the U.S. that exceed a standard for a criteria pollutant are in non-attainment for that criteria pollutant. Areas of the U.S. that meet the standard for a criteria pollutant are in attainment for that criteria pollutant. Brevard County and KSC are currently in attainment for all six criteria pollutants.

6.1.5 Under the General Duty Clause of the CAA, KSC has a duty to report accidental (non-permitted) releases of air pollutants. Organizations and contractors shall take measures to eliminate or minimize air pollution emissions and prevent accidental releases and report accidental releases according to the requirements in Chapter 4 of this KNPR.

6.1.6 Title V of the CAA establishes the operating permit program for facilities. A Title V Air Operation Permit is a facility-wide permit that consolidates all emission units (EU) and their applicable air compliance requirements into one permit. KSC has a Title V Air Operation Permit issued by the FDEP. As emission sources are constructed or eliminated at KSC, they are incorporated into or removed from the Title V Air Operation Permit. The NASA EAB shall manage and maintain the KSC Title V Air Operation Permit.

6.1.7 Under CAA regulations, facilities that store specific toxic and flammable substances above certain quantity thresholds must develop a Risk Management Plan (RMP) to identify hazards that may result from a release, take steps to prevent an accidental release, and minimize consequences should an accidental release occur. KSC is no longer subject to this requirement due to reduced chemical storage levels, for example mono methyl hydrazine. KSC deregistered their CAA RMP and may re-register at a later date if processes change or chemical storage quantities increase.

6.2 Kennedy Space Center Title V Air Operation Permit

6.2.1 Operational, Testing, Recordkeeping, Inspection, and Reporting Requirements

a. Organizations and contractors shall follow all KSC Title V Air Operation Permit requirements and operate their EUs according to permit conditions and requirements. Organizations and contractors shall develop management procedures to ensure EUs are operated according to permit conditions and requirements.

b. The KSC Title V Air Operation Permit requires that Visual Emission Observation (VEO) testing be performed on certain EUs. The frequency of the testing is specified in the permit.

(1) Organizations and contractors shall coordinate and schedule VEO testing with the NASA EAB to meet permit and notification requirements.

(2) The NASA EAB shall notify FDEP of VEO tests at least 15 days prior to the test.

(3) Once the VEO test is complete, organizations and contractors shall review the test results for accuracy and submit the test results to the NASA EAB.

(4) The NASA EAB shall submit all VEO test reports to FDEP.

c. Organizations and contractors shall collect and maintain records (such as chemical usage data, fuel usage data, equipment operating hours, maintenance logs, sampling data, etc.) required by the permit for each EU they operate and submit these records to the NASA EAB by the tenth day of each month for the preceding month's operations.

d. Organizations and contractors shall demonstrate compliance with all applicable regulatory and permit requirements during internal and regulatory inspections.

e. The NASA EAB shall:

(1) Maintain a copy of the latest version of the KSC Title V Air Operation Permit at the facility.

(2) Maintain records submitted from contractors and organizations on each EU.

(3) Compile monthly data, calculate 12-month rolling totals to ensure compliance with permit conditions, and assess KSC's status as a major or minor emission source as defined within EPA and FDEP regulations.

(4) Conduct periodic inspections of EUs to monitor compliance and ensure proper recordkeeping.

(5) Maintain KSC Potential to Emit (PTE) calculations.

(6) Maintain Site Specific Monitoring Plans as required for permitted EUs.

f. Semi-Annual Monitoring Report, Annual Operating Report, Statement of Compliance, and Emission Fee Report.

(1) The NASA EAB shall prepare the Semi-Annual Monitoring Report, Annual Operating Report, Statement of Compliance, and Emission Fee Report required by the permit; obtain signatures from the Office of the Associate Director; and submit the documents to FDEP by the regulatory deadline.

(2) Organizations and contractors shall support the preparation of these documents by providing operating data, records, and compliance information as requested by the NASA EAB.

(3) Organizations and contractors shall submit annual compliance statements to the NASA EAB certifying that their EUs were operated IAW permit conditions and requirements.

6.2.2 KSC Title V Air Operation Permit Renewals

a. IAW CAA regulations, Title V Air Operation Permits must be renewed no later than five years from the last issuance. The NASA EAB shall be responsible for identifying regulatory changes, coordinating any permit changes with organizations and contractors, exploring new permitting strategies, preparing the application, and obtaining the permit renewal.

b. Organizations and contractors shall support the permit renewal process by providing EU information and records, reviewing and commenting on draft applications, and reviewing and commenting on draft permits.

6.2.3 KSC Title V Air Operation Permit Modifications

a. Organizations and contractors shall immediately notify the NASA EAB of any plans to construct, purchase, modify, change the operation of, or demolish an air emission source.

b. The NASA EAB shall review the proposed action and determine whether a permit or permit modification is required.

c. If the NASA EAB determines that the proposed air emission source or action does not require a permit or permit modification, the NASA EAB shall notify the project proponent and instruct the project proponent about any operational conditions or recordkeeping requirements.

d. If the NASA EAB determines that the proposed air emission source or action requires a minor modification to the KSC Title V Air Operation Permit, the NASA EAB shall execute the permit modification through the FDEP, notify the project proponent when operations can begin (or when they can execute the proposed action), and instruct the project proponent about the permit requirements, operational conditions, and recordkeeping requirements.

e. If the NASA EAB determines that the proposed air emission source or action requires a major modification to the KSC Title V Air Operation Permit or that a new source construction and operation permit is required, the project proponent shall:

(1) Prepare a complete permit application package that must be signed and sealed by a registered PE (certain new sources may require a combined construction and operation permit application).

(2) Coordinate the new emission source PTE calculations with the NASA EAB maintained KSC PTE.

(3) Submit the draft application package to the NASA EAB for review.

(4) Incorporate comments identified by the NASA EAB into the application package (in coordination with the PE).

(5) Submit the final application package to the NASA EAB who shall obtain signatures from the Office of the Associate Director and submit the application package to FDEP.

(6) Prepare responses (in coordination with the PE) to any requests for additional information (RAI) from FDEP regarding the permit application package.

(7) Submit RAI responses to the NASA EAB for submission to FDEP.

(8) Review the draft permit from FDEP.

(9) Provide comments or corrections to the draft permit (in coordination with the PE) to the NASA EAB for submission to FDEP.

f. The NASA EAB shall publish any required public notices regarding air permitting actions.

g. If a new source construction and operation permit is obtained, the NASA EAB shall incorporate those sources into the KSC Title V Air Operation Permit.

h. When FDEP issues an air permit, the NASA EAB shall distribute the permit to all affected contractors, organizations, and project proponents, and communicate all operational conditions, emission limits, testing requirements, and recordkeeping requirements.

6.3 Kennedy Space Center Clean Air Act Risk Management Plan

6.3.1 Section 112(r) of the CAA established the chemical accident prevention provisions. The chemical accident prevention implementing regulations are located in 40 CFR 68, Protection of Environment, and require facilities that manufacture, process, store, or handle regulated substances above thresholds listed in 40 CFR 68.130 to have a risk management program and RMP. The purpose of the risk management program and RMP is to identify hazards that may result from an accidental release, take steps to prevent an accidental release, and minimize consequences should an accidental release occur.

6.3.2 If KSC re-registers the CAA RMP, it will be reviewed by various emergency planning and response entities such as KSC Protective Services, Brevard County Emergency Management, State Emergency Response Commission (SERC), and the Local Emergency Planning Committee. KSC CAA RMP elements would also be incorporated into the KSC Comprehensive Emergency Management Plan.

6.3.3 If KSC needs to re-register the RMP, the NASA EAB shall develop and maintain the KSC CAA RMP.

6.3.4 Organizations and contractors shall notify the NASA EAB prior to:

a. Adding, deleting, or modifying (change in process, regulated substance volume, or chemical type) any operations that manufacture, process, store, or handle any regulated substance greater than the threshold listed in 40 CFR 68.130.

b. Increasing the volume of a regulated substance in an existing operation to the point where it exceeds the threshold listed in 40 CFR 68.130.

6.3.5 RMP Modification requirements if KSC re-registers the CAA RMP:

a. When new processes are added to the RMP, the NASA EAB must perform the required analyses, modify the RMP, and submit the revised RMP to EPA before the process becomes operational (loading of the regulated substance into the process equipment). Organizations and contractors shall support the RMP modification by providing process information to the NASA EAB as requested.

b. For changes to existing processes listed in the RMP (process deletion, decrease in regulated substance volume below threshold levels, increase in regulated substance volume above threshold levels, etc.) the NASA EAB must perform the required analyses, modify the RMP, and submit the revised RMP to EPA within six months after the change occurs. Organizations and contractors shall support the RMP modification by providing process information to the NASA EAB as requested.

c. IAW chemical accident prevention regulations, the NASA EAB shall review the RMP for changes and resubmit the RMP to EPA at a minimum of every five years even if no changes are required to the RMP.

d. IAW chemical accident prevention regulations, the NASA EAB shall revise the RMP and submit it to EPA within six months after any chemical accident that meets certain criteria defined in the regulations.

e. As stated in Section 6.1.7 of this KNPR, KSC deregistered the CAA RMP, but may re-register at a later date if processes change or chemical storage quantities increase.

6.3.6 Annual RMP Audits if KSC re-registers the CAA RMP:

a. The NASA EAB shall conduct annual audits to verify that KSC operations are incorporated into and in compliance with the RMP.

b. Prior to the audit, organizations and contractors shall complete an “Annual Applicability Checklist” provided by the NASA EAB.

c. The NASA EAB shall review the checklists, inspect facilities with knowledgeable organization and contractor personnel, verify RMP elements, and modify the RMP as necessary.

6.3.7 IAW 40 CFR 68.58, Protection of Environment, if KSC re-registers the CAA RMP, the NASA EAB shall:

a. Conduct a formal compliance audit at least every three years to ensure that all KSC operations are in compliance with chemical accident prevention regulations.

b. Inspect facilities with knowledgeable organization and contractor personnel, document findings, and develop an audit report.

c. Identify corrective actions for all findings, implement the corrective actions, and document when the findings have been corrected.

d. Maintain the two most recent compliance audit reports on file for potential regulatory inspection.

6.3.8 If KSC re-registers the RMP and a new process is required to be added, the owning organization or contractor shall complete an "Emergency Response Checklist" provided by the NASA EAB and submit the completed checklist to both the NASA EAB and KSC Emergency Preparedness Office to support RMP and KSC emergency response document updates. The purpose of this checklist is to gather information for emergency planning and response related to the new process.

6.4 Ozone Depleting Substance Requirements

6.4.1 ODS are used across KSC (in refrigeration systems, in fire suppression systems, as cleaning solvents, etc.) and must be properly managed according to CAA regulations. ODS are divided into two classes based on their potential to break down the stratospheric ozone layer. The EPA is phasing out the production and use of all ODS. Since Class I ODS have a higher ozone depleting potential than Class II ODS, Class I ODS are being phased out first. A list of Class I ODS can be found in 40 CFR 82 Appendix A, Protection of Environment. A list of Class II ODS can be found in 40 CFR 82 Appendix B.

6.4.2 Training Requirements

a. Personnel who test, maintain, service, repair, or dispose of stationary refrigeration and air conditioning systems shall complete certification training required under Section 608 of the CAA.

b. Organizations and contractors shall submit the number of newly certified personnel to the NASA EAB as requested.

c. Personnel who test, maintain, service, repair, or dispose of motor vehicle air conditioner (MVAC) systems shall complete certification training required under Section 609 of the CAA.

d. Personnel who test, maintain, service, repair, or dispose of halon-containing systems and equipment shall be trained IAW 40 CFR 82.270. Organizations and contractors can refer to EPA's "Guidance for the EPA Halon Emission Reduction Rule" document for additional guidance on halon training requirements.

e. Organizations and contractors that manage halon-containing systems or equipment shall provide initial and refresher training, document training course content, and maintain training records for their personnel.

6.4.3 Refrigerant System Repair and Maintenance Requirements

a. During maintenance and servicing activities, organizations and contractors shall take precautions to minimize and prevent releasing refrigerants into the atmosphere. The CAA prohibits individuals from knowingly venting refrigerants into the atmosphere while maintaining, servicing, repairing, or disposing of air conditioning and refrigeration equipment.

b. Personnel who test, maintain, service, repair, or dispose of stationary refrigeration and air conditioning systems shall do so as described in Section 608 of the CAA.

c. Personnel who test, maintain, service, repair, or dispose of MVAC systems shall do so IAW Section 609 of the CAA.

d. Organizations and contractors shall keep up-to-date service records for equipment containing 50 or more pounds of refrigerant for the previous three years showing the dates, types of service, and quantities of refrigerant added and purchased.

e. Organizations and contractors with commercial refrigeration equipment containing over 50 pounds of refrigerant shall repair all leaks within 30 days if the equipment is leaking at a rate which will exceed 35 percent of the total charge during a 12-month period (amount of refrigerant added in pounds/total system refrigerant charge in pounds X 365 days/smaller between number of days since refrigerant last added or 365 days X 100 percent greater than 35 percent).

f. Organizations and contractors with industrial refrigeration equipment containing over 50 pounds of refrigerant shall repair all leaks within 30 days if the equipment is leaking at a rate which will exceed 35 percent of the total charge during a 12-month period (amount of refrigerant leaked in pounds X 12 months/total system refrigerant charge in pounds/elapsed time of leak in months X 100 percent greater than 35 percent). In the event that an industrial refrigeration system shutdown is required or if the necessary repair parts are unavailable, organizations and contractors may have up to 120 days to complete the repair providing that leak verification testing is performed after the repair as required by 40 CFR 82.156.

g. Organizations and contractors operating comfort cooling equipment shall repair all leaks within 30 days if the unit leaks at a rate exceeding 15 percent of the total charge during a 12-month period (amount of refrigerant leaked in pounds X 12 months/total system refrigerant charge in pounds/elapsed time of leak in months X 100 percent greater than 15 percent).

h. Organizations and contractors operating industrial refrigeration or HVAC equipment containing over 50 pounds of refrigerant shall keep required release, maintenance, and repair records and make them available to the EAB or regulatory inspector upon request.

6.4.4 Halon System Repair and Maintenance Requirements

a. During maintenance and servicing activities, organizations and contractors shall take precautions to minimize and prevent releasing halons into the atmosphere. The CAA prohibits individuals from knowingly venting halons into the atmosphere while maintaining, servicing, repairing, or disposing of halon-containing equipment.

b. Personnel who test, maintain, service, repair, or dispose of halon-containing systems and equipment shall do so IAW the requirements in 40 CFR 82.250 – 82.270.

c. Organizations and contractors shall submit the types, usage quantities, storage quantities, and purchase amounts of all ODS and ODS substitutes to the NASA EAB during annual data calls issued by the NASA EAB.

6.4.5 The NASA EAB shall enter this information into NETS for NASA HQ tracking and review.

6.4.6 Organizations and contractors shall submit PIR forms for releases of ODS according to the requirements in Chapter 4 of this KNPR.

6.5 Asbestos Emission and Notification Requirements

6.5.1 Asbestos is categorized as a hazardous air pollutant because of adverse health effects on the lungs. EPA regulations for asbestos emissions, known as the asbestos National Emission Standard Hazardous Air Pollutants (NESHAP), are located in 40 CFR 61.140 - 61.157. FDEP regulations for asbestos removal are located in FAC Chapter 62-257, Department of Environmental Protection. Organizations and contractors shall conduct all facility and asbestos abatement projects as required by these asbestos regulations.

6.5.2 When a project involving the modification or demolition of a facility is proposed:

a. The project initiator shall follow KNPR 1840.19, KSC Industrial Hygiene Program, in considering the potential hazards associated with asbestos-containing building material (ACBM).

b. The project designer shall determine the presence of ACBM and the need for its disturbance or removal.

c. The project designer shall ensure that current asbestos survey data from the KSC contractor's web-based Asbestos Management Information System is used to determine the locations and quantities of identified ACBM and that this information is included in any statement of work or other work control package provided to the abatement contractor.

6.5.3 Organizations and contractors shall notify FDEP of individual demolition, renovation, and asbestos abatement projects using FDEP Form 62-257.900(1), Notice of Demolition or Asbestos Renovation, no later than ten working days prior to the start of work if:

a. The project involves removal of at least 260 linear feet, 160 square feet, or 35 cubic feet of Regulated Asbestos-Containing Material (RACM).

b. The demolition or renovation project involves the disturbance of any load-supporting structural member regardless of RACM presence or absence.

(1) Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations, or the intentional burning of any facility.

(2) Renovation means the alteration in any way of a facility or of one or more facility components.

c. Organizations and contractors shall submit copies of all FDEP notification forms to NASA EAB the same day. Submit a copy to the NASA Aerospace Medicine and Occupational Health Branch IAW the requirements of KNPR 1840.19, Section 3.3., KSC Asbestos Management Program, specifically FDEP Form 62-257.900(1).

d. Organizations and contractors shall submit a revised notification form to FDEP if the amount of RACM changes by more than 20 percent.

6.5.4 The NASA EAB shall send out an annual data call to KSC organizations and contractors asking for anticipated demolition, renovation, and asbestos abatement projects for the upcoming calendar year.

6.5.5 Organizations and contractors shall submit a list of all projects involving both RACM and non-regulated asbestos containing material and the estimated quantities of asbestos even if the project is below the FDEP notification thresholds listed above in Section 6.5.3a.

6.5.6 The NASA EAB shall submit one notification form to FDEP covering all projects that fall below the individual project reporting thresholds listed above in Section 6.5.3a for KSC for the upcoming calendar year and a revised notification form to FDEP if the actual amount of RACM from those projects changes by more than 20 percent.

6.5.7 Organizations and contractors shall ensure that demolition, renovation, and asbestos abatement projects are in compliance with the following asbestos NESHAP requirements:

a. No visible emissions can be discharged to the outside air from the collection, processing, transport, and disposal of asbestos-containing waste materials during renovations or demolition activities. Visible asbestos-containing debris on the ground outside a removal job is considered a visible emission and a violation of the asbestos NESHAP.

b. At least one trained supervisor shall be present when asbestos-containing material is stripped, removed, disturbed, or otherwise handled.

c. Evidence of this training shall be posted and made available for inspection at the demolition, renovation, or asbestos abatement job site.

6.6 Air Permitting and Compliance Requirements at the Diverted Aggregate Reclamation and Collection Yard

6.6.1 The Diverted Aggregate Reclamation and Collection Yard (DARCY) is a cleared, 10-acre parcel adjacent to the KSC landfill on Schwartz Road. The DARCY provides a temporary storage and processing area for reuse of waste concrete, porcelain (toilets, sinks), and other aggregate-based materials such as river rock, limestone, and gravel.

6.6.2 This section addresses air permit and compliance requirements for the crushing operations at the DARCY. These requirements do not apply to screening, sifting, emplacement, removal, segregation, rebar removal, or sorting activities. All other DARCY use and environmental compliance requirements are located in Chapter 26 of this KNPR.

6.6.3 The KSC Title V Air Operation Permit (Emission Unit 92) covers the emissions from the crushing activity. Crushing equipment operators shall possess an active General Air Operation Permit issued by FDEP for the portable crushing equipment in order to operate at the DARCY.

6.6.4 Crushing Equipment Operator Requirements

a. The crushing equipment operator shall provide a copy of the following information for each crushing event to the NASA EAB prior to mobilizing crushing equipment to the DARCY:

(1) Current General Air Operation Permit for the crushing equipment

(2) Most recent visible emission test report for the crushing equipment

(3) Permitted operating rate for the crushing equipment

(4) Actual anticipated operating rate of the crushing equipment during operations at KSC

(5) A schematic of the unit operations comprising the crushing equipment, clearly identifying particulate matter emission points (i.e., conveyor transfer points, crushers, and screening operations)

(6) A list of controls that are used at the particular unit operations

(7) Anticipated start up and completion dates of the crushing event

b. The crushing equipment operator shall control unconfined emissions of particulate matter (dust) by using a water suppression system with spray bars located in such a manner as to confine emissions to where they occur (such as the feeder, crusher entrance, crusher exit, filter screen, and conveyor drop points).

c. The crushing equipment operator shall maintain an operating log onsite for all crushing operations with the following information:

(1) Equipment operator name

(2) General Air Operation Permit number

(3) Operation start date

(4) Operation end date

(5) If an internal combustion engine is used onsite, engine manufacturer, model, serial number, horsepower or kilowatt rating, manufacturer date, EPA Tier classification (if applicable), and EPA Certificate of Conformity (if applicable).

(6) Total gallons of each fuel consumed by the crushing equipment during the operation

(7) Total weight of each type of aggregate material crushed during the operation

d. The crushing equipment operator shall deliver the operating log to the NASA EAB before the crushing equipment is removed from the DARCY.

e. In the event the crushing operation straddles two calendar years, the crushing equipment operator shall deliver separate operating logs for the activities performed during each calendar year to the NASA EAB.

(1) The operating log for the first calendar year shall be submitted by January 15th of the next calendar year.

(2) The operating log for the second calendar year shall be submitted before the crushing equipment is removed from the DARCY.

(3) The operation end date on the operating log for the first calendar year shall be December 31.

(4) The operation start date on the operating log for the second calendar year shall be January 1.

f. The landfill operator shall provide the NASA EAB with annual Material Delivery records and Removed for Reuse records by January 15th for activities of the previous calendar year.

CHAPTER 7. CONSTRUCTION DEWATERING

7.1 Dewatering Permits

7.1.1 All dewatering activities at KSC, including the pumping out of manholes, sumps, and other structures in which groundwater may accumulate, shall follow KSC dewatering requirements.

7.1.2 Organizations and contractors shall not begin construction or operation of a dewatering system without approval and receipt of a permit, if required.

a. A dewatering activity may require coverage under SJRWMD's general permit by rule to withdraw ground or surface water anywhere within the District for short-term construction dewatering activities (excluding borrow operations), subject to the limiting conditions in Chapter FAC 40C-2.042(9) and Appendix I of the "Applicant's Handbook, Consumptive Uses of Water."

b. A dewatering activity may require coverage under the FDEP's general permit by rule to discharge ground or surface water to a surface water body for short-term construction dewatering activities, subject to the limiting conditions in FAC Chapter 62-621.300(2), Permits.

c. Whether a permit is required or not, there may be additional conditions, restrictions, or requirements placed on the dewatering activity due to the proximity of groundwater contaminants. NASA EAB Remediation team lead will provide those requirements upon notification of proposed dewatering.

7.1.3 The organization, contractor, or other entity performing the dewatering is responsible for applying for all required permits.

7.1.4 Organizations and contractors are responsible for ensuring that the entity performing the dewatering activity abides by all permit conditions and regulations. Organizations and contractors shall inspect the project site, notify the NASA EAB of any potential issues or violations, and correct any issues or violations.

7.1.5 The NASA EAB shall perform compliance assistance, conduct inspections, and interpret permit conditions or regulatory requirements.

7.2 Dewatering Requirements

7.2.1 All dewatering projects at KSC shall:

a. Comply with guidance provided by the NASA Remediation Project Manager for potentially contaminated water.

b. Adhere to BMP regarding turbidity and erosion control.

c. Not directly discharge to Outstanding Florida Waters, Class I water bodies, or Class II water bodies.

d. Not be performed where there are chemicals or materials present in the discharge area that may contaminate the dewatering discharge.

7.2.2 Dewatering activities shall be considered separate projects when they involve distinctly separate dewatering operations (i.e., different geographic locations, different objectives). For example:

a. Dewatering for trenching operations at two different construction locations shall be considered two separate dewatering activities.

b. A series of manholes being simultaneously dewatered for a related project shall be one distinct dewatering operation.

CHAPTER 8. DRINKING WATER

8.1 Background and Regulatory Requirements

8.1.1 KSC operates and maintains a non-transient, non-community public water system (FDEP Public Water System Identification Number 3054024). KSC purchases water from the City of Cocoa and performs additional treatment onsite to ensure safe drinking water and protect the distribution system.

8.1.2 Operations and Maintenance

a. The KSC Drinking Water System shall be operated and maintained IAW:

(1) FAC Chapter 62-550, Drinking Water Standards Monitoring and Reporting

(2) FAC Chapter 62-555, Permitting, Construction, Operation, and Maintenance of Public Water Systems

(3) FAC Chapter 62-602, Water or Domestic Wastewater Treatment Plant Operators and Distribution System Operators

(4) FAC Chapter 62-699, Treatment Plant Classification and Staffing

(5) FAC Chapter 64E-8, Drinking Water Systems

b. All pipe materials and joints/fittings including gaskets utilized shall be compatible with soil and/or groundwater contamination identified in SWMU areas to prevent chemical transmission into the water supply or reduced lifespan of the material.

c. The operator of the KSC Drinking Water System shall coordinate with the City of Cocoa when a compliance issue within the KSC Drinking Water System arises as a result of issues originating from the City of Cocoa water system.

d. Compliance and operational monitoring of the KSC Drinking Water System shall be conducted according to the sampling plan developed by the KSC contractor providing sampling support.

e. Microbiological samples shall be analyzed by the in-house laboratory.

f. Completed compliance reports shall be provided to the NASA EAB by the fifth day of the month they are due to be submitted to FDEP. The Government will submit the required forms to FDEP.

g. The operator of the KSC Drinking Water System shall notify the appropriate State agencies, the Contracting Officer Representative (COR) or authorized representative(s), the KSC Sanitation and Public Health Officer, and the AF (as applicable) immediately upon discovery of any sabotage, emergency, abnormal operating condition, or off-nominal circumstance IAW FAC 62-555.350, Permitting, Construction, Operation, and Maintenance of Public Water Systems.

h. The operator of the KSC Drinking Water System shall provide notification to the COR or authorized representatives, AF, and FDEP on the status of the potable water system following any severe weather events including hurricanes and tropical storms.

i. The operator of the KSC Drinking Water System shall communicate “boil water” notices to the applicable parts of the KSC community as a result of an emergency on Center or if reported by the City of Cocoa Utilities Department. Note that under agreement with FDEP, KSC issues “boil water” notices as “Do Not Drink” postings, tagging out affected areas.

j. If the KSC Drinking Water System is out-of-compliance, the operator of the KSC Drinking Water System shall perform necessary actions to bring the system back into compliance, notify personnel in affected areas of the distribution system, and post notices at—or remove from service—affected drinking water sources (such as fountains and sinks).

k. The NASA EAB shall develop any required public notices for out-of-compliance conditions, coordinate the public notices through FDEP, and distribute the public notices to KSC personnel. Facility managers, in addition to the system operator, may be required to post the public notices in conspicuous locations and remove them after the system is returned to compliance.

l. For potable water line breaks considered to be non-malfunctions, the operator of the KSC Drinking Water System shall complete all necessary repairs and request the sampling contractor to collect a one-day bacteriological sample. These records are held internally and are not required to be submitted to FDEP.

8.2 Planned Modifications of the Kennedy Space Center Drinking Water System

8.2.1 Organizations and contractors shall ensure that all projects that will modify the KSC Drinking Water System are designed according to Federal, state, and local regulations, codes, specifications, and standards.

8.2.2 Organizations and contractors shall not begin construction without approval and receipt of a permit, if required. Permit determination will be made by the NASA EAB.

8.2.3 The initiating organization or contractor shall ensure that the design information submitted to the FDEP in the permit application (and any subsequent submittals) is equivalent to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

8.2.4 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

8.2.5 All prepared permit documents will be reviewed by the NASA EAB, signed by the Government when deemed complete, and returned to the preparer for their submittal to the FDEP. The initiating organization or contractor shall pay the application fee.

8.2.6 The Government will provide all bacteriological sampling services by the KSC contractor providing sampling support.

8.2.7 Projects not requiring permits shall follow appropriate sanitary practices including chlorination, flushing, and operational bacteriological testing prior to placing projects into service.

8.2.8 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall periodically inspect the project site, notify the NASA EAB of any potential issues or violations, and immediately correct any issues or violations.

8.2.9 The NASA EAB shall perform compliance assistance, conduct inspections, interpret permit conditions or regulatory requirements, and consult with regulatory agencies in support of a construction activity.

CHAPTER 9. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

9.1 Background and Regulatory Requirements

9.1.1 The National Pollutant Discharge Elimination System (NPDES) program under the Clean Water Act (CWA) is a permitting program to control the discharge of pollutants from any point source into waters of the U.S.

9.1.2 EPA has authorized the FDEP to implement the NPDES permitting program in the state of Florida. Therefore, the FDEP issues and enforces NPDES permits at KSC.

9.2 Stormwater Discharge from Construction Activity

9.2.1 Organizations and contractors shall obtain coverage under FAC Chapter 62-621.300(4), Permits, for projects that include land disturbance greater than one acre in area.

9.2.2 The initiating organization or contractor shall ensure that the design information submitted to the FDEP in the permit application (and any subsequent submittals) is equivalent to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

9.2.3 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

9.2.4 All prepared permit documents will be reviewed by the NASA EAB and returned to the preparer for submittal to the FDEP. The initiating organization or contractor shall pay the permit application fee.

9.2.5 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall inspect the project site, notify the NASA EAB of any potential issues or violations, and correct any issues or violations.

9.2.6 The responsible organization or contractor shall abide by all applicable regulations; abide by all general and sector-specific permit conditions including the development, implementation, and maintenance of a Stormwater Pollution Prevention Plan (SWPPP); perform all required inspections and recordkeeping; and take appropriate measures to properly manage site stormwater.

9.3 Stormwater Discharge Associated with Industrial Activity

9.3.1 Organizations and contractors shall obtain coverage under Chapter 62-621.300(5), Permits, for operations and activities that are covered by this permit.

9.3.2 Under certain circumstances, a particular regulated activity may be eligible to be exempt from permitting under the NPDES stormwater program (see Section 9.4 of this KNPR).

9.3.3 The initiating organization or contractor shall ensure that the design information submitted to the FDEP in the permit application (and any subsequent submittals) is equivalent

to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

9.3.4 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

9.3.5 All prepared permit documents will be reviewed by the NASA EAB and returned to the preparer for their submittal to the FDEP. The initiating organization or contractor shall pay the permit application fee.

9.3.6 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall inspect the project site, notify the NASA EAB of any potential issues or violations, and correct any issues or violations.

9.3.7 The responsible organization or contractor shall abide by all applicable regulations; abide by all general and sector-specific permit conditions including the development, implementation, and maintenance of an SWPPP; perform all required inspections and recordkeeping; and take appropriate measures to properly manage site stormwater.

9.3.8 If the permit or SWPPP requires sampling results or discharge monitoring reports to be submitted to FDEP:

a. The responsible organization or contractor shall coordinate with the NASA EAB sampling contractor to perform the sampling and analysis.

b. The NASA EAB shall submit the sampling results and reports to FDEP.

9.4 Obtaining a Conditional No Exposure Exclusion to National Pollutant Discharge Elimination System Stormwater Industrial Activity Permits

9.4.1 The organization or contractor shall establish that no industrial materials or activities are exposed to precipitation or runoff by meeting the criteria for no exposure outlined in FAC 62-620.100(2)(o), Wastewater Facility and Activities Permitting.

9.4.2 The organization or contractor shall apply for the exemption by completing the FDEP Form 62-620.910(17), No Exposure Certification for Exclusion from NPDES Stormwater Permitting, and submitting it to the NASA EAB for review and comment.

9.4.3 If the exemption is approved by FDEP, the responsible organization or contractor shall maintain the site conditions that allowed the exemption.

9.4.4 Organizations and contractors shall renew No Exposure Certifications every five years by following the process described in this section.

CHAPTER 10. STORMWATER MANAGEMENT SYSTEMS

10.1 Background and Regulatory Requirements

10.1.1 The State of Florida developed the Environmental Resource Permit (ERP) Program to regulate activities that would affect wetlands, alter surface water flows, or contribute to water pollution.

10.1.2 The Florida ERP Program regulates activities involving the alteration of surface water flows. This includes new activities that generate stormwater runoff from new construction as well as dredging and filling in wetlands and other surface waters. For KSC, these regulations often require the construction and maintenance of surface water management systems to control stormwater runoff.

10.2 Operations and Maintenance

10.2.1 The permitted stormwater management systems at KSC shall be operated and maintained IAW FAC Chapter 40C-4, Environmental Resource Permits: Surface Water Management Systems.

10.2.2 Compliance inspections shall be conducted by the contractor providing operations and maintenance (O&M) oversight of the KSC stormwater systems.

10.2.3 All compliance issues will be reported to the NASA EAB. Major compliance issues, such as the washout of stormwater pond berms, will be reported to SJRWMD by the NASA EAB. Minor compliance issues, such as grass needing to be mowed, skimmers needing to be repaired, or sediment build-up, shall be handled as routine maintenance issues.

10.2.4 The contractor providing O&M oversight of the KSC stormwater systems shall perform necessary actions to bring the system back into compliance.

10.2.5 The contractor providing O&M oversight of the KSC stormwater systems shall provide notification to the COR (or authorized representatives) and NASA EAB on the status of the KSC stormwater systems following any severe weather events including hurricanes and tropical storms.

10.3 Projects That Require Stormwater Management Systems

10.3.1 Organizations and contractors shall ensure that all projects that will modify existing or create new stormwater management systems are designed according to Federal, state, and local regulations, codes, specifications, and standards.

10.3.2 Organizations and contractors shall not begin construction without approval and receipt of a permit, if required. Permit determinations will be made by the NASA EAB.

10.3.3 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

10.3.4 All prepared permit documents will be reviewed by the NASA EAB, signed by the Government when deemed complete, and returned to the preparer for their submittal to the SJRWMD. The initiating organization or contractor shall pay the permit application fee.

10.3.5 The initiating organization or contractor shall ensure that the design information submitted to the SJRWMD in the permit application (and any subsequent submittals) is equivalent to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

10.3.6 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall periodically inspect the project site, notify the NASA EAB of any potential issues or violations, and immediately correct any issues or violations.

10.3.7 The NASA EAB shall perform compliance assistance, conduct inspections, interpret permit conditions or regulatory requirements, and consult with regulatory agencies in support of a construction activity.

CHAPTER 11. DOMESTIC WASTEWATER

11.1 Background and Regulatory Requirements

11.1.1 The FDEP administers programs, promulgates regulations, and issues permits concerning domestic wastewater disposal in order to protect public health and water resources.

11.1.2 The KSC domestic wastewater collection and transmission system is regulated by the FDEP. This system transports raw domestic wastewater to an AF-operated domestic wastewater treatment plant at CCAFS that operates under a No Discharge NPDES domestic wastewater permit.

11.2 Operations and Maintenance

11.2.1 The KSC Domestic Wastewater System shall be operated and maintained IAW:

a. FAC Chapter 62-604, Collection Systems and Transmission Facilities

b. FAC Chapter 64E-6, Standards for Onsite Sewage Treatment and Disposal Systems

11.2.2 All pipe materials and joints/fittings, including gaskets used, shall be compatible with soil and/or groundwater contamination identified in SWMU areas to prevent chemical transmission into the wastewater supply or reduced lifespan of the material.

11.2.3 The operator of the KSC Domestic Wastewater System shall notify the appropriate state agencies, the COR or authorized representative(s), the KSC Sanitation and Public Health Officer, and the AF (as applicable) immediately upon discovery of an abnormal event.

a. Sewage spills of less than 1,000 gallons shall be reported by the operator of the KSC Domestic Wastewater System to the FDEP as soon as practical, but no later than 24 hours after discovery.

b. Sewage spills of 1,000 gallons or more, or where the public health or the environment may be endangered, shall be reported by the operator of the KSC Domestic Wastewater System to the State Watch Office's toll-free number, [redacted]

11.2.4 The operator of the KSC Domestic Wastewater System shall provide notification to the COR or authorized representatives, AF, and FDEP on the status of the KSC Domestic Wastewater system following any severe weather events including hurricanes and tropical storms.

11.2.5 The operator of the KSC Domestic Wastewater System shall perform necessary actions to remediate sewage spills and repair line breaks.

11.2.6 Organizations and contractors shall not discharge non-domestic wastewater into a KSC domestic wastewater collection and transmission system unless authorized by the operator of the KSC Domestic Wastewater System and the AF’s domestic wastewater treatment plant operator.

11.3 Planned Modifications of the Kennedy Space Center Domestic Wastewater System

11.3.1 Organizations and contractors shall ensure that all projects that will modify the KSC Domestic Wastewater System are designed according to Federal, state, and local regulations, codes, specifications, and standards.

11.3.2 Organizations and contractors shall not begin construction without approval and receipt of a permit, if required. This determination will be made by the NASA EAB.

11.3.3 The initiating organization or contractor shall ensure that the design information submitted to the FDEP in the permit application (and any subsequent submittals) is equivalent to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

11.3.4 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

11.3.5 All prepared permit documents will be reviewed by the NASA EAB and signed by the Government when deemed complete. The Government will deliver the submittal to the AF for their signature. Once signed by the AF, the submittal will be returned to the preparer for submittal to the FDEP. The initiating organization or contractor shall pay the permit application fee.

11.3.6 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall periodically inspect the project site, notify the NASA EAB of any potential issues or violations, and immediately correct any issues or violations.

11.3.7 The NASA EAB shall perform compliance assistance, conduct inspections, interpret permit conditions or regulatory requirements, and consult with regulatory agencies in support of construction activity.

11.3.8 The completed work shall not be placed into service until approved by the FDEP.

11.4 Onsite Sewage Treatment and Disposal Systems

11.4.1 The installation and use of an onsite sewage treatment and disposal system (OSTDS) is prohibited at KSC except when connection to a domestic wastewater collection and transmission system is infeasible based on the remoteness of the facility from existing infrastructure.

11.4.2 The operator of the KSC Domestic Wastewater System shall operate, maintain, abandon, and repair all existing OSTDS IAW all applicable state rules and regulations.

CHAPTER 12. INDUSTRIAL WASTEWATER

12.1 Background and Regulatory Requirements

12.1.1 State of Florida regulations define industrial wastewater as any wastewater that is not classified as domestic wastewater. Since industrial wastewater has the potential to contain various pollutants at various concentrations, all discharges to the environment are regulated. Examples of industrial wastewater at KSC are launch deluge water, industrial process water, wash water, rinse water, sump water, stormwater captured in secondary containment structures, air conditioning system condensate, compressor condensate, cooling tower water, groundwater dewatering effluent, and water flushed from potable and drinking water systems.

12.1.2 Organizations and contractors shall properly collect, evaluate, manage, treat, and dispose of industrial wastewater according to Federal regulations, state regulations, and the requirements of this KNPR.

12.2 Regulatory Requirements

12.2.1 Industrial wastewater shall be handled as a hazardous or controlled waste and properly collected, evaluated, managed, treated, and disposed of according to Federal regulations, state regulations, and the requirements of Chapter 13 of this KNPR.

12.2.2 A Process Waste Questionnaire (PWG) shall be submitted to the KSC WMO for all potentially hazardous waste streams in accordance with Section 13.2.1. The KSC WMO will prepare a Technical Response Package (TRP), which will authorize one of the following methods of wastewater disposal:

a. Containerization (usually in drums or tanks) for off-Center shipment and disposal by the waste management contractor at an approved disposal facility (some form of onsite treatment may or may not be required prior to shipment).

b. Pick up and transportation (usually in tanker trucks) by the waste management contractor for processing and disposal at the CCAFS Trident wastewater pretreatment plant.

c. Discharge to the domestic wastewater system under an approval from the operator of the KSC wastewater system and the AF domestic wastewater treatment plant operator (some form of treatment at the facility may or may not be required prior to discharge).

d. Collection, treatment, and discharge to the environment at a facility under an industrial wastewater permit.

e. Discharge to the environment at a facility with minimal or no treatment (approval by the NASA EAB or FDEP may be required).

12.3 Industrial Wastewater Permits

12.3.1 Organizations and contractors shall ensure that all projects are designed according to Federal, state, and local regulations, codes, specifications, and standards.

12.3.2 Organizations and contractors shall not begin construction without approval and receipt of a permit, if required.

12.3.3 The initiating organization or contractor shall ensure that the design information submitted to the FDEP in the permit application (and any subsequent submittals) is equivalent to the design information in the final work package, support request, or construction contract and that the entity performing the work abides by all applicable regulations and permit conditions.

12.3.4 Organizations and contractors shall prepare all required documents, drawings, forms, and other necessary instruments required by the permitting process from application to close out of the permit.

12.3.5 All prepared permit documents will be reviewed by the NASA EAB and signed by the Government when deemed complete. Once signed, the submittal will be returned to the preparer for submittal to the FDEP. The initiating organization or contractor shall pay the permit application fee.

12.3.6 Organizations and contractors are responsible for ensuring that the entity performing the work abides by all permit conditions and regulations. Organizations and contractors shall periodically inspect the project site, notify the NASA EAB of any potential issues or violations, and immediately correct any issues or violations.

12.3.7 The NASA EAB shall perform compliance assistance, conduct inspections, interpret permit conditions or regulatory requirements, and consult with regulatory agencies in support of a construction activity.

12.3.8 The completed work shall not be placed into service until approved by the FDEP.

12.4 Industrial Wastewater Permit Operations

12.4.1 Organizations and contractors responsible for industrial wastewater permits shall:

a. Operate, maintain, and repair all industrial wastewater facilities IAW all applicable Federal and state regulations and permit conditions.

b. Ensure that all industrial wastewater discharges meet regulatory and permit conditions and limits.

c. Develop and maintain procedures to ensure permit compliance.

d. Inspect facilities and discharges to ensure permit compliance.

e. Conduct all required sampling, monitoring, and analysis (or request the NASA EAB Sampling Support contractor to perform).

f. Maintain all operational records, data, and logs required by regulation or the permit.

g. Prepare and submit all required operational, monitoring, and regulatory reports to the NASA EAB at least seven calendar days prior to the due date.

h. Immediately notify the NASA EAB of any potential permit violations, deficiencies, or non-compliance items.

i. Immediately correct violations, deficiencies, or non-compliance items.

j. Not communicate directly with FDEP unless approved by the NASA EAB.

12.4.2 The NASA EAB shall:

a. Review all operational, monitoring, and regulatory reports submitted by the responsible organization or contractor for accuracy and submit them to the FDEP by the due date.

b. Conduct periodic inspections of permitted facilities, activities, and discharges.

c. Request and monitor corrective actions for any violations, deficiencies, or non-compliance items.

d. Coordinate and respond to inquiries from regulatory agencies concerning sampling data, monitoring data, and regulatory reports.

e. Verify that adequate procedures have been developed by the responsible organization or contractor to ensure compliance with regulatory and permit requirements.

f. Report apparent permit violations to the appropriate regulatory agencies.

CHAPTER 13. HAZARDOUS AND CONTROLLED WASTE

13.1 Background and Regulatory Requirements

13.1.1 The Federal Government and the State of Florida have passed laws and promulgated regulations regarding the identification, transportation, treatment, storage, and disposal of hazardous and controlled waste.

13.1.2 The Federal RCRA administered by the EPA regulates the identification, transportation, treatment, storage, and disposal of solid and hazardous wastes. EPA's implementing regulations for RCRA are located in 40 CFR 260-279, Protection of Environment.

13.1.3 The Federal Toxic Substances Control Act (TSCA) is administered by the EPA and regulates the manufacture, processing, distribution in commerce, use, marking, storage, and disposal of polychlorinated biphenyls (PCB). EPA's implementing regulations for PCBs are located in 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.

13.1.4 The State of Florida regulations for hazardous waste management and used oil management are FAC 62-730, Hazardous Waste, and FAC 62-710, Used Oil Management, respectively.

13.1.5 The EPA has delegated authority to the FDEP to implement and enforce RCRA regulations and issue hazardous waste permits in the State of Florida. Therefore, the FDEP regulates, inspects, and issues permits to KSC for hazardous and controlled waste management.

13.1.6 KSC is a large quantity generator of hazardous waste. Consequently, all wastes generated on KSC property are subject to stricter regulatory requirements for storage, labeling, management, and disposal. Industry norms and waste management procedures practiced by contractors not on KSC property may not be acceptable on KSC property. All activities at KSC are subject to inspection and enforcement by Federal and state regulatory agencies.

13.1.7 Organizations and contractors shall properly identify, manage, and dispose of all hazardous and controlled waste according to the applicable Federal, state, and local regulations and the requirements of this KNPR.

13.1.8 Organizations and contractors shall develop general and site-specific waste management procedures and requirements for their operations to ensure compliance with applicable Federal, state, and local regulations and the requirements of this KNPR.

13.1.9 Organizations and contractors shall reduce the volume and toxicity of hazardous wastes to the extent economically practicable. Chapter 26 of this KNPR provides requirements for waste minimization as required by the RCRA, the 1984 Hazardous and Solid Waste Amendments to RCRA, and the Pollution Prevention Act.

13.1.10 The KSC Waste Management Office (WMO) shall characterize, pick up, and dispose of all hazardous and controlled waste generated at KSC. More detailed guidance for requesting KSC WMO support can be obtained from EVS-P-0001, Waste Management and Sampling Plan.

13.1.11 All spills and releases of hazardous and controlled waste shall be reported according to the requirements of Chapter 4 in this KNPR.

13.1.12 All communication and interface with regulatory agencies regarding hazardous and controlled waste management and disposal shall be coordinated through and performed by the NASA EAB.

13.2 Waste Evaluation and Sampling

13.2.1 Organizations and contractors shall complete KSC Form 26-551, Process Waste Questionnaire, for all potentially hazardous or controlled waste streams and submit them to the KSC WMO. The Process Waste Questionnaire (PWQ) is used to evaluate and characterize the waste streams.

13.2.2 KSC has a web-based application, called the Waste Management System (WMS), to request sampling, submit PWQs, evaluate waste streams, and facilitate the waste characterization process. The WMS stores PWQ information and tracks the status of PWQ submittals and can be used to recertify PWQs.

13.2.3 Organizations and contractors shall submit PWQs via the WMS unless they do not have access to the KSC computer network.

13.2.4 PWQs shall be submitted prior to generating the waste if there is sufficient information available to evaluate and characterize the waste.

13.2.5 Organizations and contractors shall submit relevant waste evaluation information or data (such as Safety Data Sheets [SDS], sampling results, process knowledge, etc.) with the PWQ.

13.2.6 If sampling and analysis is required to characterize the waste stream or complete the PWQ, the generating organization or contractor shall conduct the sampling and analysis or request sampling and analysis support from the KSC ESAM Office.

13.2.7 Organizations and contractors shall evaluate waste streams annually to determine if the waste generating process has changed or if there is variability in waste characteristics.

13.2.8 Organizations and contractors shall recertify PWQs annually and submit revised PWQs if the waste generating process has changed or if there is variability in waste characteristics.

13.2.9 Organizations and contractors shall place KSC Form 29-759, Label, Hazardous Waste Determination In-Progress, (per the requirements found below in Section 13.3 of this KNPR) on the waste container pending completion of the sampling, analysis, and waste evaluation process.

13.2.10 The KSC WMO shall evaluate PWQs, characterize the waste streams, determine whether wastes are hazardous waste or controlled waste, and issue a TRP back to the generating organization or contractor with the following information and guidance:

a. Hazardous waste or controlled waste determinations

b. Controlled waste classifications

c. Sampling and analysis parameters

d. Packaging and container requirements

e. Labeling requirements

13.2.11 Organizations and contractors shall manage, package, and label wastes according to TRP instructions.

13.3 Hazardous Waste Determination in Progress Requirements

13.3.1 The Hazardous Waste Determination in Progress (HWDIP) is a specific KSC label and process that has been partnered with and approved by the FDEP to meet regulatory requirements. This process is used when an unknown waste stream, new waste stream, or established waste stream with variable characteristics or compositions is generated.

13.3.2 A variable waste is a waste that may change between hazardous waste or non-hazardous waste from batch to batch (such as blast media or anti-freeze) and the generator has been previously provided PWQs/TRPs for both types of waste.

13.3.3 The HWDIP label is used to adequately document, identify, and track dates in the generation, sampling, characterization, and evaluation process. Organizations and contractors shall place KSC Form 29-759, Label, Hazardous Waste Determination In-Progress, on the waste container and fill out the top part of the label (identify the contents of the waste container, point of contact, phone number, and organization) when waste is first placed in the container.

13.3.4 Organizations and contractors shall mark the dates on the HWDIP label IAW the requirements defined below.

a. Waste Generated Date – Date when generated waste is first placed in the container.

b. Sample Requested Date – The date when an adequate amount of waste has been accumulated for a representative sample and sampling has been requested. Once the container has been sampled and sealed, additional wastes shall be placed in a new container.

c. Sampled Date – Date when the waste characterization samples were collected. The samples shall be collected within seven calendar days of the Sample Requested Date.

d. Analysis Received Date – Date when the requester receives the laboratory analysis report. Since the standard laboratory turnaround time to analyze samples is 14 calendar days, the Analysis Received Date should not exceed 20 calendar days from the Sampled Date.

e. PWQ Submitted Date – Date when the requester submitted the PWQ to the KSC WMO. The PWQ shall be submitted no more than seven calendar days after the Analysis Received Date.

13.3.5 Containers with HWDIP labels shall be managed as if they were hazardous waste and be stored in the Satellite Accumulation Area (SAA) or Central Accumulation Area (CAA)/90-day sites. As a best management practice (BMP), smaller accumulation containers should be used to collect enough waste for a representative sample.

13.3.6 Within one workday of receiving the TRP, organizations and contractors shall replace the HWDIP label with the label(s) indicated in the TRP. TRPs are generally issued by the KSC WMO within 14 workdays of PWQ submission.

13.3.7 If a HWDIP waste at a CAA/90-day Hazardous Waste Storage Area is determined to be hazardous, the Accumulation Start Date (ASD) for the waste shall be the date the TRP was received from the KSC WMO. This only applies to new waste streams and not to waste streams with variable characteristics.

13.3.8 For waste streams with variable characteristics which are determined to be hazardous, the ASD for the waste shall be the date the laboratory analysis report is received.

13.3.9 The HWDIP waste characterization process (Waste Generated Date to TRP receipt) described above shall not take more than 60 days unless there is documentation explaining the delay.

13.4 Hazardous and Controlled Waste Storage Locations

13.4.1 Organizations and contractors shall notify the NASA EAB whenever hazardous or controlled waste storage locations are established, moved, or discontinued.

13.4.2 Organizations and contractors shall respond on time to data calls from the NASA EAB requesting comprehensive lists of hazardous and controlled waste storage locations.

13.5 Hazardous Waste Storage

13.5.1 Organizations and contractors shall establish and maintain 90-day hazardous waste storage areas and hazardous waste SAAs as needed to properly store and manage the hazardous wastes generated by their operations and activities.

13.5.2 All hazardous wastes are, by definition, hazardous materials, and employees whose actions directly affect the safe transportation of hazardous materials must be trained as required by 49 CFR 172 Subpart H, Training. Specific actions include filling, marking, and labeling of hazardous waste containers.

13.5.3 The following requirements apply to CAA/90-day hazardous waste storage areas:

a. Ninety-day hazardous waste storage areas shall meet all physical requirements outlined in 40 CFR 260-279 including:

(1) Emergency communication equipment such as a telephone or a two-way radio.

(2) Fire extinguishing equipment.

(3) Fire control equipment.

(4) Spill control equipment.

(5) Decontamination equipment.

(6) Safety shower or eyewash (refer to American National Standards Institute Z358.1).

b. Containers shall be properly labeled and marked according to regulatory requirements and the information given in the TRP.

(1) Markings on labels shall be legible.

(2) Spill pallet lids and overpack containers used for containment shall be labeled as “Hazardous Waste” or “Controlled Waste” or “Universal Waste.”

(3) These labels shall be placed facing out and visible to approaching personnel. New waste streams without a TRP will be labeled with an HWDIP until a TRP has been issued.

(4) Small containers such as lab pack items shall be clearly labeled “Hazardous Waste” and include descriptive wording, label, or symbol.

(5) Temporary or incorrect labels (such as “Empty” or “HWDIP”) shall be removed when the known status of the container or waste changes (e.g., adding waste to the drum or upon receipt of the TRP or the laboratory analysis.)

c. Additional descriptive words, labels, or markings may be placed upon the hazardous waste containers if they are removed prior to pickup for disposal.

d. All hazardous waste containers shall be marked with the proper ASD:

(1) For new waste streams, the ASD is the date the TRP was received from the KSC WMO.

(2) For recurring waste streams, the ASD is the date waste is first added to the container.

(3) For containers transferred from SAAs, the ASD is the date of transfer.

e. Hazardous wastes shall not be stored at CAA/90-day hazardous waste storage areas for longer than 90 days based on the ASD.

(1) Organizations and contractors shall refer to EVS-P-0001, Waste Management and Sampling Plan, for details regarding waste pickup services and procedures.

(2) Organizations and contractors shall submit waste pickup support requests to the KSC WMO no later than day 75 (day 60 for hypergolic wastes) to provide scheduling flexibility and to resolve pickup discrepancies.

(3) Emergency waste pickups are available for hazardous waste that is approaching accumulation time limits. Organizations and contractors shall submit an emergency waste pickup support request to the KSC WMO and confirm the KSC WMO received the request.

(4) Organizations and contractors shall keep documentation to demonstrate that hazardous waste tanks are emptied at least once every 90 days.

(5) If unforeseen circumstances prevent pickup within the 90-day limit, the organization or contractor shall immediately, by day 85, contact the NASA EAB who will request an extension from the FDEP.

f. Organizations and contractors shall inspect CAA/90-day hazardous waste storage areas at least weekly (not to exceed 9 calendar days between inspections) according to the requirements in 40 CFR 262.34, Standards Applicable to Generators of Hazardous Waste, and FAC 62-730.160, Standards Applicable to Generators of Hazardous Waste.

g. During 90-day hazardous waste storage area inspections, organizations and contractors shall:

(1) Check the availability and condition of any security devices.

(2) Ensure required signs (such as “Danger” and “No Smoking”) are posted, unobstructed, and legible.

(3) Check the availability, condition, and functionality of safety equipment.

(4) Check the area and containers for waste releases.

(5) Check all waste containers for deterioration, corrosion, and signs of physical damage.

(a) Containers shall not have severe rust, visible pitting, flaking, or beaded metal.

(b) Containers shall not have dents or creases that compromise the integrity or significantly alter the original shape of the container.

(c) Containers shall not have paint or other coatings applied to obscure damage.

(6) Check waste drum bungs and lids for tightness (drum lids and bungs shall be tightly closed when not in use).

(7) Check hazardous waste container ASDs and verify that the date is not near the 90-day limit.

(8) Check hazardous waste container labels and ensure they are properly completed.

(9) Ensure that adequate fire suppression equipment is available, compatible with the types of waste being stored, and regularly inspected and maintained by fire protection personnel.

(10) Verify that sources of ignition are absent and that “No Smoking” signs are conspicuous.

(11) Check that incompatible and reactive wastes are segregated to prevent adverse reaction in the event of a spill or leak.

(12) Check proper aisle space for container inspection and unobstructed access in the event of emergencies.

(13) Check that communication equipment for emergency instruction and summoning emergency assistance is operable.

(14) Check that spill control materials are available.

(15) Check operability of safety shower and eyewash, if applicable (for portable eyewashes and showers that cannot be tested without discharging all of the contents, the operator shall ensure that the equipment is charged and the seal has not been broken).

(16) Check that the contingency plan is posted and current and that it has been provided to fire, occupational health, and security organizations.

(17) Record the number of hazardous waste containers at the site.

(18) Inspect facility containment for cracks or damage, signs of leakage, standing water, or debris.

(19) Inspect facility grounding points and drum grounding connections.

h. Personnel with waste management responsibilities at CAA/90-day hazardous waste storage areas shall complete classroom and on-the-job training as required by 40 CFR 265.16, Personnel Training, and as needed to properly manage hazardous waste at KSC.

(1) Employees new to CAA/90-day hazardous waste storage area management shall complete the training within the first 3 months.

(2) Employees with waste management responsibilities at CAA/90-day hazardous waste storage areas shall complete refresher training within 13 months of the last date of training.

i. Ninety-day hazardous waste storage areas shall have a posted contingency plan that meets the requirements of 40 CFR 265.52, Content of Contingency Plan, and describes actions to be taken by facility personnel in response to evacuations, fires, explosions, or releases of hazardous wastes.

j. Contingency plans shall include the following:

(1) References to KNPD 8710.1, KSC Emergency Management Program Policy, KNPR 8715.2, Comprehensive Emergency Management Plan, and KDP-KSC-P-3008, Hazardous Materials Emergency Response.

(2) Appropriate emergency phone numbers.

(3) The name and phone number of a primary and alternate site contact who are personally familiar with stored wastes and their characteristics.

(4) All emergency equipment (fire control equipment, spill control equipment, communication and alarm systems, and decontamination equipment) including a description of each item’s capabilities.

(a) Emergency equipment shall be reviewed with KSC Protective Services whenever the facility changes in its design, construction, operation, maintenance, or other circumstance in a way that materially increases the potential for fires, explosions, or releases of hazardous waste.

(b) Any associated changes to the list of emergency equipment or changes to the list of site contacts shall be posted at the site.

(5) An evacuation plan describing signals for area personnel to begin evacuation, evacuation routes, alternative evacuation routes, and marshaling areas. Where applicable, excerpts from emergency action plans developed under KNPR 8715.3, KSC Safety Procedural Requirements, shall be used for this purpose.

k. Organizations and contractors shall maintain the following records (hard copy or electronic providing they are readily available for inspection) for all CAA/90-day hazardous waste storage areas:

(1) Weekly inspection records (per Section 13.5.3.g of this KNPR) for at least the past three years.

(2) Training records maintained for current employees until closure of facility. Training records maintained on former employees for three years from date last worked. The training records shall include:

(a) Job titles and names of employees filling each job.

(b) Description for each job title that includes hazardous waste management duties.

(c) Description and dates of initial and refresher training.

(3) Waste evaluation records (including PWQ, TRP, chemical analyses, SDS, or other information used as a basis for waste characterization) for at least the past three years.

(4) The completed PWQ, TRP, and supporting documentation constitutes the Hazardous Waste Determination which will be retained within the WMS IAW NPR 1441.1, NASA Records Program Management Requirements. KSC generators who do not have access to the WMS must retain hard copies of this data for review by regulatory inspectors and auditors.

13.5.4 The following requirements apply to SAAs:

a. SAAs shall be established at or near the point of generation where small quantities of hazardous waste are generated.

b. All hazardous wastes are, by definition, hazardous materials, and employees whose actions directly affect the safe transportation of hazardous materials must be trained IAW 49 CFR 172 Subpart H, Training. Specific actions include filling, marking, and labeling of hazardous waste containers.

c. SAA containers shall be under the control of the worker generating the hazardous waste, be within visual sight of the worker, and be located no more than 50 feet from the process generating the waste.

d. Containers from different waste generating processes may be stored at the same SAA provided each waste stream does not exceed SAA storage limits for that waste (55 gallons for non-acutely hazardous waste or 1 quart for acutely hazardous waste).

e. Containers shall be properly labeled and marked according to regulatory requirements and the information given in the TRP.

(1) Markings on labels shall be legible.

(2) Spill pallet lids and overpack containers used for containment shall be labeled as “Hazardous Waste” or “Controlled Waste” or “Universal Waste.”

(3) These labels shall be placed facing out and visible to approaching personnel. New waste streams without a TRP will be labeled with an HWDIP until a TRP has been issued.

(4) Small containers such as lab pack items shall be clearly labeled “Hazardous Waste” and include descriptive wording, label, or symbol.

(5) Temporary or incorrect labels (such as “Empty” or “HWDIP”) shall be removed when the known status of the container or waste changes (e.g., adding waste to the drum or upon receipt of the TRP or the laboratory analysis.)

f. Additional descriptive words, labels, or markings may be placed upon the container during storage at a SAA, as long as they are removed prior to pick up by the KSC WMO.

g. Volume limits:

(1) No more than one quart of an acutely hazardous waste stream shall be stored at an SAA.

(2) No more than 55 gallons of a non-acutely hazardous waste stream shall be stored at an SAA.

13.5.5 Removing hazardous waste from an SAA:

a. If the accumulation volume limit (55 gallons for a non-acutely hazardous waste or 1 quart for an acutely hazardous waste) of a waste stream is reached at an SAA, the organization or contractor shall transfer the container to either a CAA/90-day hazardous waste storage area within 3 consecutive calendar days or have it picked up by the KSC WMO within 3 consecutive calendar days.

b. If the accumulation volume limit has been reached, the organization or contractor shall use the date when the accumulation volume limit was reached as the ASD.

c. If the accumulation volume limit has not been reached, but there is a need to dispose of the waste, organizations and contractors can transfer the waste containers at any time to a CAA/90-day hazardous waste storage area or request pickup by the KSC WMO.

d. If the accumulation volume limit has not been reached, the organization or contractor shall use the date the container was removed from the SAA as the ASD.

e. Organizations and contractors shall keep waste evaluation records (including PWQs, TRPs, chemical analyses, SDS, or other information used as a basis for the waste characterization) for waste managed at SAAs for at least three years.

f. While RCRA regulations do not require formal training of personnel who manage hazardous waste in SAAs, organizations and contractors shall ensure that personnel who

generate hazardous waste at SAAs are aware of hazardous wastes they create and are adequately trained in hazardous waste management requirements.

13.6 Hazardous Waste Container Requirements

13.6.1 Waste generators accumulating hazardous wastes shall comply with the packaging requirements identified in the TRP for that waste stream.

13.6.2 New, unused, or reconditioned containers shall be used for the accumulation of hazardous waste. Stainless steel drums used only for accumulation and storage of fuel and oxidizer wastes may be reused for the same commodity without rinsing or reconditioning.

13.6.3 Containers shall meet United Nations (UN) specification performance-oriented packaging standards unless otherwise authorized in 49 CFR 173, Transportation. The appropriate standards, including special permits or exemptions, are included in the TRP. TRP packaging requirements are based upon chemical compatibility, ease of handling, and minimizing the risk of leaks and spills. Exceptions to TRP packaging references may be allowed by KSC WMO on a case-by-case basis.

13.6.4 Bulging drums may represent a potential for fire, explosion, or release of toxic gases. Once a bulging drum is discovered, the individual should leave the area immediately and contact 911 to report the emergency and the condition of the drum.

13.6.5 Containers shall be kept in good condition and free of rust and corrosion. If a container becomes deteriorated, the container must be placed into an overpack drum or the waste transferred to a new container.

13.6.6 Containers shall be properly labeled and marked according to regulatory requirements and the information given in the TRP.

(a) Markings on labels shall be legible.

(b) Spill pallet lids and overpack containers used for containment shall be labeled as needed, i.e., “Hazardous Waste” or “Controlled Waste” or “Universal Waste.”

(c) These labels shall be placed facing out visible to approaching personnel. New waste streams without a TRP will be labeled with a HWDIP until a TRP has been issued.

(d) Small containers such as lab pack items shall be clearly labeled “Hazardous Waste” and descriptive wording, label or symbol.

(e) Temporary or incorrect labels (such as “Empty” or “HWDIP”) shall be removed when the known status of the container or waste changes (e.g., adding waste to the drum or upon receipt of the TRP or the laboratory analysis).

13.6.7 Temporary or incorrect labels (such as “Empty” or “HWDIP”) shall be removed when the known status of the container or waste changes (e.g., adding waste to the drum or upon receipt of the TRP or the laboratory analysis).

13.6.8 The following are examples of incorrect labeling:

a. Striking out or writing over any information or entries on hazardous waste labels such as the ASD, EPA waste codes, or Department of Transportation (DOT) proper shipping name.

b. Covering a pre-existing label with a new label. If a label is changed, the existing label shall be removed first.

c. Adding labels or information that conflicts with the labels required by the TRP.

d. Labels placed anywhere other than the upper third of the container or drum.

e. Hazard class labels placed farther than six inches away from the hazardous waste label.

13.6.9 Containers storing hazardous waste shall be closed at all times except during the addition, removal, or transfer of waste.

13.6.10 Funnels and closures (e.g., bungs and lids) shall be considered closed if installed hand tight so that the gasket contacts the seat and no waste spills or leaks if the container is tipped.

13.6.11 Hazardous materials containers must be provided for pickup fitted with the manufacturer's original closures. Waste Management will secure the closures as called out in the manufacturer's instructions prior to offering for transportation.

13.6.12 Containers may be equipped with safety relief valves that open periodically to relieve excess pressure. Recommend use of five pounds per square inch (psi) Factory Mutual Approved Standard safety relief valves.

13.6.13 Visual inspections shall be performed for holes, gaps, or open spaces that may allow volatile emissions to escape to the atmosphere.

13.6.14 Organizations and contractors shall not fill waste containers to 100 percent capacity and must allow adequate headspace for expansion to prevent seepage or container bulging.

13.6.15 Organizations and contractors shall comply with TRP requirements regarding container filling maximums for safe transportation and easy handling.

13.6.16 Empty containers located in SAAs and CAA/90-day hazardous waste storage areas shall display an "EMPTY" label.

13.6.17 "EMPTY" labels shall be placed on the upper third of the container and be plainly visible when the container is stored.

13.6.18 Pallets or large numbers of empty containers can be labeled as "EMPTY" as a group if they are secured together.

13.6.19 Empty containers of hypergol oxidizer or fuel rinsate waste, which are returned to the generator for reuse, shall have "EMPTY" labels placed over the bung.

13.6.20 Organizations and contractors shall have empty containers picked up for recycling by submitting a Waste Support Request (WSR) to the KSC WMO. Unless purged of all hazardous materials residue, retain all previous markings (including waste labels) to identify previous contents and associated hazards.

13.7 Hazardous Waste Storage Tanks

13.7.1 Organizations and contractors who operate hazardous waste storage tank systems shall comply with the regulations in 40 CFR 265, Subpart J, Tank Systems.

13.7.2 Hazardous waste accumulated in tanks shall be transferred to a vendor tanker truck or appropriate containers by the KSC WMO for disposal.

13.7.3 Organizations and contractors shall notify the NASA EAB prior to any installations, repairs, or modifications to hazardous waste tank systems.

13.7.4 Organizations and contractors shall perform leak tests on secondary containment repairs or modifications and attest to the integrity of the secondary containment.

13.7.5 Organizations and contractors storing hazardous waste in a new, repaired, or modified tank system shall obtain a written certification by a qualified, registered PE prior to placing the system into service. The assessment must attest to the tank and secondary containment structural integrity and acceptability for storing or treating hazardous waste.

13.7.6 Tanks accumulating hazardous wastes shall be equipped with a secondary containment system meeting the requirements in 40 CFR 265.193, Containment and Detection of Releases.

13.7.7 Organizations and contractors shall inspect hazardous waste storage tanks at least once each operating day according to the requirements in 40 CFR 265.195, Inspections.

