

ENVIRONMENTAL ASPECTS REVIEW
Of
MOBILE LAUNCH PLATFORM #1
Kennedy Space Center, Florida

Report Date: July 16, 2008
Project: Mobile Launch Platform 1 Turnover Assessment
[REDACTED]

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APPENDICES

Appendix A - Property Maps and Site Plans

Appendix B - Site Photographs

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1.0 PROJECT SUMMARY

1.1 GENERAL PROPERTY & AREA INFORMATION

The scope of this Environmental Aspects Review (EAR) includes Mobile Launch Platform #1 (MLP-1 or the Property). This personal property is located within Kennedy Space Center, Florida. MLP-1 was constructed in 1967 to transport space vehicles from the Vehicle Assembly Building to either Launch Complex 39A or 39B where the space vehicles would be launched from this structure. Most recently MLP-1 has been used for launching the National Aeronautics and Space Administration's Space Shuttle. When not in use MLP-1 may be located at either the MLP East or West Park Site for maintenance activities.

1.2 SUMMARY OF FINDINGS & CONCLUSIONS

Recognized Environmental Conditions (RECs) and a Historical concern were identified during this Environmental Aspects Review of MLP-1. Details of the RECs are provided in Section 6.1 according to systems. The following is a summary of RECs identified during this review.

MLP-1 is eligible to be listed on the National Register of Historic Places; therefore MLP-1 should be regarded as a National Historic Place for any modification decision-making purposes.

During site reconnaissance visits housekeeping was observed to be good and no overt signs of chemical contamination were observed.

An Asbestos Containing Material (ACM) survey conducted in January 1996 indicated friable ACM in wires associated with lights in Compartment 16B.

Interviews of key personnel indicate potential for interior paint to contain lead and/or polychlorinated biphenyls. No confirming documentation was identified.

Although no chemical storage is allowed on MLP-1, the following chemicals were identified in systems aboard the MLP.

- Compressed gases: Helium, Nitrogen, Shop air, Breathing air
- Freon R124
- Hydraulic fluid
- Lead-acid batteries
- Petroleum gear lubrication oil
- Petroleum grease
- Silicone vacuum oil
- Domestic wastewater
- Halon fire extinguishment

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2.0 INTRODUCTION

2.1 PURPOSE

The purpose of this EAR is to identify Recognized Environmental Conditions affecting the Property and to identify Historically Significant Sites as the Property is being transitioned from NASA's Space Shuttle Program to its Constellation Program. See Definition of Recognized Environmental Condition.

2.2 SIGNIFICANT ASSUMPTIONS, LIMITATIONS AND EXCEPTIONS

An EAR is limited by the availability and quality of site documentation. Undocumented, unauthorized releases of hazardous materials, the remains of which are not readily identifiable by visual inspection, are very difficult and often impossible to detect within the scope of such an investigation. Performance of this EAR is intended to reduce but not eliminate uncertainty with respect to the potential for Recognized Environmental Conditions (RECs) associated with the Property.

In preparing this report, United Space Alliance (USA) has relied on certain information provided by various government agencies and officials, interviews, third party environmental database providers, and data available at the time of the site inspection. Although there may be some degree of overlap in the information provided by these various sources, USA did not attempt to independently verify the accuracy of all information reviewed or received during the course of this EAR. USA disclaims any and all liability for any errors, omissions or inaccuracies in information provided by third party sources.

The findings of this report are valid as of the date of this report. Changes in the condition of a property can occur with the passage of time, whether due to natural processes or to the works of man on this or adjacent sites. In addition, changes in state-of-the-art procedures or government regulations may occur. Such changes, which are beyond USA's control, may render the findings of this report invalid, wholly or in part. USA has no responsibility for any contingent liabilities for any reason.

The final assessment of the potential for the existence of hazardous material at the subject property should be considered professional opinions based upon the data obtained during the investigations and should not be considered a definitive statement that hazardous material is or is not present in the area of study.

This report does not constitute legal advice, nor does USA claim to give legal advice. Any maps, plats, sketches, drawings, or photographs reproduced and included in this report are intended only for the purpose of showing spatial relationships and do not represent legal surveys.

Regulatory agency personnel were not contacted during this EAR.

An investigation of previous owners and uses of the Property and adjoining properties was not performed. Uses of the Property were investigated only for the duration of ownership by NASA.

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2.3 USER RELIANCE

This EAR was prepared at the direction of an Environmental Professional in accordance with usual professional practices and the normal standard of care exercised within the profession. The presence or absence of contaminants on the surface of or subsurface of the Property cannot be determined without testing. Accordingly, the observations of this report merely assess the potential for liabilities arising from past usage of the Property and should not be construed as conclusive evidence that the Property has not been impacted. Further, although reasonable efforts have been made to use reliable information from outside sources, USA does not warrant their accuracy or completeness. USA shall not be liable for the costs of assessment or remediation for conditions which are not identified in this report. This EAR shall not create any rights or benefits to any third parties.

3.0 PROPERTY DESCRIPTION

3.1 PROPERTY LOCATION

During this review MLP-1 was initially located in High Bay 3 of the Vehicle Assembly Building. It was moved to High Bay 1 of the Vehicle Assembly Building on 6/30/08.

3.2 PROPERTY IMPROVEMENTS

3.2.1 GENERAL

MLP-1 (one of three MLPs) was constructed of steel in 1967 for transporting and launching the Saturn V rocket for the Apollo program lunar landing missions of the 1960s and 1970s. Each MLP originally had a single exhaust vent for the Saturn V's motors. The MLPs also featured the distinctive 400-foot launch umbilical tower with arms that permitted the servicing of the rocket on the launch pad. The arms swung away from the Saturn V at launch. For Skylab and Apollo-Soyuz, MLP #1 was modified with a so-called "milkstool" pedestal that allowed the shorter Saturn IB rocket to use the Saturn V tower and service arms, and Saturn V Ground Support Equipment (GSE) was removed or de-activated and Saturn IB GSE equipment was installed.

In the post-Apollo years, the umbilical towers from MLP- 1 were removed. In addition to removal of the umbilical tower, MLP-1 was extensively reconfigured with the addition of two Tail Service Masts, one on either side of the Main Engine exhaust vent. These 31-foot masts contain the feed lines through which liquid hydrogen (LH₂) and liquid oxygen (LOX) are loaded into the shuttle's external fuel tank, as well as electrical hookups and flares which eliminate free hydrogen present prior to main engine ignition. At launch, the umbilicals pull away from the orbiter and retract into the Masts, where protective hoods rotate closed to shield them from the exhaust flames. Each Tail Service Mast assembly is 15 feet (4.6 meters) long, 9 feet (2.7 meters) wide, and rises 31 feet (9.4 meters) above the Platform deck. Other umbilicals carry helium and nitrogen, as well as ground electrical power and communications links. MLP-1, in total, weighs approximately 9.25 million pounds (4,2 Mkg) and measures 160 feet by 135 feet (49 meters by 41 meters), and is 25 feet (7.6 meters) high.

Eight attach posts, four on the aft skirt of each SRB, support and hold the Space Shuttle on the Mobile Launcher Platform. These posts fit on counterpart posts located in the

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Platform's two solid rocket booster support wells. The space vehicle disconnects from the Platform by explosive nuts. Sound suppression water is transmitted into the exhaust vents of the MLP.

The main body of the Platform provides three openings - two for the exhaust of the solid rocket boosters and one for the main engines exhaust. MLP-1 has two inner levels containing electrical, test and propellant-loading equipment.

The launch vehicle is assembled in the Vehicle Assembly Building (VAB) on an empty MLP. After the SRB Aft Skirts are affixed to the platform by means of attach posts, the remaining vehicle components are stacked. The Crawler-Transporter then carries the combined platform and vehicle to the launch site, and places them there together. Once the launch is completed, the Crawler-Transporter retrieves the empty MLP from the pad to be readied for its next use.

3.2.2 Systems

Structural. MLP-1 is of welded steel construction. The steel is coated with Ameron (Product #D-21-9) inorganic zinc primer and GE (Product #4304) topcoat.

Utilities. Utilities include telephone, electrical power, lighting, domestic sewer transmission lines, domestic waste tank, potable water, fire alarm, firex water, Halon fire extinguishment system, oxygen monitoring system, breathing air, heating, ventilation, air conditioning, and battery back-up power.