13.7.8 The following controls shall be used to minimize the release of volatile organic emissions according to 40 CFR 265, Subpart CC, Air Emission Standards for Tanks, Surface Impoundments, and Containers, for those waste streams containing greater than 500 parts per million (ppm) Volatile Organic Constituents. These controls meet requirements for level one tank controls as found in Subpart CC:

a. Tank shall be equipped with a fixed roof tank (not a floating roof).

b. Each opening in the fixed roof shall be equipped with a closure device or vented by a closed vent system to a control device.

c. A pressure-vacuum relief valve may be used to maintain internal pressure within tank specifications and to avoid an unsafe condition. The valve may be vented to the atmosphere but shall remain in the closed position when not venting.

d. The maximum organic vapor pressure shall be determined for the hazardous waste being accumulated to ensure that the pressure does not exceed the limits specified for tank control level one.

e. Tank defect repairs subject to Subpart CC shall be started within 5 days of the discovery of the defect and completed within 45 days of discovery.

f. Hazardous waste transfers from one tank to another tank shall be performed in a closed system. However, transfer from a tank to a container of 119 gallons or less need not be performed in a closed system.

13.8 Waste Pickup

13.8.1 Organizations and contractors shall submit a KSC Form 28-809, Waste Support Request, to the KSC WMO for pickup of hazardous and controlled waste from their facilities.

13.8.2 The WMS includes a capability where waste generators can complete and submit WSRs electronically. Organizations and contractors shall submit WSRs via the WMS unless they do not have access to the KSC computer network.

13.8.3 The KSC WMO shall pick up hazardous and controlled waste from organizations and contractors.

13.8.4 The KSC WMO shall coordinate a pickup date and time with the organization or contractor, prepare the internal KSC waste manifest, and bring the internal KSC waste manifest to the pickup appointment.

13.8.5 The KSC WMO shall verify that the waste to be picked up meets all TRP packaging and labeling requirements.

13.8.6 The waste generating organization or contractor shall review the internal KSC waste manifest, verify the waste to be picked up is correctly identified on the manifest, and sign the internal KSC waste manifest as the generator.

13.8.7 The KSC WMO shall arrange for a vendor to pick up and transport the waste directly off-Center, or pick up and transport the waste to the Treatment, Storage, and Disposal Facility (TSDF), CCAFS Trident Pretreatment plant, or other appropriate storage location.

13.9 Waste Aerosol Can Requirements

13.9.1 General Requirements:

a. All empty, spent, broken, unusable, or unwanted aerosol cans are considered “waste aerosol cans” and must be properly collected, stored, labeled, and disposed of through the KSC WMO.

b. The KSC WMO crushes and recycles most empty and defective aerosol cans generated at KSC as part of the KSC Waste Minimization Program. Some aerosol can products such as inorganic zinc (IOZ) primer, IOZ paint, pepper spray, and foam insulation cannot be crushed and recycled and must be managed and disposed of separately.

c. Waste aerosol cans shall undergo the same waste characterization and evaluation process identified in Section 13.2 of this KNPR.

d. Prior to the accumulation of waste aerosol cans, all generators shall submit a PWQ (to identify specific products) to KSC WMO.

e. Generators shall store, label, and manage waste aerosol cans according to TRP instructions and the requirements in Section 13.2 of this KNPR.

f. All waste aerosol can accumulation containers shall be legibly labeled IAW the TRP and marked with the words “Waste Aerosol Cans Only.” KSC Forms 28-1019, Waste Aerosol Can Container Labels, and 28-1020, Waste Aerosol Cans Only Label, are available to generators to help meet this requirement.

g. Waste aerosol cans shall only be stored in three locations: (1) 90-day Hazardous Waste Accumulation Site, (2) Hazardous Waste SAAs (a self-closing step can may be used at an SAA for collection being accumulated in a CAA/90-day site), or (3) a flammable storage cabinet. Storage of waste aerosol cans at locations (1) and (2) above will be managed as called out in Section 13.5 of this KNPR. Storage of waste aerosol cans in a flammable storage cabinet will be managed as called out in Section 13.9.2 of this KNPR.

13.9.2 Flammable Storage Cabinet Requirements for Waste Aerosol Cans

a. In areas where the waste aerosol can generation rate is low and waste aerosol cans are the only hazardous waste stream generated in that area, a flammable storage cabinet may be used to store waste aerosol cans.

b. Small quantities of waste aerosol cans generated in the field may be brought back to a flammable storage cabinet or SAA if waste aerosol cans are the only hazardous waste stream generated by that shop. Otherwise, the aerosol cans shall be taken to and managed in a CAA/90-day hazardous waste storage site.

NOTE: This requirement is applicable to waste aerosol cans only and no other waste generated in the field.

c. Waste aerosol cans shall be stored in a labeled tote, labeled container, or labeled shelf in an approved flammable storage cabinet and segregated from other materials.

d. Containers, totes, or shelves shall be marked as described in Section 13.9.1 of this KNPR.

e. There are three options for removing waste aerosol cans from a flammable storage cabinet:

(1) Containerize and label the waste aerosol cans according to the directions on the TRP and request a waste pickup from the KSC WMO.

(2) Transfer the waste aerosol cans to a CAA/90-day hazardous waste storage area. If the waste aerosol accumulation container in the flammable storage cabinet is transferred to the CAA/90-day hazardous waste storage area, the container shall be managed IAW Section 13.5 of this KNPR.

(3) Transfer small quantities of waste aerosol cans to the Drop Your Chemicals Off Here (DYCOH) location (Building K7-115) during designated days and times. The requirements for this procedure can be found in document, EVS-P-0001, Waste Management Sampling Plan. Waste aerosol cans must be managed according to the requirements found in Section 13.9.1 of this KNPR prior to transport to DYCOH.

13.9.3 Managing Waste from the Hydraulic Aerosol Can Puncture and Crusher Machine

a. The KSC WMO shall crush waste aerosol cans at a CAA/90-day hazardous waste storage area at Facility K7-115.

b. The KSC WMO shall manage residue waste from the aerosol can crushing machine as called out in the SAA storage requirements in Section 13.5 of this KNPR.

13.10 Controlled Waste Management

13.10.1 Controlled wastes include, but are not limited to:

a. Contaminated soils or debris

b. Non-hazardous industrial wastewaters

c. Non-hazardous used oil and oil filters

d. Asbestos-containing material

e. PCBs and PCB items

f. Other non-hazardous waste where the release of the waste to the environment (either on KSC or off-Center) could result in an exposure, risk, liability, or cleanup

13.10.2 Organizations and contractors shall properly containerize, store, manage, and dispose of all controlled wastes through the KSC WMO.

13.10.3 Organizations and contractors shall submit PWQs for potential controlled wastes to the KSC WMO for evaluation.

13.10.4 Containers shall be properly labeled and marked according to regulatory requirements and the information given in the TRP.

a. Markings on labels shall be legible.

b. Spill pallet lids and overpack containers used for containment shall be labeled as needed, i.e., “Hazardous Waste” or “Controlled Waste” or “Universal Waste.”

c. These labels shall be placed facing out visible to approaching personnel. New waste streams without a TRP will be labeled with an HWDIP until a TRP has been issued.

d. Small containers such as lab pack items shall be clearly labeled “Hazardous Waste” and include descriptive wording, label, or symbol.

e. Temporary or incorrect labels (such as “Empty” or “HWDIP”) shall be removed when the known status of the container or waste changes (e.g., adding waste to the drum or upon receipt of the TRP or the laboratory analysis).

13.10.5 Organizations and contractors shall use best management practices (BMPs) when storing and managing controlled waste to ensure timely disposal, prevent improper disposal, and minimize releases to the environment.

13.11 Petroleum Contact Water

13.11.1 Petroleum Contact Water (PCW) is wastewater containing a recoverable petroleum product that is not otherwise managed under the used oil regulations. PCW is managed according to regulations established in FAC 62-740.030, Petroleum Contact Water. Aboveground PCW storage tanks of greater than 550 gallons and underground PCW storage tanks of greater than 110 gallons shall be registered with the FDEP.

13.11.2 In addition to requirements found in the TRP, organizations and contractors shall comply with the following PCW standards:

a. Label or mark the container or tank with the words “Petroleum Contact Water.”

b. Mark the PCW storage container or tank with the date the PCW accumulation first begins.

c. Keep the container or tank closed at all times and stored in a safe manner.

d. Inspect the tank or container weekly for leaks or deterioration and maintain the associated records for three years.

e. Store PCW for no more than 180 days and document compliance by maintaining inventory records, annotating the ASD on KSC Form 28-1088, Petroleum Contact Water Label, and keeping records for at least three years.

13.12 Universal Waste

13.12.1 Universal Waste (UW) regulations were established by the EPA and the FDEP to ease the requirements for managing hazardous wastes that can be recycled. Items meeting the definition of UW can be collected and managed under requirements found in 40 CFR 273, Standards for Universal Waste Management, FAC 62-730, Hazardous Waste, and FAC 62-737, The Management of Spent Mercury-Containing Lamps and Devices Destined for Recycling.

13.12.2 The FDEP has adopted the 40 CFR 273 provisions of the UW rule under FAC 62-730.185, Standards for Universal Waste Management. EPA has authorized the state of Florida to develop guidance and requirements for additional waste streams that may be incorporated to the existing UW management handling standards.

13.12.3 Florida UW currently includes most batteries which exhibit a characteristic of hazardous waste, pesticides that are recalled or collected under a pesticide waste collection program, mercury-containing thermostats and devices such as manometers and switches, mercury-containing lamps such as fluorescent lamps, and pharmaceuticals. Pharmaceutical waste management requirements are specifically addressed in Section 13.13 of this KNPR.

13.12.4 UW generators are called handlers and shall comply with the following requirements:

a. Handlers shall identify UW using the PWQ and TRP process and request pickup and disposal of UW as a controlled waste by the KSC WMO.

b. Handlers shall manage UW in a way that prevents releases to the environment. Non-leaking containers in good condition must be used if the UW is damaged or leaking. Containers must be kept closed except when necessary to add or remove UW.

c. Handlers shall use KSC Form UW05, KSC Universal Waste Label, mark UW accumulation containers IAW PWQ and TRP instructions, and may not accumulate UW for more than six months. This accumulation time limit allows the KSC WMO to consolidate and arrange for a recycling contractor to pick up the materials in conformance with UW storage restrictions.

d. Handlers shall clearly mark the ASD (the date when the first item was placed into the container) on the UW label.

e. Wastes created from the cleanup of spilled or leaked UW items shall be managed under the Waste Evaluation and Sampling process in Section 13.2 of this KNPR.

(1) Handlers shall respond appropriately to releases.

(2) Handlers shall determine if the residues resulting from releases are hazardous waste.

(3) If they are hazardous waste, handlers shall manage them under the full hazardous waste regulations as instructed in the TRP. Any release not cleaned up constitutes illegal disposal of hazardous waste and may lead to RCRA enforcement actions.

(4) The handler shall comply with the pollution incident notification requirements according to Chapter 4 of this KNPR.

f. UW handlers shall complete training to ensure they are familiar with proper waste handling and emergency procedures and retain records for inspection.

13.13 Universal Pharmaceutical Waste

In April 2007, FDEP finalized the Universal Pharmaceutical Waste rule (FAC 62-730.186), which applies to pharmaceuticals classified as a hazardous waste under RCRA regulations. Due to the limited application on Center, complications with the State rule, and uncertainty over prospective EPA regulations, KSC chooses to continue managing hazardous waste pharmaceuticals under the full range of hazardous waste regulations found in this Chapter.

13.14 Asbestos Waste

13.14.1 Handling asbestos-containing material for disposal requires specialized training and adherence to specific procedures as directed by 29 CFR 1910.1001, Asbetos, and 29 CFR 1926.1101, Toxic and Hazardous Sustances - Asbestos.

13.14.2. The removal of asbestos-containing insulation or pulverizing of asbestos-containing floor tiles can cause asbestos fibers to become airborne resulting in serious health risks. Before attempting to remove or handle any suspected asbestos-containing materials, the waste generator or waste generating organization shall contact KSC Environmental Health at 321-867-2400 for guidance.

13.14.3 The Asbestos Management Information System contains detailed facility asbestos survey data and can be accessed at Asbestos and Hazardous Metals/PCB Survey Data page. The waste generator shall refer to Section 6.5 of this KNPR for the procedures and notification required for asbestos abatement and removal projects.

13.14.4 The following procedures shall be used for the containerization and management of asbestos-containing waste material from miscellaneous sources:

a. Friable asbestos-containing waste material shall be wetted and placed in leak-tight, double wrapping before placement in a container such as fiberboard cartons, bags, or roll offs.

b. Non-friable asbestos-containing waste material, such as floor tiles, may be placed directly into a waste container such as fiberboard cartons, bags, or roll offs. Certain non-friable asbestos-containing waste materials can release airborne asbestos fibers if the material becomes brittle or is exposed to extreme situations such as demolition or mechanical pulverization. In these cases, non-friable asbestos-containing waste material shall be wetted and double wrapped before placement in containers.

c. Non-friable asbestos-containing waste material may be disposed of in the KSC Landfill with prior approval. Refer to Chapter 14 of this KNPR for guidance.

d. Personal Protective Equipment (PPE) and other equipment used in the handling and removal of asbestos shall also be managed as asbestos-containing waste material if not decontaminated.

e. Occupational Safety and Health Administration (OSHA) regulations require KSC Form 28-366, Asbestos Danger Label, on all containers.

f. Waste containers storing asbestos-containing material shall be managed in a secure area, such as a CAA/90-day hazardous waste storage area, as a BMP.

g. Asbestos waste shipment records shall be maintained by the waste generator for at least two years.

13.15 Used Oil

Any lubricant refined from crude oil (or synthetic oil) that has been "used," and as a result of such use is contaminated by physical or chemical impurities, is classified as used oil. Used oil is managed according to regulations established in 40 CFR 279, Standards for the Management of Used Oil, and FAC 62-710, Used Oil Management. The following waste generator standards apply to the management of used oil:

a. Used oil containers, tanks, and associated piping shall be marked “Used Oil.”

b. Used oil containers, tanks, and associated piping shall be in good condition with no severe rusting, structural defects, deterioration, or leaks.

c. Containers storing used oil shall be kept in secondary containment of sufficient size to contain the entire capacity of the largest single container plus sufficient freeboard to contain precipitation, where necessary. Reference the KSC SPCC Plan, KSC-PLN-1919, Section 4.3,

for specific instructions on used oil container management and secondary containment requirements.

d. Containers storing used oil shall be compatible with their contents.

e. Aboveground used oil storage tanks of greater than 550 gallons and underground used oil storage tanks of greater than 110 gallons shall be registered with the FDEP.

f. Used oil waste generators shall refer to Chapter 17 of this KNPR for used oil tank registration requirements.

g. If a used oil spill occurs, the waste generator shall immediately call 911 and report the release IAW the requirements in Chapter 4 of this KNPR. The generator may attempt to stop the release, contain the released oil, and clean up the spill only if these actions do not pose a health and safety risk to the individual.

13.16 Used Oil Filters

Used oil filters are collected and managed as controlled wastes before recycling according to regulations established in FAC 62-710.850, Management of Used Oil Filters. The following procedures shall be used for the management of used oil filters:

a. Only non-tern plated filters shall be managed according to these guidelines. Tern plated filters contain a lead and tin alloy that may require management as a hazardous waste.

b. Used oil filters shall be hot-drained of residual oil. The oil must be collected and managed as a controlled waste.

c. Containers storing used oil filters shall be sealed or otherwise protected from the weather and stored on an oil-impermeable surface such as polyethylene sheeting, rigid plastic secondary containment, or epoxy-coated concrete.

d. Containers shall be labeled “Used Oil Filters.”

13.17 Orangeburg Material Requirements

13.17.1 Orangeburg material, which is a combination of coal tar and creosote, has been found in underground ductwork at KSC. The material was sampled and found to contain semi-volatile organic compounds in concentrations that may pose health concerns and that are regulated by Federal and state environmental agencies.

13.17.2 The primary hazard posed by this material is the debris that is created through cleaning or upgrading work in ducts containing it. This debris contaminates water in the manholes, creates worker safety concerns, and is subject to state and Federal regulations. Personnel shall minimize disturbance of this material to prevent any accumulation of debris in manholes or conduits.

13.17.3 All project managers whose work involves potential contact with Orangeburg ductwork material or debris shall ensure that appropriate PPE is identified and used. In general, PPE for this type of work includes chemical eye goggles, butyl rubber gloves, and full-body impermeable clothing such as Tyvek or similar material.

13.17.4 Proper field sanitation shall be available in the form of washing and sanitation facilities in case of contact with the material.

13.17.5 When working at any KSC site with Orangeburg material present, personnel shall:

a. Take action prior to disturbing the Orangeburg material to prevent any accumulation of solid debris at the worksite (e.g., ground cover for cleanout equipment, a capture mechanism in the manhole). Any solid material that is accumulated from this or any similar activities shall be containerized and disposed of as required by this KNPR.

b. Clean out visible solid debris that has accumulated in manholes or conduits known to contain Orangeburg material. Dewatering effluent that has come into contact with Orangeburg debris shall be containerized and disposed of as required by KSC waste management's PWQ and TRP instructions. A filter mechanism on the discharge line would help capture any debris associated with duct cleanout.

c. Any solid material accumulated during the cleanout shall be containerized and disposed of as called out in this KNPR.

d. A project manager or construction inspector shall visually inspect and conclude that no solid Orangeburg debris is in the manhole before discharging dewatering effluent to grade. For work at sites where Orangeburg material has not been disturbed and there is no visible Orangeburg debris, dewatering effluent may be discharged to grade.

13.18 Paint and Coating Waste Management

13.18.1 Various paints and coatings are used across KSC for corrosion control, surface protection, safety, aesthetics, etc. Many different waste streams and waste materials are generated from paint and coating removal and application activities. Chemicals present in paints, coatings, thinners, additives, blast media, stripping solvents, and cleaning solvents may require certain paint and coating-related waste streams to be managed as hazardous or controlled wastes. Materials that would not normally be considered a hazardous or controlled waste may become such when they come into contact with certain paints, coatings, thinners, additives, blast media, stripping solvents, and cleaning solvents.

13.18.2 Paint and coating-related waste materials including, but not limited to, those listed below may be a hazardous or controlled waste. These materials shall be evaluated to ensure proper management and disposal:

a. Unused or leftover paints, coatings, stains, thinners, additives (stabilizers, binders, dryers, thickeners, preservatives, etc.), stripping solvents, cleaning solvents, etc.

b. Spent cleaning solvents

c. Paint and coating chips and dust

d. Spent blast media with paint and coating chips and dust

e. Paint and coating stripping wastes

f. Miscellaneous materials such as rags, brushes, rollers, stirring sticks, liners, PPE, masking, tape, and other waste materials that have contacted paints, coatings, solvents, thinners, etc.

g. Sludge from paint thinner or cleaning solvent distillation

h. Spray booth filters

i. Aerosol and spray paint cans

NOTE: Aerosol cans are to be managed according to the requirements in Section 13.9 of this KNPR.

j. Decontamination water and equipment wash water

13.18.3 Prior to generating any paint and coating-related waste streams, the generator shall submit a PWQ to the KSC WMO for each waste stream.

13.18.4 The KSC WMO shall determine if a waste stream is a hazardous or controlled waste and issue a TRP. Waste sampling may also be required to determine if a waste stream is a hazardous or controlled waste.

13.18.5 Open air drying or evaporation of unused or leftover paints and coatings is prohibited at KSC, as these materials may also be considered hazardous and controlled waste.

13.18.6 Open air drying or evaporation of other paint and coating-related wastes may be a regulatory violation and is strictly prohibited at KSC unless approved by the NASA EAB. All hazardous and controlled wastes shall be stored in closed containers. Waste containers must be kept closed unless waste is being added to the container.

13.18.7 Empty paint, coating, thinner, cleaning solvent, and other product containers shall meet certain criteria before they can be considered “empty” and disposed of as regular trash or recycled. Improper management and disposal of spent product containers can lead to possible regulatory violations and improper hazardous and controlled waste disposal.

13.18.8 At KSC, a container is considered “empty” when:

a. All contents that have been removed have been using the practices commonly employed to remove materials from that type of container (pouring, pumping, scraping, etc.).

(1) For containers that held a material that can be readily poured, all material must be removed by any practicable means (including draining, pouring, pumping, or aspirating) before the container can be considered empty. A container is empty when there is no longer a continuous stream of material coming from the opening when the container is held in any orientation.

(2) For containers that previously held non-pourable material, no material shall remain in the container that can feasibly be removed by physical methods, including scraping and chipping, but not rinsing. This standard applies to materials that pour slowly or don’t pour at all from the container, including, but not limited to, viscous materials, solids which have “caked up” inside the container, and non-pourable sludges.

(3) Any materials removed to empty a container must either be used for their intended purpose or managed as a waste material as described in this Chapter.

b. No more than one inch of material or no more than three percent by weight of the total capacity of the container remains in the container.

13.18.9 Containers that do not meet the “empty” criteria and definition described above cannot be disposed of as regular trash or recycled. Those containers and their contents may be considered a hazardous or controlled waste and shall be properly managed and disposed of according to the requirements of this Chapter.

13.18.10 Once a container meets the “empty” criteria and definition, residual material left inside the container shall be air dried or cured in the container prior to container disposal. After the residual materials are dried or cured, the container can be disposed of as regular trash or recycled.

13.18.11 IOZ Paint Waste Management Requirements

a. IOZ paints and coatings are used at various facilities across KSC for corrosion control. Due to the unique nature of this material, a separate waste management requirement has been developed to meet hazardous waste requirements and mitigate safety concerns.

b. When placed in a sealed container, IOZ paint can produce hydrogen gas and other gases from chemical reactions that occur during the curing process. The gas production builds pressure in the container and can cause the container to bulge or rupture, thus creating a safety hazard to personnel.

c. Due to its constituents, unused and leftover IOZ paints or coatings are a hazardous waste and shall be properly managed according to hazardous waste regulations. It is a regulatory violation to allow unused or leftover IOZ paint to open air dry at KSC.

d. Users of IOZ paint shall physically separate IOZ paint-related waste streams from other waste streams at the job site or shop.

e. Users of IOZ paint shall segregate and manage IOZ paint-related waste streams according to the three categories (and respective requirements) below.

f. Prior to generating waste, users of IOZ paint shall submit PWQs to the KSC WMO.

g. The KSC WMO shall issue a TRP that lists acceptable storage container types and provides specific marking and labeling instructions.

(1) Category 1: Leftover or Unusable IOZ Paint

(a) Leftover or unusable IOZ paint shall be stored in the original product containers supplied by the manufacturer with a loosely secured lid.

(b) The original product containers shall be placed into a larger closed drum or container that meets hazardous waste storage requirements and prevents any possible release to the

environment. To avoid potential safety hazards, a 5 psi pressure relief vent must be installed on the larger closed drum or container.

(c) Original product containers of leftover or unusable IOZ paint are to be picked up daily by the KSC WMO. Waste generators are responsible for coordinating with and notifying the KSC WMO about IOZ painting operations, working days, and waste pickups.

(d) No cleaning solvents shall be placed into any leftover or unusable IOZ paint containers.

(2) Category 2: Spent Cleaning Solvents

(a) Spent cleaning solvents that have contacted IOZ paint shall be stored in appropriate containers according to TRP instructions. To avoid potential safety hazards, a 5 psi pressure relief vent must be installed on these spent cleaning solvent containers.

(b) Waste generators are responsible for requesting pickup from the KSC WMO when the container is full or work is completed.

(3) Category 3: Solids from IOZ Mixing and Painting Operations

(a) Solids include rags, brushes, rollers, liners, stirring sticks, PPE, masking paper or tape, or other waste solid materials that have contacted IOZ paint.

(b) Solids that have contacted IOZ paint shall be stored in appropriate containers according to TRP instructions. To avoid potential safety hazards, a 5 psi pressure relief vent must be installed on these solid containers.

(c) Spent original product containers, cans, and buckets shall be wiped empty of all residuals and disposed of IAW TRP instructions.

(d) Waste generators are responsible for requesting pickup from the KSC WMO when the container is full or work is completed.

h. Aerosol cans of IOZ primer and IOZ paint are exempt from the requirements of this section and shall be managed according to aerosol can requirements in Section 13.9.1.b of this KNPR.

i. Empty paint, coating, thinner, cleaning solvent, and other product containers generated from IOZ operations shall meet certain criteria before they can be considered “empty” and disposed of as regular trash or recycled. Improper management and disposal of spent product containers can lead to possible regulatory violations and improper hazardous and controlled waste disposal.

(1) All contents have been removed by using the practices commonly employed to remove materials from that type of container (pouring, pumping, scraping, etc.).

(2) Containers that held a material that can be readily poured must have all material removed by any practicable means (including draining, pouring, pumping, or aspirating) before the container can be considered empty. A container is empty when there is no longer a continuous stream of material coming from the opening with the container held in any orientation.

(3) Containers that previously held non-pourable material shall have no material remaining in the container that can feasibly be removed by physical methods, including scraping and chipping, but not rinsing. This standard applies to materials that pour slowly or don't pour at all from the container, including, but not limited to, viscous materials, solids which have "caked up" inside the container, and non-pourable sludges.

(4) Any materials removed to empty a container must either be used for their intended purpose or managed as a waste material as described in this Chapter.

j. Containers from IOZ operations that do not meet the "empty" criteria and definition described above cannot be disposed of as regular trash or recycled. Those containers and their contents may be considered a hazardous or controlled waste and shall be properly managed and disposed of according to the requirements of this Chapter.

k. Once a container from IOZ operations meets the "empty" criteria and definition, the container can be disposed of as regular trash or recycled.

13.19 Electronic Equipment Waste

13.19.1 Organizations and contractors shall dispose of intact, non-broken E-waste items through the KSC Property Disposal Office for resale or recycling.

13.19.2 Certain E-waste items are considered a hazardous waste when broken or leaking; therefore, organizations and contractors shall consult with the NASA EAB or KSC WMO regarding the proper management and disposal of broken or leaking E-waste items.

13.19.3 The organization or contractor shall containerize the item, submit a PWQ, and dispose of the item through the KSC WMO.

13.20 Flex Hose Disposal

13.20.1 New and Unused Flex Hoses

a. Flex hoses in unopened manufacturer packages shall be considered new flex hoses.

b. Flex hoses that have been opened and have documentation showing they have never been used shall be considered unused flex hoses.

c. As a safety precaution, all other flex hoses shall be considered used flex hoses.

d. New and unused flex hoses are not subject to any environmental regulatory requirements for disposal.

e. The KSC Reutilization, Recycling, and Marketing Facility (RRMF) can accept new and unused flex hoses from organizations and contractors.

f. New flex hoses shall be transferred to the RRMF in the manufacturer's packaging for further disposition.

g. Flex hoses deemed used based on opened packaging and lack of documentation that they are unused shall be cut into 4 foot to 6 foot sections.

(1) Used flex hoses 4 feet and shorter shall be cut in half. Organizations and contractors without the capability to safely cut flex hoses can seek assistance from other organizations (such as the ISC) for this task, if funding is provided.

h. A completed KSC Form 7-49, Purchase Request (Supplies/Equipment or Property Turn in), must accompany the flex hoses upon delivery to the RRMF. The description should reflect either “new flex hose – resale” or “unused flex hose” shall be on the form to further aid in identifying the appropriate disposition.

13.20.2 Used Clean Gas Flex Hoses (used for inert or atmospheric gases such as air, oxygen, nitrogen, helium, argon, etc.)

a. Clean gas flex hoses are not subject to any environmental regulatory requirements for disposal.

b. The RRMF may accept clean gas flex hoses from organizations and contractors for recycling as scrap metal.

c. Organizations and contractors shall cut clean gas flex hoses into 4 foot to 6 foot sections. Organizations and contractors without the capability to safely cut flex hoses can seek assistance from other organizations (such as ISC) for this task, if funding is provided.

d. A completed KSC Form 7-49 must accompany the flex hoses upon delivery to the RRMF. The description “clean gas flex hose – scrap only” shall be on the form.

13.20.3 Used Hydrocarbon Flex Hoses (used for liquid hydrocarbons such as hydraulic fluids, fuels, oils, solvents, etc.)

a. Used hydrocarbon flex hoses are not subject to any environmental waste disposal regulations provided the fluids have been adequately drained (no visible drips) from the flex hose. The drained fluids shall be containerized and properly disposed of as separate waste streams.

b. The RRMF may accept used hydrocarbon flex hoses from organizations and contractors for recycling as scrap metal.

c. Organizations and contractors shall adequately drain the flex hoses (no visible drips) and cut them into 4 foot to 6 foot sections before delivery to the RRMF. Organizations and contractors without the capability to safely cut flex hoses can seek assistance from other organizations (such as ISC) for this task if funding is provided.

d. A completed KSC Form 7-49 must accompany the flex hoses upon delivery to the RRMF. The description “hydrocarbon flex hose – scrap only” shall be on the form.

13.20.4 Used Ammonia and Hypergolic Elastomeric Flex Hoses (used for ammonia, hypergolic fuels, hypergolic oxidizers, etc.)

a. Elastomeric flex hoses have internal liners or soft goods that can absorb hazardous materials.

b. Soft goods are synthetic materials (such as polyurethane, Teflon, plastics, etc.) bonded to the inside of the flex hose.

c. Used ammonia and hypergolic elastomeric flex hoses are subject to hazardous waste disposal regulations and shall not be sold, recycled, or reused in another application.

d. Used ammonia and hypergolic elastomeric flex hoses must be decontaminated and disposed of through the KSC WMO by the following process:

(1) Organizations and contractors shall submit a PWQ for the flex hose to the KSC WMO according to Chapter 13 of this KNPR. The KSC WMO will issue a TRP with waste packaging and labeling instructions.

(2) Organizations and contractors shall drain the flex hose of the hazardous material.

(3) Organizations and contractors shall flush the flex hose at least three times to remove residual hazardous material. A fresh set of flushing liquids, with a volume greater than 10 percent of the flex hose capacity, must be used for each flush. The three sets of flushing effluent must be containerized and properly disposed of as a separate waste stream.

(4) Organizations and contractors shall place KSC Form 29-1096, Ammonia Partial Decontamination Verification Tag, KSC Form 4-295, Hypergol Fuel Partial Decontamination Verification Tag, or KSC Form 4-296, Hypergol Oxidizer partial Decontamination Verification Tag, on the flex hose to document that the field flush has been completed.

(5) After the three flushes, the flex hose must be flushed with neutralizer solution to remove the hazardous material. The flex hose will then be flushed with water until a neutral potential of hydrogen (pH) is obtained in the water rinsate. All neutralizer and water rinsates shall be containerized and properly disposed as separate waste streams.

(6) The flex hose shall be dried and placed in a sealed container or bag for at least 72 hours. The decontamination process is complete if the air concentration (determined by toxic vapor detector test) of the hazardous material in the sealed container or bag is below the acceptable decontamination limit (ADL) concentration listed below.

NOTE: If the hazardous material concentration exceeds the ADL concentration, the flex hose must be decontaminated again.

(a) Hypergolic oxidizer ADL - 1.0 ppm

(b) Hypergolic fuel ADL - 0.1 ppm

(c) Ammonia ADL - 3.0 ppm

e. After decontamination, organizations and contractors shall cut the flex hoses into 4 foot to 6 foot sections; containerize the flex hose sections according to TRP instructions, and dispose of the containers through the KSC WMO.

f. Organizations and contractors without the capability to safely decontaminate or cut flex hoses can seek assistance from other organizations (such as ISC) for this task if funding is provided.

13.20.5 Used Ammonia and Hypergol Convoluted Flex Hoses (used for ammonia, hypergolic fuels, hypergolic oxidizers, etc.)

a. Convoluted flex hoses typically do not have any internal liners or soft goods that can absorb hazardous materials. Soft goods are synthetic materials (such as polyurethane, Teflon, plastics, etc.) bonded to the inside of the flex hose.

b. Used ammonia and hypergolic convoluted flex hoses are subject to hazardous waste disposal regulations until they are properly decontaminated.

c. The RRMF may accept used ammonia and hypergolic convoluted flex hoses from organizations and contractors for recycling as scrap metal provided they are properly decontaminated by the following process:

(1) Drain the flex hose of the hazardous material.

(2) Flush the flex hose at least three times to remove residual hazardous material. A fresh set of flushing liquids, with a volume greater than 10 percent of the flex hose capacity, must be used for each flush. The three sets of flushing effluent must be containerized and properly disposed of as a separate waste stream.

(3) KSC Form 29-1096, KSC Form 4-295, or KSC Form 4-296 shall be placed on the flex hose to document that the field flush has been completed.

(4) After the three flushes, the flex hose must be flushed with neutralizer solution to remove the hazardous material. The flex hose will then be flushed with water until a neutral pH is obtained in the water rinsate. All neutralizer and water rinsates shall be containerized and properly disposed of as separate waste streams.

(5) The flex hose shall be dried and placed in a sealed container or bag for at least 72 hours. The decontamination process is complete if the air concentration (determined by toxic vapor detector test) of the hazardous material in the sealed container or bag is below the ADL concentration listed below. If the hazardous material concentration exceeds the ADL concentration listed below, the flex hose must be decontaminated again.

(a) Hypergolic oxidizer ADL - 1.0 ppm

(b) Hypergolic fuel ADL - 0.1 ppm

(c) Ammonia ADL - 3.0 ppm

d. All non-metal gaskets, seals, or caps must be removed from the flex hose and properly disposed of as a separate waste stream. These items cannot be transferred to the RRMF.

e. After decontamination, organizations and contractors shall cut the flex hoses into 4 foot to 6 foot sections and transfer them to the RRMF for recycling as scrap metal. A completed KSC Form 7-49, Purchase Request (Supplies/Equipment or Property Turn in), must accompany

the flex hoses upon delivery to the RRMF. The description “ammonia flex hoses (decontaminated) – scrap only” or “hypergolic flex hoses (decontaminated) – scrap only” must be on the form.

f. Organizations and contractors without the capability to safely decontaminate or cut flex hoses can seek assistance from other organizations (such as ISC) for this task if funding is provided.

13.20.6 Flex Hose Hardware

a. Flex hose hardware includes metal fittings, B-nuts, caps, unions, elbows, etc.

b. In general, flex hose hardware shall be processed, decontaminated, and disposed of in a manner similar to the related flex hose requirements described above. For example, hardware with elastomeric components used for ammonia or hypergol must be disposed of in the same manner as ammonia and hypergol contaminated elastomeric flex hoses.

c. For hardware that can be accepted at the RRMF, a completed KSC Form 7-49 must accompany the hardware upon delivery to the RRMF. The following appropriate description shall be on the form:

(1) New flex hose hardware

(2) Unused flex hose hardware – scrap only

(3) Clean gas flex hose hardware – scrap only

(4) Hydrocarbon flex hose hardware – scrap only

(5) Ammonia flex hose hardware (decontaminated) – scrap only

(6) Hypergol flex hose hardware (decontaminated) – scrap only

13.21 Kennedy Space Center Treatment, Storage, and Disposal Facility

13.21.1 KSC operates a permitted hazardous waste TSDF under a permit issued by the FDEP. The TSDF permit allows for temporary storage (up to one calendar year) of hazardous, controlled, universal, and PCB wastes generated at KSC.

13.21.2 The KSC WMO contractor shall operate the TSDF and maintain all required records according to all applicable Federal and state regulations and permit conditions.

13.21.3 The KSC WMO contractor shall prepare TSDF permit renewal application packages and submit them to the NASA EAB.

13.21.4 The NASA EAB shall sign TSDF permit renewal application packages and submit them to the FDEP.

13.21.5 The KSC WMO contractor shall prepare all KSC biennial hazardous waste reports and submit them to the NASA EAB for review.

13.21.6 The NASA EAB shall sign KSC biennial hazardous waste reports and submit them to the FDEP.

13.22 Compliance Inspections

13.22.1 The NASA EAB shall conduct periodic compliance inspections of waste storage locations, management processes, and records to ensure compliance with regulatory requirements and the requirements of this KNPR.

13.22.2 The NASA EAB shall attend regulatory agency compliance inspections and respond to regulatory agencies regarding potential non-compliance issues or violations.

13.22.3 Organizations and contractors shall attend compliance inspections and provide records to the inspector.

13.22.4 Organizations and contractors shall implement corrective actions to address any non-compliance issues, violations, deficiencies, and findings identified during inspections, and provide corrective action information and status to the NASA EAB when requested.

13.23 Abandoned Waste and Materials

13.23.1 Upon discovery of a potentially abandoned waste/material, the discoverer shall make a reasonable attempt to locate the waste generator/material owner by checking with personnel in nearby area/facilities or examining labels.

a. Assistance may be obtained from the assigned Facility Manager, who may be familiar with the source of the material.

b. If the container has a hazardous waste label or a controlled waste label, a process waste code may be located on the label. If so, contact the KSC WMO, who may be able to assist in determining the waste generator and location.

13.23.2 If the waste generator/material owner cannot be located, or if the container shows signs of leakage, the discoverer shall immediately report the abandoned waste/material by calling 911, using the same reporting conventions for “non-emergency spills” found in the KSC Emergency Reference Guide, Section 4.2, and reporting that he or she has found abandoned waste/material. Discoverer will indicate if the container shows signs of leakage

13.23.3 Due to health and safety concerns, discoverers shall not move waste/material or open containers to determine contents.

13.23.4 Upon reporting to 911, the KSC spill response team shall take control of the abandoned waste/material and perform follow-up reporting IAW Chapter 4 of this KNPR.

13.24 Ordnance Waste Management

13.24.1 Applicability

a. The ordnance waste management requirements outlined in this section apply to NASA organizations, programs, and contractors and do not apply to commercial entities or tenants performing non-NASA operations and activities at KSC.

b. Commercial tenants performing non-NASA operations and activities shall properly manage and dispose of all ordnance waste according to Federal, Florida, and local environmental laws, statutes, regulations, and ordinances.

c. All ordnance waste generated by commercial tenants performing non-NASA activities must be properly containerized, stored, labeled, manifested, shipped, and disposed of under the commercial entity's own EPA hazardous waste identification number.

13.24.2 Background and Regulatory Requirements

a. For this section, the term "ordnance items" refers to unexpended ordnance devices or explosive raw materials that have not been declared a waste or defined as a waste under environmental regulations.

b. For this section, the term "ordnance waste" refers to excess unexpended ordnance devices, expended ordnance devices that contain (or may contain) residues of hazardous materials or regulated substances, damaged ordnance devices, or excess explosive raw materials used to make an ordnance device that have been declared a waste or defined as a waste under environmental regulations.

c. Ordnance waste may be classified as either a hazardous waste or a controlled waste depending on the constituents and the DOT hazard classification.

(1) Hazardous wastes are flammable, toxic, corrosive, or reactive wastes defined by RCRA regulations.

(2) Controlled wastes are either non-hazardous wastes regulated by non-RCRA regulations or are non-hazardous wastes that may pose an environmental cleanup liability to NASA if released to the environment.

d. NASA does not currently operate an ordnance disposal facility at KSC.

e. The 45th Space Wing (45 SW) operates an Explosive Ordnance Disposal (EOD) Range at CCAFS under a RCRA hazardous waste treatment and disposal permit issued by the FDEP.

f. The CCAFS EOD Range consists of an open detonation area and a thermal treatment area.

g. The current CCAFS EOD Range RCRA hazardous waste treatment and disposal permit limits the quantity of ordnance that can be treated for each disposal event to 100 pounds net explosive weight (NEW).

h. The CCAFS EOD Range Safety Plan limits the types and sizes (such as NEW) of ordnance that can be disposed of.

i. The 45 SW EOD personnel dispose of certain ordnance waste for NASA at the CCAFS EOD Range under KCA-1285 (also known as Joint Operating Procedure 15E-2-51).

j. NASA organizations and contractors must supply all ancillary materials (such as C-4 explosives, detonation cord, blasting caps, wood, fuel, etc.) required by AF EOD personnel to dispose of NASA ordnance waste at the CCAFS EOD Range.

k. The Launch Operations Support Contract (LOSC) contractor currently operates the KSC Ordnance Storage Facility (OSF) and is available to transport ordnance and ordnance waste for NASA organizations and contractors.

l. Organizations and contractors shall properly identify, manage, and dispose of all ordnance waste according to the applicable Federal, state, and local regulations and the requirements of this KNPR.

m. If approved by the 45 SW, organizations and contractors shall dispose of ordnance waste below 100 pounds NEW at the CCAFS EOD Range. Treatment and disposal at the CCAFS EOD Range reduces ordnance waste disposal costs and increases public safety by preventing ordnance waste items from being shipped over public highways.

n. Organizations and contractors shall dispose of ordnance waste greater than 100 pounds NEW and ordnance waste not approved for disposal at the CCAFS EOD Range at a permitted off-site commercial disposal facility.

13.24.3 Ordnance Waste Declaration

a. Organizations and contractors shall determine when their unexpended ordnance items and expended ordnance items are a waste.

b. Ordnance items that have been used for their intended purpose or determined to be excess shall be declared an ordnance waste.

c. Ordnance items that have been used for their intended purpose but are being stored for, or actively undergoing, post-flight testing, evaluation, or analysis shall not be declared an ordnance waste until the post-flight testing, evaluation, or analysis is complete.

d. Ordnance items kept for a known or potential future use shall not be declared an ordnance waste until the items are determined to be excess by the owning organization or program.

e. Leaking, damaged, unstable, or abandoned ordnance items shall be immediately declared an ordnance waste.

f. Once an ordnance item has been declared an ordnance waste by the organization or contractor that declaration is irrevocable and the organization or contractor shall immediately submit paperwork to the KSC WMO to characterize the waste, properly store and label the waste, and initiate the disposal process according to the requirements outlined below.

g. Ordnance Waste Evaluation and Characterization

(1) Organizations and contractors shall complete a PWQ for ordnance waste streams that have not been recently (within the past 12 months) evaluated and submit the PWQ to the KSC WMO IAW the requirements outlined in Section 13.2 of this KNPR.

(2) The KSC WMO shall prepare the required LDR Notification and Certification form and submit it to the NASA EAB for approval.

(a) For ordnance waste disposed at the CCAFS EOD Range, the NASA EAB shall approve and sign the LDR form and provide it to the 45 SW.

(b) For ordnance waste disposed of at an off-site commercial disposal facility, the KSC WMO shall sign the approved LDR form and submit a copy to the disposal facility and NASA EAB.

13.24.5 Ordnance Waste Storage and Labeling Requirements

a. Organizations and contractors shall store ordnance waste at the KSC OSF unless an alternative ordnance waste storage location has been approved by Safety and Mission Assurance, KSC Protective Services, and NASA EAB.

b. Organizations and contractors shall immediately notify the NASA EAB whenever an ordnance waste storage location is established, activated, relocated, deactivated, or disestablished.

c. Organizations and contractors shall immediately notify the NASA EAB when ordnance waste is generated, declared, or placed into an ordnance waste storage location so NASA EAB can assist in coordinating disposal.

d. Organizations and contractors shall store ordnance waste IAW the requirements outlined in NASA-STD 8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics, KDP-KSC-P-2236, KSC Ordnance Life Cycle, and the requirements outlined in 40 CFR [redacted], Design and Operating Standards.

e. Organizations and contractors shall store waste ordnance IAW the hazardous and controlled waste storage requirements outlined in Section 13.5 of this KNPR. Key requirements and exceptions are as follows:

(1) Because ordnance items with a DOT Hazard Class of 1.1, 1.2, or 1.3 are known reactive RCRA hazardous waste, organizations and contractors shall immediately label and store the ordnance waste as a hazardous waste before the TRP has been issued by the KSC WMO. This is an exception to the HWDIP labeling requirements outlined in Chapter 13 of this KNPR.

(2) For ordnance items with a DOT Hazard Class of 1.4, 1.5, or 1.6, or for ordnance items with an unknown hazard class, organizations and contractors shall label the waste with KSC Form 29-759, Label, Hazardous Waste Determination In-Progress, and store the waste as if it were a hazardous waste until the waste characterization process is complete (KSC WMO has issued the TRP).

(3) After receipt of the TRP from the KSC WMO, organizations and contractors shall containerize and label hazardous and controlled ordnance waste according to TRP instructions.

f. Organizations and contractors shall obtain bar codes from the KSC WMO and place bar codes on ordnance waste containers for tracking throughout the disposal process.

g. Hazardous waste ordnance shall be stored in either a CAA/90-day hazardous waste storage area or SAA IAW the requirements outlined in Sections 13.5.3 or 13.5.4 of this KNPR.

(1) Organizations and contractors shall actively manage all ordnance waste in storage, track ordnance waste storage times, and coordinate waste pickups with enough advance notice to complete offsite shipment or onsite disposal within regulatory time limits.

(2) If unforeseen circumstances (such as weather, safety concerns, range operations, unavailability of AF EOD technicians, etc.) prevent the local disposal or offsite shipment of ordnance waste by the CAA/90-day storage limit, the organization or contractor shall immediately contact the NASA EAB who will request an extension from the FDEP.

13.24.6. Additional Requirements for Ordnance Waste Storage at the KSC OSF:

a. Organizations and contractors shall coordinate the establishment, activation, relocation, deactivation, or disestablishment of ordnance waste storage locations with the OSF operator.

b. Organizations and contractors shall store ordnance waste in the appropriate magazine based on the DOT Hazard Class.

c. Organizations and contractors shall coordinate the delivery, removal, and ongoing storage of ordnance waste with the OSF operator.

d. The OSF operator shall approve access to the OSF and escort personnel during visits to ordnance storage magazines.

e. The OSF operator shall maintain an inventory of all ordnance waste placed into storage at the OSF.

f. Organizations and contractors shall be responsible for providing adequate funding to the LOSC contractor to support their ordnance waste storage activities and escorted visits.

g. Additional Requirements for Ordnance Waste Storage at Facilities other than the KSC OSF

(1) Organizations and contractors shall obtain approval from Safety and Mission Assurance, KSC Protective Services, and NASA EAB to store ordnance waste at locations other than the KSC OSF.

(2) Organizations and contractors shall store ordnance waste IAW the requirements outlined in NASA Standard 8719.12.

(3) The combined quantity of ordnance material and ordnance waste stored at each location shall not exceed the approved sited amount for that location.

13.24.7 Ordnance Waste Transportation

a. When transporting ordnance waste from one location to another on KSC or CCAFS property, organizations and contractors shall comply with transportation requirements outlined in NASA Standard 8719.12, NASA-STD 8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics, and KDP-KSC-P-2236, KSC Ordnance Life Cycle.

b. When transporting ordnance waste over public highway for disposal at an offsite commercial disposal facility, organizations and contractors shall:

(1) Ensure that the shipment complies with all state of Florida and DOT regulations including transportation approvals, transporter licenses, vehicle types, placarding, and manifesting requirements.

(2) Have the KSC WMO prepare and sign the hazardous waste or non-hazardous waste shipping manifest.

13.24.8 CCAFS EOD Range Ordnance Waste Disposal Requirements

a. If approved by the 45 SW, organizations and contractors shall dispose of small ordnance items (up to 100 pounds NEW) at the CCAFS EOD Range.

b. Only certified AF EOD technicians shall perform treatment and disposal of ordnance items at the CCAFS EOD Range.

c. Organizations and contractors shall prepare an ordnance disposal support request letter addressed to the 45 SW EOD Office with the following information and submit it to the NASA EAB:

(1) Ordnance information

(2) UN number

(3) Nomenclature

(4) Proper shipping name

(5) Number of items

(6) DOT hazardous material classification and division

(7) NEW (each item)

(8) Total NEW (sum of all items of the same type)

(9) Department of Defense (DOD) Identification Code (if applicable)

(10) Condition and stability of the ordnance waste

(11) Reason and justification for disposal at the CCAFS EOD Range

(12) Applicable mission support agreement number (i.e., KCA 1285/JOP 15E-3-15)

(13) LOSC Contract Job Order Number (if LOSC is providing ordnance transportation support)

d. The NASA EAB shall coordinate the disposal of NASA ordnance waste with the 45 SW EOD Office, 45 SW Environmental Office, and AF Environmental Support Contract (ESC) Office.

e. The NASA EAB shall submit the ordnance disposal support request letter, PWQ, TRP, LDR form, design information, and any other documentation required to facilitate safe disposal to the 45 SW EOD Office, 45 SW Environmental Office, and AF ESC Office for review.

f. If approved by the 45 SW, the NASA EAB shall communicate the scheduled disposal operation date, required ancillary materials (such as C-4 explosives, detonation cord, blasting caps, wood, fuel, etc.), and disposal method (open detonation or thermal treatment) to the organization or contractor.

g. The responsible NASA program or organization shall provide funding for all ancillary materials (such as C-4 explosives, detonation cord, blasting caps, wood, fuel, etc.) needed by AF EOD personnel to perform the disposal operation.

(1) All ancillary ordnance items required to support the disposal operation shall be National Stock Number listed ordnance items procured from a DOD Ordnance Logistics Depot (AF EOD requirement).

(2) The NASA EAB shall assist organizations and contractors with purchasing ordnance items from a DOD Ordnance Logistics Depot.

13.24.9 Open Detonation Disposal Requirements

a. The responsible NASA program or organization shall provide funding for the transportation of the ordnance waste and ancillary materials to the open detonation area at the CCAFS EOD Range on the day of the disposal operation.

b. After the disposal operation is complete, the 45 SW EOD personnel will dispose of any scrap metal generated from the disposal operation and provide an ordnance disposal confirmation letter to the NASA EAB.

c. The NASA EAB shall distribute the ordnance disposal confirmation letter to the contractor or organization responsible for the waste, the KSC WMO, and the 45 SW Environmental Office.

d. The KSC WMO shall maintain all ordnance disposal confirmation letters in order to complete hazardous waste disposal reports submitted to the FDEP.

13.24.10 Thermal Treatment Disposal Requirements

a. At least seven calendar days prior to the scheduled disposal operation date, the NASA EAB shall submit KSC Form 28-809, Waste Support Request, to KSC WMO to support clean-out of residual waste from the thermal treatment unit after completion of the operation.

b. The responsible NASA program or organization shall provide funding for the transportation of the ordnance waste and ancillary materials to the thermal treatment area at the CCAFS EOD Range on the day of the disposal operation.

c. After the disposal operation is complete and 45 SW EOD personnel have declared the thermal treatment unit safe, the KSC WMO shall clean out the thermal treatment unit and obtain a completed KSC Form 7-49, Purchase Request (Supplies/Equipment or Property Turn in), from the 45 SW EOD personnel stating that the scrap metal is ordnance free.

d. The KSC WMO shall transport all scrap metal from the thermal treatment unit to the RRMF for recycling and provide a copy of the completed KSC Form 7-49 to the RRMF personnel.

(1) RRMF personnel shall provide a letter of acceptance (that includes the weight of the scrap metal) to the KSC WMO.

(2) The KSC WMO shall provide a copy of the completed KSC Form 7-49 and RRMF letter of acceptance to the NASA EAB.

(3) The NASA EAB shall provide a copy of the completed KSC Form 7-49 and RRMF letter of acceptance to the 45 SW Environmental Office.

e. The KSC WMO shall place all other residuals (such as ash) from the thermal treatment unit into waste drums and transport the drums to the CAA/90-day site at the KSC waste storage complex. Treatment residue (ash) is managed through HWDIP process and cannot be stored in permitted facility prior to waste characterization through PWQ TRP process.

f. The NASA EAB shall arrange to have waste characterization samples collected (if required), submit a PWQ, obtain a TRP, label the drum according to TRP instructions, and coordinate offsite disposal of the residual waste (such as ash) through the KSC WMO IAW the requirements outlined in Chapter 13 of this KNPR.

g. After the disposal operation is complete, the 45 SW EOD personnel will provide an ordnance disposal confirmation letter to the NASA EAB.

h. The NASA EAB shall distribute the ordnance disposal confirmation letter to the organization or contractor responsible for the waste, the KSC WMO, and the 45 SW Environmental Office.

i. The KSC WMO shall maintain all ordnance disposal confirmation letters in order to complete hazardous waste disposal reports submitted to the FDEP.

j. The responsible NASA program or organization shall provide funding for thermal treatment unit clean-out, scrap metal transportation, residual waste sampling, residual waste transportation, and residual waste disposal.

k. In the event that a disposal operation is cancelled due to adverse weather conditions, 45 SW EOD personnel unavailability, or other range restrictions, the organization or contractor shall coordinate and provide funding to transport the ordnance waste and ancillary materials back to their storage locations until a new disposal operation date is scheduled.

13.24.11 Offsite Ordnance Waste Disposal Requirements

a. When disposing of ordnance waste at an offsite commercial disposal facility, organizations and contractors shall coordinate the disposal through the NASA EAB and KSC WMO.

b. The responsible NASA program or organization shall obtain an ordnance waste disposal contract through a NASA procurement office or provide a funded support request to the KSC WMO to complete the disposal.

c. Organizations and contractors shall ensure that the facility is adequately permitted to receive and dispose of the ordnance waste.

d. Organizations and contractors shall provide waste information and assist the NASA EAB and KSC WMO in obtaining DOT approvals required to transport the ordnance waste over public highways.

e. Regardless of whether the ordnance disposal is contracted by a NASA procurement office or by the KSC WMO, the KSC WMO shall:

(1) Ensure that the commercial disposal facility is properly permitted and the disposal method meets waste disposal regulations.

(2) Prepare and sign the shipping manifest or hazardous waste manifest.

(3) Ensure the shipment mode meets all DOT requirements.

(4) Track the disposal and obtain a completed manifest or certificate of disposal (or equivalent) from the commercial disposal facility.

(5) Maintain manifests and certificates of disposal in order to complete hazardous waste disposal reports for submittal to the FDEP.

f. The responsible NASA program or organization shall be responsible for all ordnance waste transportation costs, ordnance waste disposal costs, and labor costs incurred by the KSC WMO to support the disposal action.

13.24.12 Emergency Disposal

a. In the event that an ordnance item or ordnance waste becomes damaged or unstable to the point where it is immediately dangerous to life or health, organizations and contractors shall immediately contact Safety and Mission Assurance and NASA EAB to initiate an emergency disposal operation.

b. The NASA EAB shall immediately notify the 45 SW EOD Office, 45 SW Range Safety Office, 45 SW Environmental Office, and FDEP about the incident.

c. Once an emergency disposal plan is developed and agreed to by all stakeholders, the NASA EAB shall coordinate with the FDEP and, if necessary, obtain an emergency hazardous waste disposal permit.

d. Once an emergency disposal plan is developed and agreed to by all stakeholders, the 45 SW EOD Office shall execute the emergency disposal operation IAW the emergency hazardous waste disposal permit conditions.

13.24.13 Ordnance Waste Storage Extensions

a. Organizations and contractors shall actively manage their ordnance waste and take measures to ensure that their ordnance waste is disposed of in a timely manner and as required by hazardous waste storage time limits.

b. In the event that hazardous ordnance waste stored at a 90-day hazardous waste storage area cannot be disposed at the CCAFS EOD Range or shipped offsite for disposal within the 90-day limit, organizations and contractors shall notify the NASA EAB before the 75th day and provide a justification letter describing why an extension is needed.

c. The NASA EAB will formally request extensions (only in 30-day increments) from the FDEP until the ordnance waste is disposed of at the CCAFS EOD Range or shipped offsite for disposal at a commercial disposal facility.

13.24.14 Recordkeeping and Regulatory Reporting

a. The KSC WMO shall maintain all disposal records, manifests, and certificates of disposal for all ordnance waste disposed of by NASA organizations and contractors.

b. The KSC WMO shall incorporate ordnance disposal activities (CCAFS EOD Range and offsite commercial disposal facilities) into biennial hazardous waste reports submitted by KSC to the FDEP.

CHAPTER 14. LANDFILL

14.1 Background and Regulatory Requirements

14.1.1 KSC has two unlined Class III landfills (one operational and one closed) on Schwartz Road east of State Road 3. The landfills are authorized under permits issued by the FDEP. The ISC contractor operates and maintains both landfills.

14.1.2 FAC 62-701, Solid Waste Management Facilities, is the regulation for solid waste management facility construction, operation, closure, and permitting in the state of Florida.

14.1.3 Organizations and contractors shall ensure that only authorized wastes are delivered to the landfill for disposal.

14.2 Authorized Waste

The following types of waste are authorized for disposal at the KSC Landfill:

a. Yard Trash - Vegetative matter resulting from landscaping maintenance or land clearing operations, including materials such as tree and shrub trimmings, grass clippings, palm fronds, trees, and tree stumps

b. Construction and Demolition Debris - Materials considered to be non-water soluble and non-hazardous in nature, including but not limited to steel, brick, glass, concrete, asphalt, pipe, gypsum wallboard, dry electrical equipment, and lumber. This includes rocks, soils, tree remains, trees, and other vegetative matter which normally results from land clearing or development from a construction project.

c. Shredded Waste Tires - "Shredded waste tire" means a tire that is no longer suitable for its originally intended purpose because of wear, damage, or defect, and that has been reduced in size by cutting, grinding, shredding, milling, or rasping.

d. Non-regulated asbestos containing materials (NRACM) (see additional guidance and requirements in Section 14.4 of this KNPR)

e. Carpet and furniture, however recycling is preferred

f. Non-pressure treated wood and wood scraps

g. Certain PCB bulk product wastes (see additional guidance and requirements below in Section 14.5 of this KNPR)

h. Certain Spent Blast Media:

(1) In general, spent blast media shall be managed and disposed of as a controlled or hazardous waste according to the procedures and requirements of Chapter 13 of this KNPR. On a case-by-case basis, the NASA EAB may approve the disposal of spent blast media in the KSC landfill if it meets certain conditions (e.g., it is non-hazardous waste under RCRA regulations, an unregulated waste under TSCA regulations, and a low risk for leaching and potential future remedial actions).

(2) Organizations and contractors shall obtain approval by submitting a completed KSC Form 28-1117, Spent Blast Media Disposal Certification, to the NASA EAB.

(3) Organizations and contractors shall bring a copy of the approved form with each waste load delivery to the landfill.

i. Clean soil (used as landfill cover material)

j. Other waste materials specifically approved by the FDEP that are not expected to produce leachate, which poses a threat to public health or the environment. Waste generators shall contact the NASA EAB who will request approval from the FDEP.

14.3 Unauthorized Waste

The following wastes are not authorized for disposal at the KSC Landfill:

a. Any waste not permitted by FDEP regulations to be disposed of in a Class III landfill as defined in FAC 62-701, Solid Waste Management Facilities

b. Hazardous wastes as described by RCRA regulations

c. Liquid and oily wastes (containerized or non-containerized)

d. Paint chips, coating chips, paint chips mixed with blast media, and coating chips mixed with blast media unless approved by the NASA EAB

e. Putrescible waste and general office trash

f. Pressure treated wood (including chromated copper arsenate treated wood)

g. Liquid PCBs

h. Oil-containing or oil-contacted electrical and mechanical equipment (drained or not drained)

i. RACM

j. Biomedical waste

k. Lead-acid batteries

l. Tires (other than "shredded waste tires")

m. White goods or appliances

n. Small capacitors

o. Fluorescent light ballasts

p. Drums (empty or full)

q. Contaminated soil

r. Materials that are recycled at KSC such as cardboard, office paper, glass bottles, plastic bottles, steel, copper, and lead

14.4 Non-Regulated Asbestos Disposal at the Kennedy Space Center Landfill

14.4.1 The KSC Class III landfill only accepts NRACM for disposal. Before disposing of NRACM in the KSC landfill, organizations and contractors must obtain approval by submitting a completed KSC Form 28-1084, NASA-KSC/Schwartz Road Landfill Non-Friable Asbestos Landfill Disposal Verification Form, to the NASA EAB. RACM shall be disposed of off-Center at an appropriate facility (e.g., Brevard County Landfill).

14.4.2 If disposal of the NRACM waste in the KSC Class III landfill is not approved, the generator shall find an appropriate offsite disposal location.

14.4.3 Once written approval from the NASA EAB has been obtained, organizations and contractors shall abide by the following conditions to dispose of the NRACM waste at the KSC landfill:

a. The waste generator or hauler shall notify and make arrangements with the KSC landfill operator at least 24 hours before the delivery of NRACM waste.

b. The waste generator or hauler shall provide the quantity of the waste and the scheduled arrival date at the landfill.

c. The waste generator or hauler shall deliver NRACM waste to the KSC landfill during regular landfill hours before 1400 hours.

d. The waste generator or hauler shall ensure the waste is packaged as if it were regulated asbestos and the physical dimensions of the waste are within the handling capabilities of the landfill disposal equipment (less than 8 foot sections).

14.5 Polychlorinated Biphenyl Bulk Product Waste Disposal at the Kennedy Space Center Landfill

14.5.1 There is documented existence of PCB in various building materials (such as paints, coatings, caulk, mastic, window glazing, adhesives, gaskets, cable insulation, etc.) across KSC and NASA-operated facilities at CCAFS. The KSC Class III landfill accepts certain types of PCB bulk product waste for disposal. PCB bulk product waste is defined in 40 CFR 761.3, Definitions, as waste derived from manufactured products containing PCBs in a non-liquid state at any concentration where the concentration of PCBs at the time of designation for disposal is greater than or equal to 50 ppm.

14.5.2 PCB Bulk Product Waste Acceptable for Disposal in the KSC Landfill:

a. Construction and demolition debris that contains or may contain PCB bulk product waste, provided there are no materials in the debris that are specifically prohibited for disposal in the landfill

b. Dry electrical equipment (items that do not use oil as a heat transfer or dielectric fluid) with PCB paints or coatings, provided there are no materials in the electrical equipment that are specifically prohibited for disposal in the landfill

14.5.3 PCB Bulk Product Waste Not Acceptable for Disposal in the KSC Landfill:

a. Oil-containing or oil-contacted electrical equipment (drained or not drained)

b. Oil-containing or oil-contacted mechanical equipment (drained or not drained)

c. Construction and demolition debris that contains materials specifically prohibited for disposal in the landfill

d. Paint chips, paint chips mixed with blast media, caulk, mastic, or any other PCB-containing materials physically separated and containerized from other construction or demolition debris where the total PCB concentration is greater than 50 ppm

14.5.4 KSC organizations and contractors may assume that suspect materials are PCB bulk product waste without sampling but must manage the materials according to PCB bulk product waste storage requirements in 40 CFR 761.65(c)(9), Storage for Disposal, (e.g., store the waste on a lined impervious surface or in a sealed container that is covered from precipitation) until it is disposed of.

14.6 Landfill Operations

14.6.1 The ISC contractor shall operate and maintain the landfills according to all applicable regulations, permit requirements, and the EAP-REF-0001, John F. Kennedy Space Center KSC/Schwartz Road Landfill, Class III Revised Landfill Operations Plan.

14.6.2 The ISC contractor shall maintain a copy of the latest closed landfill permit, operational landfill permit, and approved KSC Landfill Operations Plan at the landfill scale house.

14.6.3 Records required by FAC 62-701, Solid Waste Management Facilities, and permit-specific conditions are inspected on a routine basis. Records of daily operations, maintenance, load checking, and training shall be maintained by the operational organization and provided to NASA EAB for transmittal to the FDEP IAW permit conditions.

14.6.4 KSC Schwartz Road Landfill Class III Operations Plan

a. The ISC contractor shall maintain the current KSC Schwartz Road Landfill Class III Operations Plan. All changes to the KSC Schwartz Road Landfill Class III Operations Plan must be approved by the NASA EAB and the FDEP.

b. The ISC contractor shall submit the revised KSC Schwartz Road Landfill Class III Operations Plan to the NASA EAB.

c. The NASA EAB shall submit the revised KSC Schwarz Road Landfill Class III Operations Plan to the FDEP for approval.

14.6.5 The NASA EAB shall perform all required notifications and reporting to regulatory agencies regarding the KSC landfills.

14.7 Compliance Inspections

14.7.1 The NASA EAB shall implement an inspection program to monitor landfill operations and ensure compliance with FAC 62-701, Solid Waste Management Facilities, permit conditions, and the KSC Schwartz Road Landfill Class III Operations Plan.

14.7.2 The NASA EAB shall coordinate and attend all landfill inspections by regulatory agencies.

14.7.3 The NASA EAB shall respond to and correspond with regulatory agencies regarding potential non-compliance issues or regulatory violations.

14.8 Sampling and Reporting

14.8.1 The KSC environmental support contractor shall:

a. Conduct all permit-required groundwater sampling, surface water sampling, and gas monitoring at the landfills and submit regulatory reports to the NASA EAB at least ten working days prior to the date due to FDEP.

b. Use a state-certified laboratory to analyze samples.

c. Maintain all landfill sampling and analysis records for the NASA EAB.

14.8.2 The ISC contractor shall prepare all permit-required operating reports and submit them to the NASA EAB at least ten working days prior to the date due to FDEP.

14.8.3 The NASA EAB shall submit all permit-required sampling and operating reports to the FDEP.

14.9 Permit Renewals

14.9.1 The KSC environmental support contractor shall prepare the permit renewal application package, including FDEP Form 62-701.900(1), Forms, required supporting documentation, an updated landfill monitoring plan, and an updated landfill operating plan, for the landfills and submit them to the NASA EAB for review at least 30 calendar days prior to the date due to FDEP.

a. The KSC environmental support contractor shall submit five copies of the final application package to the NASA EAB.

b. The KSC environmental support contractor shall ensure that a PE registered in the state of Florida signs and seals any designs, site plans, specifications, drawings, documents, or forms required by FAC 62-701.

14.9.2 The NASA EAB shall sign the application packages as the Applicant and forward them to the FDEP.

14.9.3 The FDEP will review the permit application for completeness and accuracy. If not satisfied with the permit application, the FDEP will submit an RAI to the applicant to correct any

deficiencies, errors, or omissions. Multiple RAIs may be submitted to the applicant until FDEP deems the application package to be complete.

14.9.4 The KSC environmental support contractor shall prepare draft RAI responses (in coordination with the PE) and submit them to the NASA EAB for review and comment.

14.9.5 The NASA EAB shall submit the final RAI responses to the FDEP.

14.9.6 When the permit application is approved, the NASA EAB shall forward the new permit to the ISC contractor.

CHAPTER 15. BIOMEDICAL WASTE

15.1 Background and Regulatory Requirements

15.1.1 Biomedical waste is any solid or liquid waste that may present a threat of infection to humans, including non-liquid tissue, body parts, blood, blood products, and body fluids from humans and other primates; laboratory and veterinary wastes which contain human disease-causing agents; and discarded sharps. This definition also includes the following:

a. Used, absorbent materials saturated with blood, blood products, body fluids, or excretions or secretions contaminated with visible blood and absorbent materials saturated with blood or blood products that have dried.

b. Non-absorbent, disposable devices that have been contaminated with blood, body fluids, secretions, or excretions visibly contaminated with blood, but which have not been treated by an approved method.

15.1.2 The regulations and requirements for management of biomedical waste are located in 29 CFR 1910.1030, Bloodborne Pathogens, and in FAC Chapter 64E-16, Biomedical Waste. Organizations and contractors shall manage all biomedical waste according to these regulations.

15.2 Biomedical Waste Management Requirements

15.2.1 The KSC WMO shall pick up and properly dispose of biomedical waste generated by KSC organizations and contractors.

15.2.2 Organizations and contractors generating biomedical waste shall comply with the following requirements:

a. Biomedical waste mixed with a hazardous waste shall be managed as hazardous waste.

b. Biomedical waste mixed with radioactive waste shall be managed as radioactive waste.

c. Biomedical waste mixed with solid waste that is not hazardous waste or radioactive waste shall be managed as biomedical waste.

d. Sharps and sharps containers shall be managed according to the requirements in FAC Chapter 64E-16.004(2)(d), Storage and Containment.

(1) Sharps shall be discarded at the point of origin into single use or reusable sharps containers.

(2) Needles and scalpel blades shall be placed into sharps containers and not into double-walled corrugated containers.

(3) Sharps containers shall be sealed when full.

(4) Sharps containers shall be considered full when materials placed into it reach the designated fill line, or, if a fill line is not indicated, when additional materials cannot be placed into the container without cramming, or when no additional materials are to be placed in the

container.
(5) Sharps containers shall bear the phrase and the international biological hazard symbol described in paragraph FAC Chapter 64E-16.004(2)(b).

(6) Permanently mounted sharps container holders shall bear the phrase and the international biological hazard symbol described in paragraph FAC Chapter 64E-16.004(2)(b) if this information on the sharps container itself is concealed by the sharps container holder.

(7) The international biological hazard symbol on sharps containers and sharps container holders shall be at least 1 inch in diameter.

(8) Reusable sharps containers shall only be emptied into a treatment cart or directly into a treatment unit.

(9) Reusable sharps containers shall be constructed of smooth, easily cleanable materials, and be decontaminated after each use.

e. Biomedical waste outer containers shall be rigid, leak-resistant, and puncture-resistant.

f. Reusable biomedical waste outer containers shall be constructed of smooth, easily cleanable materials, and decontaminated after each use.

g. The international biological hazard symbol shall be at least 6 inches in diameter on biomedical waste outer containers measuring 19 inches by 14 inches or larger, and at least 1 inch in diameter on biomedical waste outer containers measuring less than 19 inches by 14 inches.

h. Biomedical waste shall be stored in designated areas away from general traffic flow patterns and accessible only to authorized personnel.

i. Outdoor biomedical waste storage areas shall be conspicuously marked with the international biological hazard symbol and be secured against vandalism.

j. Indoor biomedical waste storage areas shall be constructed of smooth, easily cleaned materials that are impervious to liquids, have restricted access, and have a written operating plan.

k. Biomedical waste storage shall not exceed 30 days at the generating facility.

(1) The 30-day storage period shall begin when the first non-sharps item of biomedical waste is placed into a red bag, biomedical waste container, or sharps container.

(2) For sharps containers containing only sharps, the 30-day storage period shall begin when the container is full or sealed.

(3) Biomedical waste bags and containers shall be clearly marked with the 30-day storage period start date.

(4) For biomedical waste returning to KSC from flight, the 30-day storage period shall begin the day the biomedical waste becomes accessible from flight storage containers.

l. Biomedical waste generators shall maintain records at each facility with types and amounts of biomedical wastes generated.

m. Biomedical waste generators shall properly package biomedical wastes for safe handling, transportation, and disposal.

n. Biomedical waste generators shall contact the KSC WMO and arrange for biomedical waste pickups before the 30-day storage period expires.

o. Biomedical waste removed from a returning space vehicle in a state other than Florida shall be disposed of under the rules of that state.

15.3 Training

Prior to commencement of biomedical waste duties, organizations and contractors shall provide biomedical waste and bloodborne pathogen training (initial and annual refresher) to all personnel generating, handling, packaging, and shipping biomedical waste.

15.4 Records

Organizations and contractors shall maintain all biomedical waste records (such as generation logs, waste shipping manifests, training certificates, operating plans, autoclave logbooks, and biomedical waste bag reports) required by FAC Chapter 64E-16, Biomedical Waste, for at least three years.

15.5 Inspections

The NASA EAB shall inspect biomedical waste storage locations, waste records, and training records on a periodic basis to ensure compliance with biomedical waste regulations.

CHAPTER 16. BLOODBORNE PATHOGENS AND EXPOSURE CONTROL

Environmental requirements for bloodborne pathogens and exposure control are located in KSC-UG-1904, NASA Employee Exposure Control Plan for Bloodborne Pathogens.

CHAPTER 17. STORAGE TANKS

17.1 Background and Regulatory Requirements

17.1.1 The EPA and FDEP have promulgated regulations regarding the design, construction, installation, registration, operation, maintenance, repair, closure, and disposal of petroleum storage tank systems. These regulations are designed to minimize the occurrence of and the environmental risks from releases and discharges from registered storage tank systems. The information provided in this Chapter only applies to storage systems registered with the FDEP.

17.1.2 Federal underground storage tank (UST) system regulations are located in 40 CFR 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST).

17.1.3 The EPA has authorized the FDEP to administer Federal UST regulations in the state of Florida.

17.1.4 Florida UST system regulations are located in FAC 62-761, Underground Storage Tanks. USTs with individual capacities greater than 110 gallons must be registered with the FDEP prior to being placed into service.

17.1.5 There are currently no Federal regulations covering aboveground storage tank (AST) systems except that 40 CFR 112, Oil Pollution Prevention, requires SPCC plans for oil storage (see Chapter 5 of this KNPR for SPCC requirements).

17.1.6 Florida AST system regulations are located in FAC 62-762, Aboveground Storage Tank Systems. ASTs with volumes greater than 550 gallons must be registered with the FDEP prior to being placed into service.

17.1.7 The FDEP has delegated the compliance inspection program for FDEP registered petroleum storage tank systems in Brevard County to the Brevard County Natural Resources Management Department (BCNRMD). The BCNRMD inspects all registered petroleum storage tank systems at KSC.

17.1.8 Organizations and contractors shall comply with all applicable Federal, state, and local storage tank system regulations and the requirements of this KNPR.

17.1.9 All communication and interface with regulatory agencies shall be coordinated through and performed by the NASA EAB.

17.2 Inventory and Notifications

17.2.1 Organizations and contractors shall provide an accurate listing of all registered tank systems, whether in-service or out-of-service, at their facilities to the NASA EAB when requested.

17.2.2 Organizations and contractors shall immediately notify the NASA EAB of any non-compliance concerns, maintenance, repairs, or change in status (such as changing contents, removing the system from service, or abandoning the system) associated with registered storage tank systems.

17.2.3 When required, the NASA EAB shall notify regulatory agencies and change registration information with the FDEP to reflect the current inventory and status.

17.2.4 Organizations and contractors shall report any spill, release, overfill, or other discharge of a regulated substance from a storage tank system according to the requirements in Chapter 4 of this KNPR.

17.3 Installation and Modification of Storage Tank Systems

17.3.1 By using the KSC Environmental Checklist process outlined in Chapter 3 of this KNPR, organizations and contractors shall immediately notify the NASA EAB regarding any planned project involving the installation, modification, repair, or the removal of a registered storage tank system.

17.3.2 The NASA EAB shall review the proposed project, provide recommendations, determine applicable regulatory requirements, coordinate with regulatory agencies, and schedule all required regulatory inspections.

17.3.3 Organizations and contractors shall ensure that the design, construction, or modification of a registered tank system meets the requirements of 40 CFR 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST), FAC 62-761, Underground Storage Tanks, and FAC 62-762, Aboveground Storage Tanks.

17.3.4 If the new storage tank system must be registered according to FAC 62-761 or FAC 62-762, or if the modification requires a change in the registration, the responsible organization or contractor shall prepare the registration package, which includes FDEP Form 62-761.900(2), Storage Tank Facility Registration Form and Instructions, and all required supporting documentation, and submit it to the NASA EAB.

17.3.5 The NASA EAB shall sign registration forms as the Owner and submit the registration packages to the FDEP.

17.3.6 When the storage tank system has been inspected and approved by the BCNRMD, the responsible organization or contractor shall place the storage tank system into service.

17.4 Inspecting, Monitoring, Testing, and Reporting

Organizations and contractors responsible for registered storage tank systems shall:

17.4.1 Conduct all required inspections, monitoring, and testing for assigned registered storage tank systems according to the requirements in FAC 62-761 or FAC 62-762.

17.4.2 Perform visual inspections and release detection evaluations of assigned registered storage tank systems and associated secondary containment at least once a month (not exceeding 35 days between inspections).

17.4.3 Inspect the integrity of the storage tank systems and secondary containment at least once a month (not exceeding 35 days between inspections).

17.4.4 Immediately report any non-compliance items, regulatory violations, deficiencies,

corrosion, secondary containment integrity issues, and equipment problems to the NASA EAB and, if required by the NASA EAB, remove the storage tank system from service until repairs are made or the non-compliance items are corrected.

17.4.5 Correct and repair non-compliance items, regulatory violations, deficiencies, corrosion, secondary containment integrity issues, and equipment problems.

17.5 Recordkeeping

17.5.1 Each KSC organization responsible for registered storage tank systems shall maintain all activity, inspection, monitoring, and testing records required by FAC 62-761 and FAC 62-762 including:

a. Monthly inspection logs indicating the dates of the inspections, the Release Detection Response Level detection methods and results, findings or problems, and corrective actions taken

b. Daily inventory measurements and reconciliation calculations for vehicular fuel tanks

c. Dates of upgrade or replacement of existing storage tank systems

d. Results of maintenance examinations on storage tank systems

e. Results of all tightness tests and integrity tests

f. Descriptions and dates of all repairs

g. Release detection equipment specifications and instructions

17.5.2 Records Retention

a. Organizations and contractors shall maintain all assigned registered storage tank system activity, inspection, monitoring, and testing records for at least three years.

b. Organizations and contractors shall submit records related to registered storage tank system installations, registrations, modifications, upgrades, and closures to the NASA EAB.

c. The NASA EAB shall retain records related to storage tank system installations, registrations, modifications, upgrades, and closures according to the appropriate records retention schedule.

17.6 Closures

17.6.1 Organizations and contractors shall immediately notify the NASA EAB regarding any planned closure of any registered storage tank system.

17.6.2 The responsible organization and contractor shall properly close registered storage tank systems according to the requirements in FAC 62-761 and FAC 62-762.

17.6.3 The responsible organization and contractor shall conduct a closure assessment, prepare a closure assessment report, and submit the closure assessment report to the NASA EAB.

17.6.4 The NASA EAB shall submit the closure assessment report and revised registration paperwork to the FDEP.

17.7 Compliance Inspections

17.7.1 The NASA EAB shall conduct periodic compliance inspections of registered storage tank systems to ensure compliance with regulatory requirements and the requirements of this KNPR.

17.7.2 The NASA EAB shall attend all regulatory compliance inspections, respond to regulatory agencies regarding potential non-compliance issues or violations, and schedule required follow-on inspections with regulatory personnel.

17.7.3 Organizations and contractors shall attend inspections and provide any requested activity, inspection, monitoring, testing, maintenance, or repair records to the inspector.

17.7.4 Organizations and contractors shall implement corrective actions to address any non-compliance issues, violations, deficiencies, and findings identified during inspections and provide corrective action information and status to the NASA EAB when requested.

CHAPTER 18. PESTICIDES

18.1 Background and Regulatory Requirements

18.1.1 A pesticide is any substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest and includes insecticides, herbicides, fungicides, rodenticides, plant regulators, defoliants, and various other substances used to control pests.

18.1.2 The Federal Government and State of Florida have passed laws and promulgated regulations regarding the production, distribution, sale, use, storage, management, and disposal of pesticides.

a. The Federal Government pesticide law is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), administered by the EPA.

b. EPA's implementing regulations for FIFRA are located in 40 CFR 150-189, Pesticide Programs. FIFRA mandates that EPA regulate the use and sale of pesticides to protect human health and preserve the environment.

18.1.3 The state of Florida has three pesticide laws, administered by the Florida Department of Agriculture and Consumer Services (FDACS):

a. Florida Pesticide Law (Chapter 487 FS)

b. Florida Structural Pest Control Act (Chapter 482 FS)

c. Florida Mosquito Control Law (Chapter 388 FS)

18.1.4 FDACS's implementing regulations for Florida's pesticide laws are located in FAC 5E-2, Pesticides; FAC 5E-9, Licensed Pesticide Applicators and Dealers; FAC 5E-14, Entomology - Pest Control Regulations; and FAC 5E-13, Mosquito Control Program Administration.

18.1.5 Organizations and contractors shall comply with all Federal and state laws and regulations and requirements of this KNPR regarding pesticide use, storage, management, and disposal.

18.2 Licensing

All pesticide applications at KSC shall be accomplished by, or under the direct supervision of, an applicator licensed by the FDACS Bureau of Compliance Monitoring.

18.3 Pesticide Registration

All pesticides used at KSC shall be registered with the EPA and the FDACS and bear an EPA-approved label.

18.4 Pesticide Use, Disposal, and Labeling Requirements

18.4.1 Organizations and contractors shall only use and dispose of pesticides according to the product instructions or label requirements, or in a manner specified by the EPA or the FDACS.

18.4.2 Organizations and contractors shall dispose of pesticide containers (including empty containers) according to the product instructions or label requirements, or in a manner specified by the EPA or the FDACS.

18.4.3 Organizations and contractors shall ensure that pesticide product labels are securely attached to containers and meet the labeling requirements in 40 CFR Part 156, Labeling Requirements for Pesticides and Devices (also found in EPA's pesticide Label Review Manual).

18.5 Pesticide Storage and Operational Requirements

18.5.1 Organizations and contractors shall:

a. Maintain a current list and inventory of all pesticides stored or used.

b. Maintain current SDS for all pesticides stored or used.

c. Ensure that SDS are readily available for each pesticide listed on the current inventory.

d. Store pesticides only in approved facilities.

e. Ensure that pesticide storage facilities and rooms are dry, well-ventilated, and dedicated to pesticide operations.

f. Ensure that pesticide storage facilities and rooms are secure to prevent unauthorized entry.

g. Place identification and warning signs (such as "No Smoking" signs, "Authorized Personnel Only" signs, "Pesticide Storage" signs, and "In case of Emergency, CONTACT:" signs) on pesticide storage facilities and rooms to advise personnel of the contents and hazards.

h. Store pesticide containers off the ground with the labels visible.

i. Store pesticide containers in rows with lanes to provide access.

j. Ensure that pesticide containers are in good condition and that all lids and bungs are tightly closed.

k. Segregate different pesticide formulations in storage.

l. Regularly check pesticide containers for corrosion and leaks.

m. Keep adequate spill cleanup materials and supplies on hand for the types of pesticides stored and used.

18.5.2 Organizations and contractors shall report any spills, leaks, and releases of pesticides to the NASA EAB according to the requirements in Chapter 4 of this KNPR.

18.5.3 Organizations and contractors shall follow safety procedures and precautions and use PPE directed by the pesticide label or instructions.

18.5.4 Organizations and contractors shall label equipment used for pesticides as “Pest Control” or other appropriate identifying language.

18.5.5 Organizations and contractors shall not remove equipment used for pesticide application from the site or use the equipment for other purposes unless it has been properly decontaminated.

18.5.6 Organizations and contractors shall properly dispose of decontamination water.

18.5.7 Organizations and contractors that store, mix, and apply pesticides shall:

a. Require pesticide handlers to wear appropriate PPE and clothing while mixing pesticides, applying pesticides, and cleaning equipment as directed by the product label.

b. Ensure pesticide handlers receive physical examinations and blood testing annually.

c. Decontaminate personnel as directed by the product label.

d. Direct personnel to the KSC Occupational Health Facility in the event of an accidental or suspected exposure to pesticides.

18.6 Recordkeeping Requirements

18.6.1 Organizations and contractors shall keep at a minimum the following record information for restricted use, non-restricted use, and experimental use pesticide applications for a minimum of two years:

a. Name of the person who applied the pesticide

b. Date of the pesticide application

c. Location of application site, i.e., building number, north side railroad tracks, camera pads, Pad 39B, Rocket Garden

d. Brand name and EPA registration number of the pesticide product applied

e. Total amount (pounds, gallons, etc.) of formulated product applied

18.6.2 Organizations and contractors shall maintain current training records (initial and refresher) and physical examination records for personnel handling or applying pesticides at KSC.

18.7 Compliance Inspections

18.7.1 The NASA EAB shall conduct periodic compliance inspections of pesticide storage locations, mixing areas, equipment, and records to ensure compliance with regulatory requirements and the requirements of this KNPR.

18.7.2 The NASA EAB shall attend any regulatory compliance inspections and respond to regulatory agencies regarding potential non-compliance issues or violations.

18.7.3 Organizations and contractors shall attend all pesticide compliance inspections and provide records to the inspector.

18.7.4 Organizations and contractors shall implement corrective actions to address any non-compliance issues, violations, deficiencies, and findings identified during inspections and provide corrective action information and status to the NASA EAB when requested.

CHAPTER 19. POLYCHLORINATED BIPHENYL MANAGEMENT

19.1 Background and Regulatory Requirements

19.1.1 PCBs are regulated by the EPA under the TSCA. Federal PCB regulations are located in 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions. These regulations establish prohibitions and requirements for the manufacture, processing, distribution in commerce, use, disposal, storage, and marking of PCBs and PCB items.

19.1.2 At KSC, the NASA EAB develops requirements and implements a management program for PCB use, storage, and disposal. This includes the processes for identification, marking, retro-filling, storage, inspection, inventory, and disposal of PCBs and PCB items.

19.1.3 The NASA EAB shall perform all notifications and reporting to regulatory agencies concerning PCB compliance at all NASA-operated facilities at KSC and CCAFS.

19.1.4 The following PCB Items may be stored temporarily in an area that does not comply with the requirements of paragraph 40 CFR 761.65(b), Storage for Disposal, for up to 25 days from the date of their removal from service, provided that a notation is attached to the PCB item or a PCB container (containing the item) indicating the date the item was removed from service:

a. Non-leaking PCB articles and PCB equipment

b. Leaking PCB articles and PCB equipment if the PCB Items are placed in a non-leaking PCB container that contains sufficient sorbent materials to absorb any liquid PCBs remaining in the PCB Items

c. PCB containers containing non-liquid PCB such as contaminated soil, rags, and debris

d. PCB containers containing liquid PCBs at concentrations of greater than or equal to 50 ppm, provided an SPCC plan has been prepared for the temporary storage area IAW part 40 CFR 112, Oil Pollution Prevention, and the liquid PCB waste is in packaging authorized in the DOT Hazardous Materials Regulations at 49 CFR (Transportation) parts 171 through 180 or stationary bulk storage tanks

e. Any storage area subject to the requirements of paragraph 19.1 of this section shall be marked as required in subpart C§ 761.40(a)(10), Marking Requirements

f. For more information on other PCB waste storage for disposal reference 40 CFR 761.65.

19.2 Management and Disposal of Oil-Containing or Oil-Contacted Electrical and Mechanical Equipment

19.2.1 Oil-containing or oil-contacted electrical equipment includes transformers, switches, capacitors, cable, reclosers, regulators, bushings, electromagnets, etc., that contain oil (dielectric fluid or heat transfer fluid).

19.2.2 Oil-containing or oil-contacted mechanical equipment includes cranes, lifts, elevators, jacks, stands, forklifts, and other hydraulic machines that contain oil (hydraulic fluid).

19.2.3 Oil inside electrical equipment shall be sampled to determine if the equipment is classified as PCB (greater than 500 ppm PCB), PCB-contaminated (between 50 and 500 ppm PCB), or non-PCB (less than 50 ppm PCBs).

a. If possible, sampling shall be done prior to taking the equipment out of service.

b. Once the equipment is taken out of service, the equipment and oil shall be managed IAW 40 CFR 761.60, Disposals Requirements, or 40 CFR 761.62, Disposal of PCB Bulk Product Waste.

19.2.4 Oil inside mechanical equipment may also contain PCBs. If the piece of mechanical equipment was manufactured prior to 1979 and will be disposed of, the oil shall be sampled for PCBs unless there is documentation or knowledge that the oil does not contain any PCBs.

19.2.5 There is documented existence of PCBs in various paints and coatings (including electrical equipment and mechanical equipment paint) across KSC and NASA-operated facilities at CCAFS. If the total PCB concentration in the paint is greater than or equal to 50 milligrams (mg) per kilogram (kg), the equipment is a PCB waste and shall be subject to PCB regulations even if the oil does not contain any PCB.

19.2.6 All organizations disposing of oil or equipment that potentially contains PCBs shall use the PWQ and TRP process outlined in Chapter 13 of this KNPR for managing and handling the waste streams.

19.2.7 Electrical equipment that has been historically retro-filled (flushing and replacement of oil to reduce PCB concentrations and the equipment's regulated category) and certified as "Non-PCB" or "PCB-Contaminated" may no longer meet those classification requirements at the time of disposal due to leaching of PCBs from internal components back into the cleaner oil. Sampling of oil for this equipment is required and shall occur just prior to (no more than six months in advance of) taking the equipment out of service.

19.2.8 Paints and coatings manufactured prior to 1979 may contain PCB. Sampling and testing for PCB in paints and coatings is recommended to maximize equipment recycling and to minimize waste disposal.

a. If the paint is not sampled and the equipment was manufactured prior to 1979, generators shall assume that the PCB concentrations in the paint are greater than 50 mg for every kg and manage the equipment as a regulated PCB waste even if the oil contains no PCB.

b. If the equipment contains no layers of paint manufactured prior to 1979, or there is documentation such as SDS etc., that the paint contains less than 50 mg for every kg PCB, paint sampling does not need to be conducted.

c. Even if the PCB concentration in the oil is greater than 50 mg per kg, the KSC WMO may be able to decontaminate, reclassify, and recycle the equipment through a licensed vendor if the paint is sampled and found to contain less than 50 mg for every kg PCB.

19.2.9 Oil-containing equipment where the PCBs concentrations in both the oil and paint are less than 50 mg per kg may be taken to the KSC RRMF for resale or recycling.

19.2.10 Oil must be removed from the equipment, containerized, and labeled according to the PWQ and TRP instructions, and disposed of through the KSC WMO. KNPR 4000.1, Supply and Equipment System Manual, NPR 4200.1, NASA Logistics Management Operations Compensating Controls Reviews, and NPR 4200.2B, Equipment Management Manual for Property Custodians, provide requirements for turning in excess equipment to the RRMF. Sample results are required to be provided to the RRMF.

19.2.11 Oil-containing or oil-contacted equipment (drained or not drained) cannot be disposed of at the KSC landfill.

19.2.12 In rare instances, it may be beneficial to service (drain, flush, and refill) and reclassify a piece of electrical equipment to lower its regulated PCB category. 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, contains strict guidelines and rules for reclassification of electrical equipment. All reclassification efforts shall be approved by the NASA EAB and coordinated through the KSC WMO.

19.2.13 Leaking oil-filled equipment shall be placed in appropriate non-leaking containers or drums with adequate absorbent materials.

19.2.14 Refer to Section 19.6 of this KNPR for the cleanup, management, and disposal of environmental media (soil, asphalt, concrete, gravel, etc.) potentially contaminated with PCBs.

a. PCB-contaminated environmental media is a regulated waste stream and shall be properly disposed of regardless of whether it is a recent or historical release.

b. If a spill occurs or ongoing release of potentially PCB-containing oil is discovered, the organization shall report and control the spill IAW the requirements in Chapter 4 of this KNPR.

19.2.15 Table A summarizes requirements and options for managing and disposing of oil-containing and oil-contacted equipment.

Table A: Requirements and Options for Managing and Disposing of Oil-Containing and Oil-Contacted Electrical and Mechanical Equipment

<table>
<tr><th>Total PCB Concentration in Oil</th><th>Oil Management, Storage, and Disposal Requirements</th><th>Total PCB Concentration in Paint</th><th>Equipment Management, Storage, and Disposal Requirements</th></tr>
<tr><td rowspan="2">Greater than or equal to 50 ppm

--OR--

PCB concentration in the oil is unknown or is assumed to be greater than or equal to 50 ppm because the oil cannot be reasonably sampled (e.g., completely sealed bushing).</td><td rowspan="2">Oil shall be drained from the equipment and disposed through KSC WMO.

Drained oil shall be containerized and labeled according to the PWQ and TRP instructions (DOT approved container and PCB label with the date the equipment was removed from service).

Drained oil shall either be picked up by KSC WMO <u>within 24 hours</u> from the date the equipment was removed from service or stored onsite for up to 30 calendar days providing the drained oil is containerized and labeled according to PWQ and TRP instructions and stored under a site-specific SPCC plan.

Notify KSC WMO at least 5 calendar days prior to the required oil pickup date.</td><td>Less than 50 ppm

--OR--

Paint sampling not needed because all paint on the equipment was manufactured after 1979 or there is documentation that the PCB concentration in the paint is less than 50 ppm.</td><td>Equipment shall be disposed of through KSC WMO.

Equipment disposal shall be coordinated through property accountability personnel.

Equipment shall be staged or stored in a manner that prevents any leaking of residual oil.

If the PCB concentration in the oil is greater than 500 ppm,the drained equipment shall be marked with a PCB label (with the date the equipment was removed from service), stored on an impervious surface, covered from rain, and moved offsite within 30 calendar days from the date the equipment was removed from service.

If the PCB concentration in the oil is greater than or equal to 50 ppm but less than 500 ppm, the drained equipment shall be stored on an impervious surface, covered from rain, and moved offsite as soon as practicable.</td></tr>
<tr><td>Greater than or equal to 50 ppm.

--OR--

Paint was not sampled and is assumed to have a PCB concentration greater than or equal to 50 ppm.</td><td>Equipment shall be disposed of through KSC WMO.

Equipment disposal shall be coordinated through property accountability personnel.

Equipment shall be staged or stored in a manner that prevents any leaking of residual oil.

If the PCB concentration in the oil is greater than 500 ppm, the drained equipment shall be marked with a PCB label (with the date the equipment was removed from service), stored on an impervious surface, covered from rain, and moved offsite within 30 calendar days from the date the equipment was removed from service.

If the PCB concentration in the oil is greater than or equal to 50 ppm but less than 500 ppm, the drained equipment shall be marked with a PCB label (with the date the equipment was removed from service), stored on an impervious surface, covered from rain, and moved offsite as soon as practicable (not to exceed 180 calendar days from the date the equipment was removed from service).</td></tr>
</table>

<table>
<tr><th>Total PCB Concentration in Oil</th><th>Oil Management, Storage, and Disposal Requirements</th><th>Total PCB Concentration in Paint</th><th>Equipment Management, Storage, and Disposal Requirements</th></tr>
<tr><td rowspan="2">Less than 50 ppm</td><td rowspan="2">Option 1: Dispose of oil through KSC WMO as used oil.
Drained oil shall be containerized and labeled according to the PWQ and TRP instructions.
Onsite storage of oil containers shall comply with used oil and SPCC regulations.
Option 2: Contractor can accept the oil as a project cost off-set for reuse, recycling, or energy recover <u>only if</u> the PCB concentration is below 1 ppm.
The Contractor shall follow all Federal and State used oil regulations.
Onsite storage of oil shall comply with used oil and SPCC regulations.
Option 3: Reuse the oil in other electrical equipment at KSC.
Onsite storage of oil shall comply with used oil and SPCC regulations.</td><td>Less than 50 ppm

--OR--

Paint sampling not needed because all paint on the equipment was manufactured after 1979 or there is documentation that the PCB concentration in the paint is less than 50 ppm.</td><td>Option 1: Drained equipment can be excessed through the RRMF.
Equipment shall be staged or stored in a manner that prevents any leaking of residual oil.
Provide PCB sampling results and required excess forms to the RRMF.
Option 2: Contractor can accept the drained equipment for reuse or recycling (possible project cost off-set).
Equipment shall be staged or stored in a manner that prevents any leaking of residual oil.
Transfer of equipment shall be coordinated through property accountability personnel.
Option 3: Drained equipment can be reused elsewhere at KSC.

Equipment shall be staged or stored in a manner that prevents any leaking of residual oil.</td></tr>
<tr><td>Greater than or equal to 50 ppm.

--OR--

Paint was not sampled and is assumed to have a PCB concentration greater than or equal to 50 ppm.</td><td>Equipment shall be disposed of through KSC WMO.

Equipment shall be stored in a manner that prevents any leaking of residual oil.

Equipment disposal shall be coordinated through property accountability personnel.

Drained equipment shall be marked with a PCB label (with the date the equipment was removed from service), stored on an impervious surface, covered from rain, and moved offsite as soon as practicable (not to exceed 180 calendar days from the date the equipment was removed from service).</td></tr>
</table>

19.3 Management and Disposal of Small Capacitors and Fluorescent Light Ballasts

19.3.1 PCBs were commonly used in the small capacitors and fluorescent light ballasts (in potting material and capacitors) manufactured through 1979 and shall be properly managed according to PCB regulations.

19.3.2 Definition of Small Capacitor: Small capacitors contain less than 1.36 kg (3 pounds) of dielectric fluid or have a total volume of less than 1,639 cubic centimeters (100 cubic inches) if the weight of dielectric fluid is unknown. A capacitor whose volume is greater than 1,639 cubic centimeters (100 cubic inches) but less than 3,278 cubic centimeters (200 cubic inches) may

still be managed as a small capacitor if the total weight of the capacitor is less than 4.08 kg (9 pounds).

19.3.3 Large capacitors that contain oil shall be managed according to the requirements in Section 19.2 of this KNPR.

19.3.4 All organizations disposing of small capacitors and fluorescent light ballasts that potentially contain PCB shall use the PWQ and TRP process outlined in Chapter 13 of this KNPR for managing, handling, and disposing of these waste streams. Sampling small capacitors and ballasts for PCB is not required.

19.3.5 Small capacitors and ballasts that are marked as non-PCB shall be segregated and managed separately from small capacitors and ballasts that are marked as containing PCB or are unmarked.

19.3.6 Unmarked small capacitors and ballasts shall be managed as if they contain PCB material. However, ballasts manufactured after 1998 with no markings can be managed as "non-PCB."

19.3.7 All small capacitors and fluorescent light ballasts shall be containerized and labeled according to PWQ and TRP instructions and disposed of through the KSC WMO.

19.3.8 Leaking small capacitors and ballasts shall be placed in appropriate non-leaking containers or drums and disposed of through the KSC WMO.

19.3.9 Small capacitors and fluorescent light ballasts cannot be disposed at the KSC landfill.

19.4 Management and Disposal of Polychlorinated Biphenyl Contaminated Wastewater

19.4.1 There is documented existence of PCB in older (pre-1979) paints and coatings across KSC and in NASA-operated facilities at CCAFS. Therefore, PCB contaminated wastewater or slurries could be produced from activities such as high-pressure washing or water blasting of buildings or structures that have PCB containing paints and coatings.

19.4.2 Organizations shall follow the industrial wastewater management requirements outlined in Chapter 12 of this KNPR. In addition, wastewater that is contaminated with PCB must be properly managed according to the requirements of 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.

19.4.3 PCB contaminated wastewater disposal shall be approved by and coordinated through the KSC WMO using the PWQ and TRP process outlined in Chapter 13 of this KNPR.

19.4.4 PCBs can be removed from the wastewater without a regulatory treatment permit as long as the PCB decontamination requirements in 40 CFR 761.79, Decontamination Standards and Procedures, are followed. The decontamination process shall be reviewed and approved by the NASA EAB. The removed PCB must be containerized and properly disposed through the KSC WMO.

19.5 Management and Disposal of Other Polychlorinated Biphenyl Contaminated Waste

19.5.1 Other wastes that may contain PCB include, but are not limited to:

a. Dry (non-oil-containing) electrical equipment coatings

b. Dry (non-oil-containing) mechanical equipment coatings

c. Construction and demolition debris

d. Building materials (such as paints, coatings, caulk, mastic, window glazing, adhesives, dry cable insulation, etc.)

e. Coated or painted concrete

f. Waste paint chips

g. Spent blast media

NOTE: Requirements for the management and disposal of oil-containing or oil-contacted electrical and mechanical equipment are covered in Section 19.2 of this KNPR.

19.5.2 Building materials, paints, and coatings manufactured prior to 1979 may contain PCB, which has been found in many building materials, paints, and coatings across KSC and NASA-operated facilities at CCAFS.

19.5.3 Any material with a PCB concentration greater than or equal to 50 mg per kg is a regulated waste and shall be properly managed and disposed of according to PCB regulations.

NOTE: If a waste item (e.g., door) contains a material (e.g., paint) with a PCB concentration greater than or equal to 50 mg per kg, the entire item is a regulated PCB waste.

19.5.4 All organizations disposing of waste that potentially contains PCB shall use the PWQ and TRP process outlined in Chapter 13 of this KNPR for managing and handling the waste streams.

19.5.5 Sampling and testing for PCBs may be optional depending on the waste disposal location but is recommended to maximize recycling and minimize waste disposal (especially for metals and concrete).

a. If the waste is not sampled but has the potential to contain PCB, generators shall assume that the PCB concentrations in the paint are greater than 50 mg per kg and manage and dispose of the material as a regulated PCB waste.

b. If the waste contains no materials, paints, or coatings manufactured prior to 1979, or if there is documentation (SDS, etc.) that the materials contain less than 50 mg per kg PCB, sampling and testing for PCB does not need to be conducted.

c. Sampling and testing for other regulated compounds (e.g., heavy metals) may be required to characterize the waste for proper management and disposal.

19.5.6 Disposal of all real property shall be coordinated through the KSC Real Property Office.

19.5.7 Organizations and contractors shall:

a. Properly store, stage, containerize, and prevent the release of any PCB containing materials (including paints, coatings, caulk, mastic, etc.) to the environment.

b. Conduct demolition activities in a manner that limits the potential release of PCB containing materials.

c. Delineate the extent of and remediate any PCB releases to the environment (reference Section 19.6 of this KNPR).

d. Use BMPs and engineering controls during the demolition of structures with potential PCB-containing materials such as:

(1) Contain and process demolition debris on impermeable surfaces (such as concrete, asphalt, tarps, liners, etc.), when possible.

(2) Cover waste piles to prevent contact with precipitation.

(3) Control stormwater runoff from the site.

(4) Conduct regular housekeeping to limit the potential runoff and migration of potential PCB-containing materials.

(5) Remove all demolition debris from demolition areas and debris storage areas upon project completion.

19.5.8 If a demolition project or debris storage area is located on a soil or permeable surface and the debris contains potential PCB-containing materials, the project proponent shall sample, excavate, and properly dispose of any soil or sediment contaminated with PCBs according to requirements outlined in Section 19.6 of this KNPR.

19.5.9 If a decision is made to decontaminate (remove the PCB-containing paint, coating, caulk, adhesive, etc.) metal, concrete, or a piece of equipment so that it can be reused, recycled, or salvaged, the removed PCB-containing paint, coating, caulk, adhesive, etc. shall be containerized, stored, managed, and disposed of according to TSCA regulations.

a. The decontamination process shall be conducted according to the requirements in 40 CFR 761.79 and be approved by the NASA EAB.

b. Only certain decontamination methods can be conducted without approval from the EPA.

c. The removed PCB-containing paint, coating, caulk, or adhesive must be disposed of through the KSC WMO.

19.5.10 Tables B through E summarize the requirements and options for managing and disposing of various other PCB-containing waste streams.

Table B: Dry Electrical Equipment and Dry Mechanical Equipment (non-oil containing)

Areas With Possible PCBs	Sampling for PCBs Required for Disposal?	PCB Sampling Results	Management, Storage, and Disposal Requirements
Paints Coatings	No (But recommended to maximize reusing and recycling of equipment and minimize waste generation).	Less than 50 ppm. **--OR--** Sampling not needed because the equipment was manufactured after 1979 or there is documentation that the PCB concentration in the paint or coating is less than 50 ppm.	Equipment disposal **shall** be coordinated through property accountability personnel. **Option 1:** Excess equipment through the RRMF. Provide PCB sampling results and required excess forms to the RRMF. **Option 2:** Contractor can accept the equipment for reuse or recycling (possible project cost off-set). **Option 3:** Equipment reused elsewhere at KSC. **Option 4:** Dispose of in KSC Landfill.
		Greater than or equal to 50 ppm. **--OR--** Equipment was not sampled and assumed to have a PCB concentration greater than or equal to 50 ppm in the paint or coating.	Equipment disposal **shall** be coordinated through property accountability personnel. Equipment **shall** be staged or stored according to PCB Bulk Product Waste storage requirements in 40 CFR 761.65(c)(9) until disposed of (e.g., in a container or on a liner that prevents contact with soil and covered from precipitation). **Option 1:** Dispose of in KSC Landfill. **Option 2:** Dispose of off-Center through KSC WMO. **Option 3:** Decontaminate by removing the PCB-containing materials from the equipment according to 40 CFR 761.79 and then recycle or reuse the decontaminated equipment. • Decontamination process **shall** be approved by the NASA EAB. • Removed PCB-containing material is a regulated waste and **shall** be collected, containerized, and disposed of through KSC WMO.

Table C: Construction and Demolition Debris

Areas With Possible PCBs	Sampling for PCBs Required for Disposal?	PCB Sampling Results	Management, Storage, and Disposal Requirements
Paints Coatings Caulk Mastic Window Glazing Adhesives Dry Cable Insulation	No (But recommended to maximize reusing and recycling of materials and minimize waste generation).	Less than 50 ppm. **--OR--** Sampling not needed because all the debris was manufactured after 1979 or there is documentation that the PCB concentrations in all areas is less than 50 ppm.	Equipment disposal **shall** be coordinated through property accountability personnel. **Option 1:** Reusable or recyclable materials should be taken to the RRMF. **Option 2:** Contractor can accept materials for recycling or reuse (possible project cost off-set). **Option 3:** Dispose of in KSC Landfill.
		Greater than or equal to 50 ppm. **--OR--** Debris or material was not sampled and assumed to have a PCB concentration greater than or equal to 50 ppm in at least one possible PCB area.	Equipment disposal **shall** be coordinated through property accountability personnel. Debris **shall** be staged or stored according to PCB Bulk Product Waste storage requirements in 40 CFR 761.65(c)(9) until disposed of (e.g., in a container or on a liner that prevents contact with soil and covered from precipitation). **Option 1:** Dispose of in KSC Landfill **Option 2:** Dispose of off-Center through KSC WMO. **Option 3:** Decontaminate by removing the PCB-containing materials from the equipment according to 40 CFR 761.79 and then recycle or reuse the decontaminated debris or materials. • Decontamination process **shall** be approved by the NASA EAB. • Removed PCB-containing material is a regulated waste and **shall** be collected, containerized, and disposed of through KSC WMO.

Table D: Concrete

Areas With Possible PCBs	Sampling for PCBs Required for Disposal?	PCB Sampling Results	Management, Storage, and Disposal Requirements
Paints Coatings	No (But recommended to maximize reusing and recycling of concrete and minimize waste generation).	Less than 0.5 ppm. **--OR--** Sampling not needed because all layers of paints or coatings were manufactured after 1979 or there is documentation that the PCB concentration is less than 0.5 ppm.	**Option 1:** Concrete can be recycled or reused (concrete sent to the DARCY **shall** meet acceptance requirements in Chapter 27 of this KNPR). **Option 2:** Contractor can accept concrete for recycling or reuse (possible project cost off-set).
		Greater than 0.5 ppm but less than 50 ppm.	**Option 1:** Dispose of in KSC Landfill. **Option 2:** Dispose of off-Center through KSC WMO. **Option 3:** Remove the PCB-containing paint/coating from the concrete and recycle or reuse the concrete. Containerize and dispose of removed paint or coating through KSC WMO.
		Greater than or equal to 50 PPM. **--OR--** Paints and coatings were not sampled and assumed to have a PCB concentration greater than or equal to 50 ppm.	Concrete **shall** be staged or stored according to PCB Bulk Product Waste storage requirements in 40 CFR 761.65(c)(9) until disposed of (e.g., in a container or on a liner that prevents contact with soil and covered from precipitation) **Option 1:** Dispose of in KSC Landfill. **Option 2:** Dispose of off-Center through KSC WMO.
Oil Stains Associated with Oil-Filled Electrical or Mechanical Equipment.	No (Recommended to reduce management requirements and disposal costs.) If concrete sampling is performed, it **shall** be conducted according to EPA Region 1 guidance document entitled "Standard Operating Procedure for Sampling Concrete in the Field." Contact the NASA EAB for a copy of this guidance document.	Less than 0.5 ppm.	**Option 1:** Dispose of in KSC Landfill. **Option 2:** Dispose of off-Center through KSC WMO.
		Greater than or equal to 0.5 ppm. **--OR--** Concrete was not sampled and assumed to have a PCB concentration greater than or equal to 50 ppm.	The concrete may be a regulated PCB spill or remediation waste. **Option 1:** Remove the stained concrete and dispose of through KSC WMO. Notify the NASA EAB of the removal and the location. **Option 2:** Sample, delineate the extent of, and dispose of the contaminated concrete according to the requirements in Section 19.6 of this KNPR. Contact the NASA EAB for assistance.

Table E: Isolated Paint Chips, Isolated Coating Chips, and Spent Blast Media

Areas With Possible PCBs	Sampling for PCBs Required for Disposal?	PCB Sampling Results	Management, Storage, and Disposal Requirements
NOTE: The guidance below only addresses PCB regulatory requirements. Additional sampling, management, storage, and disposal requirements may apply to these waste streams due to the potential presence of other regulated compounds (e.g., heavy metals). Contact the KSC WMO for additional guidance.			
Paints Coatings	No *NOTE: For spent blast media with paints/coatings, PCB sampling and analysis **shall** be conducted on the paint/coating prior to blasting.*	Less than 50 ppm. **--OR--** Sampling not needed because all the debris was manufactured after 1979 or there is documentation that the PCB concentrations in all areas are less than 50 ppm.	**Option 1:** Dispose of off-Center through KSC WMO. **Option 2:** Dispose of in KSC Landfill.
		Greater than or equal to 50 ppm. **--OR--** Sampling not conducted; waste is assumed to have a PCB concentration greater than or equal to 50 ppm.	Waste **shall** be staged or stored according to PCB Bulk Product Waste storage requirements in 40 CFR 761.65(c)(9) until disposed of (e.g., in a container or on a liner that prevents contact with soil and covered from precipitation). Waste **shall** be disposed of off-Center through KSC WMO**.**

19.6 Polychlorinated Biphenyl Spill Cleanup and Remediation

19.6.1 All organizations shall immediately control and report new or ongoing spills and releases of PCB according to the requirements in Chapter 4 of this KNPR.

19.6.2 Organizations shall be responsible for remediating any remaining PCB contamination at a new or ongoing spill site that is beyond the scope or capabilities of the KSC spill response team.

19.6.3 All PCB spill cleanup and remediation activities shall be performed IAW TSCA regulations (reference 40 CFR 761.60, 40 CFR 761.61, 40 CFR 761.65, 40 CFR 761.125, and 40 CFR 761.130).

19.6.4 Since approval from EPA Region IV and the FDEP may be required before executing any sampling or remediation activities, all PCB remediation activities shall be coordinated with the NASA EAB. The NASA EAB will coordinate with and obtain approvals from EPA and FDEP.

19.6.5 In addition to TSCA regulations, the state of Florida has promulgated soil clean-up standards (soil cleanup target levels [SCTL]) for PCBs. To avoid implementing and maintaining land use controls, PCB spills and releases shall be remediated to the residential SCTL unless otherwise approved by the NASA EAB.

a. The current residential SCTL is 0.5 mg for each kg.

b. The current industrial SCTL is 2.6 mg for every kg.

19.6.6 Electrical and mechanical equipment may contain PCB-laden oil now or may have contained PCB-laden oil in the past. There is a possibility that PCB contamination is currently present from historical spills and releases in environmental media (concrete pads, asphalt, soil, sediment, etc.) that currently surrounds (or used to surround) electrical and mechanical equipment. For projects involving the removal of such environmental media, organizations shall evaluate and properly dispose of it according to TSCA regulations.

19.6.7 There is documented existence of PCBs in various building materials (such as paints, coatings, caulk, mastic, adhesives, window glazing, etc.) across KSC and NASA-operated facilities at CCAFS. Organizations shall delineate the extent of and remediate any PCB released to the environment (including soil, concrete, asphalt, sediment, etc.) from those building materials during facility construction or demolition projects.

19.6.8 Organizations disposing of environmental media, spill cleanup wastes, and remediation wastes that potentially contain PCBs shall use the PWQ and TRP process outlined in Chapter 13 of this KNPR for managing and handling the waste streams.

19.6.9 PCB-contaminated environmental media with a PCB concentration less than the state of Florida residential SCTL (currently 0.5 mg per kg) may be disposed of in the KSC Landfill (used as landfill cover material). Otherwise, all PCB-contaminated environmental media and spill cleanup wastes shall be properly stored, labeled, and disposed of off-Center through the KSC WMO.

19.6.10 All environmental media samples shall be analyzed using EPA SW-846 Method 8082A, Polychlorinated Biphenyls (PCBs) by Gas Chromatography.

19.6.11 Sampling of concrete shall be conducted according to EPA Region I guidance document entitled "Standard Operating Procedure for Sampling Concrete in the Field." Contact the NASA EAB for a copy of this guidance document.

19.7 Health, Safety, and Worker Protection

19.7.1 There is documented existence of PCBs in various paints and coatings (including electrical equipment, mechanical equipment, and structural paint) across KSC and in NASA-operated facilities at CCAFS.

19.7.2 The employer shall assess potential personnel exposures to PCBs and ensure that personnel involved in the removal, disturbance, demolition, management, or cutting of PCB-containing materials (equipment, oils, paints, coatings, etc.) have been briefed on the hazards, provided appropriate PPE, and trained on proper waste management.

19.7.3 Potential PCB hazards and mitigation efforts shall be included in project health and safety plans.

19.7.4 Sampling may be required to confirm the presence or absence of PCBs or to determine the concentration of PCBs in materials in order to minimize worker exposure, ensure proper worker protection, and comply with health and safety and environmental compliance regulations.

19.7.5 Organizations shall consult the KSC Aerospace Medicine and Occupational Health Branch or KSC WMO contractor for guidance on worker protection and environmental health sampling requirements regarding PCBs. Sampling and testing for other regulated compounds (e.g., heavy metals) that can accompany PCBs may also be required.

19.7.6 Organizations shall not directly torch cut or use heat on any materials that contain PCBs as burning of PCBs can create toxic byproducts (such as dioxins).

a. Paint samples shall be collected and analyzed for PCBs prior to using heat or torch cutting of materials that could potentially contain PCBs. Heating or torch cutting of materials with PCB concentrations greater than or equal to 50 mg per kg is a regulatory violation and is prohibited without a permit issued by the EPA.

b. Paints and coatings with PCBs shall be removed by physical or mechanical means from areas to be heated or torch cut.

19.8 Sampling Requirements for Painted and Coated Surfaces for Disposal

19.8.1 All organizations shall follow the sampling requirements and guidance below for materials with paints and coatings that may contain PCBs.

19.8.2 The NASA EAB can approve exceptions to these requirements. The organization shall submit the proposed change along with the justification or other information in writing to the NASA EAB Chief for a determination.

19.8.3 TSCA regulations do not explicitly require testing of painted or coated surfaces for PCB while in use. However, improper storage or disposal of painted or coated materials with a PCB concentration greater than or equal to 50 mg per kg is a regulatory violation regardless of whether or not the material has been tested to determine its PCB content.

19.8.4 PCBs have been found in various paints and coatings at KSC and NASA-operated facilities at CCAFS. Each KSC organization shall properly sample, manage, and dispose of painted and coated waste materials that potentially contain PCB.

19.8.5 Sampling and testing for PCB in paints or coating is recommended to maximize recycling and minimize waste disposal (especially metals and concrete). Sampling and testing for PCB can also reduce storage requirements, disposal costs, and worker protection requirements.

19.8.6 There are no established industry standards and methods for the collection of paint samples that potentially contain PCB; therefore,

a. Paint samples shall be obtained IAW the cold-scraping method described in American Society for Testing and Materials E1729-05, “Standard Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques.” However, the heat gun method described in this standard is not approved for the collection of the paint or coatings.

b. If the laboratory requires at least 30 grams of paint or coating to run EPA SW-846 Method 8082, a composite sample can be produced from multiple painted locations to achieve the 30 gram requirement.

c. Photographs of the individual sample locations making up the composite sample and the sample identification number shall be documented in the project file and be submitted to the KSC WMO during the PWQ and TRP process.

19.8.7 Representative samples of the paints and coatings shall be collected and analyzed to determine PCB concentrations.

a. All layers of paints and coatings at each sampling location shall be included in the sample.

b. For large, continuous, homogeneous areas (such as a painted wall or coated concrete floor) multiple samples are required due to potential variations in PCB concentrations from one location to another.

(1) Homogeneous areas are defined as painted or coated areas that are similar in color, function, and form. Sample locations shall be randomly selected to cover the entire area.

(2) Table F defines the minimum required number of paint or coating samples based on the area square footage.

Table F: Paint or Coating Samples Recommendations

SURFACE AREA (SQUARE FEET)	MINIMUM NUMBER OF PCB SAMPLES
less than 500	1
500 to 1000	3
1000 to 5,000	5
5,000 to 10,000	7
greater than 10,000	9

(3) After the initial round of sampling, it may be desirable to collect additional paint and coating samples to delineate areas where PCB concentrations were greater than or equal to 50 mg per kg. If feasible, it may be beneficial to segregate and manage material from areas above 50 mg per kg separately from areas below 50 mg per kg.

c. For individual pieces of equipment and small building materials, one paint or coating sample is enough to determine the PCB content. If multiple pieces of equipment or building materials (e.g., doors) contain the same paint or coating, one PCB sample can represent all the items.

19.8.8 If paint or coating samples are not collected and no information exists which documents that the paint or coating does not contain PCBs, generators shall assume that the PCB concentrations in the paint are greater than or equal to 50 mg per kg and manage the material as a regulated PCB waste as required by 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.

19.8.9 If there is adequate documentation that the paint or coating does not contain any PCBs or that the concentration is less than 50 mg per kg (e.g., proof that all layers of paints or coatings were manufactured after 1979, SDS, etc.), sampling and testing for PCBs does not

need to be conducted. The documentation shall be maintained in the project file and submitted to the KSC WMO during the PWQ and TRP process.

19.8.10 Additional paint or coating sampling and testing for other regulated compounds (e.g., heavy metals) may be required depending on the planned disposition of waste. KSC WMO will advise, request, and require the needed sampling in order to process the PWQ and issue the TRP for waste disposal.

19.8.11 Additional paint or coating sampling and testing may be required for industrial health and worker protection requirements. Consult KNPR 1840.19, Kennedy Space Center Industrial Hygiene Programs, and contact the KSC Aerospace Medicine and Occupational Health Branch for additional guidance.

19.9 Inspections and Recordkeeping

19.9.1 The NASA EAB shall implement an inspection program for PCB management and inspect facility projects involving PCB wastes and PCB storage areas (including the KSC PCB waste storage facility [K7-0115]) for compliance with regulations and requirements identified in this chapter.

19.9.2 When compliance concerns are identified, the operational organization shall be responsible for corrective action.

19.9.3 By July 1 of each year, the KSC WMO shall prepare the annual document log as described in 40 CFR 761. The annual document log documents all PCB waste management activities of the previous calendar year.

CHAPTER 20. RADIOACTIVE MATERIALS

20.1 Applicable Documents

The basic principles are documented in KNPD 1150.24, KSC Councils, Boards, and Committees; KNPD 1860.1 KSC Radiation Protection Program; KNPR 1860.1 Kennedy Space Center Ionizing Radiation Protection Program; and KNPR 1860.2, Kennedy Space Center Nonionizing Radiation Protection Program. Reference the most current version of KNPD 1860.1 for more detailed instruction concerning authorities, definition, responsibilities, general provisions, applicable documents, the summations, implementation, and functions.

20.2 Kennedy Space Center Radiation Protection Program

KNPD 1860.1 describes the policy for handling of radioactive materials at KSC. This KNPD documents ionizing and non-ionizing radiation protection program policy and responsibilities to ensure conformance with referenced regulatory agency requirements for licensing, possession, and use of radiation sources for the KSC. This KNPD applies to all KSC organizational elements, facilities, geographical areas, and operations under KSC jurisdiction or direction, including civilian and military personnel, prime and subcontractor organizations, tenants, principal investigators, and visitors.

CHAPTER 21. ENVIRONMENTAL NOISE

21.1 Regulatory Requirements

Under the Noise Control Act of 1972, the state and local governments have primary regulatory authority that Federal facilities shall honor. Florida statute directs the FDEP to "establish standards for the abatement of excessive and unnecessary noise." The CAA establishes an EPA Office of Air, Noise, and Radiation. Under the CAA, the EPA may require any Federal facility to control noise deemed to be a public nuisance.

21.2 Responsibility

The noise generating organization is responsible for ensuring compliance with the regulations. The NASA EMB shall assist KSC organizations in determining the appropriate actions to control noise and notify the responsible organization of any public complaint associated with operational noise, including those that may affect wildlife.

21.3 Monitoring

21.3.1 Monitoring of noise due to public complaint or regulatory intervention shall be performed by the Aerospace Medicine and Occupational Health Branch.

21.3.2 Occupational Health shall submit the monitoring report to the appropriate Organizational Representatives (OR) and the NASA EMB.

21.3.3 NASA EMB shall maintain copies of the monitoring reports.

CHAPTER 22. REMEDIATION ACTIVITIES

22.1 Regulatory Requirements

22.1.1 KSC has a Hazardous and Solid Waste Amendment permit that mandates the investigation of any releases of hazardous waste or hazardous constituents at the facility regardless of the time at which the waste was released. KSC is also required to take appropriate corrective action for any such releases.

22.1.2 The permit requires the facility to comply with all land disposal restrictions.

22.1.3 The investigation and cleanup of KSC's contaminated sites is performed with guidance and direction from the EPA Region 4 and the FDEP.

22.2 Modifications to Operational Solid Waste Management Units

22.2.1 Modifications to facilities located at, on, or in any SWMU require notification to and approval by the FDEP prior to the implementation of the modification.

22.2.2 Organizations and contractors shall use KSC Form 21-608, KSC Environmental Checklist, to identify facility modification plans to the NASA EAB.

22.2.3 The NASA EAB shall coordinate the modification plans with the FDEP.

22.3 Remediation of Solid Waste Management Units

22.3.1 The NASA EAB shall maintain a schedule, IAW the permit, to investigate and clean up SWMUs and suspected PRLs.

22.3.2 The NASA EAB shall:

a. Manage and coordinate with the FDEP the performance of confirmatory sampling, RCRA facility investigations, interim measures, corrective measures studies, and selected remedies for all sites.

b. Keep the results of work plans, studies, and decisions in an administrative file in the NASA EAB.

22.4 Controls

22.4.1 Organizations and contractors that are involved in the handling of hazardous waste or materials shall:

a. Ensure that their activities are conducted in a manner that prevents the uncontrolled release of these wastes or materials into the environment.

b. In the event of a release, take steps to immediately clean up the release and limit the area impacted by the release. The organization causing the release shall notify the NASA EAB at the time of the release IAW the procedures described in Chapter 4 of this KNPR.

22.4.2 For ORs that discover contamination, or if the NASA EAB informs them that there is contamination at their facilities, the OR shall:

a. Review all ongoing procedures to ensure that current operations are not causing or adding to the contamination.

b. Take measures to eliminate the sources of any releases.

c. Provide corrective measures to the NASA EAB within 30 days of being notified of the discovery of contamination.

22.4.3 The NASA EAB shall review the corrective measures documentation to determine if the corrective actions are appropriate and provide comments, if required.

22.4.4 The NASA EAB is responsible for the overall investigation of suspected and contaminated sites and the management of corrective actions. Through the KSC Environmental Checklist (KDP-P-1727) process, the NASA EAB shall issue guidance on the requirement for operations and training at active SWMUs.

22.4.5 The NASA EAB shall manage the identification and reporting of contaminated sites to the regulatory agencies, identify a Potential Responsible Party (PRP), and develop funding through Environmental Compliance and Restoration budget for the management of cleanups at sites not covered by a PRP.

22.5 Training

Personnel involved in the investigation or remediation of an SWMU shall have the training outlined in Title 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, and Title 40 CFR Parts 264 and 265, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

CHAPTER 23. EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

23.1 The Emergency Planning and Community Right-to-Know Act

23.1.1 The Emergency Planning and Community Right-to-Know Act (EPCRA), Title III, of the Superfund Amendments and Reauthorization Act of 1986, requires reporting of the amount and location of hazardous chemicals produced, stored, used, or released to the environment each year in the U.S.

23.1.2 EPCRA is divided into three sections:

a. Subtitle A - emergency planning and notification of hazardous materials (Sections 301 through 304)

b. Subtitle B - reporting requirements for chemical inventories and releases (Section 311 through 313)

c. Subtitle C - general provisions dealing with trade secret protection, public access to records, and penalties for noncompliance (Sections 321 through 330)

23.2 Reporting Requirements

23.2.1 The following sections of EPCRA require reports to be submitted to the SERC or other regulatory entities. All reports filed by KSC shall be submitted through the NASA EMB.

23.2.2. Section 302 is a one-time reporting requirement. Any organization that has an Extremely Hazardous Substance (EHS) present at KSC in amounts greater than or equal to the threshold planning quantity (TPQ) of the substance shall notify the NASA EMB. A list of EHS and their respective TPQ is available in 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan, and 40 CFR 355, Emergency Planning and Notification.

a. To determine whether a contractor has an EHS that meets or exceeds the TPQ, the contractor shall calculate the total amount of the EHS present at any one time at the facility, regardless of location, duration, number of containers, or methods of storage. The SERC defines all areas of KSC, including NASA-controlled areas at CCAFS, as one facility.

b. To determine if the EHS meets or exceeds the TPQ, all sources of EHS, both pure forms and in mixtures at a level greater than or equal to one percent, shall be added together and the total amount compared to the TPQ. The unit of the TPQ is pounds.

c. If the amount is equal to or greater than the TPQ, it shall be reported under Section 302.

d. If the EHS is present in a solution or mixture in an amount less than one percent (de minimis), it does not have to be added to the total amount for determination of exceedance of the TPQ and is exempt from reporting.

e. If a total amount of an EHS is present at less than the TPQ, it is exempt from the Section 302 reporting requirements.

f. The NASA EMB shall notify the SERC as appropriate.

23.2.3 Section 303 is a one-time notification to the SERC of an emergency contact at the facility. At KSC, the Chief of the NASA EMB is the emergency contact.

23.2.4 IAW Section 304, all releases of chemicals listed as EHS or CERCLA hazardous substances shall be reported to Federal and state authorities. These lists are available in the appendices of 40 CFR 355, Emergency Planning and Notification, and table 302.4 of 40 CFR Part 302, Designation, Reportable Quantities, and Notification.

23.2.5 IAW Section 311, government agencies shall submit SDS or a list of certain chemicals present within their facilities to the SERC.

a. Chemicals and thresholds covered by this Section are:

(1) Any of the EHS that meet or exceed the TPQ or 500 pounds, whichever is less.

(2) Any of the hazardous chemicals that meet or exceed 10,000 pounds for which OSHA requires an SDS to be maintained. (In both cases, the amount is the total amount that is present either in a pure form or in a mixture on any one day. It is not a cumulative amount.).

(3) Lists of EHS and their TPQ are given in Appendices of 40 CFR 355.

b. No list of OSHA regulated chemicals exists. Chemicals are ranked by OSHA as 1 of 9 physical hazards or 1 of 15 health hazards (29 CFR 1910.1200, Hazard Communication). An SDS form shall list the hazards associated with the substance. In general, if a material has an SDS, it is an OSHA-regulated substance.

c. While 40 CFR 355 calls for an SDS for each chemical meeting reporting requirements IAW Section 311 to be submitted to the state committees, the Florida SERC prefers facilities submit a list of chemicals instead of the SDS. Chemicals on the list shall be grouped by the five EPA physical and health hazard categories:

(1) Fire hazard

(2) Sudden release of pressure hazard

(3) Reactive hazard

(4) Immediate (acute) health hazard

(5) Delayed (chronic) health hazard

d. A chemical can fit more than one hazard category and all applicable categories must be noted on the report list. The OSHA hazard groupings noted on SDS must be converted to the five EPA categories.

e. Each contractor shall determine which chemicals used, stored, or processed by the contractor meet reporting requirements under Section 311. Guidelines and formulas for calculating chemical quantities are given in that Section.

f. Concentrations shall be listed on the SDS for the hazardous chemical. If the concentration is not listed, the person reporting is not required to search any further for the

value and can assume the value is less than one percent (or 0.1 percent in the case of a carcinogen). The chemical is not required to be added to the total amount for comparing to the TPQ.

g. Reporting under Section 311 is a one-time requirement. When a chemical meets requirements for reporting, then the SERC shall be notified within 90 days.

23.2.6 Section 312 requires the chemicals covered by Section 311 and their location be reported to the SERC on an annual basis (Tier Two report). The Tier Two report is due to the SERC, the Local Emergency Planning Committee (LEPC), and the KSC Fire Department via KSC Emergency Management Officer by March 1 for the previous calendar year.

a. The NASA EMB shall submit the Tier Two report to the SERC, the LEPC, and the KSC Emergency Management Officer.

b. All KSC operations and contractors at KSC shall annually report the amounts of covered chemicals for which OSHA requires an SDS to the EMB.

23.2.7 Section 313, the toxic chemical releases Section, applies to all Federal facilities associated with the manufacture, processing, or other use of a listed toxic chemical in amounts that meet or exceed the TPQ.

a. A TRI Form (Form R or Form A) shall be filed for each chemical present above the threshold level.

(1) The threshold level for manufacturing, importing, or processing any listed chemical is 25,000 pounds a year.

(2) The threshold for other use (which includes cleaning) is 10,000 pounds a year.

b. KSC operations and contractors shall report all quantities of covered chemicals to the NASA EMB.

c. The NASA EMB shall submit TRI forms to the SERC and to the EPA by July 1 for the previous calendar year.

CHAPTER 24. NATURAL RESOURCES

24.1 Threatened and Endangered Species

24.1.1 Section 7 of the Endangered Species Act (ESA) requires all Federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) on all actions that may affect a threatened or endangered species or its habitat. The most current list of threatened and endangered species can be found at http://myfwc.com/wildlifehabitats/imperiled/profiles/.

a. The rules and requirements for these consultations are delineated in Title 50 CFR Part 402, Interagency Cooperation--Endangered Species Act of 1973, as Amended, which identifies the type of consultation required (e.g., formal, early, informal), parties involved, and timing.

b. Under the provisions of the ESA, it is the duty of NASA and all Federal agencies to protect and enhance these species and their habitats. Therefore, prior to taking any actions on KSC, potential impacts to all natural resources shall be considered. This includes impacts to wildlife species as well as their habitats.

24.1.2 KSC is home to many species that are listed as threatened or species of special concern by state and local agencies as described in KSC-PLN-1911, Environmental Resources Document. These species shall be protected, even if the review and consultation requirements under the ESA do not apply.

24.1.3 When the response to the KSC Environmental Checklist (KDP-P-1727) or REC indicates that a project may impact any protected species (Federal or state listed), a biological survey shall be completed by the NASA EMB.

24.1.4 If an unavoidable impact or one that cannot be mitigated is identified, then a formal consultation with the FWS shall be conducted.

24.1.5 All species shall be treated as protected unless otherwise directed by the NASA EMB. Questions regarding the level of protection required for any species on KSC are to be directed to the NASA EMB. NASA EMB has several plans and guidelines to address impacts to threatened, endangered, and species of special concern at KSC:

a. Gopher Tortoise Management Plan: The gopher tortoise is a long-lived animal recognized as a keystone species because it digs burrows that provide shelter for at least 360 known other animal species. They are protected by law mainly due to loss of habitat and predation. The KSC protection document insures both long-term and immediate protection of the animal that may occur due to operation, development, or other activities occurring on Center.

b. Osprey Management Plan: The Osprey is a federally listed species under the Migratory Bird Treaty Act (16 U.S.C. 703-712). To ensure compliance with this Act, KSC has developed requirements to guide actions in circumstances when an Osprey nest may be affected by KSC operations. These requirements have been established in coordination with the FWS at Merritt Island National Wildlife Refuge (MINWR).

c. Terns and Skimmers Management Plan: Least terns and black skimmers are protected wildlife species due to multiple factors including loss and degradation of natural colony sites. They have adapted to this loss by nesting on gravel rooftops. KSC protects these rooftop

nesting birds and their chicks during nesting season as outlined in this document.

d. Light Management Plan: KSC is required to protect marine turtle nesting habitat and assess how programs and associated actions may affect that environment. As part of this assessment, KSC has coordinated with the FWS on the effects of exterior lighting on protected species, resulting in the issuance of an interim Biological Opinion (BO). The purpose of the lighting requirements is to ensure KSC compliance with the conditions of the BO and to provide clear guidance to project and/or facility managers who are required to comply with these requirements.

24.1.6 Mitigation for project impacts often involves the requirement to compensate for the loss of habitat. For example, taking of scrub habitat for construction typically requires that existing, low-quality scrub habitat be restored elsewhere at KSC. The NASA EMB is responsible for the overall management and coordination of mitigation activities with input from other KSC organizations, as appropriate. Funding for such activities may be required from the program or project implementing the action. The following documents are located on the Environmental Program webpage.

a. Florida Scrub-Jay Compensation Plan: The purpose of the Scrub-Jay BO and Compensation Plan is to consolidate the goals of ecosystem management associated with Florida Scrub-Jays and ensure compliance with the ESA. The BO also streamlines the permitting review process and reduces regulatory uncertainty.

b. Advanced Ecological Mitigation Plan (AEM): The purpose of the AEM Plan is to assess expected impacts and identify proposed compensatory mitigation for those impacts. These AEM permits from the SJRWMD and United States Army Corps of Engineers (USACE) are living documents; mitigation plans can be added over time and used as needed.

24.2 Coastal Zone Consistency Determination

24.2.1 By law, all states shall develop and implement coastal zone management programs. The Coastal Zone Management Act also requires all federally conducted or supported activities be consistent with the state program in which they are undertaken.

24.2.2 All Federal agencies performing or approving work in the coastal zone of any state shall determine if their activities directly affect the coastal zone of that state, and if they do, provide the state with the determination at the earliest possible time, but at least 90 days prior to the final approval of implementation of the activity, to allow the state time to concur or non-concur.

24.2.3 The Florida Coastal Zone Management Plan describes the entire State of Florida to be within the coastal zone. However, it also lists several entities which are considered to be outside the coastal zone.

a. KSC is listed as outside the coastal zone. This does not mean, however, that KSC projects are exempt from the regulatory requirement of determining consistency with the Florida Coastal Zone Management Program.

b. Each project and activity shall be reviewed to determine if the action affects areas outside KSC.

c. If the project affects the coastal zone, a consistency determination shall be prepared and submitted to the state by the NASA EMB.

d. The determinations are typically included in the EA or EIS for the proposed project (KDP-P-1726, Environmental Assessment).

24.3 Wetlands and Floodplains

24.3.1 Background

a. The Federal Government regulates work in wetlands and waters of the U.S. through the authority of the USACE IAW Section 10 (33 U.S.C. 403, Construction of Bridges, Causeways, Dams or Dikes Generally; Exemptions) of the Rivers and Harbors Acts of 1890 (superseded) and 1899 (33 U.S.C. 401, et seq, Construction of Bridges, Causeways, Dams or Dikes Generally; Exemptions) and Section 404 authority (33 U.S.C. 1344, Permits for Dredged or Fill Material) of the CWA (amended 1977).

b. The State of Florida regulates work in, on, or over wetlands or surface waters within the state through Chapter 403 FS, Environmental Control, and the Environmental Resource Permitting (ERP) Rule Chapter 40C-4, FAC, Environmental Resource Permits: Surface Water Management Systems, and Chapter 62, FAC, Department of Environmental Protection.

c. EO 11988, Floodplain Management; EO 11990, Protection of Wetlands; and the CWA direct Federal facilities to avoid impact to floodplains and wetlands, whenever practicable, and to develop procedures for protection of floodplains and wetlands.