The following supporting systems were visited during site reconnaissance of this assessment:

- Auxillary Power Units
- Environmental Control System/PVD
- External Tank/Solid Rocket Booster Electrical
- External Tank Mechanical
- Ground Cooling
- Ground Special Power (Low Voltage & Special Power)
- Hazardous Gas Detection System
- Hazard Warning System
- Hydraulics
- Launch Accessories
- Liquid Oxygen/Liquid Hydrogen
- Main Propulsion System (MPS)
- Pad Electrical
- Power Reactant Supply Distribution/Fuel Cells
- Pyrotechnics
- Range Safety
- Solid Rocket Booster - Hydraulic Power Unit
- Space Shuttle Main Engine
- Heating, Ventilation, and Air Conditioning

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- KSC Complex Control System
- Pneumatics
- Power
- Structures
- Water

NASA's Space Shuttle is transported to the pad surface atop the Mobile Launch Platform by the Crawler Transporter. The Mobile Launch Platform and the Crawler Transporter include multiple petroleum-containing hydraulic, lubrication and compressed gas systems.

3.3 CURRENT USE OF THE PROPERTY

MLP-1 is currently used to launch NASA's Space Shuttle.

4.0 RECORDS REVIEW

4.1 HISTORICAL INFORMATION

MLP-1 is not currently listed on the National Register of Historical Places. The NASA Environmental Program Branch personnel have determined MLP-1 to be eligible for such listing under the Shuttle Program. Therefore MLP-1 should be regarded as a National Historic Place for any modification decision-making purposes.

4.2 STANDARD ENVIRONMENTAL RECORDS REVIEW

A Federal and state records search was not pursued for this assessment. During previous assessments at Kennedy Space Center such searches have proven unsuccessful or inaccurate in revealing environmental records. Such regulatory record searches are not applicable to personal property. Instead, local environmental databases and facility records from NASA/KSC were obtained and reviewed.

- Asbestos Management Information System (AMIS) indicated an Asbestos Containing Material (ACM) survey was conducted in January 1996. The 1996 survey indicated 10ft² of friable ACM in the wiring for round white lights in Compartment 16B. Friable ACM in round white lights in Compartments 1A and 2A had been abated.
- Being located within Kennedy Space Center, generation of hazardous waste aboard MLP-1 is subject to a Hazardous and Solid Waste Amendments (HSWA) Permit (Permit No. FL6800014585) issued by Florida Department of Environmental Protection.
- A satellite hazardous waste accumulation area is located in Compartment 15B of MLP-1. Hazardous wastes accumulated in this area include paint solids such as applicators and rags generated from small scale touch-up work.
- Wastes generated aboard MLP-1 while parked in the Vehicle Assembly Building are removed to a 90-day, Hazardous Waste Building (K6-0998) to the southwest. Hazardous wastes generated aboard MLP-1 while parked at LC39A are removed to portable, 90-day, Hazardous Waste Buildings (J8-1708J and J8-1708K) to the west. Wastes generated aboard MLP-1 while parked at LC39B are removed to portable, 90-day, Hazardous Waste Buildings (J7-0337I and J70337J) to the west.

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- During launches acidic residue is deposited MLP-1 from the exhaust of the Shuttle's Solid Rocket Boosters (SRBs). Post-launch washdowns are performed on MLP-1 using potable-quality water. The acidic wastewater is collected in tanks, treated and disposed in percolation ponds within the perimeter of each Launch Complex. These wastewaters are subject to Industrial Wastewater Facility Permits #05-FLA010307 (LC39A) and #05-FLA010299 (LC39B).
- Spill reporting information was obtained from the USA Environmental Management Office. One spill was indicated on an Environmental Release Documentation Form dated 3/7/07. The spill released 1,000 gallons of fire extinguishment water from MLP-1 to the pad surface at LC39B.

4.3 PRIOR ENVIRONMENTAL REPORTS

No previous environmental investigations have been performed by NASA's KSC Remediation Group on MLP-1 because it is personal property as opposed to real property.

- *Incidental Wastewater Discharge Engineering Study* of 1994 provides details regarding wastewater emissions and configuration of drains of environmental concern at KSC. This report was reviewed but did not include MLP-1 within its scope.

5.0 RECONNAISSANCE & INTERVIEWS

5.1 RECONNAISSANCE

A walking reconnaissance (walkdown) was performed of individual systems identified by the Preliminary MLP1 End State & Systems Transition Matrix 20080116, Revision B. Those systems are identified in Section 3.2.2 of this report. A technical representative accompanied the Environmental Professional during each system walkdown.

Housekeeping was observed to be good in most areas.

No overt signs of environmental contamination were observed.