24.3.2 ERP for Wetlands and Surface Waters

a. The ERP Program regulates activities that would affect wetlands, alter surface water flows, or contribute to water pollution. The wetlands portion of the ERP Program regulates activities involving any work in, on, under, or over wetlands or surface waters. This includes any activities that have direct, secondary, and/or cumulative impacts to these resources. For KSC, these regulations often require demonstration that all wetland permitting criteria, such as avoidance and minimization of impacts and mitigation to offset any unavoidable impacts, has been met. ERP Permitting encompasses both the stormwater and wetland review criteria in a single permit. Issuance of this permit (with Water Quality and Coastal Zone Management Certification) is a pre-requisite to meeting Federal CWA review criteria discussed in Section 24.3.3 below.

b. The ERP Program is administered by both the SJRWMD and the FDEP. These two agencies are responsible for reviewing wetlands, surface waters, and stormwater system designs and issuing permits authorizing their construction and operation. Authorization is required from either SJRWMD or FDEP; which agency will review the permit application is dependent upon project type.

c. The SJRWMD's stormwater rules and ERP permitting procedures are located on the SJRWMD Permitting Web site. The SJRWMD has also published the *Applicant's Handbook: Management and Storage of Surface Waters* to assist in the preparation of ERP permit applications. Organizations and contractors shall refer to and use these Web sites, rules, and handbooks when preparing ERP stormwater permit applications.

d. The USACE rules and permitting procedures are located on the USACE Web site. Within the regulatory section of this Web site is a source book available for assistance in preparing applications and understanding rules and procedures. Organizations and contractors shall refer to and use this when preparing Federal environmental permit applications.

24.3.3 Activities that may require an ERP or Federal Environmental Permit:

a. Any project that involves work in, on, or over wetlands or surface waters may require an environmental permit.

b. Organizations and contractors shall immediately notify the NASA EMB regarding any new planned project or activity identified in Chapter 24.3.1. This notification is typically accomplished through the KSC Environmental Checklist process outlined in Chapter 3 of this KNPR.

c. The NASA EMB shall evaluate the proposed project or activity and determine whether an environmental permit is required. Some projects may not require a permit if they are below certain permitting thresholds.

24.3.4 Obtaining an ERP or Federal Environmental Permit

a. If a project requires an ERP or permit, the initiating organization or contractor shall prepare the application package, which includes SJRWMD Form 40C-4.900(1), Joint Application for: Environmental Resource Permit, Authorization to Use State Owned Submerged Lands, Federal Dredge and Fill Permit, and all required supporting documentation.

b. The initiating organization or contractor shall refer to the appropriate rules and use the applicant handbooks on the SJRWMD Permitting Web site and the USACE Web site when preparing the permit application.

c. Organizations and contractors shall include the NASA EMB in design reviews or other meetings for projects or activities involving ERP or USACE permitting.

d. The initiating organization or contractor shall submit the draft application package to the NASA EAB and EMB for review and comment.

e. The NASA EMB and EAB shall review the draft application package and provide comments to the initiating organization or contractor.

f. The initiating organization or contractor shall deliver one hard copy and one electronic copy of the final application package to the NASA EMB and EAB.

g. Documents and drawings requiring PE certification shall be signed and sealed.

h. The NASA EAB shall sign the applications packages as the Applicant and submit them to the appropriate agency (SJRWMD, FDEP, and/or USACE).

i. The agency will review the permit application for completeness and accuracy within 30 days. If not satisfied with the permit application, the agency will submit an RAI to the applicant to correct any deficiencies, errors, or omissions. Multiple RAIs may be submitted to the applicant until agency deems the application package to be complete.

j. The initiating organization or contractor shall prepare draft RAI responses (in coordination with the PE) and submit them to the NASA EMB and EAB for review and comment.

k. The NASA EMB and EAB shall submit the final RAI responses to the agency.

l. When the permit application is approved, the agency will issue and mail the permit to the NASA EAB. The NASA EAB shall forward the permit to the initiating organization or contractor. Projects involving ERP stormwater permits are typically issued within 30 days after the application package is determined to be complete. Projects requiring individual ERP stormwater permits require approval from a governing board and are typically issued within 120 days after the application package is determined to be complete.

24.3.5 Project execution involving an ERP Stormwater Permit

a. The initiating organization or contractor is responsible for ensuring that the design information submitted in the ERP permit application (and any subsequent submittals or RAIs) is equivalent to the design information in the final design package, support request, or construction contract. The permit and permit conditions shall also be included in the support request or construction contract.

b. The initiating organization or contractor shall not begin construction prior to receiving the ERP and/or USACE permits.

c. Prior to the start of site work, the initiating organization or contractor shall submit an SJRWMD Form 40C-4.900(3), Construction Commencement Notice, to the NASA EMB and EAB at least five days before the start of construction.

d. The NASA EAB shall sign the form as the Permittee and submit it to the SJRWMD at least two days before the start of construction. The NASA EMB will submit a Construction Commencement Letter to the USACE IAW the USACE guidance.

e. The initiating organization or contractor is responsible for ensuring that the entity performing the work abides by all rules and permit conditions. The initiating organization or contractor shall periodically inspect the project site to ensure compliance with all permit conditions and immediately notify the NASA EMB and EAB and correct the deficiencies, in the event a permit violation is discovered.

24.4 National Aeronautics and Space Administration Use of Areas Managed by the United States Department of the Interior

24.4.1 Of the 140,000 acres of land and water which comprise KSC, less than 10 percent has been developed by NASA. The remainder is managed for NASA IAW KCA-1649, Interagency Agreement between the NASA KSC and U.S. Department of the Interior Fish and Wildlife Service for Use and Management of Property at KSC known as Merritt Island National Wildlife Refuge, with the FWS as the MINWR, and by the National Park Service (NPS) as a portion of the Canaveral National Seashore.

a. The NASA operational areas include the Industrial Area, Complex 39, the Shuttle Landing Facility, the KSC Visitor Complex, KSC roads, and various other smaller areas.

b. The refuge traces its beginnings to the development of the nation's Space Program. In 1962, NASA acquired 140,000 acres of land, water, and marshes adjacent to Cape Canaveral to establish the John F. Kennedy Space Center. NASA built a launch complex and other space-related facilities, but development of most of the area was not necessary. In1963, the FWS signed an agreement to establish the refuge and, in 1975, a second agreement established Canaveral National Seashore. Today, the Department of Interior manages most of the unused portions of the Kennedy Space Center as a National Wildlife Refuge and National Seashore.

24.4.2 When a project or action is proposed outside a KSC operational area and within the MINWR, a special-use permit from the FWS is required. These permits are usually valid for one year.

24.4.3 If the project is intended to last longer than one year or is permanent, the affected area shall be removed from refuge lands and considered a new or additional KSC operational area. The procedure for withdrawal of refuge land is implemented by the Spaceport Integration and Services organization as called out in KDP-P-3235, Land Withdrawal from Fish and Wildlife Services (FWS) to Support NASA Missions.

CHAPTER 25. CULTURAL RESOURCES

25.1 Regulatory Requirements

25.1.1 The National Historic Preservation Act (NHPA) of 1966 is the keystone of Federal historic preservation laws to ensure places of historic value are considered and preserved for listing on the National Register of Historic Places (NRHP). Section 106 of the Act requires Federal agencies to evaluate the effect of all federally funded or permitted projects on historic properties (e.g., buildings/structures and archaeological sites) and to mitigate adverse effects. Section 110 of the Act obligates federal agencies to establish a historic preservation program for the identification, evaluation, and nomination to the NRHP.

25.1.2. 36 CFR Part 800, Protection of Historic Properties, is the Advisory Council on Historic Preservation (ACHP) implementing regulations that require agencies to consult with stakeholders on all Federal undertakings that have the potential to affect historic properties. Consultation for NASA KSC projects is performed between the KSC Historic Preservation Officer (HPO) and stakeholders that may include, but are not limited to, the Florida State Historic Preservation Officer (FL SHPO), the ACHP, Native American Tribes, interested parties, and the public. The consultation process must be completed and any adverse effects mitigated prior to the execution of any Federal undertaking.

25.1.3 Other Federal and state regulatory requirements including executive orders with which NASA KSC must comply are listed below:

a. American Indian Religious Freedom Act of 1978

b. Archaeological Resources Protection Act of 1979

c. Native American Graves Protection and Repatriation Act of 1990

d. National Environmental Policy Act of 1969

e. EO 11593, Protection and Enhancement of the Cultural Environment

f. EO 13007, Indian Sacred Sites of 1995

g. EO 13175, Consultation and Coordination with Indian Tribal Governments

h. EO 13287, Preserve America

i. 36 CFR 79, Curation of Federally-owned and Administered Archaeological Collections

25.2 National Aeronautics and Space Administration Requirements and Documentation

25.2.1 NPR 8510.1, NASA Cultural Resources Management, implements applicable requirements for the Cultural Resources Management Program; establishes requirements, roles, and responsibilities for Native American consultation; and ensures the responsible stewardship of NASA's cultural resources are IAW *The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs* pursuant to the NHPA.

25.2.2 KSC-PLN-1733, NASA KSC Integrated Cultural Resources Management Plan, (ICRMP) serves as KSC's planning document for managing cultural resources on NASA-owned lands as well as NASA-owned resources located on CCAFS. The ICRMP reflects KSC's commitment to the protection of its significant archaeological sites and historic facilities and structures. The ICRMP is updated every five years.

25.2.3 KCA-4185, Programmatic Agreement Among the National Aeronautics and Space Administration John F. Kennedy Space Center, Advisory Council on Historic Preservation, and the Florida State Historic Preservation Officer Regarding Management of Historic Properties at the Kennedy Space Center, Florida, is dated May 2009, and streamlines the Section 106 review process; exempts categories of undertakings from the consultation process; eliminates the need to prepare other agreement-type documents on undertakings that will have an adverse effect to a listed or eligible historic building, structure, or district; and establishes when consultation is required such as for demolition activities.

25.2.4 KSC's Historic Property Listing for built resources is available on the NASA KSC Environmental Planning Cultural Resources Management Web site, (http://environmental.ksc.nasa.gov/projects/cultural.htm), or by contacting the KSC HPO. The listing excludes archaeological sites discovered on NASA-owned lands and the National Historic Landmarks (NHL) properties managed by NASA. The KSC Historic Property Listing is updated yearly. The known archaeological sites and their locations are protected from the public IAW the Archaeological Resources Protection Act and Section 304 of the NHPA, but is available for project planning purposes by contacting the KSC HPO.

25.2.5 KSC's Landmark Property Listing is available on the NASA KSC Environmental Planning Cultural Resources Management Web site, (http://environmental.ksc.nasa.gov/projects/cultural.htm), or by contacting the KSC HPO.

25.2.6 When an undertaking may adversely affect an NHL, or does not otherwise fall under the KSC PA (KCA-4185), a Memorandum of Agreement (MOA), or other agreement-type document, will be prepared. The MOA or agreement document shall describe the undertaking, adverse effects, and mitigation measures to be taken by all parties. The MOA is signed by the Center Director, FL SHPO, ACHP, the NPS, and other stakeholders, as appropriate.

25.3 Controls

25.3.1 Standard operating procedures (SOP) have been developed that can be found in the KSC ICRMP (KSC-PLN-1733), Chapter 6, for the identification, evaluation, treatment, and preservation of significant historic properties (including archaeological sites and historic facilities) for KSC. For example, SOP 5 and SOP 6 describe what must occur when unanticipated discoveries of archaeological materials or human remains are uncovered. Work must stop immediately and the Project Manager should contact the KSC HPO so that the findings may be identified and evaluated to determine if additional archaeological survey is required.

25.3.2 KDP-P-1733 is the flow process used to consider the effects on historic properties and when to consult on projects.

25.3.3. KDP-P-1727, Environmental Checklist, must be completed on all projects at KSC, including ground disturbing activities. The project is reviewed and evaluated for impacts to historic properties and historic areas that will be documented on the KSC REC. The REC will

indicate if an adverse effect may result from a project or if a survey is required. The REC will also identify mitigation measures.

25.3.4 No undertaking that may adversely affect a historic property shall be initiated until the Section 106 consultation process is completed between the KSC HPO and FL SHPO. If a property's historic significance has not been determined, a survey and evaluation will need to be completed and coordinated with the FL SHPO.

25.3.5 No Federal undertaking that may affect a resource significant to Native American Tribes shall be initiated until the appropriate level of consultation has been completed between NASA KSC and the Tribe.

25.4 Mitigation Measures

If an undertaking has an adverse effect to a historic property, after consultation with the FL SHPO, mitigation measures will need to be agreed upon between KSC and the FL SHPO prior to project implementation. Mitigation measures may be in the form of historic recordation, data recovery, Web site development, oral histories, salvage of artifacts, development of reports or pamphlets, etc.

CHAPTER 26. POLLUTION PREVENTION, SOLID WASTE DIVERSION, RECYCLING, AND GREEN PURCHASING

26.1 Regulatory Requirements

26.1.1 Section 6002 of the RCRA, Solid Waste Disposal Act, and EO 13693, Planning for Federal Sustainability in the Next Decade, direct Federal agencies to establish solid waste diversion goals and establish and maintain cost-effective pollution prevention programs.

26.1.2 Reporting

a. The NASA EMB and other NASA and contractor organizations shall collect data on green purchasing, recycling, and waste diversion practices at KSC throughout the year to support data calls.

b. All NASA and contractor organizations shall respond to the data calls.

c. NASA EMB and other NASA and contractor organizations shall input the data into NETS during the annual Green Purchasing, Recycling, and Solid Waste Diversion data call or other data calls.

26.2 Pollution Prevention

26.2.1 KSC's goal is to reduce the volume and toxicity of hazardous solid wastes to the extent economically practicable. All personnel shall adopt this practice in day-to-day operations and are encouraged to introduce new ideas concerning waste minimization opportunities to management.

26.2.2 All NASA and contractor organizations shall contribute to Agency and Center waste diversion goals.

26.2.3 The NASA EMB shall provide guidance and direction to help achieve KSC's goals.

26.2.4 KSC Hazardous Solid Waste Minimization Elements

a. Management Support - Management of each NASA and contractor organization that generates hazardous solid waste shall show support of waste minimization efforts by using these techniques:

(1) Incorporate waste minimization as an integral part of organizational strategies to increase productivity and quality.

(2) Set goals for the reduction of both volume and toxicity of waste streams consistent with those established by the NASA EMB.

(3) Commit to implementing recommendations identified through assessments, evaluations, and waste minimization teams.

(4) Designate a waste minimization coordinator who is responsible for facilitating effective implementation, monitoring, and evaluation of the program.

(5) Publicize waste minimization success stories and recognize individual and group accomplishments.

(6) Raise employee awareness of the waste generating impact that results from daily operations and work procedures.

b. Characterization of Waste Generation and Waste Management Costs - The KSC environmental support contractor shall track types and amounts of waste generated at KSC and the direct costs associated with waste disposal. True costs affect the economic practicability of waste minimization activities and include:

(1) Additional costs of regulatory compliance oversight

(2) Reporting requirements

(3) Cost of labor and materials

(4) Employee exposure and health care

(5) Liability insurance

(6) Possible corrective action costs

c. Periodic Waste Minimization Assessments - The NASA EMB will assist each waste generating organization in performing process or facility assessments to identify opportunities at all points in a process where materials can be prevented from becoming waste. These waste minimization opportunities shall be analyzed based on true costs associated with management of the waste.

d. Technology Transfer - Useful and valid waste minimization techniques can be shared within waste generating organizations and among other waste generating organizations. Functions at KSC, such as the KSC Environmental Solutions Partnering Team, provide a forum for sharing these technologies and techniques.

e. Project Implementation - If feasible and practicable, recommendations developed through the waste minimization assessments should be implemented.

(1) The NASA EMB will assist the KSC waste generating organizations in monitoring the overall effectiveness of waste minimization activities in relation to waste minimization goals.

(2) The KSC environmental support contractor will help these efforts through distribution of periodic reports on the amount of hazardous waste generated and the associated direct disposal costs.

26.2.5 Waste Minimization Options (in order of preference)

a. Prevention through Source Reduction - Source reduction is the practice of reducing the amount of hazardous substances, pollutants, or contaminants entering any waste stream or otherwise released into the environment before recycling, treatment, or disposal. Source reduction reduces or eliminates the hazards to employees, the public, and the environment

along with the liability of regulatory compliance. Several source reduction techniques are listed below:

(1) Initial Environmental Design - Incorporation of environmental considerations into the initial process or facility design to limit or prevent pollution or waste generation from occurring.

(2) Process Efficiency Improvement - Changes to a process or facility to reduce requirements for hazardous substances, pollutants, or contaminants.

(3) Material Substitution - Substitution of non-hazardous or less hazardous materials into a process to reduce the toxicity of the resulting waste stream.

(4) Inventory Control - Control of hazardous materials in inventories to promote efficient use and to avoid shelf-life expiration and waste generation. Emphasize issuing only the quantity of a material needed for the job.

(5) Preventive Maintenance - Designing equipment for maintainability can result in detection and avoidance of equipment problems before failures and associated spills and leaks of hazardous materials occur.

(6) Improved Housekeeping - A clean, well-organized facility and awareness by personnel regarding the proper management and use of toxic and hazardous materials can greatly reduce the frequency and amount of accidental spills, releases, and subsequent waste generation.

b. Recycling and Waste Diversion - For hazardous substances, pollutants, or contaminants that cannot be reduced at the source, waste diversion practices such as recycling or reuse are the most preferred methods of waste minimization.

c. Treatment - Treatment options shall only be employed when wastes cannot be prevented or recycled.

d. Disposal - Disposal shall only be used when the waste could not be prevented, treated, or recycled.

26.3 Kennedy Space Center Non-Hazardous Solid Waste Diversion and Recycling

26.3.1 The NASA EMB shall enable Center-wide recovery and sale, reuse, or exchange of recyclable materials owned by the Government. The implementation of this program is designed to ensure all employees comply with EO 13693, Planning for Federal Sustainability in the Next Decade.

26.3.2 The NASA EMB shall work closely with the property disposal contracting officers to provide solid waste diversion and recycling requirements when modifying existing contracts and creating requirements for new contracts.

26.3.3 KSC's overall goal is to maximize the amount of materials diverted and recycled while reducing the amount of recyclable material going to our onsite landfill and Brevard County landfill. KSC civil servants and contractors shall maximize the recovery and sale of recyclable material owned by the Government which has no value other than its basic material content.

26.3.4 Recycling Program

a. The NASA EMB administers recycling programs for aluminum and steel cans, plastic and glass bottles, white and colored paper (including newspaper, post-it notes, magazines, catalogs, notepads, spiral bound notebooks, books, booklets, phone books, brochures, etc.), cardboard, toner cartridges, and other recyclable commodities. For additional information contact the recycling hotline at [redacted] See Chapter 27 of this KNPR.

b. All recyclable commodities shall be placed in designated recycling bins located in buildings throughout KSC.

c. When the recycling bin is roughly three-quarters full, employees shall submit a recycling request via the Sustainable Tracking Tool for Automated Recycling (STAR). The bins will then be serviced by the recycling contractor staff.

d. The following items shall not be placed in a recycling bin: wet garbage, carbon paper, document protectors, binders, and any electronic equipment.

e. All debris shall be emptied from cardboard boxes before recycling. Break down (flatten) boxes only if this can be done safely. Non-recyclable cardboard includes:

(1) Chemically contaminated cardboard

(2) Cardboard with food or beverage residue

f. Under no circumstances shall recyclable material be deposited in trash containers.

g. The Sensitive But Unclassified (SBU) paper shall be placed in SBU designated, locked bins. Bins must be scheduled for servicing by using the Sustainable Tracking Tool for Automated Recycling (STAR) Web site.

h. Alkaline batteries can be recycled by placing them in designated bins located in the HQ, SSPF, O&C, OSB, and OSBII buildings or by taking them to the DYCOH site.

i. Expired, cracked, or damaged hard hats may be recycled at the DYCOH site.

j. PCBs have been regularly detected in various building materials across KSC and CCAFS. Such construction and demolition debris requires sampling before it can be recycled or sold through KSC's Property Disposal Office at the Ransom Road RRMF or transferred to the construction contractor as a project off-set.

(1) Project managers shall maximize recycling and divert solid waste from disposal when cost-effective.

(2) Cost evaluations shall be retained with the project file for audit purposes. (Reference Chapter 19 of this KNPR for further information on the proper handling, storage, and disposal of materials containing PCB).

26.3.5 Use of Recycling Funds

a. Public Law 103-329 authorizes Federal agencies to receive and use funds resulting from the sale of recycled materials for additional recycling, pollution prevention, or environmental management programs. All proceeds from recycling shall be deposited into a designated recycling account.

b. A formal request for new projects to use recycling funds shall be disseminated through points of contact internal to KSC twice yearly IAW KDP-KSC-P-1449, Use of Recycling Funds for Center-wide Projects.

26.4 Diverted Aggregate Reclamation and Collection Yard

26.4.1 The DARCY is a cleared, ten acre parcel located north of the closed KSC landfill and west of the existing permitted Class III, C and D landfill. The DARCY provides a temporary storage and processing area for reuse of waste concrete and other aggregate-based materials such as river rock, limestone, and gravel.

26.4.2 Material to be brought to the DARCY shall be segregated at the source (project location) and be free of other construction debris and excess soils. Diverted concrete materials may contain rebar, wire fabric, or other metallic material. Any external metallic material must not protrude more than four inches from the concrete surface.

26.4.3 Upon entering the landfill, all vehicles shall proceed to the scale house for weigh-in with the scale house attendant.

26.4.4 The landfill operator shall retain records of material deliveries to the DARCY.

26.4.5 Records of material removed from the DARCY for reuse shall be maintained on a yearly basis by the scale house attendant and the project manager removing the material. These records will be available to the NASA EMB.

26.4.6 Acceptability Criteria

a. Clean, unstained, and unpainted concrete can be accepted at the DARCY without conducting any sampling. If the concrete has paint or coating on it, further evaluation is required to determine acceptability at the DARCY.

b. Painted or coated concrete shall be accepted at the DARCY only if one of the conditions listed below is met; otherwise, the painted or coated concrete must be disposed of in the KSC landfill as regular construction and demolition debris.

(1) The paint or coating is sampled to determine if the total PCBs and total metals (this is not the same as the Toxicity Characteristic Leaching Procedure [TCLP] testing) are below the State of Florida Residential SCTL. The most likely heavy metals of concern found in KSC paints and coatings are lead, chromium, and cadmium. The current State of Florida Residential SCTL are listed below:

(a) Total PCB = 0.5 mg per kg

(b) Total Lead = 400 mg per kg

(c) Total Chromium = 210 mg per kg

(d) Total Cadmium = 82 mg per kg

(2) Documentation is provided (e.g., SDS) that all layers of all paints and coatings on the concrete do not contain any PCBs or heavy metals.

(3) The paint or coating is sampled for total PCB, the concentration is less than 50 mg for every kg, and all of the paint or coating is removed from the concrete prior to placement in the DARCY.

NOTE: Concrete with total PCB concentrations greater than 50 mg per kg in the paint or coating shall be disposed of in the KSC landfill as regular construction and demolition debris.

(a) The removal process shall be coordinated through and approved by the NASA EAB.

(b) All of the removed paint or coating shall be containerized and disposed of through the KSC WMO IAW requirements in Chapter 13 and Chapter 17 of this KNPR.

26.4.7 No oil-stained concrete is accepted at the DARCY. When feasible, stained concrete must be segregated from clean concrete. Because of the potential to contain PCB, all removed concrete associated with oil-containing electrical equipment shall be disposed of through the KSC WMO as a regulated PCB waste.

26.4.8 No contractor is allowed to conduct any land disturbing activities at the DARCY without prior written consent of the NASA EMB. Land disturbing activities include, but are not limited to, scraping of soil, removal of soil for offsite activities, and digging. Land disturbance may require that environmental permits be secured and erosion and sediment controls implemented prior to conducting these activities. Failure to properly notify the NASA EMB or to secure a permit will have a negative impact on actions and shall be the responsibility of the contractor.

26.5 Green Purchasing and Sustainable Acquisition

26.5.1 Federal agencies and their contractors are required to purchase products made from recycled or recovered materials and other environmentally preferable products whenever possible (Ref. FAR Subpart 23.1, Sustainable Acquisition Policy, and NPR 8530.1, NASA Sustainable Acquisition). The Green Compilation Tool found at https://sftool.gov/greenprocurement helps users identify green products and services from a number of federally approved databases.

26.5.2 NASA's EMB shall facilitate awareness across the Center, assess performance, and compile Center-wide information for annual reporting requirements associated with KSC's Green Purchasing Program.

26.5.3 All NASA and contractor organizations shall submit their annual green purchasing fiscal year (FY) data into NETS before February 1 of the new FY, to include the following information:

a. The total dollar amount of each item purchased during the previous FY.

b. The total dollar amount of each item purchased during the previous FY that contained at least the minimum recommended percentages of recycled content or bio-based content.

c. The total dollar amount of each item purchased during the previous FY that contained recycled content or bio-based content less than the minimum recommended percentages of recycled content or bio-based content.

d. The number of waivers and the name of the item in each waiver submitted to the NASA EMB during the previous FY.

e. The total dollar amount for each waivered item purchased during the previous FY.

f. A narrative explanation of constraints for purchasing each item that did not meet green purchasing content requirements during the previous FY.

26.5.4 The procurement of items not found in the Green Compilation Tool (see Section 26.5.1) requires a waiver.

a. Waivers shall be submitted to the NASA EMB Chief and documented within the contract file by the Contracting Officer, showing the exception being used and rationale for using the exception.

b. Waivers shall be prepared with KSC Form 28-825, Waiver for Sustainable Acquisition Products/Services, by following the process outlined in KDP-KSC-P-8530, Sustainable Acquisition (SA) Process. An allowable exception is available if any of the following conditions exist:

(1) Product or service cannot be acquired competitively within a reasonable performance schedule.

(2) Product or service cannot be acquired that meets reasonable performance requirements.

(3) Product or service cannot be acquired at a reasonable price.

(4) An exception is provided by statute, such as the exception to procuring ENERGY STAR or Federal Energy Management Program-designated products under 42 U.S.C. § 8259b(b)(2), Federal Procurement of Energy Efficient Products.

c. The price shall be deemed unreasonable when the total life cycle costs are significantly higher for the sustainable product or service versus the non-sustainable product or service. Life cycle costs are determined by combining the initial costs of a product or service with any additional costs or revenues generated from that product or service during its entire life.

CHAPTER 27. KENNEDY SPACE CENTER ENVIRONMENTAL REQUIREMENTS FOR RECLAMATION, SALVAGE, AND RESALE

27.1 Reclamation and Salvage

This Chapter sets forth the Center's environmental requirements regarding reclamation, salvage, and resale of Center materials through the KSC RRMF located at Ransom Road. Categories of materials covered by this Chapter include, but are not limited to:

27.1.1 Oil-filled equipment

27.1.2 Lead acid batteries

27.1.3 Scrap metal

27.1.4 Electronic equipment

27.1.5 Heavy or movable equipment

27.1.6 Compressed gas cylinders

27.1.8 Severed flex hoses

27.2 Responsibility

27.2.1 All NASA and contractor organizations responsible for environmental contamination at the RRMF occurring as a result of failure to follow the requirements in this Chapter shall be held liable for all cleanup and remediation costs associated with such contamination.

27.2.2 All NASA and contractor organizations are responsible for the testing identified herein and shall submit results when transferring items to the RRMF for disposition.

27.3 Kennedy Space Center Reutilization, Recycling, and Marketing Facility

27.3.1 Safe salvage and reclamation operations at the RRMF are achieved by using good environmental management practices, preventing spills and releases, and properly identifying, describing, and documenting materials before they are transferred to the RRMF.

27.3.2 The RRMF shall accept materials only if they meet the following criteria:

a. No leakage of any type of fluid from equipment or containers.

b. No visible indication of old spills or releases on outside of equipment or containers that could be washed off from rainfall.

c. Drained of all fluids, unless determined to be acceptable by the RRMF and environmental personnel for the purpose of the item resale to maximize the Government's potential proceeds.

d. Accompanied by required documentation, KSC Form 7-49, Purchase Request (Supplies/Equipment or Property Turn In), (or equivalent), to include a full, written commercial description clearly identifying the intent for sale.

27.3.3 Sampling analysis for metals (totals or TCLP) is not necessary for items to be recycled.

27.3.4 Paints and coatings manufactured prior to 1979 may contain PCB. PCB-containing paints and coatings have been found across KSC and in NASA-operated facilities at CCAFS. All equipment being offered for sale or as scrap shall meet the following requirements. (See Chapter 19 for more guidance and requirements for managing and disposing of PCB.)

a. If the total PCB concentration in the paint or coating is greater than or equal to 50 mg per kg, the entire item is a regulated PCB waste and cannot be transferred to, sold, or recycled through the KSC RRMF.

b. Oil inside electrical and mechanical equipment may contain PCB and shall be sampled to determine the PCB concentration.

c. Oil-containing equipment where the PCB concentrations in both the oil and paint are less than 50 mg per kg can be excessed through the RRMF. The oil shall be removed from the equipment and sample results provided to the RRMF.

d. Any equipment which is found to be leaking during the initial inspection of the delivery to RRMF shall be reported as a spill. It is the financial and environmental responsibility of the organization sending the equipment to the RRMF to ensure appropriate cleanup and disposition of the equipment and any other contamination it caused.

27.3.5 Liquid-containing items delivered to the RRMF with the intent of resale, but at some point re-designated from sale to scrap metal, shall be properly drained into impermeable containment sufficient to collect and contain 100 percent of all liquids in the equipment.

a. RRMF personnel shall submit a work order to drain properly.

b. RRMF personnel shall managed these items under the requirements for scrap metal.

27.3.6 Once material has been accepted by the RRMF personnel, it is their responsibility to ensure that the material is stored in a manner that prevents environmental contamination.

27.3.7 Table G summarizes the requirements for some of the most common materials sent to the RRMF. This listing summarizes the major environmental requirements for delivery and acceptance of materials to the RRMF as well as general storage requirements of the materials while at the RRMF.

Table G: Materials Allowed at RRMF

Oil-Filled Equipment	a. Oil-filled equipment shall be drained of free-flowing liquids (unless sampling verifies that oil is PCB-free) and the exterior visually free of oil or other contamination. b. Items that previously contained dielectric fluid shall be accompanied by a copy of analytical results taken within the past 6 months documenting the fluid did not exceed 50 ppm for PCB. c. Once at the RRMF, this equipment shall be stored on an impervious surface with rain protection.
Batteries: Lead-Acid and Silver-Zinc	a. Lead-acid and silver-zinc batteries may be brought to the RRMF undrained, but shall not be leaking. b. The batteries shall be secured to pallets or containerized and protected against short circuits. c. Batteries shall not be stacked in any way that puts weight on the battery terminals. d. Batteries shall be stored in a segregated location inside shelter on an impervious surface with rain protection. e. The batteries shall be identified as lead-acid or silver-zinc and be accompanied by SDS and KSC Form 7-49, or equivalent.
Carbon Steel Drums	a. Carbon steel drums shall be brought to the RRMF emptied of all free-flowing liquid, crushed and palletized. b. Crushed drums shall be stored on pallets on impervious surface with rain protection. c. These drums shall be accompanied by PWQ and TRP and KSC Form 7-49 or equivalent.
Stainless Steel Drums	a. Stainless steel drums must be triple rinsed prior to excessing. This rinsing effort must meet the standards in 40 CFR 261.7, Residues of Hazardous Waste in Empty Containers. The drums will be sold or excessed in place. b. Once the triple rinse is complete, stencil the words, “TRIPLE RINSED” on the side of the stainless steel drums. The drums will remain uncrushed. c. Triple rinsed drums will either be sold in place or taken to RRMF for appropriate management. d. Keep a copy of the work order directing the triple rinse at the facility where the decontamination effort took place. e. Retain a signed copy of the completed work order with the stainless steel drum.

Equipment Containing ODS (e.g., Freon) – *Unusable Equipment*	a. Equipment containing ODS (e.g., Freon) that is no longer usable may be brought to the RRMF but shall be properly drained (recover ODS) and labeled as "Empty." b. The equipment shall be accompanied by KSC Form 7-49 or equivalent.
Equipment Containing ODS (e.g., Freon) – *Usable Equipment*	a. Equipment containing ODS that is offered for sale as usable equipment may be brought to the RRMF. This equipment does not need to be drained of the ODS, but shall be accompanied by shop or lab certification that the equipment is not leaking and by KSC Form 7-49 or equivalent. b. This equipment shall be stored in an area with rain protection.
Scrap Metal and Structural Steel	a. Scrap metal and structural steel shall be visibly clean of all residual oils or contaminants and clearly identified in writing as intended for sale as scrap only. b. These materials shall be accompanied by KSC Form 7-49 or equivalent.
Flex Hoses	a. Flex hoses shall be decontaminated and certified as such. b. The hoses shall be mechanically rendered unusable (by cutting, crushing, or other means) for anything but scrap. Hoses of any size must be rendered unusable and larger hoses cut into 4' to 6' lengths. The hoses may then be stored with other scrap metal for sale. c. These materials shall be accompanied by KSC Form 7-49 or equivalent.
Compressed Gas Cylinders (non-acetylene)	a. Empty compressed gas cylinders (non-acetylene) shall be returned to vendors, if possible. b. If impossible to return to vendors, the property owners shall ensure cylinders are empty, purged of all contents (providing certification), and have been rendered incapable of holding pressure through methods such as removing the head valve, drilling a hole in the sidewall, or cutting open the cylinder to display the inner walls. c. These materials shall be accompanied by KSC Form 7-49 or equivalent.
Acetylene Gas Cylinders	a. Empty acetylene gas cylinders shall be returned to vendors, if possible. Acetylene cylinders may contain asbestos; coordinate with KSC Environmental Health before cutting or disturbing structural integrity of acetylene cylinders. b. A warning shall be placed on cylinders due to the high flammability of these assets. c. If the cylinder is found to contain asbestos, RRMF cannot recycle them and they shall be disposed of as a hazardous waste. d. These materials shall be accompanied by KSC Form 7-49 or equivalent.
Magnetic Tapes	Magnetic tapes may be brought to the RRMF and stored in an area with rain protection. These materials shall be accompanied by KSC Form 7-49 or equivalent.

Electronic Equipment – *Unusable*	a. Unusable electronic equipment is identified as electronic equipment waste (E-waste). E-waste is a generic term for a variety of waste containing electronic components including products used for data processing, telecommunications, or entertainment such as computers, monitors, TV sets, mobile phones, PDAs, and electronic equipment used in industrial settings. b. All hazardous materials shall be removed (e.g., mercury, PCB, etc.) and certified as being clean for sale as scrap. c. The equipment shall be identified as intended for sale as scrap and accompanied by KSC Form 7-49 or equivalent. d. All unusable electronic equipment shall be turned over to Unicor, a certified R2 recycler, IAW the NASA Agency MOA.
Electronic Equipment – *Usable*	a. Electronic equipment that is intended for resale as usable equipment shall be stored in an area with rain protection. b. The equipment shall be accompanied by KSC Form 7-49 or equivalent.
Precious Metals	Precious metals may be brought to the RRMF and stored in an area with rain protection. These materials shall be accompanied by KSC Form 7-49 or equivalent.
Heavy or Movable Equipment (e.g., forklifts, lawn mowers, etc.) - *unusable*	a. Unusable heavy or movable equipment (e.g., forklifts, lawn mowers, etc.) may be brought to the RRMF drained of all fluids (fuel, hydraulic oil, etc.) and the exterior shall be visibly clean of all oil or contaminants. b. The equipment shall be stored on an impervious surface with rain protection. c. The equipment shall be identified as intended for sale as scrap and accompanied by KSC Form 7-49 or equivalent.
Heavy or Movable Equipment – *usable*	a. Heavy or movable equipment for sale as usable equipment shall be inspected and certified to ensure all fluid lines and reservoirs are intact and not leaking. b. The exterior of all equipment shall be visibly clean of all oil or contaminants. c. The equipment shall be stored on an impervious surface with rain protection and segregated from scrap materials. d. The equipment shall be accompanied by KSC Form 7-49 or equivalent. e. Once accepted, RRMF personnel shall conduct routine inspections for leaks, promptly clean up any contamination from leaks, and store equipment in secondary containment until leak is fixed.
Hypergolic Equipment	a. The equipment shall be drained of all fluids. b. The sampling results shall be provided indicating no residual commodities.

	c. The soft goods shall be removed and disposed of through the appropriate waste stream. d. The equipment shall be stored on an impervious surface with rain protection.

27.3.8 The following materials shall not be accepted for salvage, reclamation, or resale at the RRMF:

a. Visibly leaking equipment or containers

b. Spent blast media

c. Uncrushed drums except those clearly identified as artifacts

d. Treated lumber

e. Explosives or ordnance

f. Radioactive materials

g. Intact compressed gas cylinders and acetylene cylinders containing asbestos

h. Intact flex hoses

i. Hazardous materials to include property that contained hypergolic fuels

j. Biomedical wastes

k. Non-lead and non-silver zinc batteries such as:

(1) Lithium batteries managed as UW (see Section 13.12)

(2) Mercury batteries (managed as UW)

(3) Nickel-cadmium wet cell batteries containing potassium hydroxide electrolyte solution (managed as UW)

(4) Nickel-cadmium dry cell batteries (managed as UW)

27.4 Procedures

27.4.1 To successfully implement the requirements in this Chapter, NASA and contractor organizations shall develop and implement adequate procedures addressing inspection, transportation, and storage activities at the RRMF and other Center locations to prevent environmental contamination.

27.4.2 The organization transferring items to the RRMF for reclamation, salvage, or resale shall ensure that all materials sent to the RRMF meet the requirements of this Chapter at the time of delivery to RRMF and provide the proper documentation.

CHAPTER 28. ENERGY AND WATER MANAGEMENT

28.1 Kennedy Space Center Energy and Water Five-Year Implementation Plan

28.1.1 The KSC Energy and Water Five-Year Implementation Plan, KSC-PLN-1906, Kennedy Space Center Energy Efficiency and Water Conservation 5-Year Plan, supports KSC's mission by following internal and external regulations and policies and implementing energy and water efficiency processes. This includes areas such as facility planning, design, construction, operations, maintenance, procurement, logistics, and other areas affecting energy and water consumption and supply.

28.1.2 KSC-PLN-1906 implements Agency requirements mandated by NPR 8570.1, NASA Energy Management Program. The plan establishes energy efficiency and water conservation practices in order to save taxpayer dollars, reduce emissions that contribute to air pollution and global climate change, and conserve precious natural resources for future generations. It also provides standards and metrics to ensure compliance with energy and water conservation mandates.

28.1.3 All KSC organizations shall comply with Federal requirements and perform day-to-day activities in an energy and water efficient manner (e.g., designing efficient equipment and facilities, buying efficient products, operating and maintaining equipment and facilities at peak efficiency, and turning off systems when not in use).

28.2 Responsibilities

28.2.1 All KSC employees and tenants shall:

a. Conduct day-to-day functions with good energy and water efficiency practices.

b. Report energy and water waste from improperly operating equipment to appropriate Trouble Call Office and submit opportunities for improvement to organizational EWG member.

28.2.2 The KSC Energy and Water Manager shall:

a. Represent KSC on the NASA Energy Efficiency Panel and at NASA Energy and Water meetings.

b. Chair the KSC Energy Working Group and Water Working Group.

c. Lead planning and program implementation to ensure compliance with Federal and NASA mandates and communicate progress through metrics.

d. Ensure effective energy utility purchases.

e. Ensure submittal to NASA HQ of deliverables such as budget exhibits, reports, self-assessments, spot check responses, and special data collections.

f. Serve as technical contact for energy budgeting and manage special funds for energy projects such as utility rebates and Department of Energy (DOE) funding. Utility rebates are to be re-invested in energy and water conservation projects that benefit the Government.

g. Update Energy Star© Portfolio Manager and the DOE Compliance Tracking System for Covered Goal Subject KSC facilities IAW the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings. In addition, support the KSC Construction of Facilities group via Portfolio Manager's Sustainable Buildings Checklist to verify that 15 percent of existing Federal buildings meet the Guiding Principles goal by 2025 (E.O. 13693 Section 3 (h)(ii)), Planning for Federal Sustainability in the Next Decade.

28.2.3 NASA KSC program and institutional organizations including supporting contractor organizations (for operations and maintenance of facilities under their responsibility) shall:

a. Participate in the EWG.

b. Plan and implement an energy and water management program that ensures compliance with Federal and NASA mandates consistent with the KSC Energy and Water Program and communicate progress through metrics.

c. Contribute to deliverables to NASA HQ such as budget exhibits, reports, self-assessments, spot-check responses, and special data collections via NETS and otherwise.

d. Forecast energy and water consumption and cost for assigned facilities.

28.2.4 KSC facility and equipment design organizations shall ensure new construction and modifications are compliant with Federal and NASA energy and water mandates.

28.2.5 Spaceport Integration and Services' Logistics Branch shall coordinate KSC's response to transportation mandates with the General Services Administration.

28.3 Water Conservation Goals

28.3.1 Water reduction goals were established by the President in EO 13693, Planning for Federal Sustainability in the Next Decade. This EO requires Federal agencies to reduce potable, industrial, landscaping, and agricultural water consumption intensity 2 percent annually through FY 2025 or 36 percent total by the end of FY 2025 (from a baseline year of FY 2007).

28.3.2 KSC's potable water intensity baseline (FY 2007) is 38.6 gallons for every square foot. To help NASA meet the EO 13693 goal, KSC will need to reduce annual water intensity by 13.9 gallons a square foot by the end of FY 2025.

28.4 Water Conservation Requirements

28.4.1 Water conservation is the responsibility of all personnel at KSC.

28.4.2 All KSC organizations and contractors shall:

a. Carry out their day-to-day functions with good water conservation practices.

b. Report water waste from improperly operating equipment to the appropriate Trouble Call Office.

c. Ensure efficient and cost-effective utility use by applying water conservation techniques to the operation and maintenance of KSC systems.

d. Ensure that new construction and modifications are compliant with Federal and NASA water conservation mandates.

e. Contribute to deliverables for NASA HQ such as budget exhibits, reports, self-assessments, spot check responses, and special data collections as required by the NASA EAB to support water conservation initiatives at KSC.

APPENDIX A: Acronyms

45 SW	45th Space Wing
ACBM	Asbestos-Containing Building Material
ACHP	Advisory Council on Historic Preservation
ADL	Acceptable Decontamination Limit
AEM	Advanced Ecological Mitigation
AF	Air Force
ASD	Accumulation Start Date
AST	Aboveground Storage Tank
BCNRMD	Brevard County Natural Resources Management Department
BMP	Best Management Practice
BO	Biological Opinion
CAA	Clean Air Act
CATEX	Categorically Excluded
CCAFS	Cape Canaveral Air Force Station
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
COR	Contracting Officer Representative
CWA	Clean Water Act
DARCY	Diverted Aggregate Reclamation and Collection Yard
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DYCOH	Drop Your Chemicals Off Here
EA	Environmental Assessment
EAB	Environmental Assurance Branch
EC	Environmental Checklist
EHS	Extremely Hazardous Substance
EIS	Environmental Impact Statement
EMB	Environmental Management Branch
EMS	Environmental Management System
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERD	Environmental Resources Document
ERP	Environmental Resource Permit
ESA	Endangered Species Act
ESAM	Environmental Sampling, Analysis, and Monitoring
ESC	Environmental Support Contract
EU	Emission Units
E-waste	Electronic Equipment Waste
EWG	Energy Working Group
FAC	Florida Administrative Code
FAR	Federal Acquisition Regulations
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FS	Florida Statutes

FWS	Fish and Wildlife Service
FY	Fiscal Year
HPO	Historic Preservation Officer
HQ	Headquarters
HWDIP	Hazardous Waste Determination in Progress
IAW	In Accordance With
IOZ	Inorganic Zinc
ISC	Institutional Services Contract
KCA	Kennedy Customer Agreement
KDP	Kennedy Documented Process
KEMCON	Kennedy Environmental and Medical Contract
kg	Kilogram
KNPD	Kennedy NASA Policy Directive
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
LDR	Land Disposal Restriction
LEPC	Local Emergency Planning Committee
LOSC	Launch Operations Support Contract
mg	Milligram
MINWR	Merritt Island National Wildlife Refuge
MOA	Memorandum of Agreement
MVAC	Motor Vehicle Air Conditioner
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NESHAP	National Emission Standard Hazardous Air Pollutants
NETS	NASA Environmental Tracking System
NEW	Net Explosive Weight
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NPD	NASA Policy Directive
NPDES	National Pollutant Discharge Elimination System
NPR	NASA Procedural Requirements
NPS	National Park Service
NRACM	Non-Regulated Asbestos Containing Materials
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
ODS	Ozone Depleting Substance
OR	Organizational Representative
OSF	Ordnance Storage Facility
OSHA	Occupational Safety and Health Administration
OSTDS	Onsite Sewage Treatment and Disposal Systems
P.E.	Professional Engineer
PA	Programmatic Agreement
PAFB	Patrick Air Force Base
PCB	Polychlorinated Biphenyl
PCW	Petroleum Contact Water
pH	Potential of Hydrogen
PIR	Pollution Incident Report
PPE	Personal Protective Equipment
ppm	Parts Per Million
PRL	Potential Release Location

PRP	Potential Responsible Party
psi	Pounds Per Square Inch
PTE	Potential to Emit
PWQ	Process Waste Questionnaire
RACM	Regulated Asbestos-Containing Material
RAI	Requests for Additional Information
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
RMP	Risk Management Plan
RRMF	Reutilization, Recycling, and Marketing Facility
RSA	Recycling and Sustainable Acquisition
SAA	Satellite Accumulation Area
SBU	Sensitive But Unclassified
SCTL	Soil Cleanup Target Level
SDS	Safety Data Sheets
SEMS	Sustainable Environment Management System
SERC	State Emergency Response Commission
SHPO	State Historic Preservation Office
SJRWMD	St. Johns River Water Management District
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasures
STAR	Sustainable Tracking Tool for Automated Recycling
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TPQ	Threshold Planning Quantity
TRI	Toxic Chemical Release Inventory
TRP	Technical Response Package
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
U.S.	United States
UN	United Nations
USACE	United States Army Corp of Engineers
USC	United States Code
UST	Underground Storage Tank
UW	Universal Waste
VEO	Visual Emission Observation
WMO	Waste Management Office
WMS	Waste Management System
WSR	Waste Support Request

APPENDIX B: Reference Documents

Appendix I of the "Applicant's Handbook, Consumptive Uses of Water

The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs

FDEP, *Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Water*, January, 2003

FDEP, *Approach to the Assessment of Sediment Quality in Florida Coastal Waters*, November, 1994

EPA, *Guidance for the EPA Halon Emission Reduction Rule*, February, 2001

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office

[redacted]

In Reply Refer To:
FWS/R2/ES/02ETCC00-2012-F-0186

March 02, 2020

Ms. Stacey M. Zee
Office of Commercial Space Transportation
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

Dear Ms. Zee:

This letter responds to the November 29, 2019, request for U.S. Fish and Wildlife Service (Service) review of the Written Re-evaluation (WR) for Space Exploration Technologies' (SpaceX) Texas Launch Site. The WR evaluates whether supplemental environmental analyses are needed to support the Federal Aviation Administration (FAA) Office of Commercial Space Transportation's decision to issue launch licenses and/or experimental permits to SpaceX for experimental test flights of a reusable suborbital launch vehicle from the Texas Launch Site in Cameron County, Texas.

SpaceX's experimental test program will develop new rockets called the Starship and Super Heavy. The Starship will be tested and perform a suborbital space flight. The original Vertical Launch Area (VLA) and Control Center Area infrastructure will also be modified. SpaceX maintains that the modifications remain entirely within the property boundary analyzed previously. SpaceX anticipates the three-phased test program would last 2-3 years. Phase 1 construction in the VLA included the initial build of a propellant farm and associated ground equipment; development of an initial command control system; establishment of security and safety systems; establishment of water storage for fire suppression (three aboveground tanks); and construction of a small space vehicle pad for static fire tests and small hops. Additionally, Phase1 included the construction of a pad with concrete access roads and facilities to store and transfer propellant. Liquid nitrogen propellant is stored in two vertical tanks approximately 30 feet tall. The command and control center area involves the use of the launch control centers, falcon support building, ground tracking, antenna dishes, and solar panel farm and/or generators. A building 200 feet by 100 feet and approximately 16 feet tall and two windbreaks and a tent taller than 30 feet, would be used to manufacture, fabricate, and assemble the Starship and spacecraft vehicle components. The tent is to be closed so light is not visible from outside. Road

base was installed for parking next to the tent. Phase 1 is complete. Phase 2 construction includes the necessary systems and equipment for higher hop tests. We are uncertain if Phase 2 construction is complete. The "hops" in Phase 1 and 2 are launches and would require a license, permit or waiver issued from FAA. Phase 1 and 2 operations would include mission rehearsals and static engine firing tests and would use up to 7,000 gallons of deluge water for fire suppression during tests. SpaceX does not anticipate the water discharging offsite, nor increasing lighting. Power is from a solar farm with non-reflective panels that are approximately five feet tall. Phase 1 and 2 tests would inform Phase 3. Space X is unable to provide the FAA adequate data and information regarding Phase 3 to enable the FAA to analyze the potential environmental impacts. Therefore, the scope of the WR is limited to Phases 1 and 2.

FAA's WR concluded that the contents of the 2014 Environmental Impact Statement (EIS) remained current, substantially valid and that the issuance of a launch license or experimental permit to conduct tests from the Texas Launch Site did not require a new Environmental Assessment (EA) or EIS. The FAA made this decision based on the following: 1) there were no substantial changes in the action that were relevant to environmental concerns, 2) data and analysis in the previous EA or EIS were still valid, 3) there were no significant new circumstances or information relevant to environmental concerns affecting the proposed action or its impacts; and 4) pertinent conditions and requirements of the prior approval have been, or will be, met in the current action.

A majority of the construction described in the WR has been completed and operations are ongoing. We believe they warrant full evaluation of different effects than we analyzed previously to National Wildlife Refuge Property or listed species. The Service provided written comments on the WR on April 4, 2019. FAA responded to the comments, which are enclosed. We believe our 2019 comments are still valid and have not been adequately addressed. The Service has been in discussions with FAA and SpaceX over various project changes on site that do not conform to the original project description, potential violations, and incidents resulting in damages on refuge lands and excessive closure notices that affect public and scientific access to the beach. The Service recommends a new National Environmental Policy Act (NEPA) document (EIS or EA) and Biological Assessment (BA) be prepared and consultation reinitiated. During a February 19, 2019, conference call FAA committed to reinitiating section 7 consultation and writing a new NEPA document. Below are issues and recommendations to address in new analyses and documents.

Issues and Recommendations:

Construction

Much of the construction proposed in the WR has already occurred or ongoing. Buildings are described but the details of lighting, parking, construction times, and anticipated traffic are not clear and not comparable to the original consultation documents. Nighttime construction was limited in the BO to two weeks during construction of pilings and nighttime launch activities. There has been reported and documented construction at night that exceed those limits. A schedule of nighttime construction should be included in the new EIS, EA or BA. We recommend pre-construction and post construction surveys to verify that no impacts have occurred to Refuge property or listed species or their habitats. Trash associated with SpaceX

construction and operation has been identified on adjacent Refuge lands. Employee cars are parked on both sides of Highway 4, along ditches and right-of-ways. We recommend the BA assess those impacts and adhere to the conservation measures in the original BO or identify new methods to alleviate impacts that may be occurring.

Road Closures
The EIS and BO identified a maximum of 180 hours of road closures annually. The Service negotiated the 180 hours seeking to minimize disruption to the public accessing the beach, fishing, birding, visiting the refuge, state park, and battlefield site. Additionally the Service seeks to maintain predictable and regular scientific survey access.

In 2019, Space X reported 158 hours of road closures. The Service calculated overall disruption to public access in excess of 1,000 hours in 2019. We recommend all agencies need to agree on the method of record keeping, announcements, and cancellations and these details included or appended to the revised NEPA documents. This process needs to be put into effect as soon as possible to calculate 2020 hours of road closures.

The Service recommends that road closure announcements be provided to affected landowners 1-2 weeks prior via email notification with the time range. These will count toward the 180 hours allowed in the BO. Backup dates, as required by the Governor's Office for the State of Texas, will not count toward cumulative hours if cancelled within a minimum of 24-hour notice to affected agencies and the public. We recommend the Cameron County Judge be briefed by FAA or the Service on the established method of announcing and tracking closures.

Checkpoints
The Soft Checkpoint location for future road closures cannot be changed due to border security needs. It is west of the Border Patrol's Fort Brown Highway 4 Checkpoint. The Service believes the Hard Checkpoint location could be adjusted to provide access to Massey Way Gun Range users, even during road closures, as this was identified as a private landowner economic hardship.

Hazardous Incidents and Contaminants
On February 28, 2020, a test rocket exploded during a nighttime firing and voicemail was left for the Refuge Manager. Debris reportedly landed northwest of the launch site. Refuge staff will be assessing explosion impacts to nesting birds and impacts from ATV use and then make recommendations on the least impactful way to clear the debris field. On July 25, 2019, a burn occurred after a rocket test. It occurred at approximately 11:30 pm and burned about 10 to 15 acres of Boca Chica State Park, a property owned by TPWD but managed by the Service. The Refuge was not notified until the next day and by that time, the fire was smoldering and flared up and had burned approximately 130 to 135 acres more. Fire engines had gone off road and had gotten stuck causing damage to refuge lands. On August 2019, 6.2 acres were burned and debris was scattered on Refuge lands. Firefighters were not allowed to enter the area for three hours because of the type of fuel that was used. On April 22, 2019, SpaceX employees went off-road and got a golf cart stuck in the tidal flats on Refuge land. They attempted to remove the golf cart

and in doing so got an additional truck and forklift stuck in the same area. The Refuge was not immediately contacted. Damage accrued to sensitive mudflats which provide shorebird habitat.

These types of incidents were not anticipated to this extent in the original BO because the likelihood of it occurring on launching known vehicles, which we analyzed, was less than during experimentation on new space crafts. Therefore, the Refuge proposes to establish a damage assessment protocol to address any future spills, rocket fuel releases, launches/tests, fires, explosions and debris cleanup. Natural resource damages thus far were negligible, but in the event of a larger impact, a damage assessment protocol will be identified to FAA and SpaceX. The protocol should be will be similar to that used to address oil and gas development impacts on refuges in Texas and Louisiana.

The incidents that have occurred have not been during a migratory bird season. Therefore, large flocks of migratory birds or listed species were not in the area. If a fire occurs during the migratory season, impacts may be greater. SpaceX should strive to avoid or reduce the number of testing/launches between March 15 and August 15 to avoid disturbance to nesting sea turtles and shorebirds that utilize refuge areas immediately adjacent to the launch site.

The Service and TPWD should be allowed access to surrounding public lands to survey the scene and document/record any observed environmental impacts (i.e., fire, explosion, sound impacts, dead birds, other wildlife, etc.). SpaceX should also explore options to compensate the Refuge and TPWD for damages caused by the two fires and two explosions. One possible option is to contract the completion of the Cable Fence Project. The cables benefit SpaceX, the public, and conservation of the area. In addition, plant, soil and water monitoring can be added to track effects of the different fuel types and explosions.

Hiring of Law Enforcement and Biologist

SpaceX has agreed to hire one Refuge law enforcement staff through a reimbursable agreement. Further negotiations regarding the 22% Administrative Fee should be resolved. Although monitoring sites established in the general area may be of great learning experience for undergraduate studies at the University of Texas at Brownsville, the pre-construction and operational monitoring must follow peer-reviewed protocols. Protocols and monitoring should be developed and monitoring conducted by experts within the field, as findings of the baseline monitoring will lead to adaptive management decisions by the Service, SpaceX, and FAA.

During the original consultation, SpaceX agreed to hire two biologists. These biologist would be Refuge-hired employees, located at the Refuge, and would monitor and collect data outlined in the BO for the life of the project. The University of Texas at Brownsville was asked to do preconstruction baseline studies until the biologists could be hired. The hiring of the biologist has not occurred, because FAA states it was an agreement between the Refuge and SpaceX, not FAA. Additional biological monitoring needs are necessary to collect vegetation data associated with larger rocket engines and different fuel type associated with tests, launches and releases of any kind. We recommend FAA reconsider funding the biologists as SpaceX proposed.

Traffic and Speed
Additional Wildlife Crossing Signs and Reduced Speed limit signs are needed based on the significant increase in daily traffic volume now occurring on Highway 4. Roadkill appears to have increased and includes bobcats, tortoises, javelina, and white-tailed deer, along with a variety of other species (feral pigs, birds, etc.) There have been over 150-200 vehicles at the StarGate Building and SpaceX Launch Control Center area. The original EIS assessed only 30 to 130 personnel that would be at the site in the future. More construction is occurring on the site. Impacts from vehicles have included parking along the road shoulder (some on the refuge), trash and litter, and road-killed wildlife due to high volume vehicle traffic and vehicle speeds. We recommend further discussion on conservation measures that could avoid or minimize the risk of a potential take of an ocelot or jaguarundi, and possibly receiving take authorization for the species.

Suggested Conservation Activities
SpaceX approached the Service for a list of possible conservation activities they could implement for listed species. The Service would also like to collaborate with SpaceX to provide multi-purpose information for the public. An increase in public visitation is occurring because of the attraction to SpaceX. The Service seeks to take advantage of these new visitors to educate them about natural resources, the Palmito Ranch Battle, and to offer information about SpaceX activity. Another suggestion is funding or assistance in implementing recovery actions such as additional nest platforms for the northern aplomado falcon and ocelot crossing signage. The Service is interested in exploring other options with SpaceX if they would like to voluntarily assist with such efforts.

The issues and recommendations above are ones that we have discussed frequently. We recommend FAA thoroughly review the BO and compare it to the actions now proposed or being implemented, address changes in development and operation of the site, assess impacts to species and Refuge lands, note Plans that need updating, and review the Conservation Measures, Reasonable and Prudent Measures and Terms and Conditions that SpaceX agreed to implement.

Thank you for reinitiating consultation and we look forward to working with you on the new EA, EIS and/or BA. If you have any questions please contact Mary Orms at (361) 225-7315 or by email at mary_orms@fws.gov.

Sincerely,

for Charles Ardizzone
Field Supervisor

Enclosure
cc: Bryan Winton, Santa Ana Refuge
Kendall Keyes, Texas Parks and Wildlife
Ernesto Reyes, Alamo ESFO

United States Department of the Interior

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In Reply Refer To:
02ETCC00-20 12-F -0186

April 3, 2019

Stacey Zee
Federal Aviation Administration
800 Independence Avenue SW
Washington, DC 20591

Dear Ms. Zee:

The U.S. Fish and Wildlife Service (Service) thanks you for the opportunity to provide comments on the written re-evaluation (WR) of the 2014 Final Environmental Impact Statement for the Space Exploration Technologies Corporation (SpaceX) Texas Launch Site. The 2014 action was the issuance of launch licenses and/or experimental permits to authorize SpaceX to launch Falcon 9 and Falcon Heavy orbital vertical launch vehicles and a variety of reusable suborbital launch vehicles. The Service issued a Biological Opinion (BO) on December 18, 2013, to the FAA for the SpaceX license. The Federal Aviation Administration (FAA) Office of Commercial Space Transportation WR evaluates whether the development the Big Falcon Rocket (BFR) and the experimental test program of the Big Falcon Ship (BFS) requires a supplemental environmental analysis to issue launch licenses and/or experimental permits to SpaceX. The license would be to conduct experimental test flights of reusable suborbital launch vehicles from SpaceX's private launch site located at Boca Chica, Cameron County, Texas.

> **FAA Response**: Please refer to the updated WR we sent you on March 18, 2019. SpaceX renamed BFS to "Starship" and BFR to "Super Heavy." Super Heavy will eventually be the first stage of the launch vehicle and Starship will be the second stage of the launch vehicle. SpaceX's current test program at Boca Chica involves testing a Starship prototype.

The test program would last 2-3 years and have three phases. The following table details each phase. The total number of events shown in the table are for the entire test program.

Table 1. Phases of the Experimental Test Program

Test	Total # of Events[a]	Description
Wet Dress	5–10	Verify ground systems and spacecraft by fueling the Ship.
Static Fire	5	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the Ship's engines.

Small Hops	3	Verify engine ignition and thrust to lift the Ship a few centimeters off the ground.
Small Hops	3	Engine ignition and thrust to lift the Ship over 30 cm and up to 150 m.
Medium Hops	3	Engine ignition and thrust to lift the Ship over 30 cm and up to 3 km.
Suborbital Space Flight	3	Launch up to 100 km, flip the Ship at high altitude, and conduct a reentry and landing.

The proposed experimental test program involves modifications to the vertical launch area (VLA) and Control Center Area. The construction will be done in two phases within the property boundary and the same project area analyzed in the 2014 EIS. Phase 1 construction in the VLA is ongoing and includes the initial build of the propellant farms and associated ground equipment. Phase 2 construction includes the necessary systems and equipment for higher BFS hop tests.

The FAA did not issue a launch license and/or experimental permit, but opted to waive the need for SpaceX to obtain a launch license and/or permit to conduct the currently proposed actions. The waiver, a federal action, is limited to: 1) loading and unloading fuel test; 2) spin test; and 3) minihops. The total number of events, in Phases 1 and 2 that can occur within that waiver, over the 2-3 years timeframe is listed in Table 1. Phase 3 would require another WR and analysis.

> **FAA Response**: Please note that the table you included above is missing a column identifying the phase (refer to the WR sent to you on March 18, 2019). Phase 1 includes wet dress rehearsals, static fires, and small hops. Phase 2 includes small and medium hops.
>
> The FAA issued a waiver to SpaceX for tethered Starship hop tests. Since starting the Starship tests in March 2019, SpaceX has conducted five wet dress rehearsals, two static fires, and one small hop.

The FAA WR concluded that the issuance of launch licenses and/or experimental permits to SpaceX to conduct BFS tests conformed to the prior environmental documentation, that the data contained in the 2014 EIS remain substantially valid, there were no significant environmental changes, and that all pertinent conditions and requirements of the prior approval have been met or will be met in the current action. Therefore, a supplemental EIS or new environmental document was not necessary.

General Comments:

The 2014 EIS for the Falcon 9 launches described three types of launch licenses and experimental permits to operate reusable orbital and suborbital launch vehicles:

- Launch-Specific License -"authorizes a licensee to conduct one or more launches, having the same launch parameters, of one type of launch vehicle from one launch site" (14 CFR §415.3[a]). A licensee's authorization to launch terminates upon completion of all launches authorized by the license or the expiration date stated in the license, whichever occurs first.
- Launch Operator License - "authorizes a licensee to conduct launches from one launch site, within a range of launch parameters, of launch vehicles from the same family of vehicles transporting specified classes of payloads" (14 CFR §415.3 [b]). A launch operator license remains in effect for five years from the date of issuance.

- Experimental Permit - "authorizes launch and reentry of a reusable suborbital rocket" (14 CFR§437.7). An experimental permit lasts for one year from the date issued.

The EIS did not analyze the potential for a waiver to be issued to SpaceX for their Falcon 9 launches, nor is it mentioned in the WR for the Phase 1 and Phase 2 scheduled events. It appears the federal action changed from providing a license or experimental permit for SpaceX to launch Falcon 9 rockets into orbit and/or other various suborbital rockets providing a waiver for BFS tests. The Service requests an explanation of the use of a waiver instead of a license or experimental permit.

> **FAA Response**: SpaceX applied for a waiver to a license and, after reviewing the application, the FAA granted the waiver under 14 CFR Part 404.5. The waiver states that SpaceX must comply with all applicable local, state, and federal laws, as well as any applicable agreements or requirements. During Starship tests in March and April 2019, SpaceX closed a section of Highway 4 and Boca Chica Beach to ensure public safety.

In accordance with Paragraph 9-2.c of FAA Order 1050.1F, the preparation of a new or supplemental EIS is not necessary when the following can be documented:

1. The proposed action conforms to plans or projects for which a prior EA and FONSI have been issued or a prior EIS has been filed and there are no substantial changes in the action that are relevant to environmental concerns;
2. Data and analyses contained in the previous EA and FONSI or EIS are still substantially valid and there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts; and
3. Pertinent conditions and requirements of the prior approval have been, or will be, met in the current action.

The FAA contends that the mission has changed, but the proposed action of issuing a license and/or experimental permit has not changed. Additionally FAA states that: all construction and activities will be within the same footprint; pertinent requirements will be met in the current action; there have been no substantial changes to the EIS; and no significant new circumstances or information relative to environmental concerns therefore, the FAA states a new supplemental EIS is not needed.

The Service agrees the mission has changed and construction and activities will occur within the boundaries already analyzed under the 2014 EIS and 2013 BO. However, changes in how construction and closures are being conducted are not being followed as outlined in the BO and may be impacting listed species beyond what was originally analyzed. The Service has contacted FAA and SpaceX, via emails, regarding noncompliance; but resolution has not occurred. Therefore, the Service requests, closures and testing events cease until noncompliance issues are resolved.

> **FAA Response**: SpaceX apologizes for not complying with the BO's process for notification in advance of a closure. SpaceX has completed the first round of tests in Phase 1 and is not planning a closure within the next 2 weeks. SpaceX and the FAA are committed to complying with the BO's approximate 2-week notice of a closure.

The BO is a legally binding document between FAA/SpaceX and the Service. FAA/SpaceX have stated they will follow the BO. Many project aspects have changed and therefore, the BO should be amended to reflect the current proposed action and activities to occur under that waiver. Various measures under

the May 13, 2014, amendment have not been completed and should be addressed in the next amendment (enclosed) and annual report.

FAA Response: The FAA emailed a letter to the Service on November 5, 2018 to provide an update on Consultation Number 02ETCC00-2012-F-0186. The letter provided a brief consultation history and an overview of SpaceX's planned Starship test program, including a description of the Starship, updates to construction, and an effects analysis. SpaceX also provided the Service (via email on December 4, 2018) with Google Earth KMZ files showing the planned infrastructure footprint and previously mapped vegetation (including piping plover habitat). In the November 2018 letter, the FAA concluded that the proposed changes to SpaceX's Texas Launch Site would not 1) cause effects to ESA-listed species or critical habitat in a manner or to an extent not considered in the BO or 2) result in an increase in the amount of take of ESA-listed species and critical habitat provided in the Service's incidental take statement. The FAA welcomed feedback from the Service but never received any. The Service has had several months to revise the BO accordingly and/or conduct further consultation with the FAA based on the information we provided.