5.2 INTERVIEWS

██ was interviewed on 6/12/08 regarding the coatings on MLP-1. ██████████ did not provide detailed knowledge of the coatings as most of the coatings application was performed by USA Modification Management. ██████████ believed that it is likely that lead-containing paint was applied to MLP-1 during its early history. Regarding the current exterior coatings of MLP-1 ██████████ was aware that the Zero Level, Sides 1, 2, 3, and 4, and the SRB Holes had been coated with an inorganic zinc primer; it is known that inorganic zinc primer must be applied to bare metal substrates with an appropriate profile. Therefore it is likely that all previous exterior coatings have been removed.

██ was interviewed by telephone on 6/12/08. ██████████ believed the original coatings (both interior and exterior) on MLP-1 likely contained lead and polychlorinated biphenyls (PCBs). ██████████ stated the exterior of MLP-1 had been blasted and re-painted with

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inorganic zinc primer multiple times in its history. Because of the sandblasting and re-painting it is unlikely that any lead- or PCB-containing coatings remain. [REDACTED] was not aware of any removal or re-painting of the interior coatings of MLP-1. [REDACTED] believes it is likely that the interior coatings contain lead and/or PCBs. The only work that USA Modification Management has performed on the interior of MLP-1 has been touch-up of small modifications.

[REDACTED] was interviewed on June 16, 2008. [REDACTED] has worked in MLP Operations for the past 18 years; he has a total of 28 years experience at KSC. [REDACTED] identified the past uses of MLP-1 within the Apollo Program as being almost identical to that during the Shuttle Program (the same systems were in use aboard MLP-1). [REDACTED] stated that no chemical storage is allowed aboard MLP-1. Chemicals present in systems are: hydraulic oil, freon, compressed gases (GN2, GHe, and shop air), gel-cel batteries, and dry chemical firex system. [REDACTED] was aware that lead paint existed in portions of MLP-1 and that asbestos removals had been done in the past. [REDACTED] was aware of the following releases.

- Firex dry chemical discharge occurred approximately 10-12 years ago.
- Hydraulic fluid leaked into secondary containment and was pumped-out, containerized and properly disposed.
- Water leak captured by secondary containment. Water contacted hydraulic fluid in secondary containment. Waste was pumped-out, containerized and properly disposed.

6.0 FINDINGS

6.1 THE PROPERTY

The Property is not currently listed on the National Register of Historic Places however it does qualify to be registered.

The following were identified as RECs at the Property.

- Asbestos. Friable Asbestos Containing Material (ACM) was identified in wires of lights in Compartment 16B.
- Interior Paint. Although no confirming documentation was identified, potential exists for interior paint to contain lead and polychlorinated biphenyls. This concern was communicated during interviews of three key personnel.
- Main Propulsion System (MPS). A gaseous helium panel exists in Compartment 44A that supplies helium to the orbiter. During site reconnaissance the system engineer reported that valves leak every flow.
- Ground Cooling. A Freon R124 system exists including a heat exchanger, catch tank (for system over-pressurization), and an emergency vent.
- Hazardous Gas Detection System. Compressed gases are associated with this system (nitrogen, shop air, and breathing air). Payload purge system in Compartment 34A.