The FAA is aware of the file the Service refers to as the "BO Amendment." However, the FAA was never involved in the development of the amendment. It is the FAA's understanding that this file was a negotiation between SpaceX (Steve Davis) and the Refuge and was never executed. Thus, as it pertains to ESA compliance, the FAA is using the BO executed on December 18, 2013.

The FAA is aware of another document—titled "Reimbursable Funding and Donation Agreement between U.S. Fish and Wildlife Service, South Texas Refuge Complex and Space Exploration Technologies Corp. to Accommodate Commercial Spacecraft Launches from the SpaceX Texas Launch Site"—which was executed by Steve Davis on September 11, 2015 and the Service (Aaron M. Archibeque) on August 11, 2015. Please note that Matt Thompson of SpaceX provided Mary Orms a follow-up copy of the Reimbursable agreement on April 4, 2019. The FAA has no involvement in this agreement.

Specific Comments:

Page 4, WR, Table 1, Phase 1, Wet Dress, 5-10 events, verify ground systems and spacecraft by fueling the BFS.

Comment: There have been 13 days of closures or proposed closures between March 20 and April 1, 2019. If the total number of events in Table 1 are for the entire test program (2-3 years) and do not represent a number of monthly or annual operations it would appear that if a test was done each of the 13 days then the 5-10 events on the table, planned over 2-3 years has been exceeded. The EIS and BO analyzed a closure of up to 15 hours. Closures impact federal refuge and state park attendance, and interfere with daily sea turtle patrols, being conducted by Sea Turtle, Inc. in an effort to locate nesting sea turtles and secure eggs for hatching. Many of the turtles are daytime nesters. It also interferes with monitoring of birds and plants making it difficult to analyze the pre and post effects of the closures and wet dress activities.

Small hops vs medium hops include low-altitude and higher-altitude test that range from 500 meters (1,650 feet) meters to 5,000 meters (16,500 feet) for an overall time length of 1.5 to 6 minutes each and

usually run approximately 3 times a week. For clarification, will 3 small hop events occurring 3 times a week, increase the number of events and the length of time a closure will occur?

> **FAA Response**: Although the number of closures has exceed the number of tests identified in the table above, SpaceX did not conduct a test during each of closures. The table includes an estimated 5-10 wet dress rehearsals, 5 static fires, and 3 small hops for Phase 1 operations. SpaceX will not exceed these estimated numbers. Of the closures that occurred, each was limited to a maximum of 8 hours.
>
> No, SpaceX estimates a total of 3 small hops will be performed during Phase 1 of the test program, as shown in the table.

Page 5, WR, Phase 1 Construction 2"d paragraph "This is the same area that was stabilized for construction via the surcharging project conducted in 2016"

Comment: Does the surcharging project refer to the pilings discussed in the EIS and BO that were to be completed in 2 weeks? That was a one time nighttime construction with associated noise and lighting that was only to occur during the two weeks of concrete pouring.

> **FAA Response**: No, the surcharging project started in 2016 and was completed the same year. The surcharging project was needed to stabilize the substrate at the VLA. SpaceX has not used any pilings to date at the launch site.

Page 7, WR, 1st paragraph "The BFS test program would involve use of launch control centers, Falcon support building, emergency services building, ground tracking antenna dishes and solar farm."

Comment: The antenna dishes have been installed and can be used to communicate between the Control Center and the VLA. Are these dishes currently licensed and functioning or does the Federal Communications Commission require a license?

> **FAA Response**: Yes, the antennas are functioning and are operated in accordance with SpaceX's license from the Federal Communications Commission.

Page 8, WR, 1st paragraph "The tent would be installed in the location of the proposed support buildings mentioned in the 2014 EIS. The tent would be used to house welding and fabrication activities needed for structures at the VLA....Work activities inside the tent would occur at night and therefore require lighting"

Comment: The EIS and the BO state there would not be any night construction except for the 2-week period when pilings were to be installed. Night construction should cease and there should not be any lighting visible over the dunes during sea turtle season (March 15 to October 1st). Inspections should be occurring to ensure lights, security and parking follow the guidelines set in the Conservation Measures of the BO.

> **FAA Response**: SpaceX is avoiding nighttime activity as much as possible. Some nighttime activity has occurred in order to meet project requirements. The tent lighting is being minimized to the greatest extent possible. The tent is located approximately two miles from the beach and is not visible from the beach. SpaceX has been conducting periodic inspections of the facilities to

ensure that all required turtle related lighting mitigations are in place. These include the mobile fixtures, filters, orientation, and shielding, and also the use of appropriate permanent light fixtures. According to SpaceX, no lights are discernable from the beach.

Page 9, Table 3. Phase 2 Commodities

Quantity	Description
302 cubic feet	Ship purges/pneumatics
2 tanks: 302 cubic feet 450 cubic feet	Ship pneumatics
Two tanks: 16,000 gallons 60,000 gallons	Propellant densification/Gaseous Nitrogen Recharge/Densification
1550 cubic feet	Ship Oxygen Tank Press
1040 cubic feet	Ship Methane Tank Press

Comment: The type of fuel has changed from the original EIS and the BO should be amended to reflect that change.

FAA Response: The FAA provided this information in the ESA letter sent to the Service on November 5, 2018.

Page 10, WR, Affected Environment, Paragraph 2 "SpaceX installed a solar farm on Parcel 2."

Comment: Texas Parks and Wildlife commented that solar arrays can have a "lake effect," and cause birds and their insect prey to mistake a reflective solar facility for a water body. SpaceX committed to installing non-reflective solar panels and it is important they were installed to limit migratory and/or listed bird species from being potentially impacted.

FAA Response: SpaceX installed non-reflective panels.

Page 11, WR, Re-evaluation of Environmental Consequences "The FAA does not believe the tent would cause effects to species listed under the Endangered Species Act (ESA) in a manner not considered in the Biological Opinion and not increase the amount of take"

Comment: A tent or building is now onsite at the VLA and appears to be a storage area for equipment and materials; however it is open on both ends and emanates light from inside and out in addition to other construction lighting at night. Lighting was not to occur onsite except during one or two nighttime launches, which SpaceX states will no longer occur. It is sea turtle nesting season and nighttime construction could cause additional impacts to sea turtles that were not considered in the EIS or BO.

FAA Response: Please note that the temporary tent structure is located at the control center area (approximately two miles from the beach), not the VLA. The tent structure is now closed on all sides. SpaceX enclosed the tent prior to the start of sea turtle nesting season.

Page 12, WR, Biological Resources (including Fish, Wildlife, and Plants) The FAA and SpaceX are committed to implementing the conservation measures and terms and conditions outlined in the BO to minimize potential effects to ESA-listed species and critical habitat. Any license or permit issued by

the FAA to SpaceX for operations at the Texas Launch Site will include a term and condition for environmental compliance."

Comment: FAA and SpaceX have been informed that they are out of compliance with the BO. The FAA and SpaceX have not coordinated with various agencies as outlined in the BO, 14 Days prior to closures. Instead, they continue to have continuous day after day closures, potentially exceeding their 2-3 year total number of events. Nighttime construction is also potentially illuminating the beach during sea turtle season and increasing the risk of "take" not anticipated or covered in the BO.

FAA Response: Please refer to our responses above on this topic.

Page 18, WR, Visual Effects (including Light Emissions) "The 2014 EIS determined construction activities would impact the visual environment of residents of Boca Chica Village and travelers on State Highway 4, but the impacts would be intermittent, temporary, and minimized through SpaceX's Lighting Management Plan.... The amount of nighttime lighting at the VLA would be less. Aside from the methane flare, SpaceX is not planning to have nighttime lighting at the VLA."

Comment: Since the new program began, Boca Chica residents have reported that the lighting is continuous throughout the night. A picture on SPACENEWS30 Texas on December 24, 2018, by Jeff Foust shows the BFS being built, at night, with bright equipment lights lighting up the night sky.

FAA Response: SpaceX has and is avoiding nighttime activity as much as possible. SpaceX does not believe take of a listed species has occurred during the nighttime activity to-date. No take has been reported to the FAA. As stated above, SpaceX has been conducting periodic inspections of the facilities to ensure that all required turtle related lighting mitigations are in place. These include the mobile fixtures, filters, orientation, and shielding, and also the use of appropriate permanent light fixtures. According to SpaceX, no lights are discernable from the beach.

The following comments address the BO:

Page 2, "*Construction Activities*, Construction of the launch and control center facilities is expected to be complete within 24 months. Most construction will occur during the hours of 8 a.m. to 5 p.m., Monday through Friday. Night construction will occur for approximately 2 weeks during concrete pouring and approximately 2 weeks for pile driving."

Comment: Construction is occurring during the night, which is not in compliance of the BO. This poses a greater risk on listed species.

FAA Response: Please refer to our responses above on this topic.

Page 2, Launch Area, "The proposed vertical launch area will occupy 20 of the 56.5 acres owned or leased by SpaceX."

Comment: The BO should be amended to include the current number of acres occupied.

FAA Response: The infrastructure at the VLA occupies approximately eight acres.

Page 2, "Pilings will be driven to construct the larger facilities that support heavy loads. Staging areas will occur within proposed project boundaries and no additional areas will be needed. Facilities within the launch area will include the integration and processing hangar (hangar), launch pad, launch stand with flame duct, water tower, deluge water retention basin, propellant storage and handling areas, workshop and office area, parts storage warehouse, roads, parking areas, fencing, security gates, and utilities (Figure 5 and 6)."

Comment: The BO should be amended to reflect current facilities to be constructed and operated.

> **FAA Response**: The FAA provided this information in the ESA letter sent to the Service on November 5, 2018.

Page 2 and 3, "There are four primary areas: liquid oxygen (LOX), rocket propellant-1 (RP-1), helium, and nitrogen. Each area will include storage tanks or vessels, containment area, fluid pumps, gas vaporizers, and other components necessary to control fuel flow to the launch vehicle."

Comment: An amended BO needs to analyze the change in fuel type and storage location.

> **FAA Response**: The FAA provided this information in the ESA letter sent to the Service on November 5, 2018.

Page 3, Access Roads and Infrastructure, "Roads and utilities will provide access, power, data, and water to the facilities within the vertical launch area. Approximately 2.45 acres will be parking and road area. Parking for the launch area and the control area will accommodate up to 250 personnel. Roads will be constructed of concrete or asphalt. The perimeter access road would be dirt/gravel. The area will also include exterior lighting, security fences, and gates."

Comment: The BO should be amended to reflect total parking and road area, number of personnel expected, and where lighting will occur if different from what has been described above.

> **FAA Response**: Please refer to our November 2018 letter for an updated description of the infrastructure at the VLA. The infrastructure at the VLA occupies approximately eight acres. SpaceX still anticipates many parking locations at the control center area.

Page 3, Access Roads and Infrastructure, "Primary power for the vertical launch area would be provided by commercial power from the control center area, located approximately 2 miles west, to the vertical launch area."

Comment: We understood the area would be powered by the solar array. What changed?

> **FAA Response**: SpaceX plans to transition to solar power only in the future, hence the installation of the solar array. Auxiliary power currently is needed during critical operations.

Page 3, Access Roads and Infrastructure, "Potable water will either be delivered by truck to a holding tank at the vertical launch area or pumped from a well on the property. The septic system would consist of a mobile above ground processing unit and holding tank."

Comment: Please update information for the BO amendment as to how potable water and the septic

system are handled.

FAA Response: SpaceX says this BO text remains accurate.

Page 3, Facility Security, "Two 6-foot tall perimeter chain-link fences will be erected around the vertical launch area and will enclose approximately 20 acres. The two fences will be approximately 10 feet apart with a 7-foot wide dirt access road inside the inner fence for security patrols. The outside perimeter fence will include a sensor system to detect unauthorized access. The control center will maintain 24 hour monitoring of all security systems."

Comment: We understand there will be a security fence, with lights, but will there still be a double fence where security guards will drive around the perimeter? Please update the section.

FAA Response: SpaceX's current plans do not include a double fence; however, another fence is possible in the future. Please also note that the launch site is located in an area that the U.S. Department of Homeland Security (DHS) has identified for border fencing. SpaceX is working with DHS representatives in South Texas to ensure the border fencing does not eliminate SpaceX's use of its launch site. To date, DHS representatives have indicated that they may be able to accept SpaceX's approach to fencing the area and connect SpaceX's fencing to the fence that DHS builds. To facilitate a mutually acceptable outcome, SpaceX has delayed progress with its fencing and is analyzing fencing options that will accommodate DHS concerns.

Page 3, Facility Security, "Lighting will be positioned to illuminate the perimeter and a zone leading up to the controlled areas in hours of darkness. All building exterior lights will be lit from dusk to dawn."

Comment: Will there building exterior lights from dusk to dawn?

FAA Response: Yes, it is certainly possible. Please refer to the Facility Design and Lighting Management Plan that we distributed to you for review on November 20, 2018, and March 18, 2019.

Page 4, Control Center Area.

Comment: Please update changed portions of this section for the BO amendment.

FAA Response: The FAA provided this information in the ESA letter sent to the Service on November 5, 2018.

Page 4, Control Center Area, "The Dragon capsule, a satellite, typically uses hydrazine, a different fuel than the launch vehicle."

Comment: Please let us know if reference to the Dragon capsule should be removed, as it will not be part of the project any longer.

FAA Response: SpaceX is not planning to launch Dragon from the launch site. Therefore, you can remove it from the BO.

Page 5, *Project Operations*, Falcon 9 and Falcon Heavy launches will have commercial payloads,

satellites, experimental payloads, or a capsule, such as the SpaceX Dragon capsule. SpaceX may also launch smaller suborbital launch vehicles with all launch trajectories to the east and over the Gulf of Mexico. SpaceX proposes up to 12 launch operations per year through 2025, within a few days or weeks of payload arrival at the launch site. Launch operations could include Falcon 9 launches, a maximum of two Falcon Heavy launches, and associated pre-flight activities such as mission rehearsals and static fire engine tests."

Comment: Please update to reflect that there are no launches planned under this waiver, phase 1 and 2, and there are no longer 12 planned launches. Additionally, please update Launch vehicles, Payloads, and Propellant, Gas, Fuel, Oil, and Solvent Storage Areas sections.

> **FAA Response**: Please refer to our November 2018 ESA letter for a description of planned construction and launch operations at the VLA. SpaceX no longer plans to conduct Falcon launches at the launch site.

Page 6, Pre-Launch Activities, "Wet dress rehearsals will require restricted access in the immediate vicinity of the vertical launch area and control center area. In addition SpaceX may conduct static fires. Static fires are identical to wet dress rehearsals except engines ignite for approximately 2 seconds then shut down. Static testing may last up to three hours.

Approximately 2 weeks in advance of a launch operation with restricted public access (i.e., actual launch, wet dress rehearsal, or static fire engine test), FAA/SpaceX will coordinate with the Cameron County Commissioner's Court, Secretariat of Communications and Transportation- Mexico, U.S. Coast Guard (USCG), Houston Air Route Traffic Control Center (ARTCC), Texas Parks and Wildlife Department (TPWD), National Park Service (NPS), the Service's Lower Rio Grande Valley NWR and Ecological Services Office, National Marine Fisheries Service, and Customs and Border Patrol regarding launch activities and ensure public safety. This will allow for the issuance of a Notice to Mariners (NOTMARs) and Notice to Airmen (NOTAMs). Approximately 3-6 days prior to a launch operation with restricted public access, the public would be notified of the upcoming launch operation and security closure through local media and through the use of NOTMARs and NOTAMs. The notices will include the proposed date, the expected closure time and a backup closure date and time."

Comment: This coordination has not occurred for any of the closures that were scheduled by SpaceX and Cameron County and does not comply with the BO. The Service and other agencies need sufficient time to prepare for the closures and coordinate ongoing activities and/or monitoring with SpaceX. We request that no further closures be scheduled until this coordination is complete. We have received a list of contacts from SpaceX that is missing many of the agencies listed above. Please update and correct the list. In addition, please add Ernesto Reyes, U.S. Fish and Wildlife Service ES, Texas Parks and Wildlife Game Wardens, and Cameron County Parks and remove Ted Hollingsworth since he is retired. We will forward the notices to our Law Enforcement.

> **FAA Response**: Please refer to our responses above regarding closure notification. We are creating a closure notification list for review by the Service. Additionally, SpaceX is working with each stakeholder to ensure they have the correct contact(s). The list will be periodically updated as needed.

Page 7, Security Plan Implementation, "Launch operation day activities will include securing the safety zone at least 6 hours prior to a launch operation. Personnel will restrict access to unauthorized

persons at the soft checkpoint on SH4, just west of the U.S. Customs and Border Protection checkpoint (approximately 14-16 miles west of the SH 4 terminus at Boca Chica Beach), and the hard checkpoint just west of the control center, approximately 1.5 miles from the coast near Massey Road. Boca Chica beach will be temporarily closed from the Brownsville Ship Channel south to the U.S./Mexico border on the Gulf side for up to 15 hours."

Comment: Closures were intended to be for launches of Falcon 9s. There were some scheduled dry and wet dress dates; however, there seems to be a disconnect on how many and how often these closures are being handled now. Additionally, the checkpoint was moved during the March 20-21 closure. This checkpoint location was agreed upon by all entities to reduce the potential impact on refuge lands. The checkpoint location should not be moved without consulting the Service and Refuge staff.

> **FAA Response**: SpaceX required multiple closures for this initial round of testing because SpaceX was unable to execute a test during each closure. Thus, SpaceX requested additional closures until they were able to complete the tests.
>
> Despite the agreed upon traffic control plan, Texas Department of Transportation (TxDOT) directed Cameron County on where to place the checkpoint. SpaceX contacted Cameron County Engineering and requested that the checkpoint be moved. Cameron County coordinated with TxDOT in order to move the checkpoint to the correct location.

Page 7, Security Plan Implementation, "FAA/SpaceX will develop a plan in coordination with Padre Island National Seashore (PAIS), Sea Turtle Coordinator or Sea Turtle Inc, (STI) to notify and allow sea turtle patrollers to survey the beach for sea turtle and sea turtle nests once the beach is closed to the public and prior to the beach security patrols and also prior to the beach being reopened to the public after a launch."

Comment: Sea turtle season is March 15 to October 1. This is the time sea turtles come up on the beach and lay their eggs and return to the water. Nest are located and the eggs are removed for secure hatching. Sea turtles nest during the day and a few at night, therefore, it is important that the patrols get out on the beach before and after closures to look for signs of nesting. FAA and SpaceX should be coordinating with PAIS or STI to allow for patrols as described above to occur. PAIS and STI patrol the beaches during peak season, April to June. If activities and closures are to occur in March, July, August or September FAA/SpaceX is responsible contracting with an experienced and certified sea turtle patroller to conduct surveys. Recent closures have delayed STI training of interns. STI now has a tentative date of April 8th for training and beginning daily patrols.

> **FAA Response**: Per the "Active Construction Species Monitoring Plan" (August 19, 2016), SpaceX is coordinating directly with STI and will ensure patrols are conducted.

Page 8, Personnel levels, On average, beginning in 2016, it is expected 30 full-time SpaceX employees/contractors will be present at the launch area and control center. They will work a single shift, between the hours of 8:00a.m. to 5:00p.m... Average personnel levels are expected to rise from 30 to 130 and the maximum levels during a launch from 130 to 250 employees onsite between 2016 and 2025.

Comment: Is this still accurate? Please provide updates for the BO amendment.

FAA Response: According to SpaceX, average personnel levels range from 30–100. Maximum levels during launch operations is expected around 150 personnel.

Page 8, Conservation Measures.

Comment: All plans should be reviewed and updated to fit the current activity and submitted to the Service for review. FAA has submitted annual reports, and addressed some of the measures in those reports. However, FAA and SpaceX should review the conservation measures and revise to reflect the most current activities authorized under this waiver.

FAA Response: SpaceX has updated and is in the process of updating the various plans mentioned in the BO, including the Facility Design and Lighting Management Plan, Emergency Action Plan, Hazardous Materials Emergency Response Plan, Hurricane Preparation Plan, and Stormwater Pollution Prevention Plan. Those plans requiring review by the Service will be submitted to the Service. For example, we submitted an updated Facility Design and Lighting Management Plan—that includes the updated Starship project—to you for review in November 2018 and March 2019. We will be submitting updates to other plans in the near future.

Comments addressing the May 13, 2014, amendment to the BO.

Comment: The BO was issued to FAA December 18,2013, and amended in 2014 to cover SpaceX proposed changes. SpaceX submitted mitigation proposals that they were willing to commit to implementing. The agreed upon changes that have not been implemented by FAA/SpaceX are highlighted in yellow. The Service was agreeable to the land acquisition but did not want to set a number of acres to be acquired because of the difficulty SpaceX may have finding sufficient land.

The most important change was SpaceX's commitment to fund three positions. The newly hired biologist were to assume all monitoring bird and vegetation plans developed and currently being undertaken by the University of Texas Rio Grande Valley at Brownsville. The positions have never been funded by SpaceX.

Under the Reasonable and Prudent Measures FAA/SpaceX agreed on additional measures to avoid impacts to listed species and refuge lands. The measures were to be addressed in six separate plans to be prepared later. The Plans were submitted and approved, but need additional review and updating to address the current testing program. Annual reports have been submitted by FAA, as required in the BO, but not all measures have been addressed.

Under the Terms and Conditions, the Lower Rio Grande Valley Refuge and SpaceX reviewed the updated measures in more detail and signed below each measure to commit to the changes. The BO amendment is enclosed for reference. We highlight the proposals not completed.

FAA Response: Please refer to our response above regarding the "BO Amendment."

This concludes the Services comments on the WR and the BO. If you have any questions please contact Mary Orms at (361) 225-7315 or by email mary_orms@fws.gov.

Sincerely,

Charles Ardizzone
Field Supervisor

cc:
Bryan Winton, LRGV NWR
Rob Jess, LRGV NWR
Sonny Perez, LRGV NWR
Ernesto Reyes, USFWS
Kendall Keyes, TPWD
Mark Spier, NPS
Alejandro Rodriguez, USFWS, LE

enclosures

Comment Response Matrix

SpaceX Boca Chica WR Closure Hours

#	Location		Type of Comment	Reviewer Initials	Comment	AST Response
	Page	Section	S, A			
1	2	Introduction	S	MO	SpaceX has requested an increase in the number of closure hours from 180 per year to 300 hours of closure per year. FAA, the federal agency, has written the written re-evaluation (WR) to re-evaluate whether the impacts of the proposed increase in closures fall within the scope of the 2014 EIS. FAA concluded the 2014 EIS remains current and substantially valid because: 1. The proposed action conforms to plans or projects for which a prior EA and FONSI have been issued or a prior EIS has been filed and there are no substantial changes in the action that are relevant to environmental concerns; 2. Data and analyses contained in the previous EA and FONSI or EIS are still substantially valid and there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts; and 3. Pertinent conditions and requirements of the prior approval have been, or will be, met in the current action. The U.S. Fish and Wildlife Service (Service) disagrees with FAA's determination.	

2	2	Introduction	S	MO	On December 18, 2013, the Service issued a Biological Opinion (BO) to FAA (the consulting and responsible government agency), for the issuance of a launch license and/or experimental permit as described in the 2014 EIS. The EIS and the BO describes the permit was for the launch operation of a Falcon 9 and Falcon Heavy orbital vertical launch vehicles and other suborbital launch vehicles. It also addressed the construction and operation of such rockets on the 56.5 acre site at Boca Chica, which is bordered on either side of State Highway 4 (SH4) by the Lower Rio Grande Valley National Wildlife Refuge (LRGV NWR). Under that BO the total number of closures and closure hours for wet dress rehearsals, static fire engine tests and actual launches were to fall within SpaceX's proposed 12 launch operations per year or an annual maximum of 180 hours of closure per year. The 12 launch operations were to occur through the year 2025 and within a few days or weeks of payload arrival at the launch site. Those launches could include the Falcon 9 and a maximum of two Falcon Heavy launches. The majority of the launch operations were to be conducted between 7 am and 7 pm with only 1 nighttime launch per year to the east over the Gulf of Mexico. Pre-launch activities were to include two dress rehearsals (Usually within 32 days of launch). Rehearsals were to include a dry dress rehearsal (without propellants on board) and a wet dress rehearsal (with propellants on the vehicle). Dry rehearsals would not require restricted public access. Wet dress rehearsals would require restricted access and a closure. Coordination for these rehearsals was to occur with governmental agencies, media outlets, and team training between SpaceX crew and operations personnel. Prelaunch activity coordination was to occur approximately 2 weeks in advance of a launch operation with restricted public access (actual launch, wet dress rehearsal, static fire engine test) FAA/SpaceX was to coordinate with Cameron County Commissioner's Court, Secretariat of Communications and Transportation-Mexico, U.S. Coast Guard, Houston Air Route Traffic Control Center, Texas Parks and Wildlife, National Park Service (NPS), LRGV NWR, Texas Coastal Ecological Services Field Office, National Marine Fisheries	

					Service, and Customs and Border Patrol. The public would be notified 3-6 days prior to an upcoming launch operation and security closure through local media and issuances of Notice to Mariners and Notice to Airmen. The above described components of the 2014 proposed project was intended for a launch site, not an experimental site and what was analyzed in the BO and 2014 EIS as a launch site. The proposed project described in the 2014 EIS has never come to fruition. The Starship/Super Heavy Program and experimental activities and construction currently ongoing have gone beyond that analysis for impacts to the environment and threatened and endangered species and their habitat. More importantly for this WR, no additional closure hours beyond the 12 launches per year and the maximum 180 hours were analyzed in the EIS or the BO. Therefore, permitting an increase to 300 hours should not occur until an EIS is available for analysis and reinitation of section 7 consultation is complete and resulted in the issuance of a new BO.	
3	2	Background	S	MO	In reviewing Table 1, it is obvious there have been many WR's and amendments, of which maybe only one, regarding solar power, was acceptable to the Service. The Service has continually reiterated the same concern since 2018, that SpaceX has continued to develop the Texas Launch Site, redesign the facilities, increase closures, and FAA and SpaceX are not in compliance with the BO and beyond the scope analyzed in the 2014 EIS. WR's may be a necessary process for FAA to follow, but, WR's are time consuming for all agencies to provide continual comments that result in the same invalid determinations and no effective action by FAA to bring themselves and SpaceX into compliance and address the issues with a new EIS and not continue with the status quo. The Service is willing to work with FAA and SpaceX to provide technical expertise in the development of the EIS, rather than continue commenting on WR's and amendments.	
4	3	Proposed Action	S	MO	The Service disagrees the proposed action and its assumptions remain the same as described in the 2014 EIS and subsequent WRs including the increase in the operation closure hours. The WR states "To accommodate the test program for which SpaceX is seeking new FAA-issued licenses and permits, the	

					approved 180 hours of closures per year would need to be increased to up to 300 hours of closure per year." The optimal wording is "seeking new licenses and permits". If SpaceX needs to increase the closure hours to accommodate the test program that has not been licensed or permitted then, FAA should not be allowing the increase until the effects of that increase are analyzed by the public and appropriate federal and state agencies effected have had a chance to review that analysis, consult if necessary, and the license and permit is issued. FAA and SpaceX should adjust their operations that complies with the 180 hours that has been analyzed. The public and agencies should not have to accommodate FAA or SpaceX and continue to let the trust resources they are responsible for be affected beyond what has been permitted in their agreements or BO.	
5	3	Proposed Action	S	MO, BW	The WR also states that "SpaceX has represented that it would not exceed 300 hours of closures per year." In 2019, SpaceX reported they had only 158 hours of road closures. Local SpaceX employees who computed the hours of closures only compiled the hours of actual closures, when soft/hard checkpoints were instituted. Other announced hours that were deemed unnecessary were not counted toward the 180 hour maximum. However, in 2019, LRGV NWR quantified that the actual number of hours of road closures on SH4 and the disruption to public access was in excess of 1,000 hours, due to many announced closures with no specified time, and for numerous cancelled announcements, where the public was already forced to change plans from visiting Boca Chica. There is a significant discrepancy in accounting and accountability for minimizing the impact to the public. Even if we were look at it conservatively, from March to November 2019 and February to July 2020 SpaceX closures have exceeded 300 hours each year if you multiply closure notices by a typical closure of 8 hours as described in the WR. That number of closure notices estimated only takes into account 1 day of closure that is announced in the notice, not the additional backup dates nor dates that were revoked. In 2020, that 300 hours was exceed in just 6 months of notices the Service had documented.	

6	3	Proposed Action	S	MO BW	Between March 21-present (COVID-19), SpaceX has closed SH4 in excess of 450 hours, stating that because Cameron County has closed the beach, there is no need to "count" the hours of road closure along SH4. However, the refuge, state park, and battlefield observation area has remained open (but inaccessible).	
7	3	Proposed Action	S	MO	Closure hours have been and are currently being exceeded and FAA and SpaceX have made no attempt to minimize those closures and come into compliance with the EIS or BO. The Service is willing to work with FAA and SpaceX to develop an agreed upon method of calculating hours and minimizing closures to include in the new EIS and Biological Assessment (BA).	
8	3	Proposed Action	S	MO	The WR states SpaceX is working with the Cameron County Commissioners Court and the Texas General Land office (TGLO) to update agreements regarding when closures may occur and how closure hours are calculated. The Service has commented several times that closure notices are not being issued as outlined in the BO. The required two week coordination meeting is not being implemented. Closure notifications are only allowing one to four days advance notice prior to closures. Plus closure hours are not consistent and run beyond 8 hours at different times of the day and night. We appreciate there is a call in number that has been added to allow the public to call and obtain information on closures. The Service recommends all agencies and organizations listed in that two week notification meeting to determine what would be a more effective way to handle notices. The Service also recommends the County Commissioner's Court and the County Judge be informed of the existing BO terms and measures as well as being included in those meetings to discuss potential future measures that may be added. Road closures should only be authorized by Cameron County when they meet the acceptance criteria developed by the natural resource agencies that are most affected by the SpaceX Project (FWS and TPWD).	
9	3	Proposed Action	S	BW	The LRGV NWR supports road closures to occur in the daytime hours, (ex: 9 am to 3 pm) daily. This enables the public to visit the area at sunrise through sunset. The LRGV NWR also recommends the county cap the number of	

					consecutive days of road closure, develop a cap of number of days the road can be closed per month, and require improved planning by SpaceX in order to avoid or reduce road closure announcements that are ultimately unnecessary.	
10	4	Biological Resources (including Fish, Wildlife, and Plants)	S	MO, CP	The Service disagrees that the 2014 EIS analysis remains substantially valid and the increase in closure hours would not result in a significant impact on biological resources. Boca Chica tract is one of the last unspoiled, undeveloped natural areas along coastal Texas with several endangered and threatened species that depend on its pristine beaches, and dunes, mangrove forest, oyster beds, bays mudflats, and natural lomas (clay dunes) as well as import nursery grounds for fisheries. More than 175 plant species and 344 animal species have been documented on or near the Boca Chica Tract. Activities at the SpaceX site are vastly different than originally analyzed. Originally, when the site was analyzed as a launch site, construction of the launch area and the control center facilities were to be completed within 24 months. Construction was to occur between the hours of 8 am to 5 pm Monday through Friday. Night construction was only to occur 2 weeks during concrete pouring and approximately 2 weeks for pile driving and launches were limited as described in comment 1. Since the site has been changed to an experimentation site there has been an increase in new activities, closures, explosions, debris from failed tests on refuge lands, fires, staffing, traffic and construction. Those increased levels were not analyzed in the 2014 EIS. Lack of implementation of certain mitigation and minimization measures described in the BO and other plans point to the need for further NEPA analysis. SpaceX development is a connected action (but for the FAA permit, these projects would not be occurring), so continued construction and any further development of this area by SpaceX, not included in the original EIS, should be included in a current NEPA analysis. To do otherwise then complicates the availability of other potential alternatives. Currently, as construction is ongoing at the SpaceX site, SpaceX and/or FAA appear to be in violation of 40 CFR § 1506.1 - Limitations on actions during NEPA process.	

11	4	Biological Resources (including Fish, Wildlife, and Plants)	S	MO	Increased closure hours also hinder researchers and Service biologist to enter research projects and Refuge lands to assess impacts or damage resulting from launch and construction activities. Service personnel and other pertinent agencies or researchers must have access to the property prior to and following each closure to survey the scene and document or record any observed environmental impacts (i.e. fire, explosion, sound impacts, dead birds, other wildlife, etc.).	
12	4	Biological Resources (including Fish, Wildlife, and Plants)	S	BW	Vehicle traffic is a significant wildlife hazard in Boca Chica because SH4 was constructed through the center of several lomas, which provide some of the only native coastal habitat remaining in south Texas for upland species and migratory birds. Note: Migratory Bird Fallout would be an example when the Service would request a SH4 road closure. SpaceX is continuously under construction. Road traffic dominated by commercial vehicles has increased exponentially on SH4 since SpaceX began their development and operation. Surcharging (transport of sand from Southmost, TX) alone resulted in 11,000 dump truck (X2) trips through Boca Chica to terminus of SH4. Increased traffic volume is a direct threat to wildlife and is documented as the primary mortality factor for the endangered ocelot.	
13	4	Biological Resources (including Fish, Wildlife, and Plants)	S	BW	The LRGV NWR opposes road closures on weekends, opposes night-time testing, due to lighting, and increased vehicle traffic by SpaceX during the night-time when refuge wildlife are active (increased roadkill). The LRGV NWR also requests that testing is suspended between April-August annually to avoid vibration, noise, lighting, and disturbance to nesting marine turtles and nesting/migrating migratory birds (T&E Species)	
14	5	Department of Transportation Act Section 4(f)	S	MO, CP	The WR states “Accordingly, the data and analyses contained in the 2014 EIS remain substantially valid, and the increase in closure hours would not result in a significant impact on Section 4(f) resources.” Establishing a maximum number of hours of road closures that would be authorized in a calendar year was important during the NEPA Planning in 2014, to minimize impacts to the public-visitors to Boca Chica beach, the refuge and state park lands, and for access to the Palmito Ranch Battlefield, much of which occurs on the LRGV NWR. Road closures are a major impact to the public and State of Texas citizens	

					who have a legal right to access the beach. Section 4(f) regulations “require rigorous exploration and objective evaluation of alternative actions that would avoid all use of Section 4(f) properties…that would avoid some or all adverse effects.” This includes national wildlife refuge lands. The refuge disagrees with this assessment now as well as in the past (see January 10, 2014 letter to the FAA, Stacey Zee), and requests a Section 4(f) analysis be undertaken to explore all reasonable and prudent alternatives that completely avoid Section 4(f) properties and/or to ensure "all possible planning to minimize harm to the Section 4(f) property" will occur. Based on the Section 4(f) definitions, a "constructive use" occurs when there is "a temporary occupancy of land that is adverse in terms of the statute 's preservation purpose" or when "a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired" Frequent closures are preventing the refuge from adequately managing its properties and allowing the public quality enjoyment of the Boca Chica Beach area for wildlife-dependent recreation. We maintain there are both "adverse" and "severe" impacts to Refuge public use, management, wildlife, and habitat from the SpaceX activities. Increasing the closure hours will only exacerbate the levels of impairment of refuge properties.	
15	6	Hazardous Materials, Solid Waste, and Pollution Prevention	S	MO BW	There have been 2 fires and 3 explosions in 2019 that have impacted the LRGV NWR and Boca Chica State Park. No assessment of any contaminants associated with debris has been conducted. Increased hours relates to increased activity and experimental launches increasing the risk for further mishaps and potential contamination. No compensation for damages has been offered. Activity should occur mid-day so there are opportunities for adjacent landowners to inspect lands prior to and after tests, in the event of fires, explosions, or spills. Mid-day activity offers emergency personnel improved response time and for timely inspection by state and federal land management personnel. Since SpaceX has had a number of anomalies resulting in scattered debris across both state and federal lands, the agencies require daylight prior to and after tests for the improved health and safety of their personnel during response efforts.	

16	6	Historical, Architectural, Archeological, and Cultural Resources	S	BW	Historical features including the Palmito Ranch Battlefield have been degraded significantly by SpaceX, due to visibility of intrusive structures now present.	
17	7	Noise Resources	S	MO	The WR states that impacts related to noise would not be beyond those discussed in the 2014 EIS. The 2014 EIS only assessed noise levels associated with a maximum of 180 hours of Falcon 9 and Falcon Heavy closures and 12 launches a year, one a month and up to 250 employees on the site. Nothing beyond that was analyzed.	
18	8	Visual Effects (including Light Emissions)	S	MO	The WR states "the increase in closure hours would not modify operations and would also not result in any potential operations related visual impacts that are outside the scope of impacts analyzed in the 2014 EIS." Visually the site, although within the 56.5 acres, is not the same as the site the Service or other agencies were lead to believe would be onsite. The facilities have doubled, the height of the proposed structure to support Starship launches is taller, more employees are active onsite than anticipated, large numbers of cars are parked along the SH4, trash is visibly scattered throughout the site and on refuge lands, cables have been removed to allow the removal of debris left behind by explosions or fires and not replaced, and tidal flats have been damaged and scarred. Lighting has increased as construction or experimental launching seems to be occurring 24/7 at the Control and launch sites. Lighting surveys from the beach have not been conducted on a regular basis as outlined in the BO to protect nesting sea turtles. As stated previously, increased closure hours allows SpaceX to increase activity during various times of the day and night and these types of impacts will only continue to increase.	
19	8	Cumulative Impacts	S	MO	The 2014 EIS did not analyze environmental impacts of the increased construction and operation of the Texas Launch site as it is currently being developed and operated. Recently there have been three LNG's approved by FERC that were not analyzed in the 2014 Cumulative Effects. We recommend FAA and SpaceX further investigate potential future industrial or transportation projects around the Brownsville Ship Channel and the Action Area as identified in the BO.	
20	8	Conclusion	S	MO	The WR concludes that SpaceX's proposed increase in operational closure hours conforms to the prior 2014 environmental documentation and remains substantially	

					valid, that there are no significant environmental changes, and that all pertinent conditions and requirements of the prior approval have been met or will be met in the current action. Therefore, no new environmental document was necessary. The Service disagrees with FAA's conclusion. There are significant changes to the previously analyzed project as it was proposed, closure hours are not in compliance with the BO or being carried out as the 2014 EIS documented and pertinent conditions and environmental requirements have not and are not being met. Therefore, a new environmental document is necessary. The Service is willing to work with FAA and SpaceX to complete that process as soon as possible.	

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Comment Types: S= Substantive; A=Administrative (See definitions below)

DEFINITIONS

Substantive – Comments identifying an item in the document that appears to be, or is potentially, incorrect, misleading, or confusing.

Administrative – Comments identifying minor inconsistencies between different sections or errors in typography and grammar.

Reviewer: Please provide your initials


4-21-2091 SpaceX Stuck Vehicles
Write a description for your map.
Legend
26.003382, -97.158092 SpaceX stuck vehicles
26.002242, -97.158854 Snowy plovers
4
SpaceX Launch site
Boca Chica Blvd
SpaceX launch Pad
Google Earth
© 2018 Google
© 2018 INEGI
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
[redacted]

April 7, 2021

Mr. Joe McMahan
Regulatory Division Chief
U.S. Army Corps of Engineers
[redacted]

Dear Mr.McMahan:

The U.S. Environmental Protection Agency (EPA) Region 6 has reviewed the Public Notice (PN) SWG-2012-00381, dated March 4, 2021. We appreciate the extension of the comment period until April 12, 2021, under Part II.4 of the 1992 404(q) Memorandum of Agreement between our agencies.

The applicant, Space Exploration Technologies, Inc. (SpaceX), proposes to modify their vertical launch area with the expansion and addition of test, orbital, and landing pads, integration towers, associated infrastructure, stormwater management features, and vehicle parking. As proposed, the modification will impact an additional 10.94 acres of mud flats, 5.94 acres of estuarine wetlands, and 0.28 acres of non-tidal wetlands. The site is located in wetlands adjacent to Boca Chica Bay, east of Boca Chica Village, Cameron County, Texas. The site is approximately 20 miles from the nearest elementary school, Raquel Peña Elementary School in Brownsville, Texas, which serves a predominately Hispanic, Environmental Justice community. We understand the Corps will consider these and other related factors in its review in satisfaction of the 1994 EO 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and in the Public Interest Review, which weighs the benefits and detriments of foreseeable impacts, including the needs and welfare of the people. The following comments are provided for use in reaching a decision compliant with the EPA's *404(b)(1) Guidelines for the Specification of Disposal Sites for Dredged or Fill Material* (Guidelines) (40 CFR Part 230).

The EPA finds this project may have substantial and unacceptable adverse impacts on aquatic resources of national importance (ARNI). Therefore, we recommend denial of the project, as currently proposed. This letter follows the field level procedures outlined in the August 1992 Memorandum of Agreement between the EPA and the Department of the Army, Part IV, paragraph 3(a) regarding Section 404(q) of the Clean Water Act.

The impacted mudflats, estuarine and non-tidal wetlands identified in the PN are aquatic resources of national importance. The wind-tidal flats are unique habitats with limited distributions in the world found only adjacent to hypersaline lagoons, such as the Laguna Madre of Texas and Tamaulipas. Wind-tidal flats support benthic invertebrate communities which make them essential foraging habitats for wintering and migrating shorebirds, including the threatened piping plover and red knot. The surrounding clay lomas, seagrass meadows, and the fringe salt marsh and mangroves addtionally support numerous rare, threatened, and endangered species. In 2000, the Laguna Madre wetland complex in

Texas and Tamaulipas, Mexico, was designated by the Western Hemisphere Shorebird Network as a Site of International Importance. The wind-tidal flats and wetlands in Boca Chica Bay are part of the bi-national Laguna Madre ecosystem critical to the survival of many species of shorebirds and waterfowl. Due to their importance, losses to these habitat types should be avoided or greatly minimized.

The EPA has reason to believe the proposed project activities, magnitude of impacts, and subsequent loss of aquatic resource functions and ecosystem values may result in substantial unacceptable adverse effects to the ARNI. The EPA is concerned the direct, secondary, and cumulative impacts associated with destruction of the rare and valuable aquatic habitats within the project area may result in impacts to surrounding water quality and suitability for use of the surrounding area by federally and state listed species and by finfish, crustaceans, shorebirds and wading birds that utilize the area. As wind-tidal flat restoration or establishment projects have been difficult to successfully implement, impacts to the functions and values of these habitats should be avoided and minimized to the maximum extent practicable.

The EPA is concerned that the applicant has not supplied enough information for the Corps to evaluate the permit modification application in compliance with the 404(b)(1) Guidelines (the Guidelines). Under the Guidelines, no discharge of dredged or fill material may be permitted by the Corps if: (1) a practicable alternative exists that is less damaging to the aquatic environment, so long as that alternative does not have other significant adverse environmental consequences or (2) the nation's waters would be significantly degraded. Under the Guidelines, a project must incorporate all appropriate and practicable measures to first avoid impacts to wetlands, streams, and other aquatic resources and then minimize unavoidable impacts; after avoidance and minimization measures have been applied, the project must include appropriate and practicable compensatory mitigation for the remaining unavoidable impacts.

Prior Comments

The EPA reviewed the original project components during an initial PN comment period in May 2013 along with the numerous subsequent modifications in 2015, 2016, 2017, and 2018 as described in the PN. Through the various permit modifications, the project impacts increased from 3.3 acres to 5.31 acres of aquatic resources. The compensatory mitigation plan for the project has also evolved over time as proposed preservation site locations, land transfer recipients and transfer timing have been altered. In the EPA's previous communications, concerns have been expressed about proposed impacts to aquatic resources of national importance, which include estuarine intertidal marsh and depressions as well as unvegetated tidal flats. The EPA maintains many of the same concerns that were expressed in our prior correspondences about the proposed adverse impacts to the important aquatic resources of the Lower Laguna Madre, a lack of adequate analysis of less environmentally damaging alternatives, and whether adequate compensatory mitigation will be provided for project impacts. The EPA continues to recommend careful consideration, in light of the Guidelines, be given to the critical ecological functions provided by the environmental resources impacted by the proposed project modification.

Avoidance and Minimization

According to the PN, the applicant has stated that measures to avoid and minimize impacts to jurisdictional waters of the U.S. were incorporated into the project design. The PN indicates that constraints limited avoidance and minimization opportunities, but the PN also states that impacts to

wetlands may be reduced as site design is refined. While the identified efforts to avoid and minimize may be meaningful, the PN does not discuss the range of practicable alternatives that were considered for this project including a combination of alternatives or the no action alternative. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose. The full range of project footprint options or operational procedures evaluated and the associated aquatic impacts for those alternatives should be provided. As it is implied a refinement of site design may result in a reduction in impacts, the evaluation should include all reasonable options that will result in the least environmentally damaging practicable alternative (LEDPA). Without the the inclusion of a robust alternatives analysis, it is not feasible to fully evaluate compliance with the Guidelines.

As reflected by the numerous project modifications that have been requested over the course of the project history, it is unclear if the final scope of a single and complete project has been included for the proposed modification. Establishing the complete scope of analysis is essential to performing a complete alternatives analysis that conforms with the Guidelines. Based on project history, there are concerns future activites, not yet disclosed, may further impact aquatic resources. Project fragmenting should be avoided as it undermines a robust alternatives evaluation and is not in line with the Guidelines. More concerning is that aquatic resources that were previously identified as avoided and used as justification to identify the LEDPA during prior alternatives analysis are now being identified for impact in this proposed permit modification. Given that the proposed project site is located in an environmentally sensitive area with high quality habitats, emphasis should be placed on the importance of avoiding and minimizing impacts to these distinctly sensitive aquatic resources. If it has not yet done so, we recommend that the applicant submit an alternatives analysis to the Corps that evaluates the respective impacts of any practicable alternatives that meet the project purpose. Please note that providing this material after public review does not allow optimum analysis of the entire range of significant potential environmental impacts. Additionally, any new alternatives analysis information should also be provided for public comment.

Evaluation of Significant Degradation

Additionally, it does not appear that compliance with the requirements of Section 230.10(c) of the Guidelines has been clearly demonstrated. Section 230.10(c) requires that no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. The Guidelines explicitly require evaluation of all direct, secondary and cumulative impacts reasonably associated with the proposed discharge in determining compliance with Section 230.10(c). In determining significant degradation, the Guidelines direct consideration of effects on such functions and values as wildlife habitat, aquatic ecosystem diversity, stability and productivity, recreation, aesthetics, and economic values. Based on the information provided by the PN, the applicant does not appear to adequately reflect consideration of all impacts to these functions and values. There appears to be a potential for significant degradation due to direct fill, water quality impacts, induced development and usage, and impacts to surrounding habitat area due to launch and post-launch activities. Given the limited references to stormwater management features in the PN and project plans, there are concerns regarding stormwater and wastewater management and potential discharge impacts upon water quality associated with the current and proposed facilities.

As the project site has evolved over time, including size and type tests occurring, the scope of the previous Environmental Impact Statement (EIS) completed by the Federal Aviation Administration (FAA) in 2014 may not be consistent with the scope of current activites. Considering the nature of the impacts, the unique special aquatic sites within the Lower Laguna Madre, and the scope and scale of public interest in the project, the EPA recommends a thorough scientific evaluation of direct, secondary and cumulative impacts associated with the final identified project scope for SpaceX's Starship/Super Heavy project. We recommend that the applicant provide information to assist the Corps in making its factual determinations, as described in §230.11, for compliance evaluation with the restrictions on discharge in §230.10. In particular, since the September 2, 2014, Memorandum for the Record noted activities at the site are non-water dependent, and do not require siting in or on a special aquatic site, such as a wetland, to meet the basic project purpose, information is need to address the restrictions at §230.10(a)(3). For non-water dependent activities, practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise.

Mitigation

Regarding compensatory mitigation, the applicant has stated they are developing a comprehensive, multifaceted mitigation strategy that will be updated as the strategy is finalized. Based upon the numerous prior modifications to the compensatory mitigation for prior impacts, the EPA is concerned with the ability to provide adequate compensation in perpetuity for the proposed aquatic impacts. Our concerns are compounded by the ecologically sensitive nature of these habitats and the demonstrated challenges in replacing them. The 2008 Final Mitigation Rule states in Section 230.93(c)(1)(i) that for individual permits, the permittee must prepare a draft mitigation plan and submit it to the district engineer for review. The final mitigation plan must include the items described in paragraphs (c)(2) through (c)(14) of the same section, *at a level of detail commensurate with the scale and scope of the impacts* [emphasis added]. At the district engineer's discretion, some of the elements may be addressed as special conditions to the permit. These required elements include: objectives, site selection, site protection, baseline information, determination of credits, mitigation workplan, maintenance plan, performance standards, monitoring requirements, long-term management plant, adaptive management plan, financial assurances and other information as required by the district engineer. If any temporary fill activities are expected to be in place for an extended period of time, the EPA suggests consideration of additional mitigation for these impacts as well.

Specific to the conceptual mitigation statement provided with the PN and prior mitigation strategies utilized for the project, there are concerns if non-contiguous and out-of-kind mitigation through preservation is proposed. The 2008 Final Mitigation Rule assigns a low priority to compensatory mitigation for impacts using preservation. 40 CFR Section 230.93(h) establishes a number of criteria, including threat of destruction or adverse modification criteria, that must all be met for proposals that use preservation to meet compensatory mitigation requirements. Enhancement is also preferred over creation due to the higher likelihood of success. Any plan should clearly address how enhanced, created and preserved resources will be maintained in perpetuity. Given the inherent difficulties associated with restoration techniques for tidal and mud flats, it is even more critical to avoid and minimize impacts to the greatest extent possible. Furthermore, the potential for temporal losses should be addressed, as it is unclear how mitigation project timing and achievement of success criteria compare to the proposed project construction. The EPA recommends that the Corps require the applicant undertake an exhaustive

evaluation of potential mitigation opportunities based on restoration or enhancement prior to limiting mitigation to preservation as the methodology of choice. While submitting the complete plan is not required at the time of the PN, providing additional details at the earliest stage possible allows the public and commenting resource agencies to have a more complete understanding of the net impacts of the proposal, taking into account mitigation.

Summary

Upon review of the current proposal, the EPA is of the opinion that this project may have substantial and unacceptable adverse impacts on the ARNI. The EPA continues to have concerns with the proposed project regarding the provided alternatives analysis, avoidance and minimization of impacts, evaluation of direct, secondary, and cumulative impacts, and proposed compensatory mitigation for unavoidable impacts. The EPA recommends the Corps work with the applicant to enhance the information provided to assist the Corps in determining compliance with the Guidelines. Without providing additional information, it is unclear how the project can be fully evaluated. The EPA would like to request that the Corps work with the EPA and other involved resource agencies to resolve the issues raised during the permit review period. The EPA also requests that prior to the decision to issue the permit, the Corps provide the EPA a copy of the draft permit and decision document in the interest of facilitating inter-agency coordination. We believe this information exchange is critical to ensure that all relevant factors and remaining issues are addressed prior to a permit decision.

Thank you for the opportunity to review and comment on this PN, and if you have any questions on these comments, please contact me at [redacted] or [redacted] or you can also contact Paul Kaspar of my staff, at [redacted] or [redacted]

Sincerely,

Maria L. Martinez

Maria L. Martinez
Chief, Permitting & Water Quality Branch

cc: U.S. Fish and Wildlife Service, Corpus Christi, TX
National Marine Fisheries Service, Galveston, TX
Texas Commission on Environmental Quality, Austin, TX
Texas Parks and Wildlife Department, Corpus Christi, TX

Ec

The Coming Surge of Rocket Emissions

With the space industry's rapid growth, rocket exhaust will increasingly accumulate in the atmosphere. How this accumulation might affect the planet is unknown—because we're not taking it seriously.

By **M. N. Ross** and **D. W. Toohey**
24 September 2019

The launch plume from a test missile, photographed on 10 October 2013 by astronaut Luca Parmitano, diffuses into the middle and upper atmosphere during the first several minutes after launch. As the number of rocket launches increases in the future, rocket engine emissions will increase proportionally. Credit: © European Space Agency/NASA

The global space industry is on the verge of a great increase in the number of rockets launched into Earth orbit. The global launch rate has already **more than doubled** in the past decade. Transformational innovations such as rocket reusability, thousand-satellite constellations, space tourism, global surveillance, tracking of the Internet of Things, proliferated low-Earth-orbit constellations, and other emerging technologies are expected to further supercharge launch demand in coming decades. The space industry, already an indispensable part of the global economy, is **preparing for a surge** in growth of a kind not seen since the birth of the space age.

As the number of launches increases, rocket engine emissions increase in proportion. Rocket engine exhaust contains gases and particles that can affect Earth's climate and ozone layer. These emissions historically have been assumed to be not much of a threat to the global environment because the space industry was deemed small and unchanging. Whether that assumption holds true for today's rapidly growing space is an important question that needs scientific attention.

The Nature of Rocket Emissions

The various rocket engine propellants produce different emissions. The most common gaseous emissions are water vapor and carbon dioxide from liquid and solid fuels, as well as hydrochloric acid from only solid fuels. The global quantities of these gas emissions from rockets, even at increased launch rates, do not significantly affect the global climate or ozone layer, and they are dwarfed by atmospheric inputs from other sources [***Larson et al.***, 2017].

As an important aside, water vapor emissions from individual launches can notably impact the mesosphere and ionosphere. Increased polar mesospheric cloud blooms, attributed to specific launches, have been frequently observed [***Stevens et al.***, 2012]. Transient dropouts in electron content have also been observed in expanding ionospheric plumes, mainly from their impact on space-based

> ***Because of the unique nature of their combustion chemistry, rocket engines emit large amounts of black carbon when compared to, for example, a modern jet engine.***

navigation signals. Although not presently a global concern, at some increased launch rate, upper atmosphere launch plumes will become ubiquitous and so affect global mesospheric and ionospheric processes and properties.

Particulate emissions from rockets, on the other hand, could have important impacts on climate and ozone [***Ross and Sheaffer***, 2014; ***Voigt et al.***, 2013]. Rocket engines emit various amounts of submicrometer-sized particles of soot (or black carbon, BC) and alumina (aluminum oxide) directly into the stratosphere. Because of the unique nature of their combustion chemistry, rocket engines emit large amounts of BC when compared to, for example, a modern jet engine. During flight through the stratosphere, BC can account for as much as several percent of the rocket emissions [***Simmons***, 2000]; the equivalent measure for a modern jet engine is smaller by a factor of 100. In 2018 BC-producing rockets (all but the hydrogen fuel type) emitted about 225 tons of BC particles into the stratosphere, comparable to the annual amount of BC emitted by global aviation [***Stettler et al.***, 2013]. Meanwhile, solid-fueled rockets emitted about 1,400 tons of alumina particles into the stratosphere.

Because particles emitted by rockets are small, they reside for 3 to 4 years in the stratosphere, where they accumulate. The "black" BC particles absorb solar radiation and slightly reduce Earth's albedo. The "white" alumina particles reflect solar radiation and so increase the albedo slightly. Paradoxically, however, both have the same consequence for the underlying atmosphere: a reduction in the intensity of solar flux entering the top of the troposphere. Solar flux reductions caused by stratospheric particles are well understood to cool the lower atmosphere [***Caldeira et al.***, 2013]. Therefore, and perhaps unexpectedly, rocket launch emissions contribute to cooling of Earth's lower atmosphere and surface.

Globally averaged, present-day **rocket particle accumulations** cool the troposphere by about 0.02 watt per square meter [***Ross and Sheaffer***, 2014], whereas carbon dioxide emissions from global aviation warm the troposphere by about 0.03 watt per square meter [***Lee et al.***, 2009]. Although these two effects involve different physics, the comparison nevertheless provides a useful context for understanding the relative magnitude of the climate impact of rocket launches. The magnitude of present-day cooling from rocket particles is about the same as the

magnitude of warming from aviation carbon dioxide. In other words, rocket launches cool Earth's surface by about the same amount that aviation warms it.

It would be an overinterpretation to conclude that rocket cooling mitigates some greenhouse gas (GHG) warming. Research shows that Earth responds to stratospheric particle injections in complex ways, with some atmospheric regions becoming warmer and others cooler, on subglobal and subseasonal scales [***Kravitz et al.***, 2012]. Similarly, Earth will respond to rocket particle injections in complex ways. Unraveling this complexity and accurately assessing the potential effects of the coming surge in rocket emissions require sophisticated computer modeling efforts. Such efforts have yet to be realized.

Past Is Not Prologue

If particles emitted by rocket engines can affect climate and ozone, why have they not been the focus of much research?

> ***With 114 launches in 2018, the number of launches has been growing at an average rate of about 8% per year for the past decade. Rocket emissions have also been growing.***

The answer is, in part, related to the history of rocket launches. The annual rate of rocket launches increased rapidly after the start of the space age, peaking at 157 launches in 1967. But then it declined over the next 4 decades, decreasing to only 42 launches in 2005. So for most of the past half century, rocket emissions have been in decline and therefore were not of much interest to researchers working to understand the most significant aspects of climate change and ozone depletion.

But that historic trend reversed in 2005 and, despite the retirement of the Space Shuttle in 2011, launch numbers began rising again. With 114 launches in 2018, the number of launches has been growing at an average rate of

about 8% per year for the past decade. Rocket emissions have also been growing, faster than global emissions from other sources with comparable impacts, such as aviation. And this growth is expected to accelerate.

Dozens of companies and government agencies around the world are planning to launch and maintain tens of thousands of satellites in vast low–Earth orbit constellations over the next decade [*Cates et al.*, 2018]. Several of the constellations have already started deployment. Even if only half of these plans are successful, the U.S. launch rate alone will double to about 200 launches per year by 2025. Following the historical pattern, other spacefaring nations will develop and launch similar satellite systems, adding roughly an additional 200 annual launches, meaning a scenario with 400 orbital launches per year globally by 2030 is very plausible.

Four Hundred Launches per Year

The global impact of 400 rocket launches per year is unknown. The series of models required to investigate this scenario have not been run, and the required plume measurements have not been made. In fact, only one detailed model of rocket BC particle emissions has ever been run—by us and a third colleague [*Ross et al.*, 2010]. This lone effort provided surprising, if as yet unverified, clues.

Astronaut Mike Hopkins photographed the plume of the 10 October 2013 missile launch as it expanded in the upper atmosphere. Studies of rocket plumes can provide important information on diffusion processes throughout Earth's atmosphere. Credit: **Mike Hopkins, NASA**

The 2010 global climate model study considered rocket BC emissions of 600 tons per year, more than double the current BC emissions of about 225 tons. Run for 40 model years to ensure the model reached steady state, the stratospheric BC burden grew to 2,400 tons. Although the globally averaged surface temperature anomaly was small and not statistically significant, on smaller scales and over limited latitude bands, significant positive and negative temperature anomalies emerged. North polar surface temperatures increased by more than 1°C, and upward of 5% of polar sea ice coverage was lost. And beneath the main BC accumulation in the northern midlatitudes (around the latitude of the assumed launch site at 33°N), the surface cooled by 0.5°C.

The complexity and magnitude of the predicted changes, for a mere 600 tons of annual BC emission per year, were remarkable. But we emphasize that this study provided only a preliminary assessment of Earth's potential sensitivity to the unique character of rocket BC emissions. The model did not consider alumina emissions, which could conceivably have a larger impact

than BC, reflecting sunlight back to space. And the results have not been confirmed with more sophisticated models.

In 2010, a scenario with 600 tons of rocket BC emission per year was considered speculative. Today, that scenario might be considered reasonable. At a rate of 400 launches per year, stratospheric BC emission could reach 800 tons per year, and alumina emission (assuming unchanging relative propellant use) could approach 5,000 tons per year.

A new source of stratospheric particles may soon add to these increasing rocket emissions. Geoengineering is a set of plans to mitigate GHG climate forcing. One type of plan envisions the continual release of carefully chosen particles into the stratosphere to reduce incoming solar radiation, just as rocket particles do today, though on a much larger scale. Scientists and policy makers struggle to envision a suitable and effective international governance framework to address such purposeful injection of particles into the stratosphere; the National Academy of Sciences convened a special study on the topic [***MacMartin and Kravitz***, 2019].

Space launches are not, by any means, linked to geoengineering, and the two are very different in terms of benefits, risks, costs, and ethics. Still, the significant scientific efforts underway to understand theoretical geoengineering particle releases, while actual rocket particle releases continue without much scientific attention, raise new questions. How could geoengineering be monitored and regulated in the presence of escalating rocket launch particle injections? Could studies of rocket plumes inform geoengineering efforts with needed information on the behavior of particles in the stratosphere? Current efforts to assess the background state of stratospheric particles should account for space activities including particle production during launches and reentry "burnup."

A Way Forward

As the space industry heads toward a future with two or three launches every day, the anticipated surge in emissions directly into the stratosphere (assuming current propellant types) would push the climate impacts of rocket emissions to be comparable in magnitude to other sources of climate

change that receive intense study by international groups of scientists, engineers, and scholars.

The obvious example is the continued scrutiny of the global impacts of emissions of supersonic transport fleets [e.g., ***Ingenito***, 2018]. Such aircraft have not flown in 2 decades and are unlikely to reappear in the coming decade, despite multiple efforts to address efficiency, noise, and safety. Meanwhile, despite the coming surge in launches, similar questions are not being asked about rocket emissions.

> ***The anticipated surge in emissions directly into the stratosphere would push the climate impacts of rocket emissions to be comparable in magnitude to other sources of climate change that receive intense study.***

A recent policy analysis [***Ross and Vedda***, 2018] showed that the most advantageous course of action for addressing launch emissions is to gather data before a tipping point is encountered. Tipping points produce unforeseeable changes in perception, arrive suddenly, and disrupt the status quo by emphasizing uncertainties. A policy that raises the appropriate scientific questions and provides resources to investigate them would place the launch industry on a path to avoid a potentially disruptive tipping point.

A suitable first step on this path would be to convene a rocket emissions advisory panel that would include representatives from the industrial, scientific, and governance communities. This panel would determine the scope of the concern, identify additional actors and stakeholders, define early metrics, and uncover key knowledge gaps. Importantly, the panel would help build a foundation for future cooperative studies of the relative importance of rocket emissions to other processes and help to ensure that future research programs are in proportion to the significance of the impacts being studied.

Patronage for such a forward looking panel is not obvious. The launch industry does not have a

> *Perhaps prominent organizations that have funded initial geoengineering experiments would value an in-depth understanding of the relationship between rocket particles and geoengineering particles.*

formal relationship with the science community, **as does aviation**. Philanthropic and public interest organizations that **support sustainable development** might sponsor the first advisory panel. Industry, science, or government organizations could take a wider view of their responsibilities, beyond what is now required or codified, to include the atmospheric impacts of rocket emissions. Perhaps prominent organizations that have funded initial geoengineering experiments would value an in-depth understanding of the relationship between rocket particles and geoengineering particles, including stratospheric processes common to both.

AGU could play a precipitating role with a statement of science policy regarding the scientific implications of a rapidly growing space industry. A Chapman Conference could possibly serve as a means to assemble an initial rocket emissions advisory panel.

The sooner that reliable and verifiable information can be compiled and assessed, the sooner effective strategies can be defined to reduce risks and limit exposure of the space industry to entanglement with geoengineering experiments and regulations that are not well aligned with long-standing space launch practices and traditions. Adoption of a long view with regard to emissions has well served the ambitious growth goals of the aviation industry. Such a view would do the same for the space industry.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office
[redacted]
Main: (956) [redacted] Fax: (956) [redacted]

In Reply Refer To:
02ETTX00-2021-TA1412

April 1, 2021

Jayson Hudson, Policy Analysis Branch
Regulatory Division, CESWG-RDP
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Dear Mr. Hudson:

The U.S. Fish and Wildlife Service (Service) reviewed a March 4, 2021, Public Notice SWG-2012-00381 (PN) for the Department of the Army, U.S. Army Corps of Engineers (USACE). The Applicant, Space Exploration Technologies, Inc. (SpaceX), has requested modification of the existing permit for the continued development of the SpaceX vertical launch areas with the expansion and addition of test, orbital and landing pads, integration towers, associated infrastructure, storm water management features and vehicle parking. The project is in the wetlands adjacent to Boca Chica Bay, at the existing SpaceX Vertical Launch Facility on State Highway 4, in Boca Chica, Cameron County, Texas. This report was prepared under the authority of, and in accordance with, the Fish and Wildlife Coordination Act (48 Stat. 401), as amended; 16 U.S.C. 661 et seq.)

The Applicant requests a modified permit to expand the current SpaceX infrastructure and impact 10.94 acres of mud flats (salt flats), 5.94 acres of estuarine wetlands (high marsh), and 0.28 acres of non-tidal (depressional) wetlands, for a total of 17.16 acres of impacts to special aquatic sites and wetlands. According to the 2014 Environmental Impact Statement (EIS), the Applicant proposed compensatory mitigation to preserve wetlands at a 10:1 ratio for acreage impacted. The Service is unsure if the previous compensatory mitigation for impacts has been satisfactorily completed. This PN indicates that the Applicant would mitigate for 17.16 acres of impacts by developing a comprehensive, multifaceted mitigation strategy for the Boca Chica Launch Site. The Applicant has stated that the information will be updated as the mitigation strategy is finalized. According to Section 404(b)(1) of the Clean Water Act, Applicants must

include a mitigation plan with their permit application; however, no mitigation plan was provided for review. The Service is concerned that additional use of preservation as mitigation may not adequately offset the adverse impacts from proposed destruction of 17.16 acres of mud flats and wetlands. The Service requests no additional permit modifications be issued to SpaceX until a new mitigation plan is reviewed by the Service and other resource agencies and approved by the USACE. The Service recommends revision of the stormwater pollution prevention plan to address potential pollution and sediment discharges into wetlands resulting from SpaceX's proposed new activities. Further, there are reports of trenches on the north side of the SpaceX site to facilitate drainage of uncertain origin across the flats. The Service recommends the drainage be assessed for physical effects to the mud flats and water quality.

The Service believes cumulative impacts associated with destruction of rare and valuable aquatic habitats may warrant an EIS prior to considering this permit application. Impacts from SpaceX's explosions, fires, falling debris from test rockets, etc., should be evaluated for wetland effects. The Service recommends that more alternatives and efforts to avoid and minimize impacts be presented such as shuttling employees and materials to the work site rather than expanding parking areas. We request USACE demonstrate consideration of avoidance, minimization, restoration, and compensation, as defined in the Mitigation Rule, were clearly met in the proposed mitigation plan.

The Service is concerned that the project may have impacts to the following listed species known to occur on and near this site: piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), black rail (*Laterallus jamaicensis*), northern aplomado falcon (*Falcon femoralis*), ocelot (*Leopardus pardalis*), jaguarundi (*Herpailurus yagouroundi*), and nesting Kemps ridley (*Lepidochelys kempii*), loggerhead (*Caretta careta*), green (*Chelonia midas*), hawksbill (*Eretmochelys imbricata*), and leatherback (*Dermochelys coriacea*) sea turtles. We request a biological assessment be prepared to consider project effects to the species and guide Endangered Species Act compliance.

The Service recommends denial of this permit because a completed mitigation plan and a more thorough analysis of cumulative impacts to wetlands are needed. The Service appreciates the opportunity to review the proposed project. If you have questions regarding these comments, please contact Laura de la Garza at [redacted] or by email at [redacted]

Sincerely,

Charles Ardizzone
Field Supervisor

cc: Assistant Field Supervisor, U.S. Fish and Wildlife Service, Corpus Christi, Texas

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Carter P. Smith
Executive Director

January 27, 2021

Ms. Stacey M. Zee
Office of Commercial Space Transportation
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

RE: Scoping Comments for Draft Environmental Assessment for Space Exploration Technologies' Starship/Super Heavy Launch Operations from the Boca Chica Launch Site in Cameron County, Texas

Dear Ms. Zee:

This letter is in response to your December 22, 2020 request for scoping comments to assist the Federal Aviation Administration (FAA) to determine the scope of issues for analysis in the Draft Environmental Assessment (EA) being prepared for Space Exploration Technologies' (SpaceX) Starship/Super Heavy Launch Vehicle operations at SpaceX's Boca Chica Launch Site in Cameron County, Texas. The FAA is considering preparing a Programmatic EA for this activity.

According to Texas Parks and Wildlife Code (PWC) section 12.0011(a), Texas Parks and Wildlife Department (TPWD) is the agency with primary responsibility for protecting the state's fish and wildlife resources. Furthermore, TPWD is charged with providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources according to PWC section 12.0011(b)(3).

TPWD staff have reviewed available material regarding SpaceX's development and operations at the Boca Chica Launch Site and offers the following comments and recommendations to facilitate a comprehensive National Environmental Policy Act (NEPA) analysis for the proposed activities.

Project Description

SpaceX proposes to conduct Starship/Super Heavy launch operations from the Boca Chica Launch Site in Cameron County, Texas. Proposed launch operations would include suborbital launches, orbital launches, and pre-flight operations (e.g., tank tests, mission rehearsals, static fire engine tests). The proposed operations would require new construction activities, including expanding an existing solar farm; adding infrastructure and facilities at the vertical launch area (VLA); and constructing a liquid natural gas pretreatment system and a liquefier. SpaceX is also proposing to construct a redundant launch pad and commodities, a redundant landing pad, two integration towers, a tank structural test stand, a desalination plant, and an injection well at the VLA.

[redacted]

Environmental Assessment Preparation

The FAA proposes to prepare a Draft EA that would only consider the proposed action and the no-action alternative. The Boca Chica Launch Site was initially selected as a suitable location for development based on criteria to support a launch site for Falcon 9 and Falcon Heavy vehicles. These criteria included: being at a low latitude; being able to support low-orbit and geostationary earth orbit trajectories; safety; and size (being large enough to accommodate all facilities to support Falcon 9/Falcon Heavy launches). The activities currently occurring and proposed to occur at the Boca Chica Launch Site have changed substantially from those described in the 2014 Final Environmental Impact Statement (EIS) and Record of Decision (ROD), for which the site was originally selected.

> **Recommendation:** The site selection criteria published in the 2014 Final EIS may no longer be applicable for an experimental testing facility. TPWD recommends the Draft EA include a detailed and updated Purpose and Need section and a rigorous evaluation of multiple reasonable alternatives considered for the proposed experimental testing facility. An equitable level of critical evaluation should be provided for each alternative throughout the Draft EA. The Draft EA should describe how the Boca Chica site uniquely fulfills the criteria of SpaceX's proposed use of the site as an experimental testing facility.

The 2014 ROD for SpaceX's activities at the Boca Chica Launch Site determined the project would result in unavoidable and significant direct and indirect impacts to several natural and cultural resource categories. Avoidance and minimization measures were to be implemented to reduce impacts to other resource categories including special-status species and Section 4(f) of the U.S. Department of Transportation Act (23 Code of Federal Regulations Part 774) properties. To date, several of the avoidance and minimization measures associated with the 2014 Final EIS and ROD have not been fully implemented, including: mitigating noise impacts by scheduling construction activities to occur between 8 a.m. and 5 p.m.; avoiding lateral light spread and uplighting per the Lighting Management Plan; maintaining cleared shoulders along SH 4; and observing speed limits not to exceed 25 miles per hour between the Control Center Area (CCA) and VLA. Also, to our knowledge, construction of vehicle barriers along SH 4 and monitoring of vegetation changes in piping plover critical habitat has not occurred.

The proposed action the FAA would license will require expanding the physical footprint of the Boca Chica Launch Site facilities for testing larger vehicles at an increased frequency than originally proposed for the site, for which an EIS was prepared and found impacts to be unavoidable and significant.

> **Recommendation:** TPWD recommends preparing an EIS to address the additional short-term and long-term impacts resulting from additional construction and operational tasks related to experimental testing activities that would be licensed by the FAA.

The FAA is considering preparing a Programmatic EA for this effort. It is TPWD's understanding that a Programmatic EA may be appropriate to address a broad group of related actions or to address a program, policy, plan, system, or national level proposal that may later lead to individual actions requiring a subsequent NEPA analysis. Also, the level

of analysis for a Programmatic EA may be broader and less specific than what is done for a specific project.

Comment: While a Programmatic EA may be appropriate for the activities proposed at the Boca Chica Launch Site, TPWD is concerned that the Purpose and Need, Project Description, and scope of analysis in a Programmatic EA could be defined too broadly for resource agencies to anticipate proposed future activities at the site and accurately comment or assess the potential impacts to the state's natural and cultural resources.

Recommendation: TPWD recommends a critical and comprehensive evaluation of significant environmental impacts be conducted during the development of the Draft EA. The evaluations should be informed by the best available scientific information including input from published literature and subject-matter experts; any sources should be clearly cited in the Draft EA.

To assist in the development of the Draft EA, please see the attachment titled, "Resources for Analysis of Potential Environmental Impacts of the Development of the Boca Chica Launch Site."

Development at the Control Center Area (CCA) has expanded significantly over the past two years. Much of the expansion appears to be in support of the development and construction of vehicles for which experimental licenses issued by the FAA are being sought.

Recommendation: TPWD recommends the Draft EA evaluate all facilities and infrastructure related to the development of the spacecraft or other vehicles for which the FAA licenses and experimental permits would be issued as they are connected actions.

Recommendation: TPWD recommends reviewing and addressing all comments provided in the attached TPWD letter dated July 9, 2020, provided for chapters 1 and 2 of an initial Draft EA for SpaceX's Starship/Super Heavy Launch Vehicle as they remain applicable.

Federal Regulations

Endangered Species Act

Federally-listed animal species and their habitat are protected by the Endangered Species Act (ESA) from take on any property. Take of federally-listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with section 7 or 10 of the ESA. Federally-listed plants are not protected from take except on lands under federal or state jurisdiction or for which a federal or state nexus (i.e., permits or funding) exists. Any take of a federally-listed species or its habitat without the required take permit (or allowance) from the U.S. Fish and Wildlife Service (USFWS) is a violation of the ESA.

Portions of the proposed project (e.g., VLA construction activities) are located on tracts of land bound on three sides by land owned by TPWD and managed by the USFWS as part

of the Rio Grande Valley Wildlife Corridor, a long-standing program aimed at preserving, restoring, and managing habitat for wildlife, including threatened and endangered species. The Rio Grande Valley Wildlife Corridor initiative has been an active project of TPWD, USFWS, many private landowners, local communities, and nonprofit organizations such as Audubon, The Nature Conservancy, Valley Land Fund, and others since the 1970s. As part of the Rio Grande Valley Wildlife Corridor, large anchor tracts such as the Boca Chica tract are managed to "conserve biological material to safeguard gene pools and replenish wildlife populations throughout the corridor" (Leslie 2016).

Within or near the proposed project area, occurrences of federally-listed ocelots (*Leopardus pardalis*), piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), and Kemp's Ridley (*Lepidochelys kempii*) and green sea turtles (*Chelonia mydas*) have been documented. Additionally, for all five species of sea turtles that occur in Texas, suitable nesting habitat is available on the beach less than one-quarter mile east of the VLA. Kemp's Ridley sea turtles have consistently used Boca Chica beach for nesting; record Kemp's Ridley sea turtle nesting occurred on Boca Chica beach in 2017. It is well documented that artificial night lighting is a cause of mortality among migratory birds and hatchling sea turtles (Salmon 2006). Considering the current and expected use of artificial lighting at the VLA for operations, TPWD is concerned with the effects that skyglow (the illumination of the night sky by reflected light) may have on hatchling sea turtles. Skyglow can disorient hatchlings as they emerge on the beach, directing them into the dunes rather than toward the ocean, resulting in mortality.

Recommendations: TPWD recommends that analyses pertaining to natural resources impacts from the proposed action, such as those that may occur on threatened, endangered, and candidate species, be based on field surveys performed in collaboration with resource agencies. In the absence of, or supplementary to, field data, the best-available science should be utilized to inform mitigation needs and potential impacts to federally-listed threatened and endangered species. In particular, the USFWS and National Park Service's (NPS) Division of Sea Turtle Science and Recovery Program should be contacted for information to assist in evaluating potential impacts to nesting sea turtles and turtle hatchlings resulting from artificial night lighting and testing and launch vibrations.

TPWD continues to be concerned with the direct and indirect impacts of noise, heat, vibrations, continual nighttime lighting, emissions, and potential hazardous material spills originating from space vehicle launches, experimental testing, and routine daily activities at the CCA and VLA. The potential impacts associated with these sources should be evaluated with respect to federally-listed species and their habitat. TPWD further recommends a proactive approach regarding the avoidance and minimization of impacts to listed species. The Draft EA should clearly present the process by which these impacts are evaluated and describe mitigation measures that will be required to avoid and minimize these impacts.

TPWD recommends reviewing the lighting plan implemented at the Kennedy Space Center which was developed, in part, to avoid or minimize potential impacts to nesting sea turtles. For example, existing light pollution issues can be corrected by disconnecting and turning off lights to ensure a dark beach (NASA 2017).

The Draft EA should also evaluate the impact additional modification to the operations and landscape at the Boca Chica Launch Site will have on daily and seasonal migrations of wildlife through the area (*e.g.*, the effects of continual nighttime lighting, increases in noise and traffic on ocelot movement through the area) and whether listed species will be permanently displaced from the area. Potential impact analysis, evaluations, and conclusions related to future environmental conditions, such as habitat changes or survival of organisms, should be supported with the best available scientific data.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control, except when specifically authorized by the Department of the Interior. This protection applies to most native bird species, including ground nesting species. Additional information regarding the MBTA is available from the USFWS-Southwest Regional Office (Region 2) at (505) 248-7882.

Review of aerial photography and the Ecological Mapping Systems of Texas (EMST), indicate that the project area is among wind tidal flats, deep sand grasslands, sea ox-eye daisy flats, and salty prairie. Areas surrounding the project area are managed or preserved as high-quality wildlife habitat that provide foraging, loafing, and nesting sites for birds. Additionally, the project area occurs in the middle of the Central Flyway Migration Corridor through which millions of birds pass during spring and fall migration. More than 250 bird species have been documented within the Boca Chica Village and Boca Chica Beach areas in recent years. The mud and sand flats surrounding the proposed construction areas are used by numerous shorebirds, including the federally-listed piping plover and rufa red knot, during the winter.

Recommendations: The Draft EA should address direct impacts that expanded infrastructure construction may have on birds. Impacts from noise, heat, vibration, permanent artificial lightning at night, emissions, anomaly debris and debris removal, and hazardous material spills should be evaluated. To minimize potential impacts to birds, TPWD recommends locating proposed infrastructure expansion or new structures in previously disturbed areas.

Additionally, TPWD recommends any vegetation clearing or trampling necessary to accommodate construction be scheduled to occur outside of the March 15 - September 15 migratory bird nesting season. If vegetation clearing must be scheduled to occur during the nesting season, TPWD recommends the vegetation to be impacted should be surveyed for active nests by a qualified biologist. Nest surveys should be conducted no more than five days prior to the scheduled clearing or disturbance to ensure recently constructed nests are identified. If active nests are observed during surveys, TPWD recommends a 150-foot buffer remain around the nests until the young have fledged or the nest is abandoned.

Two integration towers would be constructed as part of the proposed project. The information provided did not include specific information regarding the proposed towers.

The potential exists for birds to be attracted to towers as perching sites and to collide with towers or elevated structures, especially those with associated guy wires lines.

Recommendations: TPWD recommends towers be self-supporting monopoles to eliminate the need for guy wires and minimize perching opportunities for birds in areas that may place birds in imminent danger, whenever possible. All permanent structures or substrates within the proposed development areas should be designed to avoid and/or minimize potential bird impacts. TPWD recommends towers be less than 199-feet in height to eliminate the need for FAA required pilot warning and obstruction lighting which can be a bird attractant.

Preliminary shorebird monitoring conducted by the Coastal Bend Bays and Estuaries Program (CBBEP) indicates that activities attributed to SpaceX (i.e., increased vehicle traffic, construction noise, concussive force) may be a major contributor to an observed reduction in snowy and Wilson's plover nesting at Boca Chica (CBBEP 2020).

Recommendations: The Draft EA should address bird use in the area, especially for shorebirds and wading birds that are known to utilize the habitat within and adjacent to the project areas and migrate daily across the area between roosting and foraging sites. Grassland birds may also utilize available suitable habitat for nesting. The Draft EA should address proposed plans to avoid and or minimize potential impact to nesting and wintering birds. Specifically, the Draft EA should include a detailed discussion of the effects of a permanently-lit facility with upward directed lights in construction areas on bird use.

TPWD recommends SpaceX fund a long-term avian monitoring project to evaluate impacts to birds and their habitat due to construction, operations, anomalies, and debris removal following anomalies. Due to continuous construction and testing, surveys should be conducted at regular intervals (e.g., quarterly) and immediately after unexpected events that discharge material (i.e., solid debris, liquid spills, gaseous emissions), particularly if discharges affect adjacent properties.

Clean Water Act

The Clean Water Act (CWA) provides for the federal protection and regulation of surface water quality. The CWA regulates point and nonpoint sources of water pollution, including dredge and fill activities in waters of the U.S.

The proposed action occurs in the clay loma and wind tidal flats of the Lower Rio Grande Valley in an area known as Boca Chica. In Texas, these expansive sand and algal flats are concentrated within the Laguna Madre system, which in combination with the Laguna Madre of Tamaulipas, Mexico, represents one of six coastal hypersaline lagoon systems worldwide. In the Lower Rio Grande Valley, the clay loma and wind tidal flats represent one of the eleven unique biotic communities that comprise the Matamoran District of the Tamualipan Biotic Province.

Rare clay dunes, called lomas, dot the flat landscape, and the terrain is also engulfed with shallow bay waters of the South Bay Coastal Preserve which supports seagrass meadows and oysters with fringes of salt marsh and mangroves. These aquatic habitats, along with

the dune, ridge, and swale topography of upland coastal prairie and Tamaulipan thornscrub, serve as migration corridors, as well as feeding, breeding, nesting, roosting, and denning habitat for rare, threatened, and endangered species. Sand and algal flats are essential to shorebirds in general and critical to species with relatively short legs and bills, like plovers, that are physically limited to shallow water habitats. Other tidal flat features utilized by shorebirds include washovers that cut through the coastal dunes and provide a shallow tidal connection with the Gulf of Mexico. When exposed, the sand and algal flats support the dietary requirements of migratory species, such as the state- and federally-listed threatened piping plover and rufa red knot, and provide nesting habitat to resident plovers, stilts, and terns. When inundated, these shallow water features provide forage habitat for finfish, crustaceans, larger shorebirds, and wading birds. Accordingly, critical habitat has been federally designated for wintering piping plover (Unit TX-1) within the vicinity of the project site.

Proposed expansion at the VLA, including a parking and storage area north of State Highway (SH) 4, may result in additional wetland impacts.

Recommendations: Because no successful tidal flat restoration or establishment projects have been documented in Texas, TPWD considers these habitats to be difficult to replace. Consequently, impacts to functions and values of tidal flats should be avoided and minimized to the extent possible.

The Draft EA should address all direct, indirect, and cumulative impacts to the functions and values of aquatic habitats for fish and wildlife resources and include mitigation measures that will be required to avoid, minimize, and potentially compensate for those impacts. TPWD recommends continuing coordination with the U.S. Army Corps of Engineers regarding potential wetland impacts.

Due to the experimental nature of the proposed activity, environmental effects to all aquatic habitats should be evaluated using the worst case scenario for the initial impact of, and subsequent removal of, debris resulting from anomalies associated with all activities which may be authorized under the jurisdiction of FAA.

State Regulations

Parks and Wildlife Code Chapter 64 - Birds

State law prohibits any take or possession of nongame birds, including their eggs and nests. Laws and regulations pertaining to state-protection of nongame birds are contained in PWC chapter 64. Specifically, PWC section 64.002 provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. PWC section 64.003, regarding destroying nests or eggs, provides that no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.

It is important to note that 88 species of birds have been identified as Species of Greatest Conservation Need (SGCN) within Texas' Gulf Coast Marshes and Prairies Ecoregion. Fifty-eight of those species (or 65 percent) have been documented within the immediate Boca Chica area in recent years.

Recommendation: Please review the *Federal Regulations: Migratory Bird Treaty Act* section above for recommendations as they are applicable for compliance to PWC chapter 64.

Recommendation: Following testing anomalies, biologists participating in the long-term avian monitoring project recommended above and TPWD staff, should have access to TPWD property immediately after it is declared safe to enter the area to assess for habitat impacts and direct mortalities.

Parks and Wildlife Code Chapter 68 - Endangered Species

PWC section 68.015 regulates state-listed threatened and endangered animal species. The capture, trap, take, or killing (incidental or otherwise) of state-listed threatened and endangered animal species is unlawful unless expressly authorized under a permit issued by the USFWS or TPWD. A copy of TPWD Protection of State-Listed Species Guidelines, which includes a list of penalties for take of species, can be found online at the TPWD Wildlife Habitat Assessment Program website at: https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/habitat_assessment/media/tpwd_statelisted_species.pdf. While the document provides general guidelines, it is the responsibility of the project applicant to determine whether the project would adversely affect a state-listed species and comply with all statues and provisions of law. For purposes of relocation, surveys, monitoring, and research, state-listed species may only be handled by persons with the appropriate authorization obtained through the TPWD Wildlife Permits Program. For more information on this authorization, please contact the TPWD Wildlife Permits Office by phone at (512) 389-4647.

Recommendation: TPWD recommends that evaluations pertaining to natural resources impacts, such as those that may occur to state-listed threatened and endangered species, be based on field surveys performed in collaboration with resource agencies. In the absence of, or in supplement to, field data, the best available science should be utilized to inform mitigation needs and potential impacts to state-listed species.

Due to the diversity of habitat types available in the general Boca Chica project area, suitable habitat for several state-listed species occurs in, and adjacent to, the proposed project area. TPWD has concerns regarding the physical and behavioral barriers that may be created with additional development of the area, potential changes in the project's mission, and increased traffic along SH 4. These activities will further fragment and disturb suitable habitat for state-listed species. Specifically, TPWD is concerned with direct impacts to the Texas horned lizard (*Phrynosoma cornutum*) and Texas tortoise (*Gopherus berlandieri*) and indirect impacts to numerous other state-listed species on the adjacent managed lands.

The proposed action would include constructing an injection well, five gas wells, utility lines along SH 4, gas pipelines, and potentially buried interconnection lines at the solar farm. Trenching and excavation pose entrapment risks to wildlife including state-listed species that occur in the area.

Recommendation: TPWD recommends that any open trenches or excavation areas be covered overnight and/or inspected every morning to ensure no wildlife species have been trapped. If covering trenches or excavated areas is not feasible, escape ramps fashioned from soil or boards should be installed at an angle of less than 45 degrees (1:1) in trenches and excavated areas that will allow wildlife to climb out on their own.

Some reptiles, including the Texas tortoise, use hard-packed surfaces, such as asphalt, to thermoregulate, and they will occasionally seek shade by crawling under parked vehicles. Near the VLA, SpaceX employees customarily park along the north side of SH 4 between the asphalt and TPWD property, where tortoises, snakes, and other reptiles may occur.

Recommendation: Before driving passenger vehicles or construction equipment that have been parked at project sites, vehicle operators should check underneath the vehicles to ensure no tortoises or other wildlife are present. If a tortoise is located in any area associated with the project site, it should only be relocated if it is found to be in imminent danger. Individuals that must be relocated should be transported to the closest suitable habitat outside of the proposed disturbance area, but preferably within a one-mile radius of where the individual was collected. Additional information regarding Texas tortoise best management practices is available on TPWD's Wildlife Habitat Assessment Program website (https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/habitat_assessment/tools.phtml).

The 2014 Final EIS indicated that SpaceX would have an average of approximately 30 employees on site. Currently, several hundred employees and contractors travel to the Boca Chica Launch Site and between the CCA and VLA throughout the day and night, resulting in an increase in traffic along SH 4. TPWD continues to be concerned that the increase in traffic has resulted and will continue to result in an increase in wildlife-vehicle collisions (WVC; roadkill). Roadkill observations have been documented along SH 4 and include state-listed and SGCN species including Texas tortoise, Texas indigo snake, snowy plover, and Harris' hawk.

Recommendation: The Draft EA should evaluate potential impacts to state-listed species resulting from increased traffic on SH 4 and from parking in unimproved areas adjacent to land managed for wildlife.

The Texas tortoise is particularly susceptible to mortality from vehicle collisions due to its slow gait and the tendency to withdraw into its shell when startled (e.g., by oncoming traffic) rather than fleeing.

Recommendation: Due to the high potential for encountering wildlife along SH 4, TPWD recommends SpaceX employees and contractors receive environmental awareness training to be able to identify and avoid impacts to state-listed species encountered along SH 4. Conservation actions to alleviate traffic impacts should include consideration of measures to ensure the safe passage of wildlife over SH 4 such as limiting the volume of traffic through van pooling to the project area and the construction of culverts that facilitate wildlife movement under the roadway.

Parks and Wildlife Code Chapter 26 - Protection of Public Parks and Recreational Lands

PWC chapter 26 provides that a department, agency, political subdivision, county, or municipality of this state may not approve any project that requires the use or taking of public land (designated and used prior to the project as a park, public recreation area, scientific area, wildlife refuge, or historic site) unless it holds a public hearing and determines that there is "no feasible and prudent alternative to the use or taking of such land," and the project "includes all reasonable planning to minimize harm to the land…resulting from the use or taking." Chapter 26 requirements must also be met by the Texas Parks and Wildlife Commission (Commission) before it can grant an easement to cross TPWD property. The Commission is not obligated to grant approval for an easement. If an easement is granted, a fee and mitigation for possible adverse impacts would be required.

Land-use priorities for the Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR) in the Boca Chica area (including state-owned, federally managed land) include endangered species protection, migratory bird habitat, marine turtle nesting, and storm surge protection. The area also supports a wide variety of compatible public uses associated with the beach and South Bay, including fishing, kayaking, and bird watching. Aside from proposed future activities, the degree of impacts that the current SpaceX activities have on these priority land uses has not been thoroughly evaluated. Impacts to the purposes of these adjacent properties would be expected to continue or increase with the proposed expansion of activities at the Boca Chica Launch Site.

Recommendation: The Draft EA should include a detailed analysis of the impacts of restricting access and use of public land and the loss of recreational value due to proposed activities. Additionally, the Draft EA should include an access plan that will address the frequency and timing of closures, mitigation for loss of recreational, scientific, and research access due to SpaceX activities, and clearly define remedies when SpaceX exceeds thresholds or does not comply with the access plan. Between all affected landowners, a mutually agreed-upon method for implementing and calculating what constitutes "closure hours" should also be resolved.

General Comments

Many of the Boca Chica area's tangible benefits to present and future generations of Texans will continue to be impacted by the implementation of expanded infrastructure and continuous experimental testing at the Boca Chica Launch Site. Potential impacts may be compounded by the failure to completely execute or comply with the Special Conservation Measures and management plans previously developed and associated with the 2014 Final EIS and ROD.

Recommendations: TPWD recommends the Draft EA thoroughly assess existing conditions of the properties within or adjacent to SpaceX's proposed project area, particularly the VLA, and provide a thorough analysis into the reasonably foreseeable future of the ability for those adjacent lands to continue to retain the unique environmental conditions and outdoor recreational opportunities. The Draft EA should propose appropriate mitigation that provides a net benefit to offset impacts to public access and use and the management of fish, wildlife and plants.

TPWD recommends that conclusions related to future environmental conditions, such as ecosystem services expected from the post-construction environment, be supported with the best available scientific data.

Recommendation: TPWD recommends socioeconomic impacts be considered in the Draft EA including the potential economic impact from the loss of public access to and outdoor recreational opportunities at Boca Chica beach and other public land.

Currently, the process for closing SH 4, adjacent private and public lands, and Boca Chica beach does not allow adequate planning by the public or landowners and their authorized users. Closure notifications continue to be provided either the same day or as little as one to four days prior to closures, and notification of closure extensions have occurred after the extension period has begun. Also, revocation of closures occur well into the authorized closure window after landowners and the general public may have abandoned their plans for the day. Also of concern to TPWD are the closures on federal and state holidays when the general public are more likely to want access to public recreation areas like Boca Chica beach. These short-notice closures can impact TPWD and its partners' abilities to conduct day-to-day activities and fulfill each entities mission to provide outdoor recreational opportunities to the public, conduct and collect scientific research and imperiled species monitoring data, and to protect and preserve the state's natural resources. For example, in January 2021, TPWD received notification from the Coastal Bend Bays and Estuaries Program that it would be discontinuing its shorebird research and monitoring project in the Boca Chica and South Bay area due to the "magnitude and frequency of the closures and the last minute (and after-the-fact) notices."

Recommendation: TPWD recommends the process for issuing closure notices for activities to be authorized by the FAA's licenses and experimental permits be revised with input from all affected stakeholders.

Information previously provided to TPWD indicated water from an existing well would be used for sound and fire suppression during tests. The information also referenced a potential retention pond to be located adjacent to the launch mount.

Recommendations: For the most part, the area around the VLA consists of unvegetated flats. TPWD is concerned that water discharged for sound and fire suppression or as vapor released during testing, could result in vegetation shifts into unvegetated areas. Vegetation in and around the VLA should be monitored over time to assess any changes, and the Draft EA should include measures and processes to address the influences that water releases may have on the surrounding habitats.

Although retention ponds do not perform the same ecological functions as streams or wetlands, because they are designed to retain water, they may attract wildlife, particularly birds. Due to the potentially dangerous conditions for wildlife found within the VLA, the use of wildlife deterrents or exclusion practices around the retention pond should be evaluated in the Draft EA.

The project would include a liquified natural gas (LNG) pretreatment system and a liquefier. The specific LNG pretreatment method was not described.

Recommendation: The Draft EA should provide a detailed description and evaluation of the proposed LNG pretreatment method and liquefaction process. The impacts of potential emissions resulting from the process and the proposed safety measures that would be implemented should also be described.

The Draft EA should also evaluate the cumulative impacts of these emissions. The evaluation should include anticipated air quality impacts and describe the mitigative measures that would be implemented to minimize those impacts to the region's air quality.

The existing solar farm would be expanded near the CCA.

Recommendations: To reduce ground disturbance in the solar farm, TPWD recommends housing cables in above-ground cable trays rather than burying them in trenches. Utilizing above ground housing methods can reduce fugitive dust emissions, reduce use of water to suppress fugitive dust, minimize equipment emissions, preserve cultural resources, and minimize potential wildlife entrapment (Sinha et al. 2018).

To further mitigate potential impacts associated with the solar farm expansion, TPWD recommends incorporating beneficial practice guidelines for solar facilities that enhance biodiversity such as reseeding the area with native flora and allowing it to grow under solar panels to provide wildlife habitat and reduce dust. Fencing around the solar farm should be designed to be wildlife-friendly, allowing smaller species to pass through while excluding larger ones from becoming trapped within the solar farm.

TPWD also recommends incorporating avian safety features for all energized components within the solar farm (APLIC 2012).

The proposed project would also include tanks of natural gas, liquid methane, liquid nitrogen, liquid oxygen, and liquid argon, most of which would be located at the VLA and may be susceptible to catastrophic damage during hurricanes or other storm events.

Recommendation: TPWD is concerned with the potential of significant contamination of very sensitive natural resources in the event of a catastrophic event (*i.e.*, hurricane). The Draft EA should thoroughly address fuel storage and clean up procedures in the event of a catastrophic event.

Because of the project's location among grasslands susceptible to fire, and due to the accidental fires that burned approximately 140 acres of TPWD property on July 25, 2019 and in August 2019 during SpaceX test launches, TPWD continues to be concerned about the potential impacts of unintentional fires resulting from launch failures and other SpaceX operations on the sensitive natural resources on adjacent properties. For example, the only known population of an SGCN insect (the Boca Chica flea beetle [*Chaetocnema rileyi*]), occurs along the back of the primary and secondary dunes at Boca Chica in association with the marsh fimbry (*Fimbristylis castanea*), a plant occurring in marshes. If accidental fires escape into areas behind the dunes, the only known population of this species may be permanently lost.

Recommendation: The Draft EA should either incorporate SpaceX's Fire Plan that was developed in 2019 or develop a new Fire Contingency Plan to address potential wildfires and their impacts to natural resources.

Similarly, the project is located among sensitive wind tidal flats that have been negatively impacted by falling debris and subsequent retrieval following explosions of SpaceX rockets during testing anomalies in November 2019, February 2020, and December 2020.

Recommendation: TPWD recommends that the Draft EA contain a contingency plan for testing anomalies that may discharge debris onto adjacent properties. The plan should include retrieval practices that would avoid impacts to sensitive habitats, immediate habitat assessment protocols, post-incident monitoring, and proposed mitigation for unavoidable impacts.

Noise modeling in previous environmental evaluations was based on launching Falcon 9 and Falcon Heavy vehicles.

Recommendation: TPWD recommends the Draft EA evaluate noise and vibration impacts, including sonic booms, based on current and anticipated engines that will be launched or tested at the Boca Chica Launch Site. As a potential mitigation option, TPWD recommends SpaceX provide funding for research that will alleviate the paucity of data that analyzes the short, long, and cumulative impacts of noise and vibrations on the region's wildlife, in particular nesting sea turtles.

TPWD continues to be concerned with the wildlife impacts created by continuous noise and lighting associated with the project area. Research indicates that light pollution, including direct glare, increased illumination, and unexpected fluctuations in lighting from sources such as skyglow, lighted buildings and towers, security lights, and lights on vehicles and construction equipment can disrupt ecosystems and alter organisms' behavior and physiology.

Recommendations: Due to the well-documented deleterious effects of artificial night lighting on wildlife, including at other spacecraft launching facilities (NASA 2017), TPWD recommends nighttime construction and testing, particularly at the VLA be discontinued, severely limited, or modified to meet accepted standards in order to minimize potential impact to animals and preserve the ecological integrity of the adjacent managed lands.

The 2019 Launch Facility Design and Lighting Management Plan no longer accurately reflects the operational environment of the Boca Chica Launch Site. TPWD recommends developing a new Lighting Management Plan that eliminates or minimizes site lighting from being directed toward the beach or into land managed for wildlife.

The information provided did not include plans for proposed post-construction landscaping for erosion control or for aesthetics.

Recommendations: For soil stabilization and/or revegetation of disturbed areas within the proposed project areas, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats poses an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching, and/or hydroseeding due to a reduced risk to wildlife. If erosion control blankets or mats were to be used, the product should either contain no netting or contain loosely woven, natural-fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting and hydromulch that includes plastics should be avoided.

TPWD recommends the exclusive use of a mixture of regionally adapted native grasses, forbs, and pollinator species for post-construction revegetation efforts and landscaping. If needed, TPWD can provide technical guidance on appropriate plant species for the project area.

Historic Properties

The 2015 Memorandum of Agreement (MOA) among the FAA, the Texas State Historic Preservation Officer (SHPO), the NPS, the Advisory Council on Historic Preservation, SpaceX, the USFWS, and TPWD, as well as the 2019 SpaceX Vibration Monitoring Plan (Revision 10) (VMP), define measures to be taken in order to account for adverse effects on historic properties caused by SpaceX. However, many of those measures have not been sufficiently executed to date, including the Historical Context Report, Vibration Monitoring Reports on the most recent launch events, Replication of Missing Marker Elements, Additional Security, Interpretive Signage, and Educational Website.

Also, additional potential for direct adverse effects associated with SpaceX operations, including damage caused by debris/explosions, vehicular and foot traffic, and wildfires, has become apparent over recent years.

Recommendation: Based on the information provided, those same measures already defined in the MOA and VMP are likely to be appropriate for the additional operations being proposed assuming they are updated to account for any new adverse effects. It is recommended that in addition to updating those measures, the causes for the lack in execution of the measures to date be addressed and corrected prior to approval of the operations being proposed. It is also recommended that the additional potential for the direct adverse effects described above be addressed as well.

Indirect Impacts to Natural Resources

Based on information previously provided to TPWD, proposed infrastructure at the VLA would be located immediately adjacent to TPWD property; a parking and storage area along SH 4 would be bound on three sides by TPWD property, and newly proposed expansion at the CCA would be immediately adjacent to TPWD property along Eichorn Boulevard. As stated in previous environmental reviews of SpaceX activities at Boca Chica, TPWD continues to be concerned that the impacts of suborbital and orbital launches and continual testing will significantly reduce the natural resource conservation value of some or all of the state-owned property at Boca Chica.

In addition to the direct loss of habitat resulting from the infrastructure expansion, new construction and experimental testing, TPWD is concerned that the quality and natural resource value of the surrounding properties will also be diminished. Cumulatively, infrastructure expansion, new construction, and the increased closure hours necessary to support the new project mission corresponds to an increase in potential direct and indirect impacts to and disturbance of wildlife and wildlife habitat on adjacent properties through additional loss of habitat, increased traffic, noise, vibration, emissions, and night time lighting. TPWD has concerns regarding impacts associated with unexpected anomalies (e.g., explosions) including fires, scattered debris, and activities related to the response to these incidents (i.e., debris retrieval through sensitive habitats) on the integrity of TPWD property and the wildlife and plants TPWD is responsible for protecting and conserving.

Recommendations: TPWD recommends evaluating the potential direct, indirect, and cumulative impacts to fish, wildlife, and plant resources on state property that may be affected by continual construction activity and launching or experimental testing of space vehicles. Specifically, the Draft EA should describe the expected impacts (e.g., noise, heat, vibration, fuel emissions) on vegetation and wildlife. For expected impacts for which no data exists to assist in predicting their significance (i.e., vibrations to sea turtle nests, noise on ocelot movement), TPWD recommends SpaceX propose and conduct research to help predict and minimize those impacts. The Draft EA should specifically address the occurrence, frequency, quantity, extent, and fate of debris on TPWD property and that may result from activities which directly involve or support the testing and launching of experimental and established spacecraft.

TPWD appreciates the opportunity to provide comments and recommendations during the development of the Draft EA for the proposed activity. Regarding future commenting opportunities, TPWD respectfully requests that at least 45 days are provided for review and response to this complex project. If you have any questions regarding TPWD's input on this NEPA scoping opportunity, please contact Mr. Russell Hooten, Wildlife Habitat Assessment Program Biologist, by email at Russell.Hooten@tpwd.texas.gov or by phone at (361) 825-3240. Thank you.

Sincerely,

Clayton Wolf
Chief Operating Officer

CW:RH:cb

Attachments

cc: Mr. Carter Smith
Mr. John Silovsky
Mr. Robin Riechers
Mr. Rodney Franklin
Mr. Russell Hooten

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University of Texas-Rio Grande Valley, Coastal Studies Lab Research

https://www.utrgv.edu/csl/research/index.htm

Commercial Launch Site Pre-Construction Species Monitoring Survey. PIs: David Hicks, Karl Berg, and Heather Alexander.
This is the first phase of a consortium project involving three UTB/TSC faculty to conduct pre-launch site construction baseline surveys of avian, sea turtle, and vegetation of the Boca Chica SpaceX facility.

Evaluation of Beach Management Practices. PI: David Hicks
This is a collaborative effort between UTB/TSC and the town of South Padre Island. The objective of this partnership is to experimentally assess the beach management practices adopted by the City of South Padre Island (e.g., beach grooming, nourishment, dune restoration, etc.).

Coastal Impact Assistance Program - Baseline Study for Oil Spill Planning. PI: T. Whelan
Under contract with Cameron County, CSL researchers are conducting a hydrographic survey at critical locations in the Laguna Madre to predict where an oil or chemical spill would travel if it entered the Laguna Madre through the Brazos-Santiago Pass from the Gulf of Mexico.

Modeled Inflow Validation & Nutrient Loading Estimation in Two Subwatersheds of the Lower Laguna Madre. H. DeYoe, PI
This project is a collaborative project that will assess through field monitoring and rainfall-runoff modeling the input of nutrient loading from two major ungaged subwatersheds into the Lower Laguna Madre (LLM).

Shorebirds at Boca Chica. PI: David Hicks
Since 2015, UTRGV has been conducting ecological monitoring of a threatened shorebird community in the Delta of the Rio Grande and Gulf of Mexico shoreline.
https://www.utrgv.edu/avianecology/research/shorebirds-at-boca-chica/index.htm

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July 9, 2020

Ms. Stacey M. Zee
Office of Commercial Space Transportation
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

RE: Review of Chapters 1 and 2 of Draft Environmental Assessment for SpaceX Starship/Super Heavy Launch Vehicle at SpaceX Texas Launch Site, Cameron County, Texas

Dear Ms. Zee:

This letter is in response to your June 5, 2020, email request for review of the first two chapters of the Draft Environmental Assessment (EA) for SpaceX Starship/Super Heavy Launch Vehicle at SpaceX Texas Launch Site in Cameron County, Texas.

The Federal Aviation Administration (FAA) Office of Commercial Space Transportation is preparing an EA to evaluate the potential environmental impacts of activities associated with issuing experimental permits and launch licenses to SpaceX for Starship/Super Heavy launch operations at the Texas Launch Site.

Texas Parks and Wildlife Department (TPWD) staff has reviewed the material provided and offers comments and recommendations on the attached SpaceX Boca Chica Comment form provided by the FAA. TPWD appreciates the opportunity to provide comments and recommendations during the development of the EA for the proposed activity. If you have any questions regarding TPWD's input on the EA review, please contact Russell Hooten, Wildlife Division at (361) 825-3240, or Russell.Hooten@tpwd.texas.gov. Thank you.

Sincerely,

Clayton Wolf
Chief Operating Officer

CW:RH:jn

Enclosures

cc: Mr. Robin Riechers
Mr. Rodney Franklin
Ms. Colette Barron Bradsby
Mr. Russell Hooten

[redacted]

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
	Page*	Section	S, A			
1	8	1.1, line 4	S	KK	Other FAA EA's begin by stating that, "The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) proposes to issue an experimental permit to Space Exploration Technologies Corporation (SpaceX) to..." Why does the current Draft EA to state "SpaceX proposes to..." since the action being analyzed during this NEPA process is the federal action?	
2	8	1.1, line 6	S	KK/RH	Per CFR §437.9, FAA issued experimental permits authorize an unlimited number of launches. In this location, TPWD recommends that the experimental permit(s) need to be limited in scope and breadth.	
3	8	1.1, line 14	S	KK	It is confusing to reference, "activites associated with the Proposed Action" when the Proposed Action is not described, even in summary terms, until Chapter 2.	
4	8	1.1, line 15	S	KK	The term "Texas Launch Site" should identify the specific location as Boca Chica Texas Launch Site.	
5	8	1.1, line 22	S	KK	Is it correct to say that the 2014 EIS analyzed the consequences of issuing SpaceX launch licenses **and/or** experimental permits? If TPWD understands correctly, an experimental permit authorizes unlimited launches. Please explain if an experimental permit as well as a launch license will be issued for the currently proposed activities at the Boca Chica site, and why both authorizations would be necessary for the site.	
6	8	1.1, line 24, 25	S	KK	These lines state, "The analysis in the 2014 EIS included construction and operation of the launch site." TPWD disagrees with this statement. Much of the construction which has occurred and is occurring was not adequately analyzed since it diverges substantially from what was originally proposed in the 2014 EIS. TPWD has concerns with the segmenting of the current project from the proposed project rather than evaluating potential impacts from all SpaceX FAA-permitted activities as one single and complete action. The NEPA analysis	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

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	Page*	Section	S, A			
					needs to include all the construction, past, present, and planned, and all the subsequent operations and activities.	
7	8	1.1, line 29	S	KK	This line states, "Each Written Re-evaluation concluded that SpaceX's modifications 1) conformed to the prior environmental documentation..." TPWD does not agree with this conclusion. TPWD expressed concerns during the Written Reevaluation comment periods about what was perceived as actions not covered under the 2014 EIS analysis.	
8	8	1.1, line 34	S	KK	This line states that, "SpaceX has decided to use the Texas Launch Site as a site to..." Since an alternatives analysis has not yet been completed, this should be re-phrased to read, "SpaceX proposes to use the Boca Chica Texas Launch Site..."	
9	9	1.3.1, line 26	S	KK	This line states, "The purpose of FAA's Proposed Action is to ..." The Proposed Action, which is to issue experimental permits and launch licenses to SpaceX that would allow Starship/Super Heavy launches from the Texas Launch Site, is not stated until Section 2.1. It would be helpful if it was stated earlier in the document.	
10	9	1.2.#	S	RH	TPWD recommends the EA include a description in this section of the roles and contributions of participating or coordinating agencies, such as state agencies like TPWD and THC, in the NEPA process, including the preparation of the EA.	
11	10	1.3.2 line 3	S	KK/RH	Please remove the section for SpaceX's Purpose and Need. The Purpose and Need identified in NEPA documents are typically only from the perspective of the lead federal agency (CEQ Regulations §1502.13 for an EIS; §1508.9(b) for an EA).	
12	10	1.3.2 line 4	S	KK	This line states, "The purpose of SpaceX's proposal is to..." This document is discussing the purpose of the federal action, not the Purpose and Need of SpaceX, as the section heading suggested. Can this be clarified?	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

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	Page*	Section	S, A			
13	10	1.3.2 line 11	S	KK/RH	TPWD suggests changing this line from, "SpaceX's proposal is needed to increase operational capabilities ..." to "the actions decribed in SpaceX's proposal are needed..." to clarify why the Action is needed, not SpaceX's proposal.	
14	10	1.4 line 24	S	LZ	The Public Involvement section does not describe the NEPA public involvement process. This reads more like a Federal Register notice for a public comment period. TPWD recommends that FAA revise this section to describe the public involvement process typically afforded the general public during the NEPA process.	
15	12	2.1.1.	S	JR/RH	The description in this section does not adequately describe the location of the project site. While TPWD anticipates that subsequent sections will offer more robust descriptions of the land uses and natural and cultural resources within the vicinity of the project site, it would be reasonable for this section to at least briefly describe the location's proximity to public lands that are managed to preserve unique natural resources. TPWD recommends changing: "The area is in a sparsely populated coastal area adjacent to the Gulf of Mexico, characterized by sand and mud flats" to something such as, "The area is in a sparsely populated coastal area adjacent to the Gulf of Mexico and ecologically unique public lands owned by Texas Parks and Wildlife Department and the Lower Rio Grande Valley National Wildlife Refuge. The area is characterized by marsh and barrier island plant communities, shallow open water, algal flats, and unvegetated tidal flats. Uplands consist of low, newly-forming sand dunes with their anchoring vegetation amidst bare sand flats. The open water areas are fringed with black mangroves and vegetated with seagrasses. Small, ecologically unique clay hills, known as "lomas", support a diverse group of rare plants and terrestrial wildlife including the endangered ocelot and jagarundi."	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
	Page*	Section	S, A			
					Subsequent sections should discuss the diverse terrestrial and aquatic habitats at the site that provide valuable feeding, roosting, and nesting habitats for resident and migratory shorebirds, wading birds, waterfowl, and other avian species including several other federal and state listed threatened and endangered species such as northern aplomado falcon, piping plover, reddish egret, snowy plover, sooty tern, and Texas botteri's sparrow. The area also serves as a major winter ground for endangered peregrine falcons and piping plovers and a large variety of shorebirds, gulls, and terns winter here in large numbers.	
16	12	2.1, line 3	S	KK	As indicated above, this is the first time the Proposed Action is stated. TPWD recommends that it be stated earlier in the document.	
17	12	2.1, line 4	S	KK	See comments #2 and #5 above regarding the unlimited nature of Experimental Permits.	
18	12	2.1, line 7	S	KK	"...SpaceX is proposing to conduct up to eight launches per year. Annual operations would also include suborbital flight tests (Section 2.1.3.2) and/or orbital launches (Section 2.1.3.3). The Proposed Action also includes the connected actions of static fire engine tests, landings, expansion of the VLA and solar farm, and additional construction of infrastructure." Would activities covered under the experimental permit be unlimited, and if so what would those activities include?	
19	12	2.1, line 16	S	KK	The Vertical Launch Area (VLA) is approximately 3.6 km north and the launch and landing control center (LLCC) is approximately 2.1 km north of the U.S./Mexico border.	
20	12	2.1.1, lines 19 & 20	S	KK	This line should clarify that it provides the only access to the public Boca Chica Beach and TPWD's 1054-acre Boca Chica Tract.	
21	14	2.1.2, line 9	S	KK	Would refurbishment of reusable stages occur only at SpaceX facilities at Boca Chica?	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
	Page*	Section	S, A			
22	16	2.1.3.1, line 5	S	KK	Would road closures that may be necessary for transporting Starship or Super Heavy components to SpaceX facilities count towards the total of access closures for the area? If road closures are necessary for this activity, TPWD recommends that these closures should be counted toward the total closure time allowed and scheduled to avoid occurring on holidays/weekends.	
23	16	2.1.3.1, line 28	S	KK	The estimated amount of liquid methane (LCH4) that will be flared per month/year should be provided. Is this monitored, and if so, how?	
24	16	2.1.3.1, lines 20-21	S	KK	Do the numbers of proposed tests represent the total anticipated, beginning with 60 static fire engine tests per year? Does public access to the beach have to be closed for each static fire engine test? As demonstrated during the past year, testing does not usually happen on schedule and, more often than not, has to be rescheduled. The proposed total of 60 static fire engine tests should be multipled by a factor of at least 2 or 3 to determine the number of closures and does not include proposed launches. TPWD has concerns about prolonged and frequent closures to the beach and surrounding public lands and recommends that the FAA establish a more robust and transparent closure process that tracks the number of, length of, and reason for each closure, provides reasonable notification of closures, and provides a threshold trigger of alternate procedures when SpaceX approaches their closure hours minimum. An example schedule should be prepared that shows an "as planned scenario", and one that is more in line with our recent experiences of multiple closures for a single test.	
25	16	2.1.3.1, line 22-23	S	JR	This section states that there may be occasions when a static fire engine test is "unsuccessful" and that in those "rare circumstances" when the full duration is not achieved, another attempt would be made.	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

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	Page*	Section	S, A			
					The EA should define the terms "successful static fire engine test" and "unsuccessful static fire engine test". All potential direct and indirect environmental effects associated with both successful and unsuccessful static fire engine tests should be fully described and evaluated. The term "rare" should be quantified in order to fully evaluate the anticipated environmental impacts associated with both successful and unsuccessful tests. The number of additional static fire test attempts should be quantified and included in the maximum total number of static fire tests that would be conducted annually.	
26	16	2.1.3.1, line 27	S	JR	The EA should define what is meant by "off-nominal operation" when residual LCH4 may be released into the atmosphere.	
27	16	2.1.3.2, lines 29+	S	KK	The header only identifies Suborbital Flight Tests but describes both suborbital flight tests and tanking tests. TPWD recommends that it would be clearer for each activity to have its own heading followed by descriptions of the activities.	
28	16	2.1.3.2; line 32	S	LG	The process of how the liquids within the tanks will be disposed of after the tanking tests are completed should be described.	
29	16	2.1.3.2, line 35, 36	S	KK	Can the phrases "likely be higher" and "high altitudes" be made more specific?	
30	16	2.1.3.2, line 35, 36	S	KK	This line states, "...conduct up to 20 Starship suborbital flights."	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
	Page*	Section	S, A			
					Is this per year? And will closures be required? Is this in addition to 60 static fire engine tests per year?	
31	16	2.1.3.2, line 37,38	S	JR	This section states that as flight tests become "successful", SpaceX would then lower the number of suborbital flights to a minimum of approximately 5. Please define what is meant by "successful" and what would be considered "unsuccessful". How many "unsuccessful" suborbital flights are anticipated before the desired success rate is achieved? What are the potential environmental effects of both successful and unsuccessful suborbital flight tests?	
32	16	2.1.3.3, line 40	S	KK	Are the number of annual launches based on noise modeling? TPWD would like to review the noise modeling and know what the maximum and average decibel levels are for launches as well as experimental testing activities. Who will conduct the assessment of the impacts to wildlife and how will this be done?	
33	17	2.1.3.3, line 1 ff	S	JR	This section describes the maximum number of proposed orbital launches. The EA should clarify the frequency of orbital launches.	
34	17	2.1.3.3; line 6	A	LG	The "Y" orbital launches placeholder is confusing and inconsistant since it has been stated in Section 2.1 and previously in this section, 2.1.3.3, that there would be a maximum of 8 orbital launches. Please clarify this information.	
35	17	2.1.3.3, line 7	S	KK	Is the rocket exhaust plume expected to impact TPWD land immediately adjacent to SpaceX property? What is the estimated radius at which the rocket exhaust plume would affect these surroundings?	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

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	Page*	Section	S, A			
36	17	2.1.3.3; line 8	S	LG	What are the characteristics of the "surrounding areas" around the launch pad? They should be described.	
37	17	2.1.3.3, line 9 ff	S	JR	This section describes the potential use and disposal of water at the launch site. The EA should evaluate the effects of water retention and/or disposal on fish and wildlife resources at the project site. Specifically, these activities have the potential to result in habitat conversions (e.g., salt marsh to freshwater marsh or tidal flats to emergent marsh).	
38	17	2.1.3.3, line 11	S	KK	Regarding stormwater/wastewater issues addressed in this section, TPWD recommends the TCEQ be provided an opportunity to provide input and comment on this issue.	
39	17	2.1.3.3, line 11	S	KK	TPWD has noted vegetation changes at and adjacent to the site from runoff and water from fire fighting, and TPWD does not know about contamination from site water runoff. TPWD recommends that treatment or retention of stormwater or wastewater should be required and water would be contained in retention basins adjacent to the launch mount on SpaceX property.	
40	17	2.1.3.3, line 23	S	KK	Is the well referenced on line 23 an existing well or a proposed well?	
41	17	2.1.3.3; lines 24-35	S	LG	How downrange and VLA landings compare with respect to potential environmental effects should be discussed as well as how the use of one over the other is determined.	
42	17	2.1.3.3, line 25 ff	S	JR	This section describes landing Super Heavy down range "off the coast" or at the VLA. Additional information about landing "off the coast" should be provided since this activity has not been previously described for this project site and may be a connected action.	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

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	Page*	Section	S, A			
43	17	2.1.3.3; line 35, 42	A	LG	The maximum of "Y" Super Heavy and Starship landings is not consistent with what has already been stated will be a maximum of 8 orbital launches. Clarification is needed on why these paragraphs continue to state an unknown maximum number of launches and landings.	
44	17	2.1.3.3, line 32	S	KK	Delivery via road from the Port of Brownsville to the VLA is at least 20 miles without new road construction. Does the FAA and SpaceX anticipate that road expansion or construction to accommodate vehicle deliveries to the VLA?	
45	17	2.1.3.3, line 37	S	KK	The term "safing" should be defined in the EA.	
46	17	2.1.3.3, line 38	S	KK	The effects of sonic booms on wildlife should be discussed and supported by recent studies. How many times per year are sonic booms proposed to occur? Would it be a maximum of 8 times?	
47	18	2.1.3.3, line 2 ff	S	JR	This section describes the potential to recycle LCH4 back into methane tanks at the VLA or send it to the flare as technology and design develops. Please clarify if the research and development of technology to recycle methane or send it to a flare would be conducted at the project site. Will these activities and associated environmental effects be evaluated in the EA?	
48	18	2.1.3.4, line 29-30	S	JR	This section states that the Brownsville Shipping Channel would not be effected by a closure. Since the 2014 FEIS, TPWD notes that three LNG terminals have been licensed along the Brownsville Shipping Channel and a large natural gas pipeline has been constructed within 6 miles or less of the VLA.	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
	Page*	Section	S, A			
					It is our understanding that, based on a third-party independent evaluation, FERC determined that activities described for each of the LNG projects would not result in adverse effects with respect to FAA-authorized activities. FAA should address these changes to the regional landscape and evaluate potential environmental effects that may result from proposed activities including "unsuccessful tests" and "off-nominal operations" in proximity to natural gas facilities located onsite, offsite, and offshore (e.g., LNG carriers, wells, etc.).	
49	18	2.1.3.4, line 34 ff	S	JR	This section states that SpaceX would notify the Cameron County Commissioners Court of the proposed operation date, the expected closure times, and back-up closure dates and times. This section does not specify how much notice the public will be given prior to beach closures, including the use or revocation of back-up dates. In addition, SpaceX states that proposed activities would require no more than 500 hours of closure per year. The EA should clearly explain how closures will be calculated and how those closures will be evaluated with respect to adverse effects on public access to public lands. The EA should evaluate the difference between "actual closure times" and "effective closure times". For example, if a beach closure is planned for 8 hours on Monday with Tuesday and Wednesday as back-up dates, and a reasonable person was planning a day trip to Boca Chica, that person would not likely plan the trip for Monday. They would also be less likely to plan the trip for Tuesday or Wednesday because the	

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					beach is not guaranteed to be open. In this scenario, the beach would be "effectively closed" all day Monday, all day Tuesday and all day Wednesday.	
50	18	2.1.3.3, lines 2 & 3	S	KK	This line references recycling LCH4 back into methane tanks. It is unclear if LCH4 and methane are used interchangeably. Is liquid methane being returned to tanks in a gaseous state?	
51	18	2.1.3.3; line 2-4	S	LG	What will determine the method of disposal of residual methane (recycle vs. release)? What is the estimated amount of residual methane released by the flares and what are the permit requirements?	
52	18	2.1.3.3, line 4	S	KK	An estimate of how much liquid oxygen (LOX) and LCH4 will be released should be provided; estimates should be separated into releases from everyday activities, tests, launches and landings, and any other sources.	
53	18	2.1.3.3, line 7	S	KK	In the event that a vehicle would be expended into the ocean, the fate/impacts of that action should be addressed and evaluated (e.g., describe the fate of the fuel) including potential short-term and long-term environmental hazards.	
54	18	2.1.3.3, line 14	S	KK	Regarding the night-time activities described in this section, an indepth analysis of potential impacts to rare and endangered nesting sea turtle adults and hatchling sea turtles should be included in the appropriate section of the EA.	
55	18	2.1.3.3, line 21-24	S	KK	This section states that, "SpaceX is currently constrained by limits in technology and production, resulting in the proposed launch cadence. In the future, SpaceX may propose to increase the launch rate of Starship/Super Heavy to support growth in the program. Proposed modifications to the launch program would be assessed at that time in a new NEPA document." This proposed activity would occur at a facility surrounded by publicly owned land managed for wildlife. Due to its location among areas of sensitive	

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					resources and the lack of additional property for SpaceX expansion, growth of the Starship/Super Heavy at the current location may result in significant negative impacts to adjacent properties. The anticipated activities for which a new NEPA document would be required should be addressed in a Cumulative Impacts analysis.	
56	18	2.1.3.4, lines 31-33	S	KK/WC	The operational closure notices are described in this section as, "Approximately two weeks in advance of an operation requiring a closure, SpaceX would notify..." This is not how the process is currently carried out. Two weeks notice is not often given. None of the notices since April 2020 have had a two week advance notice. The longest advance was 10 days and most were 0 to 5 days. If two weeks notice is not possible, the written process should reflect what is actually possible and likely to happen.	
57	19	2.1.3.4, lines 6 & 7	S	KK	These lines state, "SpaceX has committed to work with the USFWS to fund additional resources or personnel necessary to enforce the closures required for launch operations." Working with the USFWS to provide funds for additional resources was proposed previously and has still not occurred. Because it is critical to the process of conserving natural resources while also meeting SpaceX's objectives, the EA should include assurances that SpaceX and the FAA ensure this commitment is fulfilled.	
58	19	2.1.3.4, lines 16 &17	S	KK	These lines state, "SpaceX would not exceed 500 hours of closure per year." The term "closure" needs to be defined. Currently, closures far exceed what was included in the 2014 EIS. Closure should include times that were advertised as closed, but ended up not being closed.	
59	19	2.1.3.4; line 18	S	LG	A breakdown of time (a minimum, maximum, and average hours) needed for each type of operation (i.e. wet dress rehearsal, static fire engine test, etc.)	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
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					should be provided. This information would benefit limiting closures of Boca Chica beach.	
60	19	2.1.3.4; line 20	S	LG	The EA should describe how hours of closure will be monitored/logged and by whom, and describe if that information will be available to the public. Will the 500 hours of closure include hours spent on incompleted planned flight activities as well as hours reserved for alternate dates? Are updates to those notifications provided to the public when the use of the listed alternate dates are not needed, therefore making beach access available to the public?	
61	19	2.1.3.4, lines 19-21	S	KK	"The total number of closures and closure hours for wet dress rehearsals, static fire engine tests, tanks tests, suborbital tests, and actual launches would require approximately 500 hours of closure per year." Considering the problems agency staff have had calculating closures, please estimate how many days with interruptions to access that this represents, and share with us the current SpaceX methodology for calculating this.	
62	19	2.1.3.4 Lines 24,25	S	WC	The EA proposes to increase the closure hours from 180 to 500 hours per year. Since 1 April 2020 the beach has been closed 51 days according to www.cameroncounty.us/space-x/. It appears that the number of closure hours has already exceeded 180 hours. An increase to 500 hours is excessive and should be unnecessary.	
63	20	2.1.4	S	LG	The total footprint of proposed expansion and any additional, potential impacts to wetlands and aquatic resources should be provided. The total acres for each habitat type affected and a breakdown for each of the proposed projects, should be assessed and quantified. The total acres for each habitat type and a breakdown of each should also be included in mitigation plans. The EA should	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
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					specify whether any of the new construction proposed would be outside the Space X property boundary.	
64	22	Figure 2-5	A	LG	The long, rectangular, blue area in figure abutting the air separation unit is not labeled. Nor are the two gray trapezoid-like areas attached to the redundant starship test pad and existing landing pad.	
65	20	2.1.4, line 4	S	KK	Solar farm expansion should be explained in detail. Solar farms should be located away from refuges and public lands, especially areas with large populations of birds. Special coatings should be used to prevent the panels from looking like water. Other beneficial management practices (BMPs) for solar installations are available and should be included and implemented to limit impacts on wildlife, particularly birds.	
66	24	2.1.4; line 6	S	JR/LG	The EA should specify how the soil from drill activities will de disposed of. The EA should also evaluate adverse environmental effects that may result from "unsuccessful tests" or "off-nominal operations" within the vicinity of the natural gas wells, power plants, and associated infrastructure.	
67	24	2.1.4, line 2 ff	S	KK	If drilling is proposed to go under any land other than SpaceX's, the additional review and applicable regulations should be addressed and followed. No activities, materials, or soil disposal would be allowed on TPWD land without prior consent.	
68	24	2.1.4, line 12	S	KK	Any potential emissions/flares from the natural gas wells should be addressed and included with the discussion of other emmissions/flares, if applicable.	
69	24	2.1.4, line 16	S	KK	The acreage for the desalination plant and five natural gas wells and separation units should be provided. Is the liability policy for clean up at the site $3M per	

Comment Response Matrix

SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)

#	Location		Type of Comment	Reviewer Initials	Comment	Response / Concurrence
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					the FAA permit? Are there assurances that if cleanup is needed the funds do not have to come from public funds?	
70	24	2.1.4, line 24	S	RH/KK	Figure 2.5 (Page 22) indicates that a parking area would be located on the north side of Highway 4, on a loma, outside of the SpaceX property boundary. TPWD recommends the EA clarify the locations of parking areas; they should not be located along the side of the highway. TPWD recommends coordinating with TxDOT to establish a reasonable speed limit to minimize wildlife-vehicle collisons along this section of Highway 4.	
71	24	2.1.4; line 25	S	LG	In addition to providing a footprint of the proposed parking lot expansion, the proposed material used to construct it should be described. TPWD recommends investigating the use of permeable materials to construct the parking areas.	
72	24	2.1.4; line 27-29	S	LG/KK	Please provide the exact number of proposed power plants (1 or 2) so an adequate evaluation of impacts to wetlands can be conducted since each site is proposed to be up to 5.5 acres in size.	
73	24	2.1.4, line 30	S	KK	Please provide the anticipated emissions from the proposed power plants.	
74	24	2.1.4; line 34	S	LG	The statement of, "Some structures would be up to 45 m" needs to be more definitive and detailed and less conceptual to properly and accurately determine impacts to fish and wildlife resources. This comment applies to all plans and projects proposed in the EA.	
75	24	2.1.4, line 41	S	KK	During preparation of the EA, it should be determined if TxDOThas authority in the ROW along Highway 4.	
76	25	2.1.4, line 4	S	KK	See comment #65; the solar farm expansion impacts on wildlife should be researched further.	

Comment Response Matrix SpaceX Boca Chica Sections 1 and 2 – Administrative Draft Cooperating Agency Review (June 2020)						
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77	26	2.3	S	LG	A table should be provided quantifiying the impacts (acres) to each wetland type for each of the alternative sites to support why the Texas Launch Site meets the criteria of having the minimum environmental disturbance.	
78	26	2.3, line 15	A	KK	Should the word "compromise" be "comprise" in this sentence?	
79	26	2.3, line 17	S	KK	Alternative sites were eliminated from further consideration because they do not support landing a space vehicle. The infrastructure at the Boca Chica site also does not support landing a space vehicle, which is why the site is currently undergoing additional construction. The EA needs to better demonstrate how the impacts at Boca Chica would be less than those at other more developed locations and how the existing infrastructure and size of the facilities at Boca Chica are more suitable than those at SLC-40, located at the Space Launch Complex within Cape Canaveral Air Force Station.	
80	26	2.3, line 20	S	KK	The EA should describe the analysis that led to the conclusion that impacts at a new site would be greater than those at Boca Chica, a site located adjacent to public lands containing rare and unique ecosystems. Due to the current redevelopment of the Boca Chica site to accommodate the Starship/Super Heavy, the current activities at Boca Chica essentially constitute constructing a new site for Starship/Super Heavy operations that would result in extensive environmental impacts.	
81	27	App.A	S	KK	Very few of the references listed are actually cited in the first two chapters of the EA. Will they be used in subsequent sections? Some references listed are currently outdated and should be revised with more current data/references (e.g., the 2009 referenced sea turtle report contains data from 2008. The most current data should be used).	

To add additional rows, place cursor in the bottom right cell and hit << Tab>>.
Comment Types: S= Substantive; A=Administrative (See definitions below)
* Page number refers to the pdf page number not document page number

DEFINITIONS

Substantive – Comments identifying an item in the document that appears to be, or is potentially, incorrect, misleading, or confusing.
Administrative – Comments identifying minor inconsistencies between different sections or errors in typography and grammar.

Reviewer: Please provide your initials

This is the area that was analyzed for impacts to piping plover habitat in the BO. As you can see the area of impact has changed and needs to be analyzed and vegetation monitoring plan must be re-evaluated to address the new area of impact.

New piping plover habitat that needs to be assessed for take.

Runoff from construction getting into new area that needs to be analyzed for take

New area of impact where piping plover habitat may potentially be converted as construction runoff and/or stormwater comes off the site and into the tidal flats.

Red circle is where take and monitoring was analyzed as shown in figure 15 and 16 of the BO

From: Perez, Chris
To: Winton, Bryan
Cc: Perez, Sonny; Orms, Mary; Gardiner, Dawn; delaGarza, Laura; Reyes, Ernesto
Subject: Re: [EXTERNAL] Location
Date: Friday, February 5, 2021 9:25:17 AM

Bryan:
I'm going to reach out to MVEC to see if they can provide us a copy of their existing easement and survey so we can review the easement language to see what they can and can't do first. I will be coordinating with Yvette on this as well. Based on what they're proposing to do it may not be appropriate or compatible. Overhead powerlines will likely be problematic across the salt flat areas near the SpaceX site so we probably need to see their construction plan as well. Let's see where this goes.

From: Winton, Bryan <[redacted]
Sent: Thursday, February 4, 2021 12:11 PM
To: Orms, Mary <[redacted] Gardiner, Dawn <[redacted] delaGarza, Laura <[redacted] Reyes, Ernesto <[redacted]
Cc: Perez, Sonny <[redacted] Perez, Chris <[redacted]
Subject: Fw: [EXTERNAL] Location

Mary:
I spoke with Magic Valley Electrical Cooperative staff this morning about a small line relocation project at Boca Chica but learned from them that Space-X has made their initial payment for materials to support a larger power line to traverse HW4 to their site. I know this is something that came up during 2014 EIS and we instituted that no above ground line would be allowed through the flats beyond where poles and line exist now. However, this line must cross a 10.2 mile section on HW 4 where FWS owns the land beneath the road and TxDOT has an easement for road purposes only which is how and why there has been little development out at Boca Chica. We need to communicate to Space-X that this is not likely going to be found compatible in a ROW application which is necessary in order to proceed with what they want. Can you let us know how ES would propose we proceed, interject, etc.?

bryan

From: Domitilo Cantu <[redacted]
Sent: Thursday, February 4, 2021 11:43 AM
To: Winton, Bryan <[redacted]
Subject: [EXTERNAL] Location

Bryan,

I attached the kmz files for the proposed new overhead and underground for your review. Let me know what would be required of them to be able to build during birding season so I can add it on to their costs. We can build starting at any end first if it helps at all. Let me know your thoughts.

Also, I touched base with the contractor that did the underground, apparently my inspector had been on their case about it. They will go and smooth out the surface at the latest next week. I will personally follow up and keep you updated.

Domi Cantu

[redacted] cell
[redacted] office

From:	Perez, Chris
To:	Perez, Sonny; Gardiner, Dawn; Orms, Mary; delaGarza, Laura; Garza, Rolando L
Cc:	Winton, Bryan
Subject:	Re: [EXTERNAL] RE: SN11 Anomaly March 30, 2021
Date:	Tuesday, March 30, 2021 9:59:15 AM

Ok. Good to know. Debris was raining down everywhere on the video that I witnessed....Geez, I wish they would have waited a couple hours since the fog would have lifted by then....!

From: Perez, Sonny <[redacted]
Sent: Tuesday, March 30, 2021 10:56 AM
To: Perez, Chris <[redacted] Gardiner, Dawn <[redacted] Orms, Mary <[redacted] delaGarza, Laura <[redacted] Garza, Rolando L <[redacted]
Cc: Winton, Bryan <[redacted]
Subject: Re: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

Chris,

Thank you for mentioning that as I should have included a note to that topic.

The cause of the anomaly was an engine failure and subsequent explosion. The self-detonation component is still intact and one of the critical components that the drone recon efforts are attempting to locate.

Sonny

From: Perez, Chris <[redacted]
Sent: Tuesday, March 30, 2021 10:50 AM
To: Perez, Sonny <[redacted] Gardiner, Dawn <[redacted] Orms, Mary <[redacted] delaGarza, Laura <[redacted] Garza, Rolando L <[redacted]
Cc: Winton, Bryan <[redacted]
Subject: Re: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

Can't confirm yet but on YouTube there was mention of SpaceX self-destruct being used this time?

From: Perez, Sonny <[redacted]
Sent: Tuesday, March 30, 2021 10:47 AM
To: Gardiner, Dawn <[redacted] Orms, Mary <[redacted] delaGarza, Laura <[redacted] Perez, Chris <[redacted] Garza, Rolando L

< [redacted] Justin Kockritz < [redacted]
Cc: Winton, Bryan < [redacted] Reagan Faught < [redacted]
McDowell, Kelly < [redacted]
Subject: Re: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

All,

This is the latest information on the SN11 anomaly.

Highway 4 remains closed, and site locked down as SpaceX continues to map out debris field and locate critical components that make the site unsafe for the time being.
SpaceX reported this anomaly to have a more substantial debris field on state lands north of Highway 4 than previous anomalies.
Debris has been observed via drone to be approximately [redacted] meters into state lands.
Debris size ranges from small, medium, and large pieces.
Response team will be meeting with SpaceX at 1300. It is projected that the critical components will be located before this time.
Bryan plus 2 other FWS refuge resources, TPWD deploying 1 staff resource, and CBBEP is deploying 1 staff resource for response.

Site conditions are described by SpaceX as wet and very soft after recent frontal passage and yesterday's rain events.

Sonny

From: Perez, Sonny < [redacted]
Sent: Tuesday, March 30, 2021 9:11 AM
To: Gardiner, Dawn < [redacted] Orms, Mary < [redacted] delaGarza, Laura < [redacted] Perez, Chris < [redacted] Garza, Rolando L < [redacted] Justin Kockritz < [redacted]
Cc: Winton, Bryan < [redacted] Reagan Faught < [redacted]
Subject: Fw: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

All,

This is a preliminary update. SpaceX had an anomaly this morning while the SN11 was still in flight. The foggy conditions prevented any decent observations of the potential debris field and extent of damage at this point. Bryan Winton will serve as lead responder for FWS and will be contacting Leo Alaniz (SpaceX POC). I anticipate that the foggy conditions will delay recon efforts by SpaceX. Also, there is the possibility that this explosion having taken place while still in flight may have a debris field larger than previous anomalies to the extent that other agencies may play a role in response.

A debris field map has been requested of SpaceX.

Bryan or I will provide details as they come available.

Sonny

From: Reagan Faught <[redacted]
Sent: Tuesday, March 30, 2021 8:25 AM
To: Perez, Sonny <[redacted]
Cc: McDowell, Kelly <[redacted] Winton, Bryan <[redacted]
Subject: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

Thank you Sonny, monitored the launch and have engaged the response team. I will be curious to see how large the debris field is this time.

Reagan

From: Perez, Sonny <[redacted]
Sent: Tuesday, March 30, 2021 8:22 AM
To: Reagan Faught <[redacted]
Cc: McDowell, Kelly <[redacted] Winton, Bryan <[redacted]
Subject: SN11 Anomaly March 30, 2021
Importance: High

Reagan,

I have been contacted by both Davis Libbey and Leo Alaniz of SpaceX to advise of an anomaly. They are currently focused on protecting the "methane farm" on the pad site and will begin recon when that is secure. Leo will contact me when they have completed their recon.

It is likely that we will need to engage the response individuals today.

Sonny

From: Perez, Chris
To: Perez, Sonny; Gardiner, Dawn; Orms, Mary; delaGarza, Laura
Cc: Winton, Bryan
Subject: Re: [EXTERNAL] RE: SN11 Anomaly March 30, 2021
Date: Tuesday, March 30, 2021 8:25:56 AM

Video showed debris "raining down" for a good while so I expect retrieval will be spread out further and right now conditions are very wet to access the sandflats.

From: Perez, Sonny <[redacted]
Sent: Tuesday, March 30, 2021 9:11 AM
To: Gardiner, Dawn <[redacted] Orms, Mary <[redacted] delaGarza, Laura <[redacted] Perez, Chris <[redacted] Garza, Rolando L <[redacted] Justin Kockritz <[redacted]
Cc: Winton, Bryan <[redacted] Reagan Faught <[redacted]
Subject: Fw: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

All,

This is a preliminary update. SpaceX had an anomaly this morning while the SN11 was still in flight. The foggy conditions prevented any decent observations of the potential debris field and extent of damage at this point. Bryan Winton will serve as lead responder for FWS and will be contacting Leo Alaniz (SpaceX POC). I anticipate that the foggy conditions will delay recon efforts by SpaceX. Also, there is the possibility that this explosion having taken place while still in flight may have a debris field larger than previous anomalies to the extent that other agencies may play a role in response.

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Sonny

From: Reagan Faught <[redacted]
Sent: Tuesday, March 30, 2021 8:25 AM
To: Perez, Sonny <[redacted]
Cc: McDowell, Kelly <[redacted] Winton, Bryan <[redacted]
Subject: [EXTERNAL] RE: SN11 Anomaly March 30, 2021

Thank you Sonny, monitored the launch and have engaged the response team. I will be curious to see how large the debris field is this time.

Reagan

From: Perez, Sonny <[redacted]
Sent: Tuesday, March 30, 2021 8:22 AM
To: Reagan Faught <[redacted]
Cc: McDowell, Kelly <[redacted] Winton, Bryan <[redacted]
Subject: SN11 Anomaly March 30, 2021
Importance: High

Reagan,

I have been contacted by both Davis Libbey and Leo Alaniz of SpaceX to advise of an anomaly. They are currently focused on protecting the "methane farm" on the pad site and will begin recon when that is secure. Leo will contact me when they have completed their recon.

It is likely that we will need to engage the response individuals today.

Sonny

From: Perez, Sonny
To: Gardiner, Dawn
Cc: Perez, Chris; Winton, Bryan; Ardizzone, Chuck CA; Orms, Mary; delaGarza, Laura
Subject: Re: After Action Review Follow up
Date: Thursday, December 17, 2020 9:47:51 PM

Let's push for that as soon as we can identify appropriate staffing. In the meantime, an emergency consultation could be issued for this SN8 incident or the next incident. I defer judgement on that to ES leadership.

Sent from my iPhone

> On Dec 17, 2020, at 5:51 PM, Gardiner, Dawn < [redacted] wrote:
>
> I am thinking an emergency consultation should be triggered with FAA. We should consider having someone shoulder to shoulder with the FAA staff and SpaceX at the launch.
>
> ---
>
> **From:** Perez, Sonny < [redacted]
> **Sent:** Thursday, December 17, 2020 2:51 PM
> **To:** Gardiner, Dawn < [redacted] Perez, Chris < [redacted]
> Winton, Bryan < [redacted] Ardizzone, Chuck CA
> < [redacted] Elizondo, Iriz < [redacted] Garcia, Romeo
> < [redacted] Devriendt, Donald J < [redacted]
> **Cc:** Orms, Mary < [redacted] delaGarza, Laura < [redacted]
> **Subject:** Re: After Action Review Follow up
>
> Dawn,
>
> I could use a good refresher from you on trigger points so that we can work that end of notification stronger. I heard your reference to and Matt's comments regarding endangered species impacts during the after-action review. I believe an anomaly should trigger an agency inquiry to FAA just as it triggers an FAA investigation for SpaceX.
>
> Sonny
>
> ---
>
> **From:** Gardiner, Dawn < [redacted]
> **Sent:** Thursday, December 17, 2020 1:59 PM
> **To:** Perez, Sonny < [redacted] Perez, Chris < [redacted]
> Winton, Bryan < [redacted] Ardizzone, Chuck CA
> < [redacted] Elizondo, Iriz < [redacted] Garcia, Romeo
> < [redacted] Devriendt, Donald J < [redacted]

Cc: Orms, Mary <[redacted] delaGarza, Laura <[redacted]
Subject: Re: After Action Review Follow up

I need to say one more time that neither SpaceX nor FAA have take authorization under the Endangered Species Act for the testing activities they are engaging in, whether there is an anomaly or not. It is good to do the best we all can for listed species and SpaceX/FAA needs either a new/amended biological opinion asap or to stop and get an HCP before we find a carcass or get sued by a third party.

From: Perez, Sonny <[redacted]
Sent: Wednesday, December 16, 2020 1:49 PM
To: Perez, Chris <[redacted] Winton, Bryan <[redacted]
Gardiner, Dawn <[redacted] Ardizzone, Chuck CA
<[redacted] Elizondo, Iriz <[redacted] Garcia, Romeo
<[redacted] Devriendt, Donald J <[redacted]
Subject: After Action Review Follow up

All,

I wanted to thank you all for what I perceived to be good dialogue and progress toward a better understanding and support for incident response scenarios. My perception is that there is more in place to guide our response efforts than I realized, and I'd like to continue to build on that further.

I'd like for us to follow up by creating a list of action items deliverables, etc. that we gathered from the call (e.g. Refuge maps to SpaceX, dispatch coordination to SpaceX, further coordination with TWPD on response team members, further coordination on sensitive areas). Please send me any additional items that you recorded to me via email even if it is already completed. If you have nothing further, then send me a nothing to report.

I have asked TPWD and SpaceX to speak with their teams and gather action items, deliverables, etc. to share with me. I will build a comprehensive list and share it among us. I believe a few have already been accomplished since the call ended, but I will capture them anyway.

I will be taking leave after Thursday as will many of you. I understand that this may disrupt some progress. We will have an Acting Refuge Manager for Lower Rio Grande Valley NWR and an Acting Complex Refuge Manager for South Texas Refuge Complex. On certain days, it may be the same person as we are short on staff. They have decision-making authority and are authorized to call me if they reach a level of discomfort with a situation.

The dispatch operations center will be the best way to reach the most appropriate management, Law Enforcement, or Fire representative. The number is [redacted] from 0600-2200. There is an after-hours number to the on call dispatcher recorded on the voicemail.

Thank you,

Sonny

From:	Perez, Sonny
To:	Perez, Chris; Winton, Bryan
Cc:	Gardiner, Dawn; Orms, Mary; Kendal Keyes; Reyes, Ernesto; delaGarza, Laura
Subject:	Re: Boca Chica monitoring
Date:	Wednesday, September 16, 2020 10:29:53 AM

All,

This is along the same lines of the conversation. This an excerpt from a previous conversation that I had with SpaceX. I only sent the email to Bryan and Dawn. This is from 9/2/2020

SpaceX contacted me with some questions.

1. *Katy asked if we would be interested in emulating the Cape Canaveral/Merritt Island NWR coordination.-*
    a. *she referenced the monitoring structure there has a liaison between NASA and refuge and a consultant/contractor is used for collecting data*
    b. *would this work better than UTRGV and be considered for new MOA.*
    c. *are there research or monitoring areas that SpaceX can contribute to?*
2. *Drone needs by refuge or other entities.*

In regards to item 1,
a. I advised Katy and Alma that we had spoken to Merritt Island NWR and learned that there are similarities but also differences in how we would have to work through items. I encouraged them to schedule another call between the 2 refuges and themselves if they wanted to facilitate some additional discussion.
b. I shared that my perception with the UTRGV scenario is that expectations seem to have been set that FWS staff would be funded and oversee biological monitoring therefore defaulting to UTRGV students didn't meet expectations. Advised that we need to reset expectations and at a minimum elevate the surveying/monitoring efforts to a professional firm or employees.
c. I referenced that the red knot's recent critical habitat proposal along with piping plover could be areas for them to contribute efforts. I suggested that just as they are working with Sea Turtle Inc. that perhaps an entity like CBBEP might be able to benefit from their support on the work being conducted in the area. I also referenced that monitoring of HWY 4 because of the increased traffic could help inform decisions for underpasses. I explained that these were just some items, but that I would defer this discussion to Bryan who is much more informed on these matters.

They are asking how to do better so we should probably tell them.

Sonny

From: Perez, Chris <[redacted]
Sent: Wednesday, September 16, 2020 10:13 AM
To: Winton, Bryan <[redacted]
Cc: Gardiner, Dawn <[redacted] Orms, Mary <[redacted] Kendal Keyes <[redacted] Reyes, Ernesto <[redacted] delaGarza, Laura <[redacted] Perez, Sonny <[redacted]
Subject: Re: Boca Chica monitoring

Yes. However, I could see that SpaceX may have a credibility issue with us doing the work considering the circumstances?...Probably something a neutral third party should undertake for all involved if we decided it was something worth pursuing...?

From: Winton, Bryan <[redacted]
Sent: Wednesday, September 16, 2020 9:54 AM
To: Perez, Chris <[redacted]
Cc: Gardiner, Dawn <[redacted] Orms, Mary <[redacted] Kendal Keyes <[redacted] Reyes, Ernesto <[redacted] delaGarza, Laura <[redacted] Perez, Sonny <[redacted]
Subject: Re: Boca Chica monitoring

I want to take the lead in documenting the effects of their activity. I agree Space X should pay for this but I have no confidence or expectation that they will. Time is on their side not ours. We can't go anywhere near our 22K acres of refuge at the whim of Space X now which is supported by the county with no regard for us, the wildlife or the public. We need a 3rd party to enact the research design and monitoring we develop to insure the findings are credible... although the impacts are intuitively obvious with respect to noise, vibration, lighting, traffic, and air quality deterioration. We should ask for the moon (or Mars) in the BO but expect they will do nothing toward that end as they have demonstrated since 2013, except continue to do whatever they want with no concern for the impacts to the natural world their activity causes.

Bryan

Get Outlook for iOS

From: Perez, Chris <[redacted]
Sent: Wednesday, September 16, 2020 8:58:26 AM
To: Winton, Bryan <[redacted]
Cc: Gardiner, Dawn <[redacted] Orms, Mary <[redacted] Kendal Keyes <[redacted] Reyes, Ernesto <[redacted] delaGarza, Laura <[redacted] Perez, Sonny <[redacted]
Subject: Fw: Boca Chica monitoring

Good morning Bryan:

Ok. I'm thinking we'll have to do some research on this to see if and what type of equipment has been used to monitor vibration and noise impacts to (I'm assuming nesting birds, wintering birds, and sea turtles). I think that's something we could probably ask for in the BO from SpaceX but could be something we or academia could implement? For sure I don't see

why we should have to fund it as this is something SpaceX should fund?! We should bring this up at our next meeting if we agree that's something worth pursuing and expected product outcomes. Also, would this need to be added to our recently approved 15-year IMP plan for LRGV? Let me know.
Thanks.

From: Winton, Bryan <[redacted]
Sent: Tuesday, September 15, 2020 11:34 PM
To: Perez, Chris <[redacted]
Subject: Boca Chica monitoring

When you get settled in from your move and are able to get back in the groove, can you search the web for vibration and noise monitoring equipment we can buy, deploy and monitor at set distances surrounding Space X launch site. I smell another publication or 2 for you. Bryan

From: Gardiner, Dawn
To: Winton, Bryan; Orms, Mary
Subject: Re: DRAFT REPORT SN11 Anomaly - Rocket engine explosion @ 0.5-1 mile above the launch site - 3-30-21
Date: Wednesday, March 31, 2021 7:52:27 AM

Mary- in the current BA, we need them to describe their response to anomalies. Clean up and retrieval will be occurring in piping plover habitat, maybe red knot habitat and black rail habitat and aplomado. Maybe pipl critical habitat.

From: Winton, Bryan <[redacted]
Sent: Tuesday, March 30, 2021 9:25 PM
To: Gardiner, Dawn <[redacted] Orms, Mary <[redacted]
Subject: Fw: DRAFT REPORT SN11 Anomaly - Rocket engine explosion @ 0.5-1 mile above the launch site - 3-30-21

FYI
The debris field is likely 2-3 miles. Majority is on north side of HW 4. Its the worst "anomaly" we've experienced thus far. There is the Full Moon now so tides are high, site is being inundated, and retrieval will be significantly delayed and or more costly (helicopter).

I'll forward a copy of the Final Report.
bryan

From: Winton, Bryan
Sent: Tuesday, March 30, 2021 9:22 PM
To: [redacted] <[redacted] [redacted] <[redacted] Garza, Rolando L <[redacted] Stephanie Bilodeau <[redacted] Edler, Scot <[redacted] Longoria, Gerardo <[redacted] David Kroskie <[redacted]
Cc: Reagan Faught <[redacted] Perez, Sonny <[redacted] Fernandez, Oralia Z <[redacted]
Subject: DRAFT REPORT SN11 Anomaly - Rocket engine explosion @ 0.5-1 mile above the launch site - 3-30-21

This is a DRAFT report. I am requesting the TEAM review this summary, and provide feedback by 12pm Wednesday, so that a Complete Recommendation can be reviewed/recommended by TPWD.

Thank you to the staff from TPWD, NPS, CBBEP and FWS for responding to the 7:50am Space X Anomaly/explosion today at Boca Chica.

All staff arrived on-site at or near 1pm today, and stayed until ~6:15pm.

TPWD Biological staff (Liana Garcia and Andres Garcia) were granted the lead on-site to advise me, the POC for the incident, how they recommended Space-X proceed with removal of debris. Leo Alaniz was the Space-X POC.

NPS Cultural Resources Staff (Rolando Garza) and TPWD Cultural Resources Staff (David Kroskie) surveyed the debris field but were not able to access the piling (Historical Features) or the majority of the other cultural resources within the State Park. Coastal Bend Bays and Estuary Biological staff, Stephanie Bilodeau, surveyed the area for nesting birds, evidence of nest initiation, and any evidence of impact from the debris field or Space-X staff which were authorized by myself and the Team to walk the entire debris field in search of the 2nd Flight Termination Device, which is a FAA required safety item.

No GLO representatives were present.

The debris field consists of the entire rocket. Significantly more debris on the Boca Chica State Park, Lower Rio Grande Valley NWR, and, this time, the General Land Office properties, than occurred during the previous 2 Hopper and 3 SN anomalies.

Conditions: Due to Full Moon, and subsequent high tides, the debris field had been or is subject to inundation. From what was reported by Space-X, 90% of the debris is north of the launch site/north of HW4, due to height of rocket upon explosion, and prevailing south winds.

During the afternoon much of the debris was clearly visible partly lodged in or atop the wet/soft alkaline flats.

Staff were on stand-by until 4:45pm when the 2nd Flight Termination Device was located and removed. Upon removal, staff were cleared for access to the alkaline flats to determine substrate firmness and extent of debris field. Staff reported the debris field was much more extensive than when observing from HW4. Lots more large and smaller pieces of debris than previously. Due to height of explosion, much of the materials of larger size are lodged into the alkaline flat. Approximately 20 pieces of debris are of such size that they will require equipment for removal or use of helicopter for removal. The majority of the debris (~50%) appeared to be smaller size pieces that can be removed by hand, by walking on the flats, stockpiling the materials in a particular area onto the edge of 1 of 3 vegetated lomas, where ORV or other small equipment can be used at a later time to load and remove the debris--minimizing widespread ORV/ATV tracking about the flats in the soft substrate. This was a mutual Team recommendation. The Team determined that the least-damaging approach would be to allow foot access only at this time. POC Leo Alaniz was advised that Space-X could continue GPS location for all materials so that upon my arrival on Wednesday, 9am, Space-X may begin debris capable of being collected on foot for stockpiling. Alaniz stated Space-X would focus on debris removal on HW 4, for which there was substantial materials, including 1 of the 3 raptor engines.

TPWD and the Team did not collectively agree on an approach for future debris retrieval. TPWD recommended mats for accessing the larger items that are 0.3-0.5 miles from HW 4. Some items are well into the South Bay, so during high tide those items can be retrieved by boat ideally.

The question for Leadership at this time is can we delay the retrieval due to habitat conditions, and if so, for how long. Best case scenario, the flats will likely not be capable of drying until 3-5 days after Full Moon, and an anticipated northern expected to reach the Valley by Thursday evening. The northern will likely push tidal waters far into the flats up against HW 4. Notwithstanding a significant rain event accompanying the northern, the flats could potentially be in a state they can begin drying by this Friday.

As for removal of the 20+ larger debris items. Either Space-X will need to wait until the flats are dry/firm so equipment can access those items (still high level of expected damage/ruts), and seek assistance via Helicopter so that foot access to debris can be conducted along with slings and hand-carried equipment, and then helicopter removal and drop in a designated area off the State Park/Refuge. The Team did not unanimously agree on the preferred method of retrieval for large debris items, although some participating staff had not responded to any previous Hopper or SN incidents.

US Fish & Wildlife Service will continue to serve as lead for the incident. However, TPWD Leadership, along with FWS Sonny Perez should fine-tune what approach is recommended, so that I can implement the strategy identified.

Bryan Winton
Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]

From: Winton, Bryan
To: Orms, Mary
Cc: Perez, Sonny; Perez, Chris
Subject: Re: Information for Informal Scoping FWS Response Letter to FAA per proposal to Draft a new EA - due 11am, Jan 21, 21
Date: Thursday, January 21, 2021 12:23:22 PM

Thank you Mary. Your list is more comprehensive than the one I provided. I only list explosions that resulted in major debris scattering, although the additional explosions you listed are equally notable, due to the impacts they likely have on wildlife residing in close proximity during the event. Unfortunately, we are not able to access the area immediately following an event due to safety reasons which does not offer us the ability to investigate true wildlife impacts immediately following a blast, fire, etc. Not sure how we can expect to have access immediately following future similar events, but we need assurance that Space-X employees or the public don't gain access before we have a chance to do our initial investigation after such occurrences in the future.

bryan

From: Orms, Mary <[redacted]
Sent: Thursday, January 21, 2021 1:07 PM
To: Winton, Bryan <[redacted] Perez, Sonny <[redacted]
Cc: Perez, Chris <[redacted]
Subject: Re: Information for Informal Scoping FWS Response Letter to FAA per proposal to Draft a new EA - due 11am, Jan 21, 21

Bryan,

I looked up dates of SpaceX explosions on news articles and you tube....etc..

11/18/2019 - Space Ship MK1 Pressure Test explosion

2/28/2020 - Starship SN1 pressure Test explosion

4/2/2020 - Starship SN3 pressure test explosion

5/29/2020 - Starship SN4 explosion

12/9/2020 - Starship SN8 explosion

From: Winton, Bryan <[redacted]
Sent: Thursday, January 21, 2021 10:33 AM
To: Perez, Sonny <[redacted]
Cc: Perez, Chris <[redacted] Orms, Mary <[redacted]
Subject: Information for Informal Scoping FWS Response Letter to FAA per proposal to Draft a new EA - due 11am, Jan 21, 21

Example of damages by/from Space-X:

Traffic volume, road closures, wildlife mortality
Impacts to habitat: tidal flats, dunes, coastal prairie - debris, fires, rutting, wetland filling
Fires - 2 fires in 2019
Explosions (Debris scattered) - several since 2019
Development - conversion to industrial development/testing area
Residential Eviction - Kopernik Shores
Loss of public access to refuge, state park, beach and no reliable access for land management

Important Dates:

Nov 2018 - during Federal Government Shutdown/Furlough - Space X announces they will change activity from launch facility to a testing facility

April 21,22 -2019 - Space X employee(s) get stuck with 2 vehicles and a forklift in tidal flats. Causes significant damage to tidal flats. Space X employees did not have permission to be on the refuge.

July 25, 2019 - 130-acre fire caused from Space-X test that sent

fire/embers into the coastal prairie
August 2019 - second 15-acre fire, mostly in the dunes

November 20, 2019 - MK 1 explosion; Nose cone north of HW 4; cable fence damaged (never fixed)

February 28, 2020 - explosion - SN1 - Big debris north of HW4

Dec 9, 2020 - explosion of SN8 - Big debris (LE managed); Space-X still dragged/damaged flats

United States Department of the Interior

FISH AND WILDLIFE SERVICE

South Texas Refuge Complex

Lower Rio Grande Valley National Wildlife Refuge

[redacted]

October 2, 2020

Daniel P. Murray
Manager, Safety Division
Federal Aviation Administration (FAA)
800 Independence Ave., SW
Washington, D.C. 20591

Dear Mr. Murray:

This responds to your letter dated August 27, 2020, requesting our concurrence with FAA's determination that an increase in closure hours from 180 to 300 will not result in a *"constructive use"* as defined by Section 4(f) of the Department of Transportation Act of 1966.

The Lower Rio Grande Valley National Wildlife Refuge (Refuge) does not concur with the FAA's determination based on several reasons. Since 2014, SpaceX has undertaken numerous activities not covered in the original 2014 FEIS and these new activities, including frequent road closures extending beyond 180 hours, and large explosions from failed tests, as well as significantly large staffing, traffic, and construction activities have prompted concerns and re-evaluation of their current FEIS and the need to re-consult with the Fish and Wildlife Service's Ecological Services Division on their Endangered Species Biological Opinion for SpaceX. Currently, the FAA is requesting to increase the number of closure hours from 180 to 300. However, for the past six years, closures of the road to Boca Chica Beach are increasingly frequent and may occur for one of more days due to delays or problems occurring during testing. The FAA/SpaceX are only reporting actual closures for successful tests but they aren't counting the extended closures that occur for failed tests or delays which are still de facto closures for public access to the Boca Chica tract and the beaches. In 2019, the Refuge conservatively quantified that the actual number of hours of road closures on Highway 4 exceeded 1,000 hours, noting a significant discrepancy in accounting and accountability for minimizing the impact to the public.

Based on the Section 4(f) definitions, a *"constructive use"* occurs when there is *"a temporary occupancy of land that is adverse in terms of the statute's preservation purpose"* or when *"a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired."* Frequent closures are preventing the refuge from adequately managing its properties and allowing the public quality enjoyment of the Boca Chica Beach area for wildlife-dependent recreation. We maintain now, and as we did in our January 10, 2014, letter to FAA that there are both "adverse" and "severe" impacts to Refuge public use, management, wildlife, and habitat from the SpaceX activities. Increasing the "official" closure

hours to 300 will only exacerbate the levels of impairment of refuge properties despite that the refuge has estimated far more than 300 hours of closures are occurring each year.

Section 4(f) regulations *"require rigorous exploration and objective evaluation of alternative actions that would avoid all use of Section 4(f) properties…that would avoid some or all adverse effects."* This includes national wildlife refuge lands. The refuge therefore disagrees with the FAA determination now as well as in the past (see January 10, 2014 letter to the FAA, Stacey Zee), and requests a Section 4(f) analysis be undertaken to explore all reasonable and prudent alternatives that completely avoid Section 4(f) properties and/or to ensure *"all possible planning to minimize harm to the Section 4(f) property"* will occur. Based on the Section 4(f) definitions, a *"constructive use"* occurs when there is "a temporary occupancy of land that is adverse in terms of the statute 's preservation purpose" or when *"a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired"* Frequent closures are preventing the refuge from adequately managing its properties and allowing the public quality enjoyment of the Boca Chica Beach area for wildlife-dependent recreation. We maintain there are both *"adverse"* and *"severe"* impacts to Refuge public use, management, wildlife, and habitat from the SpaceX activities. Increasing the closure hours will only exacerbate the levels of impairment of refuge properties.

We appreciate your consideration of the above issues and look forward to discussing these or other concerns as pertains to the SpaceX Boca Chica site. You may contact me via email at [redacted] or my direct line at [redacted]

Sincerely,

Manuel "Sonny" Perez III
Acting Complex Refuge Manager

cc:
Stacey Zee, Federal Aviation Administration, Washington, DC.
Bryan R. Winton, Refuge Manager, Lower Rio Grande Valley NWR
Kelly McDowell, Refuge Supervisor, OK/TX Refuges
Dawn Gardiner, Assistant Field Supervisor, Texas Coastal ES Field Office

SpaceX Update

May 7, 2020

Via Microsoft Teams

Invited attendees

US Fish and Wildlife Service

- Dawn Gardiner
- Bryan Winton
- Ernesto Reyes

TPWD Executive Office

- Ann Bright - Chief Operating Officer
- David Eichler - Intergovernmental Affairs

TPWD Legal Division

- Bob Sweeney - General Counsel
- Colette Barron Bradsby - Assistant General Counsel
- James Murphy - Attorney

TPWD Coastal Fisheries Division

- Robin Riechers - Division Director
- Dakus Geeslin - Science and Policy Resources Branch Chief
- Leslie Koza - Ecosystem Resources Program Lower Coast Team Leader
- Jackie Robinson - Ecosystem Resources Program Natural Resources Specialist

TPWD Infrastructure Division

- Andrea Lofye - Division Director
- Ted Hollingsworth - Land Conservation Branch Manager

TPWD State Parks Division

- Rodney Franklin - Division Director
- Reagan Faught - Region 2 Director
- Greg Creacy - Natural Resources Program Director
- Michael Strutt - Cultural Resources Program Director
- Kendal Keyes - Region 2 Natural Resources Coordinator
- David Kroskie - Region 2 Cultural Resources Coordinator

TPWD Wildlife Division

- Clayton Wolf - Division Director
- John Silovsky - Deputy Division Director
- Julie Wicker - Branch Chief of Administration and Research
- John Davis - Wildlife Diversity Program Director
- Laura Zebehazy - Habitat Assessment Program Leader
- Russell Hooten - Habitat Assessment Program Natural Resources Specialist

General Project Timeline

*Please refer to Back-up materials summary for more details

- 2007 – Commission leased TPWD-owned Boca Chica land to USFWS
- 2011
  - Inquiry from Realtor regarding inholdings
  - TPWD becomes aware through media that SpaceX has selected Boca Chica site
- 2012
  - Initial contacts with SpaceX
  - NEPA and Section 106 Processes Start
- 2013
  - USACE permitting process starts
  - TPWD provides concurrence letter that SpaceX activities, at the time of review, do not constitute use as defined by Section 4(f)
- 2014
  - FAA issued Record of Decision (ROD) and USACE authorizes permit
  - Construction Begins

General Project Timeline - continued

*Please refer to Back-up materials summary for more details

- 2015 - USACE issues Public Notice for revised plans that result in additional impacts and revised mitigation plans
- 2017 - SpaceX Licensed by FAA
- 2018 - USACE issues an Interagency Coordination Notice for revised mitigation plans that identifies the Kangles Tract as the alternate mitigation site for previously authorized impacts
- 2019
  - Beach closures begin
  - USACE authorizes revised plans as an Administrative Modification because the proposed changes do not result in a net loss of aquatic resources
- Between 2014 ROD and November 2019 – at least six Written Re-Evaluations provided by FAA to TPWD

Commission Activities Related to SpaceX

- Executive Session-only briefing in August 2011
- Request to accept ~15 acres of inholdings at Boca Chica
- Request by staff to accept donations of land "close to" Boca Chica. It was under this action we accepted the 50 acres adjacent to the Port of Brownsville land
- In May 2016, the Commission authorized a 70-foot security buffer easement that was never executed by SpaceX to date

Boca Chica Area Map

Boca Chica Tract and SpaceX

Boca Chica Tract Habitat

SpaceX Central Control Area (CCA)

State Hwy. 4 at CCA

SpaceX Vertical Launch Area (VLA)

Roles of TPWD Divisions and USFWS

- Coastal Fisheries Division – Ecosystem Resources Program
- Wildlife Division – Habitat Assessment Program
- State Parks Division – Cultural and Natural Resources Programs
- Infrastructure Division – Land Conservation Program
- U.S. Fish and Wildlife Service – Refuge System and Ecological Services

Coastal Fisheries Ecosystem Resources Program

- Authority
  - Federal Law - U.S. Fish and Wildlife Coordination Act
  - State Law - Parks and Wildlife Code
    - Sec. 12.0011 Resource Protection

Coastal Fisheries Ecosystem Resources Program

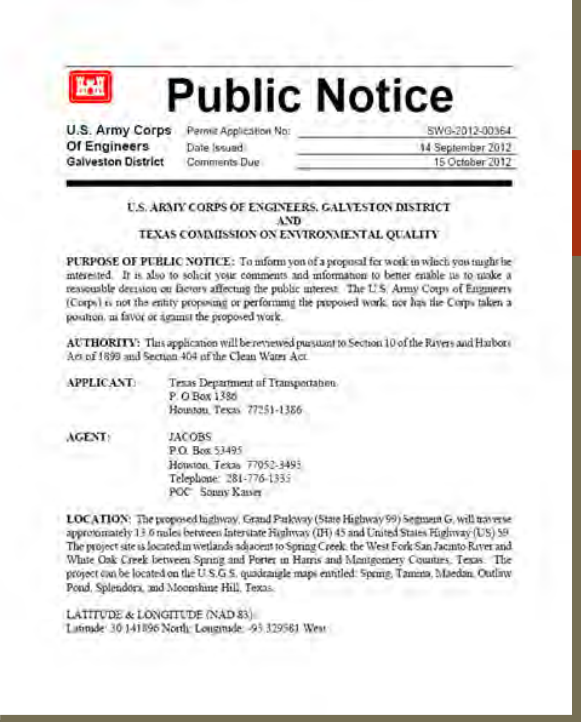
- §12.0011(b) The department's resource protection activities include:
  - (1) investigating fish kills and any type of pollution that may cause loss of fish or wildlife resources, taking necessary action to identify the cause and party responsible for the fish kill or pollution, estimating the monetary value of lost resources, and seeking restoration through presentation of evidence to the agency responsible for permitting or through suit in county or district court;

Coastal Fisheries Ecosystem Resources Program

- §12.0011(b) The department's resource protection activities include:
  - (2) providing recommendations that will protect fish and wildlife resources to local, state, and federal agencies that approve, permit, license, or construct developmental projects;
  - 3) providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources

Coastal Fisheries Ecosystem Resources Program

- USACE Sec 10/404 Permits
- Responsibilities
  - Coordinate internal review
  - Compile agency comments into a draft letter for review and signature
  - Provide for a 2-week EO review when necessary
  - Submit signed letter



Public Notice

U.S. Army Corps Of Engineers Galveston District

Permit Application No: SWG-2012-00364
Date Issued: 14 September 2012
Comments Due: 15 October 2012

U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT AND TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

PURPOSE OF PUBLIC NOTICE: To inform you of a proposal for work in which you might be interested. It is also to solicit your comments and information to better enable us to make a reasonable decision on factors affecting the public interest. The U.S. Army Corps of Engineers (Corps) is not the entity proposing or performing the proposed work, nor has the Corps taken a position, in favor or against the proposed work.

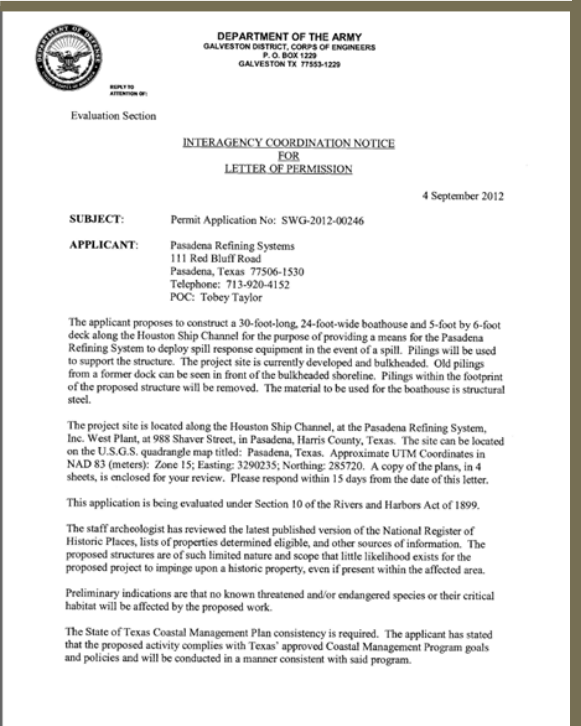
AUTHORITY: This application will be reviewed pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

APPLICANT: Texas Department of Transportation
P. O Box 1386
Houston, Texas 77251-1386

AGENT: JACOBS
P.O. Box 53495
Houston, Texas 77052-3495
Telephone: 281-776-1335
POC: Sonny Kaiser

LOCATION: The proposed highway, Grand Parkway (State Highway 99) Segment G, will traverse approximately 13.6 miles between Interstate Highway (IH) 45 and United States Highway (US) 59. The project site is located in wetlands adjacent to Spring Creek, the West Fork San Jacinto River and White Oak Creek between Spring and Porter in Harris and Montgomery Counties, Texas. The project can be located on the U.S.G.S. quadrangle maps entitled: Spring, Tamina, Maedim, Outlaw Pond, Splendora, and Moonshine Hill, Texas.

LATITUDE & LONGITUDE (NAD 83):
Latitude: 30.141896 North; Longitude: -95.329561 West



DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON TX 77553-1229

REPLY TO ATTENTION OF:

Evaluation Section

INTERAGENCY COORDINATION NOTICE
FOR
LETTER OF PERMISSION

4 September 2012

SUBJECT: Permit Application No: SWG-2012-00246

APPLICANT: Pasadena Refining Systems
111 Red Bluff Road
Pasadena, Texas 77506-1530
Telephone: 713-920-4152
POC: Tobey Taylor

The applicant proposes to construct a 30-foot-long, 24-foot-wide boathouse and 5-foot by 6-foot deck along the Houston Ship Channel for the purpose of providing a means for the Pasadena Refining System to deploy spill response equipment in the event of a spill. Pilings will be used to support the structure. The project site is currently developed and bulkheaded. Old pilings from a former dock can be seen in front of the bulkheaded shoreline. Pilings within the footprint of the proposed structure will be removed. The material to be used for the boathouse is structural steel.

The project site is located along the Houston Ship Channel, at the Pasadena Refining System, Inc. West Plant, at 988 Shaver Street, in Pasadena, Harris County, Texas. The site can be located on the U.S.G.S. quadrangle map titled: Pasadena, Texas. Approximate UTM Coordinates in NAD 83 (meters): Zone 15; Easting: 3290235; Northing: 285720. A copy of the plans, in 4 sheets, is enclosed for your review. Please respond within 15 days from the date of this letter.

This application is being evaluated under Section 10 of the Rivers and Harbors Act of 1899.

The staff archeologist has reviewed the latest published version of the National Register of Historic Places, lists of properties determined eligible, and other sources of information. The proposed structures are of such limited nature and scope that little likelihood exists for the proposed project to impinge upon a historic property, even if present within the affected area.

Preliminary indications are that no known threatened and/or endangered species or their critical habitat will be affected by the proposed work.

The State of Texas Coastal Management Plan consistency is required. The applicant has stated that the proposed activity complies with Texas' approved Coastal Management Program goals and policies and will be conducted in a manner consistent with said program.

Coastal Fisheries Ecosystem Resources Program

- Public Notice
  - 30-day public review
  - Initial project
  - Modifications to the initial project with additional direct impacts
- Interagency Coordination Notice
  - 15-day agency review
  - Revised plans
  - Compensatory mitigation plans

Coastal Fisheries Ecosystem Resources Program

- Compensatory Mitigation (in aggregate)
  - 5.5 acres of fill impact
  - 82.6 ac Preservation Only
  - Mitigation Ratio 14.92:1
- Recent Development Activities
- Future Development Activities

Coastal Fisheries Ecosystem Resources Program

- Supporting role
  - Review NEPA documents at the request of other programs
  - Provide information and recommendations concerning aquatic resources

WILDLIFE DIVISION

Background Photo: SpaceX Vertical Launch Area, May 2012

TEXAS PARKS & WILDLIFE

Wildlife Division

Wildlife Diversity Program
Science for Stewardship

Wildlife Habitat Assessment Program

- **§12.0011 Resource Protection**
- **National Environmental Policy Act (NEPA)**
- **Migratory Bird Treaty Act**
- **§64.002 Protection of Nongame Birds**
- **§67 Nongame Species, §68 Endangered Species, §88 Endangered Plants**

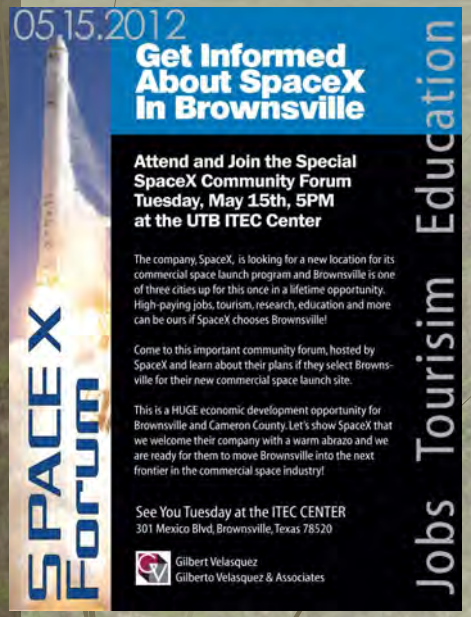
Background Photo: SpaceX Vertical Launch Area, May 2012

TEXAS PARKS & WILDLIFE

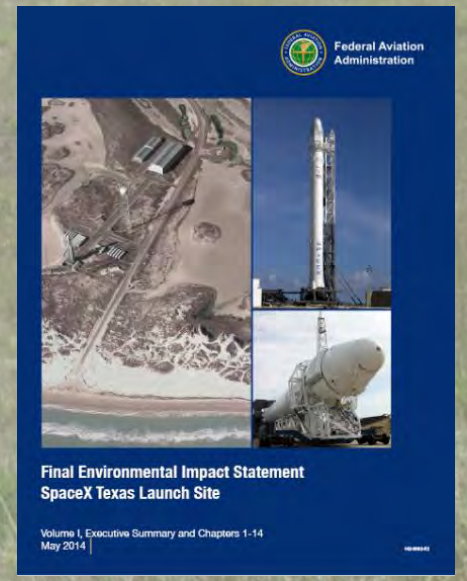
Wildlife Division

Wildlife Diversity Program
Science for Stewardship

Wildlife Habitat Assessment Program



- **Scoping Comments, May 2012**
  - Rare species, habitat impacts; affects of modifying landscape
  - Impact to State Park property
  - Indirect Impact to Natural Resources: noise, vibration, spectators, traffic
  - Contamination
- **Section 4(f) Response, April 2013**
- **Draft EIS Comments, June 2013**
  - Night lighting
  - Rare species impacts
  - Spectator control, security patrol impacts
  - Dune, wetland, and submerged aquatic vegetation impacts
- **Written Reevaluation Response, February 2020**



Background Photo: SpaceX Vertical Launch Area, May 2012

State Parks – Cultural and Natural Resources

- State Parks Division Cultural Resources Program primary reason for involvement given impacts to TPWD resources: due to Federal involvement, the SpaceX project is subject to Section 106 of the National Historic Preservation Act (36 CFR 800), which requires Federal agencies (e.g. FAA) to consider adverse effects to historic properties and make a good-faith effort to avoid, minimize, or mitigate these effects (often tasked to the applicant e.g. SpaceX).
- State Parks Division Natural Resources Program is responsible for prioritizing, planning and implementing natural resource protection, restoration and management activities for State Parks and other TPWD wildlands, as well as assuring compliance with regulations as applicable.

Cultural Resource Concerns

- TPWD resources (potentially) being impacted
- historic pilings (Mexican and Civil War) and archeological site 41CF117
  - vibration monitoring with questionable results (previous comments never addressed)
  - damages from vehicles, debris-removal, and fires are possible

- Additional concerns
- research and interpretive materials (as mitigation)
  - not being executed, NPS needs support
  - TPWD has no formal role except as stakeholder
- non-TPWD resources (e.g. Port Isabel Lighthouse) being impacted
  - support for NPS, THC needed: maintain relationships; good-faith effort as stewards

- Possible solutions
  - additional security can assist in monitoring for damages
  - more effective way of expressing concerns to FAA and SpaceX; include other agencies

TPWD Natural Resources Concerns

- Inconsistencies Between EIS & Site Activity
- Construction Impacts
- Traffic Volume & Vehicle Type
- Site Lighting Impacts
- Night Launches/Test Activities
- Noise/Pressure Impacts
- Soil Contaminants
- Wildfire Prevention & Management
- Short-term Impact Monitoring
- Long-term Impact Monitoring
- Site Access/Closures
- Notification for Closures
- Section 4(f)
- Hiring Additional USFWS Personnel
- Compensatory Mitigation

“We’ve got a lot of land with nobody around, and so if it blows up, it’s cool.” —Elon Musk, 2018

USFWS - Concerns, Impacts, and Recommendations

- USFWS and TPWD (?) began planning talks with SpaceX in 2013
  - Concerns were Park and Refuge management, border security, nesting and feeding migratory birds, threatened piping plovers using nearby flats, beach nesting endangered sea turtles, coastal wetlands, and effects to scientific surveys and public visitation.
  - SpaceX was licensed by the Federal Aviation Administration in 2017
  - SpaceX changed operational plans significantly in 2018 and is operating and impacting resources and the public differently.
- Outstanding issues are closure of public lands for launches, explosion damage mitigation, and adjusting staffing and land management to expanded SpaceX presence.

Goals from Summary

- Adequately apprise all meeting participants on the history and concerns regarding the SpaceX site to-date
- Establish notification and communication process within TPWD regarding any issues with access and damage to state lands from the construction and operation of SpaceX
- Establish review and routing procedures for natural and cultural resources commenting opportunities
- Create TPWD SpaceX working group, nominate working group facilitator, and working group charge
- Initiate discussions on facilitating meeting with SpaceX as proposed in latest response to FAA Written Re-evaluation, dated February 27, 2020

Issues & Incidents: Notification and Communication Process

- Examples
  - trespassing, lack of bollard fencing, increased traffic, vehicles (including SpaceX staff) driving on dunes and mudflats, fire response, road closures
- Roles?
- Who gets notified and responds?
  - KAST, Game Wardens, Executive Office, Communications
  - FAA, USACE, USFWS, GLO, NRDA
- Who initiates conversations with SpaceX and FAA?
- Regulatory and enforcement authority?

TPWD Review and Routing of Responses to Commenting Opportunities

- Inconsistencies on who FAA notifies on review and commenting opportunities
- Who takes the lead on what?
- How and where are letters routed?
- Can staff discuss concerns and issues directly with SpaceX and FAA?
- How do we support THC and NPS?
- Who should be involved with negotiations on commitments and mitigation with SpaceX?
- Does Executive Office need to review and sign letters regarding SpaceX?

SpaceX Working Group?

- Do we agree this is warranted?

If so,

- Working group charge
  - Be first line of defense, ensure communication does not break down
- Who should be on this working group?
- Chair person
  - To facilitate group activities
  - Needs decision making authority
- Attendance at annual FAA-hosted SpaceX meeting?

Action Item for Working Group?

Need to facilitate meeting with SpaceX as proposed in latest response to FAA Written Re-evaluation, dated February 27, 2020 and develop agenda with preferred outcomes

Orms, Mary <[redacted]>

Fwd: Speeding Trucks

3 messages

Reyes, Ernesto <[redacted]> Fri, Feb 12, 2016 at 12:55 PM
To: Dawn Gardiner <[redacted]> Mary Orms <[redacted]> Pat Clements <[redacted]>

FYI
---------- Forwarded message ----------
From: Steve Davis <[redacted]>
Date: Fri, Feb 12, 2016 at 11:35 AM
Subject: Re: Speeding Trucks
To: "Winton, Bryan" <[redacted]>
Cc: Rob Jess <[redacted]> Sonny Perez <[redacted]> Ernesto Reyes <[redacted]> Rene Avendano <[redacted]> Matt Donoho <[redacted]> Matthew Thompson <[redacted]> Alma Walzer <[redacted]> Shelby McCay <[redacted]>

Hi Bryan,

This is completely inexcusable on the contractors' part, especially as they had been given complete environmental training. We have implemented a zero-tolerance policy w them - if they ever deviate again, they will be fired from this and all future jobs.

And sounds great in the CBP front

Thanks!
Steve

On Feb 12, 2016, at 9:26 AM, Winton, Bryan <[redacted]> wrote:

> Not sure what if anything you can do but the dump trucks importing dirt to your site are traveling in excess of the posted speedlimits. On truck crashed yesterday and the concern really is public safety, wildlife mortality increasing due to high speed trucks, and damage to our property (vegetation and fence) from accidents. If there is anything you can do to communicate to your contractor that they are traversing a wildlife refuge and that they should keep their speeds down. We will be having our refuge law enforcement follow up on this report as we have concurrent jurisdiction on the last 12 miles of HW 4 so our officers can cite motorists for speeding. You can share this with the contractor as well if you would please.
>
> Thank you.
>
> Note: Hoping to meet with Ft. Brown Station CBP in the next 2 weeks where I can get their input on a final cable fence design. Will keep you posted.
>
> Sincerely,
>
> --
> Bryan R. Winton, Refuge Manager
> Lower Rio Grande Valley National Wildlife Refuge
> [redacted]

--
Ernesto Reyes
U.S. Fish and Wildlife Service
Texas DOI State Border Coordinator
Alamo Ecological Service Sub-Office
[redacted]
Tel: [redacted]
Fax: [redacted]

Reyes, Ernesto <[redacted] Tue, Feb 16, 2016 at 9:14 AM
To: Dawn Gardiner <[redacted] Mary Orms <[redacted] Pat Clements <[redacted]

FYI
---------- Forwarded message ---------
From: Steve Davis <[redacted]
Date: Fri, Feb 12, 2016 at 6:02 PM
Subject: RE: Speeding Trucks
To: "Winton, Bryan" <[redacted]
Cc: Rob Jess <[redacted] Sonny Perez <[redacted] Ernesto Reyes <[redacted] Rene Avendano <[redacted] Matt Donoho <[redacted] Matthew Thompson <[redacted] Alma Walzer <[redacted] Shelby McCay <[redacted]

FYI, there were actually 2 truckers who were iden'fied as speeding. Both were fired today.

From: Steve Davis
Sent: Friday, February 12, 2016 12:36 PM
To: Winton, Bryan
Cc: Rob Jess; Sonny Perez; Ernesto Reyes; Rene Avendano; Matt Donoho; Matthew Thompson; Alma Walzer; Shelby McCay
Subject: Re: Speeding Trucks

[Quoted text hidden]
[Quoted text hidden]

Reyes, Ernesto <[redacted] Thu, Feb 25, 2016 at 7:39 AM
To: Dawn Gardiner <[redacted] Mary Orms <[redacted] Pat Clements <[redacted]

FYI
---------- Forwarded message ---------
From: Winton, Bryan <[redacted]
Date: Fri, Feb 12, 2016 at 8:26 AM
Subject: Speeding Trucks
To: [redacted] <[redacted]
Cc: Rob Jess <[redacted] Sonny Perez <[redacted] Ernesto Reyes <[redacted] Rene Avendano <[redacted]

Not sure what if anything you can do but the dump trucks importing dirt to your site are traveling in excess of the posted speedlimits. On truck crashed yesterday and the concern really is public safety, wildlife mortality increasing due to high speed trucks, and damage to our property (vegetation and fence) from accidents. If there is anything you can do to communicate to your contractor that they are traversing a wildlife refuge and that they should keep their speeds down. We will be having our refuge law enforcement follow up on this report as we have concurrent jurisdiction on the last 12 miles of HW 4 so our officers can cite motorists for speeding. You can share this with the contractor as well if you would please.

Thank you.

Note: Hoping to meet with Ft. Brown Station CBP in the next 2 weeks where I can get their input on a final cable fence design. Will keep you posted.

Sincerely,

--
Bryan R. Winton, Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]

--
Ernesto Reyes
U.S. Fish and Wildlife Service
Texas DOI State Border Coordinator
Alamo Ecological Service Sub-Office
[redacted]

RE: [EXTERNAL] RE: Meeting Request

Clements, Pat <[redacted]>
Tue 2/5/2019 10:04 AM
To: Winton, Bryan <[redacted]> Gardiner, Dawn <[redacted]> Reyes, Ernesto <[redacted]>
Cc: Orms, Mary <[redacted]>

Bryan:

Including Mary in this discussion.

Pat

Pat Clements
Ecological Services Field Office
U.S. Fish and Wildlife Service
[redacted]

From: Winton, Bryan <[redacted]>
Sent: Tuesday, February 5, 2019 10:01 AM
To: Pat Clements <[redacted]> Whitehead, Dawn <[redacted]> Ernesto Reyes <[redacted]>
Subject: Fwd: [EXTERNAL] RE: Mee ng Request

Can we all determine a time to meet with Space-X (and FAA) on-site so it can be determined whether their EIS does or doesn't accurately reflect what it is they now want to do. Before they begin testing, experimenting, or whatever it is they now have decided to do, I want to make sure the refuge remains protected. I'm concerned the refuge and surrounding natural resources are in more threat now than the EIS described. They want to "experiment" at the Boca Chica site now. Before they proposed to launch a vehicle they have a track record with, therefore, ideally the chance of mishap was low. Not the case now necessarily. I've asked for Kendal with TPWD (Boca Chica State Park) and myself to meet with Space-X to lay out a protocol for Space-X so they know they can't do whatever they want on our property, and since the chance of a mishap seems more plausible now than before, I want them to know there is a process/protocol and that the refuge isn't open to the public to retrieve rocket parts---its for birding, photography, etc.

By the way, they have videos where they've been flying drones over the refuge so I need to inform them about the issue with wildlife or public disturbance associated with that. Anyway, Space-X won't meet with me because they know there are others that want a site visit, so they are trying to minimize the meetings I guess.

Just checking on the status of when we (Federal Agencies) will be reporting back to FAA whether the EIS is still applicable now, given the numerous "Written Reevaluations", or whether it isn't no longer sufficient.

bryan

---------- Forwarded message ---------
From: **Alma Walzer Santos** <[redacted]
Date: Mon, Feb 4, 2019 at 11:36 AM
Subject: [EXTERNAL] RE: Meeting Request
To: Winton, Bryan <[redacted] <[redacted] Matthew Thompson <[redacted]
Cc: [redacted] <[redacted]
<[redacted] Iriz Elizondo Navarro <[redacted]

+ Stacy
+ Ma

Hi Bryan,
I hope you're doing well, and thanks for reaching out on this item.
The project modifica ons were included in the FAA Wri en Reevalua on which was sent out by Stacy on Nov. 20, 2018 (about a month before the shutdown). Please see the a achment.

I've added Stacy/FAA for agency coordina on, as several en es have expressed an interest in visi ng our project site.
We're happy to accommodate this request and look forward to mee ng with everyone soon.

Thanks!
Alma Walzer Santos
SpaceX
Cell: [redacted]

From: Winton, Bryan <[redacted]
Sent: Monday, February 04, 2019 10:46 AM
To: Alma Walzer Santos <[redacted]

Cc: [redacted] Iriz Elizondo Navarro <[redacted]
Subject: Mee ng Request

Alma:
Kendal Keyes, with Texas Parks & Wildlife Department and I would like to meet with you. Kendal is responsible for Boca Chica State Park and I am manager for Lower Rio Grande Valley NWR--of which about 22K acres occurs in the Boca Chica area.

There has been a considerable amount of changes for Space-X project that differ from that described in the Environmental Impact Statement. There also appears to be interest by Space X in beginning "hopper tests" in the next few months, based on press coverage I've seen.

Would you be available to meet with Kendal and I, along with a law enforcement officer representative from both the state and federal agencies that work in the Boca Chica area? We would like to visit with you about your programs' changes and how that might affect/impact the management of our public properties that surround your site.

Can you offer up some dates toward the end of this month when you would be available to meet with us?

Sincerely,

bryan winton, refuge manager

--
Bryan R. Winton, Wildlife Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
3325 Green Jay Road, Alamo, Texas 78516
[redacted] office; (956) [redacted] cell
[redacted]

--
Bryan R. Winton, Wildlife Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]

From:	Matthew Thompson
To:	Orms, Mary; [redacted] Gardiner, Dawn; Clements, Pat; Reyes, Ernesto; Winton, Bryan; Jess, Robert RJ; Kendal Keyes; Spier, Mark E
Subject:	[EXTERNAL] RE: SpaceX closure scheduled for March 25th or 26th. Biological Opinion non-compliance
Date:	Sunday, March 24, 2019 8:20:26 AM
Importance:	High

Hi Mary –
Thank you, I confirmed that Bryan is on the list and the address we have appears correct.
Bryan – please let me know if you continue to have issues receiving the messages.
Thanks very much
Matt

From: Orms, Mary <[redacted]
Sent: Saturday, March 23, 2019 9:22 PM
To: [redacted] Matthew Thompson <[redacted] Dawn Gardiner <[redacted] Pat Clements <[redacted] Ernesto Reyes <[redacted] Bryan Winton <[redacted] Robert Jess <[redacted] Kendal Keyes <[redacted] Mark Spier <[redacted]
Subject: SpaceX closure scheduled for March 25th or 26th. Biological Opinion non-compliance

Our office, TPWD and NPS got this notice, but Bryan Winton of the Refuge did not. Seems there is still an issue on who is getting the notices.

SPACEX UPDATE as of 3/21/19, 3 PM CT:

SpaceX anticipates the need to temporarily close State Highway 4 (*and Boca Chica Beach*) in the event of a spaceflight activity today, March 21, 2019 between 12:00 p.m. and 8:00 p.m. CST. This eliminates the need for a possible closure on Friday, March 22, 2019.

Then our office got the attached notice forwarded to us. We never received the notice directly. It is a notice from Cameron County Judge saying they is going to be another closure on the 25th and possibly 26th.

The BO states:

Approximately 2 weeks in advance of a launch operation with restricted public access (i.e., actual launch, wet dress rehearsal, or static fire engine test), FAA/SpaceX will coordinate with the Cameron County Commissioner's Court, Secretariat of Communications and Transportation – Mexico, U.S. Coast Guard (USCG), Houston Air Route Traffic Control Center (ARTCC), Texas Parks and Wildlife Department (TPWD), National Park Service (NPS), the Service's Lower Rio Grande Valley NWR and Ecological Services Office, National Marine Fisheries Service, and Customs and Border Patrol regarding launch activities and ensure public safety. This will allow for the issuance of a Notice to Mariners (NOTMARs) and Notice to Airmen (NOTAMs). Approximately 3-6 days prior to a launch operation with restricted public access, the public would be notified of the upcoming launch operation and security closure through local media and through the use of NOTMARs and NOTAMs. The notices will include the proposed date, the expected closure time and a backup

closure date and time.

This means SpaceX is suppose to contact these agencies 2 weeks prior and coordinate any testing with them, then after coordinating with the agencies, 3-6 days prior to those activities a notice can come out for the pubic. This closure was not even mentioned in our discussions about the 21st and 22nd closure Thursday. No agency coordination has taken place for these new dates (25th and 26th).

That is twice FAA and SpaceX have been out of compliance. Future closures should not occur until this is corrected. We request a full list of all the agencies and the contacts with phone numbers and email addresses that need to be informed by SpaceX, as the BO states, for our review. We also request a summary of coordination prior to any closure. The Summary should include date, time, agencies, method of coordination (via email, phone call or meeting) and if that agency had any particular comments or requests. The summary can be emailed to [redacted]
If you have any questions please contact Mary Orms at [redacted] or by email at [redacted] Thank you for your attention to this matter.

Mary Orms
U.S. Fish and Wildlife Service
Ecological Services Field Office
P.O. Box 81468
Corpus Christi, TX 78468-1468
[redacted]

Orms, Mary <[redacted]>

SpaceX Comments

5 messages

Orms, Mary <[redacted]> Thu, Apr 4, 2019 at 9:29 AM
To: [redacted]
Cc: Matthew Thompson <[redacted]> Dawn Gardiner <[redacted]>

Stacey,
Attached is our comment letter. Dawn and I can give you a call later to discuss if you would like.

--
Mary Orms
U.S. Fish and Wildlife Service
Ecological Services Field Office
[redacted]

Final SpaceX Comment letter signed.pdf
1118K

Matthew Thompson <[redacted]> Thu, Apr 4, 2019 at 11:23 AM
To: "Orms, Mary" <[redacted]> <[redacted]>
Cc: Dawn Gardiner <[redacted]> Steve Davis <[redacted]> Caryn Schenewerk <[redacted]>

Stacey –

SpaceX respec. ully disagrees with assertions made by the U.S. Fish and Wildlife Service in the April 3, 2019, le er signed by Field Supervisor Charles Ardizzone to the FAA. With regard to the mitigation proposals referenced in Mr. Ardizzone's email, SpaceX submits that the a ached "Reimbursable Funding and Donation Agreement" between USFWS South TX Refuge Complex and SpaceX signed by NWRS Regional Chief Aaron Archibeque on August 11, 2015, as the basis for discussions on that topic.

Sincerely

Ma Thompson

Director, Environmental Health and Safety

Cell: [redacted]

Desk: [redacted]

[Quoted text hidden]

REIMBURSABLE AGREEMENTSpaceX 09082015 Signed.pdf
604K

Orms, Mary <[redacted] Thu, Apr 4, 2019 at 11:45 AM
To: Robert Jess <[redacted]

Rob, you are most familiar with this document. What does SpaceX disagree with? Were they not suppose to provide funding for LE and the biologists? Have they provided that funding? Or was the refuge suppose to hire and the 3 employees and then request reimbursement? and was that ever done?
[Quoted text hidden]

REIMBURSABLE AGREEMENTSpaceX 09082015 Signed.pdf
604K

Orms, Mary <[redacted] Thu, Apr 4, 2019 at 1:33 PM
To: Bryan Winton <[redacted]

FYI, if I could get an answer on this question asap I would appreciate it.
[Quoted text hidden]

REIMBURSABLE AGREEMENTSpaceX 09082015 Signed.pdf
604K

Winton, Bryan <[redacted] Thu, Apr 4, 2019 at 1:45 PM
To: "Orms, Mary" <[redacted]

Space-X never followed through with making funding available for us to hire the 3 employees that are needed to oversee the refuge during Space-X closures, so we can maintain integrity of the refuge when everyone else is closed out of the place except Space X. Space X withdrew a commitment to hire the two biologists relatively soon after the agreement was finalized. The LE person was still a go/need. There was some disagreement on the salary, startup costs, etc. for that hire, but since Steve Davis transitioned out and Alma Santos came in, there has been no commitment to follow through with arrangements made/agreements made during Steve Davis' time down here.
bryan

[Quoted text hidden]
--
Bryan R. Winton, Wildlife Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]
[redacted] office; (956) [redacted] cell
[redacted]

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office

[redacted]

In Reply Refer To:
02ETCC00-2012-F-0186

April 3, 2019

Stacey Zee
Federal Aviation Administration
800 Independence Avenue SW
Washington, DC 20591

Dear Ms. Zee:

The U.S. Fish and Wildlife Service (Service) thanks you for the opportunity to provide comments on the written re-evaluation (WR) of the 2014 Final Environmental Impact Statement for the Space Exploration Technologies Corporation (SpaceX) Texas Launch Site. The 2014 action was the issuance of launch licenses and/or experimental permits to authorize SpaceX to launch Falcon 9 and Falcon Heavy orbital vertical launch vehicles and a variety of reusable suborbital launch vehicles. The Service issued a Biological Opinion (BO) on December 18, 2013, to the FAA for the SpaceX license. The Federal Aviation Administration (FAA) Office of Commercial Space Transportation WR evaluates whether the development the Big Falcon Rocket (BFR) and the experimental test program of the Big Falcon Ship (BFS) requires a supplemental environmental analysis to issue launch licenses and/or experimental permits to SpaceX. The license would be to conduct experimental test flights of reusable suborbital launch vehicles from SpaceX's private launch site located at Boca Chica, Cameron County, Texas.

The test program would last 2-3 years and have three phases. The following table details each phase. The total number of events shown in the table are for the entire test program.

Table 1. Phases of the Big Falcon Ship Experimental Test Program

Test	Total # of Events[a]	Description
Wet Dress	5–10	Verify ground systems and spacecraft by fueling the Ship.
Static Fire	5	Verify engine ignition and performance by conducting a brief (few seconds) ignition of the Ship's engines.
Small Hops	3	Verify engine ignition and thrust to lift the Ship a few centimeters off the ground.
Small Hops	3	Engine ignition and thrust to lift the Ship over 30 cm and up to 150 m.

Medium Hops	3	Engine ignition and thrust to lift the Ship over 30 cm and up to 3 km.
Suborbital Space Flight	3	Launch up to 100 km, flip the Ship at high altitude, and conduct a reentry and landing.

The proposed experimental test program involves modifications to the vertical launch area (VLA) and Control Center Area. The construction will be done in two phases within the property boundary and the same project area analyzed in the 2014 EIS. Phase 1 construction in the VLA is ongoing and includes the initial build of the propellant farms and associated ground equipment. Phase 2 construction includes the necessary systems and equipment for higher BFS hop tests.

The FAA did not issue a launch license and/or experimental permit, but opted to waive the need for SpaceX to obtain a launch license and/or permit to conduct the currently proposed actions. The waiver, a federal action, is limited to: 1) loading and unloading fuel test; 2) spin test; and 3) minihops. The total number of events, in Phases 1 and 2 that can occur within that waiver, over the 2-3 years timeframe is listed in Table 1. Phase 3 would require another WR and analysis.

The FAA WR concluded that the issuance of launch licenses and/or experimental permits to SpaceX to conduct BFS tests conformed to the prior environmental documentation, that the data contained in the 2014 EIS remain substantially valid, there were no significant environmental changes, and that all pertinent conditions and requirements of the prior approval have been met or will be met in the current action. Therefore, a supplemental EIS or new environmental document was not necessary.

General Comments:

The 2014 EIS for the Falcon 9 launches described three types of launch licenses and experimental permits to operate reusable orbital and suborbital launch vehicles:

- Launch-Specific License — "authorizes a licensee to conduct one or more launches, having the same launch parameters, of one type of launch vehicle from one launch site" (14 CFR §415.3[a]). A licensee's authorization to launch terminates upon completion of all launches authorized by the license or the expiration date stated in the license, whichever occurs first.
- Launch Operator License — "authorizes a licensee to conduct launches from one launch site, within a range of launch parameters, of launch vehicles from the same family of vehicles transporting specified classes of payloads" (14 CFR §415.3[b]). A launch operator license remains in effect for five years from the date of issuance.
- Experimental Permit — "authorizes launch and reentry of a reusable suborbital rocket" (14 CFR§437.7). An experimental permit lasts for one year from the date issued.

The EIS did not analyze the potential for a waiver to be issued to SpaceX for their Falcon 9 launches, nor is it mentioned in the WR for the Phase 1 and Phase 2 scheduled events. It appears the federal action changed from providing a license or experimental permit for SpaceX to launch Falcon 9 rockets into orbit and/or other various suborbital rockets providing a waiver for BFS

tests. The Service requests an explanation of the use of a waiver instead of a license or experimental permit.

In accordance with Paragraph 9-2.cof FAA Order 1050.1F, the preparation of a new or supplemental EIS is not necessary when the following can be documented:

1. The proposed action conforms to plans or projects for which a prior EA and FONSI have been issued or a prior EIS has been filed and there are no substantial changes in the action that are relevant to environmental concerns;
2. Data and analyses contained in the previous EA and FONSI or EIS are still substantially valid and there are no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts; and
3. Pertinent conditions and requirements of the prior approval have been, or will be, met in the current action.

The FAA contends that the mission has changed, but the proposed action of issuing a license and/or experimental permit has not changed. Additionally FAA states that: all construction and activities will be within the same footprint; pertinent requirements will be met in the current action; there have been no substantial changes to the EIS; and no significant new circumstances or information relative to environmental concerns therefore, the FAA states a new supplemental EIS is not needed.

The Service agrees the mission has changed and construction and activities will occur within the boundaries already analyzed under the 2014 EIS and 2013 BO. However, changes in how construction and closures are being conducted are not being followed as outlined in the BO and may be impacting listed species beyond what was originally analyzed. The Service has contacted FAA and SpaceX, via emails, regarding noncompliance; but resolution has not occurred. Therefore, the Service requests, closures and testing events cease until noncompliance issues are resolved.

The BO is a legally binding document between FAA/SpaceX and the Service. FAA/SpaceX have stated they will follow the BO. Many project aspects have changed and therefore, the BO should be amended to reflect the current proposed action and activities to occur under that waiver. Various measures under the May 13, 2014, amendment have not been completed and should be addressed in the next amendment (enclosed) and annual report.

Specific Comments:

Page 4, WR, Table 1, Phase 1, Wet Dress, 5-10 events, verify ground systems and spacecraft by fueling the BFS.

Comment: There have been 13 days of closures or proposed closures between March 20 and April 1, 2019. If the total number of events in Table 1 are for the entire test program (2-3 years) and do not represent a number of monthly or annual operations it would appear that if a test was done each of the 13 days then the 5-10 events on the table, planned over 2-3 years has been exceeded. The EIS and BO analyzed a closure of up to 15 hours. Closures impact federal refuge

and state park attendance, and interfere with daily sea turtle patrols, being conducted by Sea Turtle, Inc. in an effort to locate nesting sea turtles and secure eggs for hatching. Many of the turtles are daytime nesters. It also interferes with monitoring of birds and plants making it difficult to analyze the pre and post effects of the closures and wet dress activities.

Small hops vs medium hops include low-altitude and higher-altitude test that range from 500 meters (1,650 feet) meters to 5,000 meters (16,500 feet) for an overall time length of 1.5 to 6 minutes each and usually run approximately 3 times a week. For clarification, will 3 small hop events occurring 3 times a week, increase the number of events and the length of time a closure will occur?

Page 5, WR, Phase 1 Construction 2nd paragraph "This is the same area that was stabilized for construction via the surcharging project conducted in 2016"

Comment: Does the surcharging project refer to the pilings discussed in the EIS and BO that were to be completed in 2 weeks? That was a one time nighttime construction with associated noise and lighting that was only to occur during the two weeks of concrete pouring.

Page 7, WR, 1st paragraph "The BFS test program would involve use of launch control centers, Falcon support building, emergency services building, ground tracking antenna dishes and solar farm."

Comment: The antenna dishes have been installed and can be used to communicate between the Control Center and the VLA. Are these dishes currently licensed and functioning or does the Federal Communications Commission require a license?

Page 8, WR, 1st paragraph "The tent would be installed in the location of the proposed support buildings mentioned in the 2014 EIS. The tent would be used to house welding and fabrication activities needed for structures at the VLA....Work activities inside the tent would occur at night and therefore require lighting"

Comment: The EIS and the BO state there would not be any night construction except for the 2-week period when pilings were to be installed. Night construction should cease and there should not be any lighting visible over the dunes during sea turtle season (March 15 to October 1st). Inspections should be occurring to ensure lights, security and parking follow the guidelines set in the Conservation Measures of the BO.

Page 9, Table 3. Phase 2 Commodities

Quantity	Description
302 cubic feet	Ship purges/pneumatics
2 tanks: 302 cubic feet 450 cubic feet	Ship pneumatics
Two tanks: 16,000 gallons 60,000 gallons	Propellant densification/Gaseous Nitrogen Recharge/Densification
1550 cubic feet	Ship Oxygen Tank Press
1040 cubic feet	Ship Methane Tank Press

Comment: The type of fuel has changed from the original EIS and the BO should be amended to reflect that change.

Page 10, WR, Affected Environment, Paragraph 2 "SpaceX installed a solar farm on Parcel 2."

Comment: Texas Parks and Wildlife commented that solar arrays can have a "lake effect," and cause birds and their insect prey to mistake a reflective solar facility for a water body. SpaceX committed to installing non-reflective solar panels and it is important they were installed to limit migratory and/or listed bird species from being potentially impacted.

Page 11, WR, Re-evaluation of Environmental Consequences "The FAA does not believe the tent would cause effects to species listed under the Endangered Species Act (ESA) in amanner not considerd in the Biological Opinion and not increase the amount of take"

Comment: A tent or building is now onsite at the VLA and appears to be a storage area for equipment and materials; however it is open on both ends and emanates light from inside and out in addition to other construction lighting at night. Lighting was not to occur onsite except during one or two nighttime launches, which SpaceX states will no longer occur. It is sea turtle nesting season and nighttime construction could cause additional impacts to sea turtles that were not considered in the EIS or BO.

Page 12, WR, Biological Resources (including Fish, Wildlife, and Plants) The FAA and SpaceX are committed to implementing the conservation measures and terms and conditions outlined in the BO to minimize potential effects to ESA-listed species and critical habitat. Any license or permit issued by the FAA to SpaceX for operations at the Texas Launch Site will include a term and condition for environmental compliance."

Comment: FAA and SpaceX have been informed that they are out of compliance with the BO. The FAA and SpaceX have not coordinated with various agencies as outlined in the BO, 14 Days prior to closures. Instead, they continue to have continuous day after day closures, potentially exceeding their 2-3 year total number of events. Nighttime construction is also potentially illuminating the beach during sea turtle season and increasing the risk of "take" not anticipated or covered in the BO.

Page 18, WR, Visual Effects (including Light Emissions) "The 2014 EIS determined construction activities would impact the visual environment of residents of Boca Chica Village and travelers on State Highway 4, but the impacts would be intermittent, temporary, and minimized through SpaceX's Lighting Management Plan.... The amount of nighttime lighting at the VLA would be less. Aside from the methane flare, SpaceX is not planning to have nighttime lighting at the VLA."

Comment: Since the new program began, Boca Chica residents have reported that the lighting is continuous throughout the night. A picture on SPACENEWS30 Texas on December 24, 2018,

by Jeff Foust shows the BFS being built, at night, with bright equipment lights lighting up the night sky.

The following comments address the BO:

Page 2, "*Construction Activities*, Construction of the launch and control center facilities is expected to be complete within 24 months. Most construction will occur during the hours of 8 a.m. to 5 p.m., Monday through Friday. Night construction will occur for approximately 2 weeks during concrete pouring and approximately 2 weeks for pile driving."

Comment: Construction is occurring during the night, which is not in compliance of the BO. This poses a greater risk on listed species.

Page 2, Launch Area, "The proposed vertical launch area will occupy 20 of the 56.5 acres owned or leased by SpaceX."

Comment: The BO should be amended to include the current number of acres occupied.

Page 2, "Pilings will be driven to construct the larger facilities that support heavy loads. Staging areas will occur within proposed project boundaries and no additional areas will be needed. Facilities within the launch area will include the integration and processing hangar (hangar), launch pad, launch stand with flame duct, water tower, deluge water retention basin, propellant storage and handling areas, workshop and office area, parts storage warehouse, roads, parking areas, fencing, security gates, and utilities (Figure 5 and 6)."

Comment: The BO should be amended to reflect current facilities to be constructed and operated.

Page 2 and 3, "There are four primary areas: liquid oxygen (LOX), rocket propellant-1 (RP-1), helium, and nitrogen. Each area will include storage tanks or vessels, containment area, fluid pumps, gas vaporizers, and other components necessary to control fuel flow to the launch vehicle."

Comment: An amended BO needs to analyze the change in fuel type and storage location.

Page 3, Access Roads and Infrastructure, "Roads and utilities will provide access, power, data, and water to the facilities within the vertical launch area. Approximately 2.45 acres will be parking and road area. Parking for the launch area and the control area will accommodate up to 250 personnel. Roads will be constructed of concrete or asphalt. The perimeter access road would be dirt/gravel. The area will also include exterior lighting, security fences, and gates."

Comment: The BO should be amended to reflect total parking and road area, number of personnel expected, and where lighting will occur if different from what has been described above.

Page 3, Access Roads and Infrastructure, "Primary power for the vertical launch area would be provided by commercial power from the control center area, located approximately 2 miles west, to the vertical launch area."

Comment: We understood the area would be powered by the solar array. What changed?

Page 3, Access Roads and Infrastructure, "Potable water will either be delivered by truck to a holding tank at the vertical launch area or pumped from a well on the property. The septic system would consist of a mobile above ground processing unit and holding tank."

Comment: Please update information for the BO amendment as to how potable water and the septic system are handled.

Page 3, Facility Security, "Two 6-foot tall perimeter chain-link fences will be erected around the vertical launch area and will enclose approximately 20 acres. The two fences will be approximately 10 feet apart with a 7-foot wide dirt access road inside the inner fence for security patrols. The outside perimeter fence will include a sensor system to detect unauthorized access. The control center will maintain 24 hour monitoring of all security systems."

Comment: We understand there will be a security fence, with lights, but will there still be a double fence where security guards will drive around the perimeter? Please update the section.

Page 3, Facility Security, "Lighting will be positioned to illuminate the perimeter and a zone leading up to the controlled areas in hours of darkness. All building exterior lights will be lit from dusk to dawn."

Comment: Will there building exterior lights from dusk to dawn?

Page 4, Control Center Area.

Comment: Please update changed portions of this section for the BO amendment.

Page 4, Control Center Area, "The Dragon capsule, a satellite, typically uses hydrazine, a different fuel than the launch vehicle."

Comment: Please let us know if reference to the Dragon capsule should be removed, as it will not be part of the project any longer.

Page 5, *Project Operations,* Falcon 9 and Falcon Heavy launches will have commercial payloads, satellites, experimental payloads, or a capsule, such as the SpaceX Dragon capsule. SpaceX may also launch smaller suborbital launch vehicles with all launch

trajectories to the east and over the Gulf of Mexico. SpaceX proposes up to 12 launch operations per year through 2025, within a few days or weeks of payload arrival at the launch site. Launch operations could include Falcon 9 launches, a maximum of two Falcon Heavy launches, and associated pre-flight activities such as mission rehearsals and static fire engine tests."

Comment: Please update to reflect that there are no launches planned under this waiver, phase 1 and 2, and there are no longer 12 planned launches. Additionally, please update Launch vehicles, Payloads, and Propellant, Gas, Fuel, Oil, and Solvent Storage Areas sections.

Page 6, Pre-Launch Activities, "Wet dress rehearsals will require restricted access in the immediate vicinity of the vertical launch area and control center area. In addition SpaceX may conduct static fires. Static fires are identical to wet dress rehearsals except engines ignite for approximately 2 seconds then shut down. Static testing may last up to three hours.

Approximately 2 weeks in advance of a launch operation with restricted public access (i.e., actual launch, wet dress rehearsal, or static fire engine test), FAA/SpaceX will coordinate with the Cameron County Commissioner's Court, Secretariat of Communications and Transportation – Mexico, U.S. Coast Guard (USCG), Houston Air Route Traffic Control Center (ARTCC), Texas Parks and Wildlife Department (TPWD), National Park Service (NPS), the Service's Lower Rio Grande Valley NWR and Ecological Services Office, National Marine Fisheries Service, and Customs and Border Patrol regarding launch activities and ensure public safety. This will allow for the issuance of a Notice to Mariners (NOTMARs) and Notice to Airmen (NOTAMs). Approximately 3-6 days prior to a launch operation with restricted public access, the public would be notified of the upcoming launch operation and security closure through local media and through the use of NOTMARs and NOTAMs. The notices will include the proposed date, the expected closure time and a backup closure date and time."

Comment: This coordination has not occurred for any of the closures that were scheduled by SpaceX and Cameron County and does not comply with the BO. The Service and other agencies need sufficient time to prepare for the closures and coordinate ongoing activities and/or monitoring with SpaceX. We request that no further closures be scheduled until this coordination is complete. We have received a list of contacts from SpaceX that is missing many of the agencies listed above. Please update and correct the list. In addition, please add Ernesto Reyes, U.S. Fish and Wildlife Service ES, Texas Parks and Wildlife Game Wardens, and Cameron County Parks and remove Ted Hollingsworth since he is retired. We will forward the notices to our Law Enforcement.

Page 7, Security Plan Implementation, "Launch operation day activities will include securing the safety zone at least 6 hours prior to a launch operation. Personnel will restrict access to unauthorized persons at the soft checkpoint on SH4, just west of the U.S. Customs and Border Protection checkpoint (approximately 14–16 miles west of the SH 4 terminus at Boca Chica Beach), and the hard checkpoint just west of the control center, approximately 1.5 miles from the coast near Massey Road. Boca Chica beach will be temporarily closed

from the Brownsville Ship Channel south to the U.S./Mexico border on the Gulf side for up to 15 hours."

Comment: Closures were intended to be for launches of Falcon 9s. There were some scheduled dry and wet dress dates; however, there seems to be a disconnect on how many and how often these closures are being handled now. Additionally, the checkpoint was moved during the March 20-21 closure. This checkpoint location was agreed upon by all entities to reduce the potential impact on refuge lands. The checkpoint location should not be moved without consulting the Service and Refuge staff.

Page 7, Security Plan Implementation, "FAA/SpaceX will develop a plan in coordination with Padre Island National Seashore (PAIS), Sea Turtle Coordinator or Sea Turtle Inc, (STI) to notify and allow sea turtle patrollers to survey the beach for sea turtle and sea turtle nests once the beach is closed to the public and prior to the beach security patrols and also prior to the beach being reopened to the public after a launch."

Comment: Sea turtle season is March 15 to October 1. This is the time sea turtles come up on the beach and lay their eggs and return to the water. Nest are located and the eggs are removed for secure hatching. Sea turtles nest during the day and a few at night, therefore, it is important that the patrols get out on the beach before and after closures to look for signs of nesting. FAA and SpaceX should be coordinating with PAIS or STI to allow for patrols as described above to occur. PAIS and STI patrol the beaches during peak season, April to June. If activities and closures are to occur in March, July, August or September FAA/SpaceX is responsible contracting with an experienced and certified sea turtle patroller to conduct surveys. Recent closures have delayed STI training of interns. STI now has a tentative date of April 8th for training and beginning daily patrols.

Page 8, Personnel levels, On average, beginning in 2016, it is expected 30 full-time SpaceX employees/contractors will be present at the launch area and control center. They will work a single shift, between the hours of 8:00 a.m. to 5:00 p.m... Average personnel levels are expected to rise from 30 to 130 and the maximum levels during a launch from 130 to 250 employees onsite between 2016 and 2025.

Comment: Is this still accurate? Please provide updates for the BO amendment.

Page 8, Conservation Measures.

Comment: All plans should be reviewed and updated to fit the current activity and submitted to the Service for review. FAA has submitted annual reports, and addressed some of the measures in those reports. However, FAA and SpaceX should review the conservation measures and revise to reflect the most current activities authorized under this waiver.

Comments addressing the May 13, 2014, amendment to the BO.

Comment: The BO was issued to FAA December 18, 2013, and amended in 2014 to cover SpaceX proposed changes. SpaceX submitted mitigation proposals that they were willing to

commit to implementing. The agreed upon changes that have not been implemented by FAA/SpaceX are hightlighted in yellow. The Service was agreeable to the land acquisition but did not want to set a number of acres to be acquired because of the difficulty SpaceX may have finding sufficient land.

The most important change was SpaceX's commitment to fund three positions. The newly hired biologist were to assume all monitoring bird and vegetation plans developed and currently being undertaken by the University of Texas Rio Grande Valley at Brownsville. The positions have never been funded by SpaceX.

Under the Reasonable and Prudent Measures FAA/SpaceX agreed on additional measures to avoid impacts to listed species and refuge lands. The measures were to be addressed in six separate plans to be prepared later. The Plans were submitted and approved, but need additional review and updating to address the current testing program. Annual reports have been submitted by FAA, as required in the BO, but not all measures have been addressed.

Under the Terms and Conditions, the Lower Rio Grande Valley Refuge and SpaceX reviewed the updated measures in more detail and signed below each measure to commit to the changes. The BO amendment is enclosed for reference. We highlight the proposals not completed.

This concludes the Services comments on the WR and the BO. If you have any questions please contact Mary Orms at (361) 225-7315 or by email mary_orms@fws.gov.

Sincerely,

Charles Ardizzone
Field Supervisor

cc:
Bryan Winton, LRGV NWR
Rob Jess, LRGV NWR
Sonny Perez, LRGV NWR
Ernesto Reyes, USFWS
Kendall Keyes, TPWD
Mark Spier, NPS
Alejandro Rodriguez, USFWS, LE

enclosures

May 13, 2014

A decision of concurrence or non-concurrence is requested in regard to mitigation measures resulting from potential impacts upon the natural resources of STRC from the proposed Space X Launch Pad & Facility, located near Brownsville, Texas. These mitigation measures are a result of possible impacts to 50 acres of direct impact and approximately 1580 acres of indirect impacts to Service lands.

Please reference congressional briefing document "Proposed Space X Port surrounded by South Texas Refuge Complex (STRC)" for key points, background and current status.

Mitigation Proposals

- Space X to fund 2 FTE biologists (in lieu of LEO's) to monitor uplands and species. (1 GS -401/486 9/11/12 and 1 GS-401/486 7/9/11)
- Space X will fund 1 Law Enforcement Officer to be utilized as a coordinator between the STRC Project Leader and security representatives of Space X (1 GS 1801 /11)
- Space X will reimburse all time for LEO's of STRC when needed pre/during/post launch times
- Space X will reimburse all time for firefighters of STRC when needed pre/during/ post launch times
- Space X will acquire ~592 parcels(~ 300 acres) surrounding launch site and other lands west of launch facility and donate to FWS; (the preference of Space X is to work with one land owner, i.e. USFWS).
- Minor sections of fence to be installed on Roadway 4 to further control and restrict access from public to FWS sensitive lands as needed
- Soft closure site moved further away from Space X launch site to west of Border Patrol check station. This meets the needs of all parties including FWS and further protects potentially affected lands
- Other potential land acquisitions may be acquired by Space X and donated to FWS

Specifics of the Proposed Positions

Space X agrees to fund three positions (2 biologists & 1 LEO) for the duration of Space X at this site- in essence Space X states the Brownsville, Texas Launch Facility & Pad is expected to have a life span of 30 years or more.

The two Biologists positions will report to the refuge manager of the Lower Rio Grande Valley Refuge but will be located at either the Laguna Atascosa NWR office or at the Space X office space near Boca Chica, Texas. They will be no supervisory oversight of these positions by Space X. The positions are to be used to meet the biological mitigation objectives and protocols as required by FWS for the Boca Chica site.

Any support equipment for the biological positions will be funded through Space X (with exception to vehicle support).

The one Law Enforcement Officer (LEO) will serve as a coordinator between the Project Leader of STRC and the Security Specialists of Space X. This will require periodic times dedicated to the task force, especially prior to rocket launches. The position will serve as the Service representative on the security task force for the refuge complex. The task force will be led by Space X with representatives from all federal, state, local municipal law enforcement agencies represented to ensure all resources of the affected area are protected prior to, during and post, launch events. There will be no supervisory oversight of this position by Space X as it will serve as a point of contact only relative to Service lands. During non-launch events, the LEO will patrol the STRC's Boca Chica and Bahia Grande units only unless authorized by the STRC Project Leader.

All support equipment for the law enforcement position will be funded through FWS.

Reasonable and Prudent Measures

As part of the project description, the FAA/Space X has agreed on voluntary measures to avoid and minimize impacts to the ocelot, jaguarundi, falcon, piping plover, red knot and sea turtles. The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take on these species and assist the Service in improving methods to minimize impacts of incidental take.

I. Coordinate efforts with the Service's ocelot/jaguarundi lead biologist to protect and preserve ocelot and jaguarundi habitat.
2. Establish a protocol to notify the Service of direct take of an ocelot, jaguarundi, or falcon.
3. Coordinate efforts to increase northern aplomado nest sites.
4. Coordinate efforts with refuge staff to reduce impacts to refuge lands.
5. Submit a detailed Security Plan.
6. Submit a detailed Sea Turtle Monitoring Plan.
7. Submit a detailed Bird Monitoring Plan.
8. Submit a detailed Vegetation Monitoring Plan.
9. Submit a detailed Stormwater Monitoring Plan.
10. Submit a detailed Light Monitoring Plan.
11. Reduce noise related to generator use during construction or operation.
12. Reduce impacts to piping plover habitat during security patrols.
13. Submit annual reports to the Service.
14. Coordinate decommissioning of the site with the Service.

The prohibitions against taking the red knot found in section 9 of the Act do not apply until the species is listed. However, the Service advises the FAA/Space X to consider implementing the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions, will be nondiscretionary.

Terms and Conditions
In order to be exempt from the prohibitions of section 9 of the Act, the FAA/Space X must comply with the following terms and conditions, which implement the reasonable and prudent

measures, described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary. (Ecological Services comments in red and concurrence from Space X and STRC)

1. In coordination with the ocelot/jaguarundi biologist, FAA/Space X will identify reasonable measures to protect and/or preserve suitable habitat within the Rio Grande Wildlife Corridor. This is a coordinated effort with Space X and Refuge staff. Refuge staff should identify habitat areas and suggest measures to protect and coordinate those efforts with Space X. (Space X Agrees) (STRC Agrees)

2. In the event that activities result in the direct take (killing, harming, or maiming) of an ocelot, jaguarundi, aplomado falcon, piping plover, red knot, and/or nesting sea turtles, the person(s) responsible for monitoring shall notify the Service at [redacted] immediately. A standard methodology for handling dead or injured species found during the project is to be established in coordination with the Service. This methodology shall be directed at determining the cause of death and ensuring that all data is recorded. The finder should ensure that the specimen and related evidence is not disturbed. A protocol should be developed by the Refuge staff and Space **X** as to who should be called besides the ES office staff and the Refuge staff should outline the methodology for handling dead or injured species and training provided to Space X employees about the importance of not disturbing evidence. (Space X Agrees) (STRC Agrees)

3. In coordination with private organizations (e.g., The Peregrine Fund) or state and federal agencies, assist efforts to increase releases (i.e., hack sites) or nest boxes in suitable northern aplomado falcon habitat. Locations and monitoring efforts can be coordinated between the Peregrine Fund and the refuge staff.
however, the costs of the materials for the nest box should be paid for by Sptcc X_

   (Space X agrees but requests to approve of price/quantity before proceeding with purchases) (STRC Agrees)

4. In coordination with refuge staff, identify further options that would assist in protecting refuge lands and species habitats from impacts that may result from the public intrusions prior to closures. For example, vehicle barriers, in the form of short, spaced posts, sufficiently close together to prevent a truck or ATV from entering, but wide enough apart to allow for terrestrial animals to pass. This could be done alongside SH4 or other identified roads where the footprint is
already disturbed. Location of vehicle barriers along SH4 and other recommended areas can be identified by refuge staff. If Space X agrees materials should be paid for by Space X. Maintenance of barriers will continue to be carried out by STRC staff. (Space X Agrees) (STRC Agrees)

5. A detailed Security Plan is to be developed to fully describe agreements and plans with local authorities whose support is needed to ensure public safety during launch procedures, locations of checkpoints and roadblocks, who will secure those areas, exact type of unmanned and manned aerial and ground vehicles to
be used to perform sweeps and if necessary in the future, a location on private land for

public viewing. STRC stated they are working on a comprehensive list of agencies jurisdiction, boundary of that jurisdiction and who to call in various situations and who will be performing security as needed for launches or test flights. (Space X Agrees) (STRC Agrees)

6. Because FAA/Space X will perform security sweeps on a 7.53-mile stretch of beach prior to launches during the sea turtle season (March 15 to October l) a detailed Sea Turtle Monitoring plan is to be developed. The Service approved plan will describe how the surveys will be done, when it will be done and by whom. The two STRC biologists will not be able to do bird and vegetation monitoring and further include sea turtle patrols during the entire sea turtle season. Space X should be responsible for this task. Another option would be to fund a third person that would be solely on turtle patrols, monitoring of lights and has a database background to be able to develop a program that will capture
the type of information they need for all monitoring. This third person could be a third refuge person or an independent contractor that coordinates with refuge and shares its findings. (Space X agrees to work directly with Sea Turtle Inc.) (STRC Agrees)

7. Develop a bird monitoring plan for pre, during and post construction. Plan should include the piping plover, red knot, and northern aplomado falcon, and describe how where, how, when and who will be performing the surveys. It should also provide similar information for surveys to be performed during launch operations. STRC staff can handle this. (Space X Agrees) (STRC Agrees)

8. Develop a vegetation plan to monitor changes in piping plover critical habitat adjacent to the vertical launch area. Figure 15 depicts the 8.66 acres of piping plover critical habitat that will be impacted by the water vapor ground cloud extending a maximum distance of 600 feet beyond the fence line. Take has been issued for the loss of this habitat. An additional l 000 foot radius encompasses an additional 23.51 acres that may be subject to additional changes but the Service has not issued take for (Figure 16). The detailed vegetation plan should outline how the 23.51 acres will be monitored and action to be taken if changes begin to occur. STRC staff can handle this. (Space X Agrees) (STRC Agrees)

9. To protect surrounding sensitive habitat and waterways, FAA/Space X should develop a detailed Stormwater monitoring plan that is coordinated with the Service, EPA and TCEQ to ensure compliance with protective surface water and sediment criteria (i.e. TRRP 24 Residential Surface Water and Sediment PCL and EPA Water Quality Criteria for surface water and sediment). The plan should include sampling contingencies for normal site operations, spills or emergency releases due to impending tropical stom1s or other events. The plan should be scalable, allowing for annual review by FAA/Space X, the Service, EPA and TCEQ. The initial plan should conduct sampling monthly for the first year to establish a baseline. At the end to the first year, sampling would be conducted in conjunction with major site activities (i.e. vehicle launch) where a discharge may occur or at a frequency determined by the concerned agencies and FAA/Space X. Sampling for emergency release or spill events would be conducted as needed and independent of established or routine monitoring. FAA/Space X should consult with the TCEQ and EPA on specific ecological sediment, storm and

surface water criteria. Since the surrounding area is adjacent to NWR lands and has endangered species habitat, residential/ecological standards should be used to determine protective thresholds and sampling protocols for both water and sediment samples. At no time should industrial standards be applied to offsite discharges in ecologically sensitive areas. Sampling of both sediment and surface water is to beginning immediately upon discovery of a release of 0.1 gallons or more of any substance classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste or when 25 gallons or more of a substance not meeting the classification of a RCRA hazardous waste. For development of this plan and discussion RCRA hazardous waste includes those substance defined as characteristically hazardous as specified in 40 CFR Part 26 l Subpart C. All emergency or spill response samples are to be collected immediately upon discovery and that analysis would be conducted after the event. All samples should be conveyed to an appropriate laboratory for analysis within the samples specified holding time and with all appropriate preservation and chains of custody. This is really a job for Space X employees that are \Vi thin the facility knees and TCEQ. STRC employees should be notified if there is a storm event and a spill occurs outside the fence into piping plover habitat so that STRC staff can monitor thl'. critical habitat for changes. (Space X Agrees) (STRC Agrees)

10. To minimize impacts to nesting sea turtle from lighting impacts submit a detailed Light Monitoring Plan that describes how FAA/Space X will ensure lighting is not occurring on the beach. The plan should describe how a census of number, type, and locations of lights visible from the beach. Lighting inspections should occur on the beach in front of the vertical launch area. A set of daytime and nighttime lighting inspections should be done before nesting before the nesting season and three to seven additional nighttime inspections during the nesting- hatching season are recommended. STRC staff can handle this. (Space X Agrees) (STRC Agrees)

11. The Draft Closure Plan and all monitoring plans are to be submitted to the Service for review 60 days after issuance of the Final BO. The final plans will be submitted to the Service within 30 days after receipt of Service review comments on the draft plans, and any further coordination between the Service and FAA/ Space X regarding the plans and their implementation. If additional time is needed please coordinate with the Service. This should be coordinated henvecn Space X and STRC to sec who is the appropriate person to \\Titc this. refuge or Space X. (Space X Agrees) (STRC Agrees)

12. To reduce noise impacts from generators that may be used during construction or operations all generators are to be in baffle boxes (a sound-resistant box that is placed over or around a generator), have an attached muffler, or use other noise- abatement methods in accordance with industry standards. This is a Space X responsibility since they will he at the job site. (Space X Agrees) (STRC Agrees)

13. To reduce impacts to piping plovers and red knots security patrol vehicles or other necessary equipment on the beach will be driven above the "wet line" to minimize disturbance of birds and protect feeding and roosting areas. Refuge staff and Space X should discuss what equipment will he used and where the patrol n:hicles will be used for patrolling. Also. who is to be notified if someone is not adhering to "wet line"

(Space X Agrees) (STRC Agrees)

14. FAA/Space Xis to submit an annual summary report to the Service's Coastal Ecological Services Field Office by December 31 st of each year. The FAA/Space X summary repott should include monitoring reports, measures implemented during project activities, success of such measures, incidences, and any recommendations on improvements to those measures. Reports should be sent to:
U.S. Fish and Wildlife Service, Coastal Ecological Services Field Office, ATTN: Field Supervisor, c/o TAMU-CC, 6300 Ocean Drive, Campus Box 338, Corpus Christi, Texas 78412. STRC staff could do this. with Space X providing a short summary of what they did. (Space X Agrees) (STRC Agrees)

15. Take is not authorized beyond 2025. In the event activities continue beyond 2025, the FAA should consult with the Service 6 months prior to the expiration of this BCO. FAA responsibility. (Space X Agrees) (STRC Agrees)

Musk teases new details about redesigned next-generation launch system

by Jeff Foust — December 24, 2018

Portions of SpaceX's first "hopper" test article for its Starship vehicle being assembled at the company's South Texas launch site, seen here in a photo tweeted by SpaceX CEO Elon Musk Dec. 24. Credit: Twitter @elonmusk

SANTA FE, N.M. — SpaceX Chief Executive Elon Musk says a redesigned test vehicle for the company's next-generation reusable launch system could be ready for initial flights early next year.

In a tweet early Dec. 24, Musk posted a photo of two parts of that initial test article, a conical section next to a cylindrical unit with landing legs. "Stainless Steel Starship," he wrote.

Elon Musk
@elonmusk

Stainless Steel Starship

108K 2:39 AM - Dec 24, 2018

12.2K people are talking about this

Starship is the new name, announced by Musk last month, of the upper or "spaceship" stage of the next-generation launch system previously officially known as Big Falcon Rocket, or BFR. The lower, booster stage is now called "Super Heavy."

The company has been working on a Starship test article for low-altitude flight tests at the company's South Texas launch site under development. That test article, dubbed a "hopper," would have the same nine-meter diameter as the full-scale version of the vehicle, but would not be as tall.

The company filed an application with the Federal Communications Commission Nov. 19, seeking an experimental license to support communications with the hopper during upcoming flights. SpaceX said it planned a combination of low-altitude flights, going no higher than 500 meters, and high-altitude ones, going as high as 5,000 meters, from the Texas site. The company didn't disclose a schedule for the flights in the application but said it expected to need the license for two years.

Musk and other company officials have said those hopper flights would begin in late 2019. However, Musk tweeted Dec. 22 that he expected those flights to begin as soon as early next year. "I will do a full technical presentation of Starship after the test vehicle we're building in Texas flies, so hopefully March/April," he wrote.

The recent series of tweets from Musk also confirmed a change in materials that will be used to build the vehicle. Original plans, dating back to designs presented in 2016 and 2017, called for the use of carbon composite materials, which are lightweight but have high strength. Earlier this month, though, Musk said SpaceX had shifted to a "fairly heavy metal" for use in the vehicle.

That metal, he said, is stainless steel, in particular a family of alloys called 300 Series known to maintain its strength at high temperatures. Despite being heavier than carbon composites, Musk said that stainless steel offered "slightly better" strength-to-weight performance at cryogenic temperatures, needed for the vehicle's liquid oxygen propellant tanks, and was "vastly better" at high temperatures. He acknowledged that steel was worse than carbon composite at room temperatures.

A stainless steel surface of the vehicle, he added, would require "much less" thermal protection but also would not be painted. "Skin will get too hot for paint," he tweeted. "Stainless mirror finish. Maximum reflectivity."

The test hopper will be powered by three of the company's Raptor methane/liquid oxygen engines under developments. Those engines, which the company has been working on for several years with some financial support from the U.S. Air Force, has undergone design changes as well. "Radically redesigned Raptor ready to fire next month," he tweeted, not elaborating on those changes.

He did note that SpaceX had developed a "superalloy" for Raptor, called SX500, designed to handle hot oxygen-rich gas at pressures of up to 12,000 pounds per square inch. "Almost any metal turns into a flare in those conditions," he wrote, adding that the company's foundry for producing that alloy is "almost fully operational." That foundry "allows rapid iteration on Raptor."

LAUNCH BFR ELON MUSK RAPTOR SPACEX STARSHIP

REIMBURSABLE FUNDING AND DONATION AGREEMENT
BETWEEN
U. S. FISH AND WILDLIFE SERVICE, SOUTH TEXAS REFUGE COMPLEX
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
TO
ACCOMMODATE COMMERCIAL SPACECRAFT LAUNCHES FROM THE SPACEX TEXAS LAUNCH SITE

STRC Agreement Number:
Accounting Code:
Amount Obligated:

This Reimbursable and Donation Agreement ("Agreement") is made and entered into by and between Space Exploration Technologies Corp., a U.S. Corporation incorporated in the state of Delaware ("SpaceX") and the U.S. Fish and Wildlife Service's ("Service") South Texas Refuge Complex ("STRC"), an agency of the U.S. Department of the Interior ("Department"), collectively referred to as, the "Parties," under the authority of the Fish and Wildlife Coordination Act, 16 USC 661 et seq., the Fish and Wildlife Act of 1956, 16 USC 742f et seq., the Partnerships for Wildlife Act, 16 U.S.C. 3741, the National Wildlife Refuge Administration Act, 16 USC 668dd, and Public Law 111-88, Appropriations Act for the Department of the Interior, 123 Stat. 2910, "Donations, Fundraising, and Solicitation" 212 FW 8, Endangered Species Act of 1973 16 USC 1531-1544, "Reimbursable Agreements – Policies and Procedures (and cited authorities found at 267 FW 1.4)," 267 FW 1, and the Department of the Interior's Donations Policy, 374 DM 6 to provide for staffing, resources, and land to mitigate launches of commercial spacecraft from property located adjacent to the STRC lands (Attachment A).

Date: September 10, 2015
STRC Office: Region 2, South Texas Refuge Complex
Project Title: SpaceX Texas Launch Site, Cameron County, Texas
Task Order Term: Earlier of: (a) 30 years; or (b) SpaceX cessation of operations at the Texas Launch Site; or (c) termination in accordance with Article XII.

STRC Point of Contact: Robert Jess, Project Leader, (956)784-7591

SpaceX Point of Contact: Steve Davis, Director of Advanced Projects, (310)363-6253

Background:

SpaceX is a private United States based advanced technology company that designs and builds commercial rockets and spacecraft. SpaceX is developing a relatively inexpensive reusable rocket that will go into space multiple times, similar to the turnaround time capabilities that commercial airliners currently exhibit.
SpaceX has applied for permits from the Federal Aviation Administration ("FAA") to launch its spacecraft from a site near Boca Chica beach on the Gulf Coast of Texas. The launch site is bordered on two sides by STRC lands.

The STRC includes the Laguna Atascosa, Lower Rio Grande Valley and Santa Ana National Wildlife Refuges. These three refuges are found on the most southern tip of Texas where the Rio Grande River meets the Gulf of Mexico. Combined, they include approximately 180,000 acres and provide important habitat for the many species that rest, nest, feed and live here. Many of these species can only be found in deep South Texas, including the highly endangered ocelot and several types of birds that draw wildlife watchers from around the world including the Aplomado Falcon. The mission of the Service is working with others to conserve, protect and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

SpaceX intends to provide funds to STRC that will be used to employ up to three personnel. The STRC employees funded by SpaceX will spend as much time as necessary on actions involving the SpaceX Project. When not working on SpaceX actions, these employees will engage in activities to benefit the Service. While engaging in SpaceX related activities, STRC employees are providing a service to SpaceX and thus are acting pursuant to this Agreement. While engaging in activities not related to SpaceX related activities, STRC employees will be operating pursuant to a donation agreement. For purposes of efficiency, those two agreements are combined into this one Agreement.

I. Purpose

A. Under this Agreement, SpaceX will provide advance payment for the direct costs for up to three full-time employees (FTE) for the Service (STRC). The first FTE will be a law enforcement officer (LEO) (1 GS 1801-5/7/9- salary plus benefits plus management capability, per Attachment D) who will serve as a coordinator between the STRC Project Leader and a security representative of SpaceX. Additionally, the LEO will patrol and monitor activities associated with Boca Chica and surrounding refuge areas. The second FTE, if needed and activated, will be a supervisory biologist (1 GS-0401/0486 9/11/12- salary plus benefits plus management capability, per Attachment D) who will monitor within the onshore portion of the project action area and associated species of Boca Chica and surrounding refuge areas. The third FTE, if needed and activated, will be a biologist (1 GS-0401/0486 5/7/9 - salary plus benefits plus management capability, per Attachment D) who will assist the supervisory biologist in monitoring. The purpose of this Agreement is to define the respective services and resources that will be provided by the Parties, and to establish the responsibilities and procedures of the Parties. This Agreement is intended to:

1. Enable SpaceX to continue a conservation partnership with the STRC to meet monitoring obligations from pre-construction through ongoing operations for the life of the project;

2. Enable STRC to: continue a conservation partnership with SpaceX; to receive funding for employees to monitor and protect STRC resources; and to receive donations from SpaceX for the term of this Agreement;

3. Ensure that any effects of SpaceX's actions are monitored and mitigated; in essence, ensuring full access to biological information gathered during monitoring by both parties on the lands of the Boca Chica area.

4. Maximize the effective and efficient use of STRC personnel resources by providing a dedicated, increased, and predictable level of STRC personnel resources towards SpaceX activities; and,

5. Avoid conflicts and, where possible, expedite the planning and development of necessary documents through more strategic coordination among STRC and SpaceX while providing procedures for resolving any disputes in this resource partnering effort.

6. Enhance the Service's ability to meet its national mission of working with others to conserve, protect and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

II. Regulatory Compliance

A. By entering into this Agreement, neither STRC nor SpaceX abrogate or assign their respective obligations or duties to comply with the Endangered Species Act ("ESA"), National Environmental Policy Act ("NEPA") or any other environmental statutes addressed through this Agreement, or with any other applicable law or regulation.

B. Nothing in this Agreement is to be construed as providing a guarantee that any permits or authorizations will be approved.

III. Scope of Work and Services

A. STRC Staffing

1. STRC shall provide the service of one law enforcement officer (LEO) for the purposes of: communication between law enforcement representatives of FWS and SpaceX prior to and during launch events for security of refuge lands involved; and ensure adequate protection of Service resources located at Boca Chica and surrounding areas. This LEO will have a role as representative for STRC on a combined Task Force during SpaceX launches and will be an employee of the Service. This Service employee will not in any way be supervised or directed by SpaceX.

2. STRC shall provide funding for the services of up to one supervisory biologist and up to one biologist to provide biological monitoring and data collecting of potential impacts to Service trust resources for

8

SpaceX. These individuals will be employees of the Service and will not in any way be supervised or directed by SpaceX. The final number of FTE's will be determined through a subsequent agreement (and can be modified through further subsequent agreements) between SpaceX and STRC based on determined monitoring plans.

3. STRC will provide these services by hiring at least one (1) and no more than three (3) individuals but will not: augment use of existing staff; redirect existing staff to meet the needs of these positions; nor redirect the funds allocated by SpaceX towards other projects.

4. These STRC employees will be managed and supervised by staff at STRC (specifically the STRC project Leader or designee)

5. STRC anticipates the level of work required to monitor the SpaceX Project to be equivalent to between one (1) and three (3) Full-Time Equivalents ("FTEs") annually for the term of this Agreement, using an updated General Schedule (GS) Locality Pay Table plus calculated rate (benefits and management capability) as laid out in the attached schedule (Attachment D).

6. STRC shall notify SpaceX of the qualifications and anticipated roles of qualified personnel proposed to be funded under this Agreement. Hereinafter, these personnel will be referred to as "dedicated staff."

7. STRC shall use the funds provided under this Agreement to defray the costs of salaries and associated benefits of dedicated staff, to reimburse their reasonable travel and other expenses associated with the SpaceX Project (i.e., training, workshops, etc.) and to cover indirect costs incurred by the agency in administration of this Agreement.

8. STRC recognizes the importance of maintaining staff continuity in accomplishing the objectives of this Agreement, and shall use its best efforts to provide for such continuity to the extent practicable in light of the Service's other duties and responsibilities.

B. STRC Technical Assistance and Review

Pursuant to this Agreement, STRC will:

1. Perform other related tasks as agreed to by the Parties.

2. Maintain administrative records of STRC activities related to the SpaceX Project.

3. Provide technical assistance to SpaceX in the course of the Special Use Permit (SUP) process for SpaceX activities on refuge lands.

IV. SpaceX Responsibilities and Commitments

SpaceX will:

A. Provide advance payment (on a rolling one-year basis) for direct costs for one law enforcement officer (1 GS 1801-5/7/9- salary plus benefits) beginning twelve months (or such longer period of time as may mutually be agreed in writing between SpaceX and STRC) prior to SpaceX's first launch attempt from the SpaceX Texas Launch Site. If authorized per the terms in III.A.2, provide up to one supervisory biologist (1 GS-0401/0486 9/11/12- salary plus benefits), and up to one biologist (1 GS-0401/0486 5/7/9 - salary plus benefits) for the term of this Agreement.

B. Adhere to and complete all requirements in the step-down management plan titled "Pre-Construction Species Monitoring Survey"

C. Adhere to and complete all requirements in the step-down management plan titled "Texas Launch Site Security Plan"

D. Adhere to and complete all requirements in the step-down management plan titled "Sea Turtle Monitoring Plan"

E. Adhere to and complete all requirements in the step-down management plan titled "Bird Monitoring Plan"

F. Adhere to and complete all requirements in the step-down management plan titled "Vegetation Monitoring Plan"

G. Adhere to and complete all requirements in the step-down management plan titled "Operational Storm Water Pollution Prevention Plan"

H. Adhere to and complete all requirements in the step-down management plan titled "SpaceX Texas Launch Site Lighting Management Plan"

I. Reimburse STRC for all time of non-dedicated LEO's of STRC when needed and authorized by STRC and SpaceX during certain pre/during/post launch events

J. Reimburse STRC for time of firefighters of STRC when needed and authorized by STRC and SpaceX during certain pre/during/post launch events

K. Install minor sections of fence, if approved by STRC and SpaceX, to be installed along Tx4 east/ Boca Chica Blvd. to further control and restrict access from public to FWS sensitive lands as needed during launch events

L. Provide funds, not to exceed $25,000.00 to purchase initial equipment for the biological positions described herein. This equipment includes, but is not necessarily limited to kayaks, wet lab equipment, spotting scopes, binoculars, GPS equipment, and cameras. This clause only applies if a supervisory biologist or biologist is engaged per the terms in III.A.2

M. Acquire land, when practicable and solely at SpaceX's discretion, within the vicinity of the Launch Control Center and Vertical Launch Area (Attachment B) with an overall goal of land ownership by Space X, General Land Office of Texas (GLO), Service, or Texas Parks & Wildlife Department (TPWD)

N. Move the soft closure site (launch site closure checkpoint) further west on along Tx4 east/ Boca Chica Blvd. away from SpaceX launch site. Specifically, soft closure site will be located west of Border Patrol check station adjacent to canals along Tx4 east/ Boca Chica Blvd. (Attachment C). This relocation adds an additional layer of security with the water barrier (canal) and meets the needs of SpaceX, State, federal and municipal parties, including the Service.

O. Not withstanding any other provisions in this Agreement, in no event shall SpaceX's annual out of pocket expense exceed $400,000 per year.

V. Period of Performance

Work under this Agreement shall begin on September 10, 2015 and shall terminate at the conclusion of the Task Order term defined above (30 years or SpaceX cessation of operations at the Texas Launch Site or termination of the Agreement by either party) or another time mutually agreed to by the Parties. Both SpaceX and STRC representatives will formally review the terms of this Agreement every 5 years.

VI. General Provisions

A. Project Coordination

1. SpaceX has designated its Director of Advanced Projects as its Project Manager, who will serve as the point of contact for coordination with STRC related to this Agreement. The Project Manager shall be responsible for providing information and input to STRC as specified in this Agreement, and will serve as STRC's initial contact for resolution of issues that may arise in the course of the SpaceX Project.

2. STRC has designated the South Texas Refuge Complex Project Leader as its Point of Contact ("POC") for coordination with SpaceX related to the management of this Agreement. The POC shall be responsible for providing reports and other information on STRC activities and

expenditures as specified in the Agreement, and will serve as SpaceX's initial contact for resolution of issues that may arise in the course of completing the objectives of this Agreement.

3. Requests by SpaceX for STRC assistance regarding the SpaceX Project shall be submitted in writing to the STRC POC South Texas Refuge Complex, Attn: Project Leader, 3325 Green Jay Road, Alamo, Texas, 78516 or via email to or Robert_Jess@FWS.Gov.

4. Requests by STRC for information or other assistance from SpaceX with respect to such activities regarding the SpaceX project shall likewise be submitted in writing to either the SpaceX South Texas Project, Director of Advanced Projects, 1030 15th St. NW #220E, Washington, DC, 20005 or via email to TexasLaunchSite@spacex.com.

B. Meetings

1. All meeting requests will be submitted in writing to the STRC POC and the SpaceX Project Manager, respectively. Requests must provide sufficient time, as mutually agreed upon, in advance, for scheduling and establishing travel authorizations. Such requests will include a brief agenda that characterizes the participation expected, the desired outcome of the meeting, and written or other materials containing sufficient information to enable STRC and SpaceX, respectively, to prepare for and actively participate in the meeting.

2. The STRC POC and other appropriate STRC representatives will meet with the SpaceX Project Manager and appropriate SpaceX representatives on a mutually agreed-upon schedule to review the status of work under this Agreement, assess current priorities, and address other relevant issues.

VII. Priority Projects and Activities

A. SpaceX and the STRC will work together to identify tasks and related activities to be treated as priorities. SpaceX and STRC will update the list as warranted.

B. If the current and/or projected workload of priorities exceeds STRC's ability to provide the services specified in this Agreement, STRC will consult with the SpaceX Project Manager regarding an adjustment of priorities and or identification of additional funding resources.

C. If SpaceX fails to identify priorities or related activities, STRC will establish its own priorities in accordance with the objectives of this Agreement and provide a list of priorities to SpaceX.

VIII. Performance Measures

SpaceX and STRC have agreed to establish performance measures as a means to monitor activities under this Agreement. Both Parties understand that performance measures are not intended to be punitive to either Party. Instead, performance measures are intended to provide a means by which the Parties can best manage the workload and schedule of the Project.

IX. Reports

The following requirement pertains to reports associated with the implementation of this Agreement:

STRC shall provide a written annual report (within two weeks of the beginning of the following calendar year) to the SpaceX Project Manager that documents expenditures and activities under this Agreement occurring during the prior calendar year. The report will describe the status of work under the Agreement, and will identify work scheduled to be performed during the then-current calendar year. The report will also identify STRC recommendations for improving coordination among the Parties, as appropriate. The report will specifically include, if applicable:

1. Biological surveys and year end reports of potential impacts.

2. A general update of law enforcement accomplishments and Task Force recommendations.

3. Recommendations for improving conservation measures on trust resources related to SpaceX activities.

SpaceX, with mutual agreement from STRC, may request additional information regarding any items included in the annual report as it deems appropriate.

X. Dispute Resolution

Any issues that are not readily resolved by STRC and SpaceX staff engaged in work on the development of the CCAA will promptly be referred to the STRC POC (LRGV Refuge Manager) and the SpaceX Project Manager for resolution. Should they be unable to reach resolution, issues remaining unresolved will be referred to management for resolution (for STRC, the Project Leader; for SpaceX, Director of Advanced Projects). Issue resolution may be initiated on request of either party. Both SpaceX and STRC are responsible for ensuring timely elevation and resolution of issues. Both parties retain the right to stop work and payment on the Agreement if disputes are not resolved following a notification period of thirty days. The parties will follow the dispute resolution process found in Section XIV (V and W) below.

XI. Project Coordinators

SpaceX and the STRC designate the following individuals as principal contacts for the work outlined in this Reimbursable Agreement:

STRC:

Robert Jess, Project Leader, South Texas Refuge Complex
Phone number (956) 784-7521

SpaceX:

Steve Davis, Director of Advanced Projects
Phone number (310) 363-6253

XII. Termination

Either party to this Agreement may terminate the Agreement after 180 days prior written notice to the other party. Neither party shall be liable to the other for any damages, costs or claims in the event of termination. During the intervening 180 days, the Parties agree to actively attempt to resolve any outstanding disputes or disagreements. Upon termination, STRC shall refund to SpaceX any advanced funds not expended or committed as of the date of notice of termination that was tendered by SpaceX.

XIII. Amendment

This Agreement may be amended in writing by agreement of the Parties.

XIV. Other Provisions

A. By executing this Agreement, neither party waives any administrative or judicial right it might otherwise have.

B. Non-Discrimination. All activities pursuant to or in association with this Agreement shall be conducted without discrimination on grounds of race, color, sexual orientation, national origin, disabilities, religion, age, or sex, as well as in compliance with the requirements of any applicable federal laws, regulations, or policies prohibiting such discrimination.

C. Anti-Deficiency Act. Pursuant to 31 U.S.C. § 1341, nothing contained in this Agreement shall be construed to obligate the STRC, the Department of the Interior, or the United States to any current or future expenditure of funds in advance of the availability of appropriations from Congress. Nor does this Agreement obligate the STRC, the Department of the Interior, or the United

States to spend funds on any particular project or purpose, even if funds are available.

D. Member of Congress. Pursuant to 41 U.S.C. § 22, no Member of Congress shall be admitted to any share or part of any contract or agreement made, entered into, or adopted by or on behalf of the United States, or to any benefit to arise thereupon.

E. Compliance with Applicable Laws. This Agreement and performance hereunder is subject to all applicable laws, regulations and government policies, whether now in force or hereafter enacted or promulgated. Nothing in this Agreement shall be construed as in any way impairing the general powers of the STRC to supervise, regulate, and control its property under applicable laws, regulations, and management policies. Nothing in this Agreement shall be construed to be inconsistent with or contrary to the purpose or intent of any Act of Congress.

F. Disclaimers of Government Endorsement. SpaceX will not publicize or circulate any materials (including advertisements, solicitations, brochures, press releases, speeches, pictures, movies, articles, manuscripts, or other publications), suggesting expressly or implicitly that the Government, the Department, STRC, or Government employees endorse any business, brands, goods or services. Nothing herein is intended to prevent STRC or the Department from recognizing the partnership or contributions made by the SpaceX to STRC, or from authorizing, on a case-by-case basis, inclusion of such recognition in materials generated by SpaceX related to this Agreement.

G. Merger. This Agreement, including any attachments, and or documents incorporated by reference, is the sole and entire Agreement of the Parties with respect to the subject matter hereof.

H. Waiver. If a party fails to exercise any right or to insist that the other party comply with any obligation, no such failure or insistence shall be a waiver of a right of a party to demand strict compliance with each duty or obligation under this Agreement. No custom or practice of the parties which varies from this Agreement shall constitute a waiver of the right of a party to demand exact compliance. Waiver by one party of any particular default by the other party shall not affect or impair a party's rights in connection with any subsequent default of the same or of a different nature, nor shall any delay or omission of a party to exercise any rights arising from such default affect or impair the rights of that party as to such default or any subsequent default. Waivers by one party of any duty or obligation owed by another party must be express and evidenced in writing.

I. Assignment. No part of this Agreement shall be assigned to any third-party without prior written approval of the other party.

J. Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original (including copies sent to a party by facsimile transmission) as against the party signing such counterpart, but which together shall constitute one and the same instrument.

K. Agency. SpaceX is not an agent or representative of the United States, the Department of the Interior, or STRC, nor will SpaceX represent itself as such to third parties. STRC employees are not agents of SpaceX and will not represent themselves as such to third parties. No joint venture, joint enterprise or other entity is created by this Agreement.

L. Non-Exclusive Agreement. This Agreement in no way restricts either STRC or SpaceX from entering into similar agreements, or participating in similar activities or arrangements, with other public or private agencies, organizations, or individuals.

M. No Third-Party Beneficiaries. Unless expressly stated herein, nothing in this Agreement is intended to grant any rights or provide any benefits to any third-party.

N. Survival. Any and all provisions that, by their terms or otherwise, are reasonably expected to be performed after the expiration or early termination of this Agreement, shall survive and be enforceable after the expiration or early termination of this Agreement. Any and all liabilities, actual or contingent, that have arisen during the term of this Agreement and in connection with it shall survive expiration or termination of this Agreement.

O. Partial Invalidity. If any provision of this Agreement or the application thereof to any party or circumstance shall, to any extent, be held invalid or unenforceable, the remainder of this Agreement or the application of such provision to the parties or circumstances other than those to which it is held invalid or unenforceable, shall not be affected thereby and each provision of this Agreement shall be valid and be enforced to the fullest extent permitted by law.

P. Captions and Headings. The captions, headings, article numbers and paragraph numbers appearing in this Agreement are inserted only as a matter of convenience and in no way shall be construed as defining or limiting the scope or intent of the provision of this Agreement, nor in any way affecting this Agreement.

Q. Force Majeure. Neither party shall be liable for failure to perform its obligations under this Agreement due to events beyond its reasonable control, including, but not limited to, strikes, riots, wars, fire, acts of God, and acts in compliance with or required by any applicable laws or regulations.

S. Jointly Drafted. This Agreement shall be deemed to have been jointly drafted by both Parties and, in the event of a dispute, shall not be construed against either party.

T. Further Assurances. If requested by one party, the other party shall execute and deliver such other documents and take such other action as may be necessary to effect the terms of this Agreement.

U. Donation Acceptance. This Agreement assists in ensuring that STRC's donation acceptance and the related activities of the parties comply with applicable laws, regulations and government policies. Therefore, in consideration of the mutual promises and covenants contained herein, and for other good and valuable consideration the receipt and sufficiency of which are hereby acknowledged, both Parties intend to be legally bound by this Agreement.

V. Disputes and Venue. The Parties agree that in the event of a dispute between them, STRC and Signatories of Agreement agree to work together in good faith to resolve such disputes, using the informal dispute resolution procedures set forth in this section, or such other procedures upon which the parties may later agree. However, if at any time any party determines that circumstances so warrant, it may seek any available remedy in a federal court of appropriate jurisdiction without waiting to complete informal dispute resolution.

W. Informal Dispute Resolution Process. Unless the parties agree upon another dispute resolution process, or unless an aggrieved party has initiated administrative proceedings or suit in federal court as provided in this section, the parties may use the following process to attempt to resolve disputes:

(a) The aggrieved party will notify the other parties of the provision that may have been violated, the basis for contending that a violation has occurred, and the remedies it proposes to correct the alleged violation.

(b) The party alleged to be in violation will have 30 days, or such other time as may be agreed, to respond. During this time it may seek clarification of the information provided in the initial notice. The aggrieved party will use its best efforts to provide any information then available to it that may be responsive to such inquiries.

(c) Within 30 days after such response was provided or was due, representatives of the parties having authority to resolve the dispute will meet and negotiate in good faith toward a solution satisfactory to all parties, or will establish a specific process and timetable to seek such a solution.

(d) If any issues cannot be resolved through such negotiations, the parties will consider non-binding mediation and other alternative dispute resolution processes and, if a dispute resolution process is agreed upon, will make good faith efforts to resolve all remaining issues through that process.

R

X. Prohibited Source. The parties represent that SpaceX is not a Prohibited Source as that term is defined at 267 FW 1.12.

WITNESS WHEREOF, the parties hereto have caused this Reimbursable Funding and Donation Agreement to be executed as of the date therein written.

Space Exploration Technologies Corp.

By: _____
Name: Steve Davis
Title: Director

9/11/15
Date

U.S. Fish and Wildlife Service

05/11/2015
Date

Aaron M. Archibeque
Regional Chief, NWRS

Attachment A

Space-X Proposed Project - Boca Chica Beach

Space-X Proposed Project - Boca Chica Beach

Attachment B

Initial Land Acquisition Area

Space-X Proposed Project - Boca Chica Beach

Attachment C

Location of soft check point in relation to Control Center and Launch Site

Attachment D

Sample Salaries*, Benefits and 25% Management Capability (FY 2014)

Table 1. FY 14 General Schedule (GS) Salary Table ($) by Step (1,5,10) plus 40% for Benefits** [Bnfts] and 25% Management Capability*** (MC) by Step for the South Texas Refuge Complex area.

	SALARY							
Grade	Step 1 Step 10	[Bnfts] [Bnfts]	(MC) (MC)	Total Total	Step 5	[Bnfts]	(MC)	Total
5	31,628 41,122	12,651 16,449	(7,907) (10,281)	**52,186** **67,852**	35,847	15,539	(8,962)	**60,348**
7	39,179 50,932	15,672 20,373	(9,795) (12,733)	**64,646** **84,038**	44,403	17,761	(11,101)	**73,271**
9	47,923 62,297	19,169 24,919	(11,981) (15,574)	**79,073** **102,790**	54,312	21,725	(13,578)	**89,615**
11	57,982 75,376	23,193 30,150	(14,496) (18,844)	**95,671** **124,370**	65,713	26,285	(16,428)	**108,426**
12	69,497 90,344	27,799 36,138	(17,374) (22,586)	**114,670** **149,068**	78,762	31,505	(19,691)	**129,958**

Note: *Salaries based on current year General Schedule Salary Table. **Benefits are determined based on 40% of the Grade/Step (information provided by Joanne Pena, HR). ***Management Capability is determined based on 25% of the Grade/Step (not including Benefits).

Orms, Mary <[redacted]>

[EXTERNAL] SpaceX - Refuge fire meeting

2 messages

Grey, Leslie (FAA) <[redacted] Wed, Jul 31, 2019 at 2:40 PM
To: "Orms, Mary" <[redacted] Dawn Gardiner <[redacted] Pat Clements <[redacted] Bryan Winton <[redacted] "delaGarza, Laura" <[redacted] Ernesto Reyes <[redacted] "Zee, Stacey (FAA)" <[redacted]

This meeting day/time worked for most all attendees. Thank you, Leslie Grey

invite.ics
3K

Winton, Bryan <[redacted] Wed, Jul 31, 2019 at 3:13 PM
To: [redacted]
Cc: "Orms, Mary" <[redacted] Pat Clements <[redacted] "Whitehead, Dawn" <[redacted] Ernesto Reyes <[redacted] Laura <[redacted]

Ecological Services Branch of USFWS requested a meeting/conference call with FAA and Space-X to discuss the fire occurring on the evening of July 25. Topics will likely be focused on the EIS and Written-Re-evaluation to the project and show that the recent fire is something that was not addressed in the EIS because initially Space-X proposed launches, and included in their plans to construct a water tower and infrastructure to difuse the flame of the rocket during launches. Now that the site is for testing, there is no such infrastructure in place, therefore, as before the likelihood of fire on refuge was stated to be unlikely, it is now apparent that given the changes to Space-X project/activity and constructed infrastructure, there is a likelihood we will have a fire, and maybe more to come, given Space X plans for more engines, bigger rockets, higher hops, etc. Therefore, the purpose of the conference call with FAA and Space-X and FWS will be to find out how the NEPA can be improved/amended to address what is actually happening now, as opposed to what was proposed when the project was first presented in April 2011. Because the fire occurred on TPWD lands, I'm sharing this information so please join the call if you can. Also, the frequency of road closures has been much higher than originally anticipated, so access to state and federal public lands and the beach has been impacted to a higher degree, possibly such that the public are now being conditioned to no longer anticipate being able to access this area. These and other discrepancies between the NEPA documents and what is currently occurring will be the focus of the call.

Sincerely,
bryan

[Quoted text hidden]

--
Bryan R. Winton, Wildlife Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]

invite.ics

 3K

Re: [EXTERNAL] SpaceX

Gardiner, Dawn <[redacted]>

Thu 11/21/2019 4:19 PM

To: Zee, Stacey (FAA) <[redacted]>
Cc: Orms, Mary <[redacted]> Reyes, Ernesto <[redacted]> delaGarza, Laura <[redacted]> Ardizzone, Chuck CA <[redacted]>

I got your message, thank you, and know we need to set up a call. Half of our staff retired or transferred and we are working on backfilling and juggling. We are overbooked for consultations and project reviews. Can we talk Friday December 6? We did see that SpaceX blew up a rocket test yesterday and the top of the rocket and nitrogen gas spread over the National Wildlife Refuge. I think refuge staff are assessing the situation and hope to know more when we speak.

Dawn

On Wed, Nov 20, 2019 at 7:49 AM Zee, Stacey (FAA) <[redacted]> wrote:

> Hi Dawn –
>
> This is a follow up to my voicemail. Please give me a call at [redacted] so we can set up a time to talk about the SpaceX BA/BO for Boca Chica.
>
> Thank you!
>
> Stacey M. Zee
>
> Office of Commercial Space Transportation
>
> Federal Aviation Administration
>
> [redacted]
>
> [redacted]
>
> [redacted]

--

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Dawn Gardiner
Assistant Field Supervisor
Texas Coastal Ecological Services Field Office
U.S. Fish and Wildlife Service
[redacted]
[redacted]

[redacted] **x26310**
[redacted] **direct line**
[redacted]

Working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats in South Texas for the continuing benefit of the American people.

Orms, Mary <[redacted]>

Fwd: [EXTERNAL] SpaceX removal of debris North of Hwy 4

1 message

Winton, Bryan <[redacted]> Fri, Nov 29, 2019 at 9:32 AM
To: Sonny Perez <[redacted]> Scot Edler <[redacted]> Imer Dela Garza <[redacted]>
Chris Perez <[redacted]> Ernesto Reyes <[redacted]> Laura <[redacted]> Iriz
Elizondo Navarro <[redacted]> Romeo Garcia <[redacted]> Gerardo Longoria
<[redacted]> Ellissa Martinez <[redacted]> "Whitehead, Dawn" <[redacted]>
"Orms, Mary" <[redacted]>

For your records. FAA has called for a Dec 5, 2019 meeting to revisit the EA and Biological Opinion that we worked on since April 2011, which did not turn out to accurately reflect what they (Space-X) have been doing. Their action differs significantly from what they proposed. The road closures and interruptions to the refuge/public beach is considerably more than was anticipated, and the action is now testing, rather than launches, which is inherently more inclined to result in a failure and thus damage to the refuge.

Hopefully their explosions will deter the LNG's from developing our area though. The air quality, viewshed impacts, and degradation of the Boca Chica area would be accelerated if one or more of these industrial energy projects ultimately proceeds.

bryan

---------- Forwarded message ---------
From: **Randy Rees** <[redacted]>
Date: Sat, Nov 23, 2019 at 5:09 PM
Subject: [EXTERNAL] SpaceX removal of debris North of Hwy 4
To: Extranet Contact - bryan_winton <[redacted]> <[redacted]>
Cc: Extranet Contact - Stacey.Zee <[redacted]> Matthew Thompson <[redacted]> Katy
Groom <[redacted]> Paul Sutter <[redacted]>

Hello Bryan,

For Official Use Only

Per my discussion with Scot, I wanted to send some pictures from the removal operation. The team was able to pull the debris with 2 high capacity tow trucks, over to the ATV Barrier. There the debris was rigged and flown with a crane onto our Construction Dump truck for transport to our build area for inspections.

The ATV Barrier is all there, but one bollard needs to be reset/replaced, and then the cable re-tensioned. I can work with you next week on a plan to accomplish the necessary repair.

We have had crews on foot out yesterday and today using metal detectors to ensure any small pieces aren't missed.

No vehicles or ATVs of any type crossed the ATV barrier location during the operation.

PICTURES

Initial location of debris with arrows showing direction of removal.

After the drag began.

Largest piece almost pulled in.

Final location of the drag removal operation.

Due to the weight of the debris and load bearing limitations of the sand for the crane, they had to drag into the ATV barrier several feet. This is the unset bollard. The cable tension was released at a nearby cable clamp.

If you have any questions or concerns, please call anytime.

Thank You,

Randy Rees

Environmental Health and Safety Manager

Chief of Emergency Operations

Space Exploration Technologies (SpaceX)

South Texas
Launch Operations

South Texas Physical

[redacted]

[redacted]

☎ W: (956)[redacted] | ☎ M: (515)[redacted]

✉: [redacted] 💻: www.spacex.com

MEMBER
INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
www.iafc.org

--
Bryan R. Winton, Wildlife Refuge Manager
Lower Rio Grande Valley National Wildlife Refuge
[redacted]

From: Winton, Bryan
To: Edler, Scot; Orms, Mary; Gardiner, Dawn; Reyes, Ernesto; delaGarza, Laura; Kendal Keyes
Subject: Fw: SpaceX Debris Locations / Details
Date: Monday, March 2, 2020 7:22:30 AM
Attachments: image003.png
image004.png
image005.png
image007.png

Scot and I will be meeting with CBBEP (Stephanie Bilodeaux) at 10am this morning to see where if any birds are nesting in proximity to the debris that needs removed.
bryan

From: Randy Rees <[redacted]>
Sent: Saturday, February 29, 2020 10:10 PM
To: Winton, Bryan <[redacted]> Extranet Contact - Tom.hushen <[redacted]> Extranet Contact - Stacey.Zee <[redacted]> Extranet Contact - kendal.keyes <[redacted]>
Cc: Matthew Thompson <[redacted]> Paul Sutter <[redacted]> Kyle Meade <[redacted]>
Subject: [EXTERNAL] SpaceX Debris Locations / Details

All,

Below is a recap of all the debris from our SN1 test anomaly, that we located outside of the SpaceX physical fence-line.
Notes are included with each of the maps. Debris surveys were performed with the permission of USFW, in both the Northern and Southern Debris areas, utilizing 4-wheel ATVs where appropriate and personnel on foot.
The individual pieces were each photographed and geo-tagged prior to being recovered (if recovery was possible by hand and on foot). No recovery by any mechanical means was authorized or executed.

Today, while performing evaluations, we did not come across any birds nests within the Northern or Southern Debris areas. In general the water covered areas of both South Bay and the Rio Grande tidal flats were about 6”-8” deep.

Southern Debris

Each of the pins on the image below indicates a small hand carried piece of debris that was logged and recovered.
There were no pieces of debris to the South of the Launch Pad, that we were unable to recover back to our debris processing area, on foot. SpaceX personnel took the opportunity, while out in this area, to also collect general litter that was found during the search for SpaceX debris.