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- Ground Special Power. Back-up batteries exist in secondary containment tubs within power supply “racks” in Compartments 7A and 9A (see Appendix B, Photograph 4).
- Hydraulics.
 - Hydraulic pumping systems exist to supply hydraulics to the Space Shuttle’s Solid Rocket Boosters and to the Orbiter. Three pumping units with 104-gallon capacity reservoirs exist in Compartments 2B, 43B, and 16B. Secondary containment “coffins” surround each pumping unit (see Appendix B, Photograph 1). Stainless steel piping supplies hydraulic fluid to the Zero-Level.
 - A 100-gallon capacity, single-walled, contingency tank exists in Compartment 16B to collect excess hydraulic fluid in case of an over-pressurization (see Appendix B, Photograph 2). The contingency tank is maintained “normally empty.”
- Hazard Warning System.
 - Two oil-filled vacuum pumps associated with mass spectrometer are located in Compartment 7A.
 - Approximately 34 compressed gas cylinders containing inert gases are located in Compartment 7A.
 - Approximately 3 compressed gas cylinders containing inert gases are located in Compartment 43A.
- Launch Accessories.
 - Engine Platform Winches contain approximately 5 gallons of 90-weight gear oil. Four winches are located on the SSME Platform (Compartment 2B and Compartment 16B). Eight winches are located on the SRB Platform (Compartments 37A, 41A, 31A).
 - Five shock absorbers on the platforms contain silicone oil (approximately 2 quarts each).
 - Petroleum grease is used on platform jack screws and on the personnel access doors.
- ET Cryogenics. Gaseous nitrogen pressure (for LOX system) and gaseous helium pressure (for LH2 system) is maintained during non-launch periods. Control panels for GN2 and GHe are located in Compartment 34B.
- Pneumatics. Krytox grease is used on high & low pressure gas distribution systems.
- Structures. Four attach points at the bottom of the MLP are lubricated with Molykote lubricant.
- Water Systems.
 - Lubricants are used on valve actuators.
 - Domestic wastewater (“Safe waste”) holding tank in Compartment 16B.
- KSC Complex Control System (KCCS). Two lead-acid batteries are located in FIC0045 of Compartment 7A.
- Auxillary Power Unit System (APU). A pipe system with control panel valves supplies heated gaseous nitrogen to both Solid Rocket Boosters. No gaseous nitrogen is stored aboard the MLP.
- Halon fire extinguishment system exists in Compartments 7A, 8A, 10A and 21A.

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- Space Shuttle Main Engine.
 - A gaseous nitrogen distribution control panel exists in compartment 44A to provide gaseous nitrogen throughout the MLP.
 - This system is pressurized during periods of launch processing or during test periods. Freon R124 is occasionally used for leak testing.
- Power Reactant Supply and Distribution (PRSD)/Fuel Cells.
 - Control panel exists on the Side 1 Veranda to control flow of Gaseous Hydrogen (GH₂) and Gaseous Oxygen (GO₂) to and from the orbiter fuel cells, one GH₂ panel and one GO₂ panel. The valves in the GH₂ and GO₂ control panels are actuated by GN₂. Purging of the electrical cabinet on this panel is performed using GN₂.
 - A pneumatic operated disconnect (POD) and tubing in GO₂ Tail Service Mast (TSM) at the 0-Level serves to supply the Shuttle's fuel cell manifolds with GO₂. This tubing originates at an interface with the launch pad on MLP Side 2, travels through the control panel on Side 1, and passes through the TSM. Gaseous helium is used to actuate the POD in the TSM. The GHe is controlled from an actuation panel in compartment 33A.
 - A pneumatic operated disconnect (POD) and tubing in GH₂ Tail Service Mast (TSM) at the 0-Level serves to supply the Shuttle's fuel cell manifolds with GH₂. This tubing originates at an interface with the launch pad on MLP Side 2, travels through the control panel on Side 1, and passes through the TSM. Gaseous helium is used to actuate the POD in the TSM. The GHe is controlled from an actuation panel in compartment 43A.
 - The GH₂ and GO₂ systems are pressurized during periods of launch processing or during test periods when the MLP is connected at the launch pads. The GN₂ and GHe lines are pressurized when the MLP is connected to facility supplies in the VAB and the launch pads. Bubble leak soap is occasionally used for leak testing.
- Range Safety.
 - The Range Safety System has attenuator panels (in Compartment 7A) that contain Barium and are listed as carcinogenic in the panel.
 - This system emits low level radio frequencies at +19dBm at 146.5 mega Hertz in Compartment 7A and at the Hold-Down Posts during periods of testing.

7.0 CONCLUSIONS

7.1 CONCLUSIONS

Multiple RECs exist aboard MLP-1.

Although MLP-1 is not listed on the National Register of Historical Places it qualifies for such listing under the Shuttle Program. Any decisions to modify MLP-1 must consider it as a National Historic Place.

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8.0 REFERENCES

Spreadsheet: Preliminary MLP1 End State & Systems Transition Matrix 20080116 RevB.xls

Incidental Wastewater Discharge Engineering Study for Launch Complex 39B and Associated Facilities, Final Report. Task Order No. 1-NAS10-12-6, Project Number: 943500-0300, US Environmental Group, Inc. and Precision Fabricating & Cleaning, Inc., November 18, 1994.

Spill Reporting Data including Environmental Release Documentation & Pollution Incident Reports (Electronic Folder: SPILLS). United Space Alliance, Office of Environmental Management Florida, Kennedy Space Center Florida.

The following websites were accessed to obtain information for this assessment.

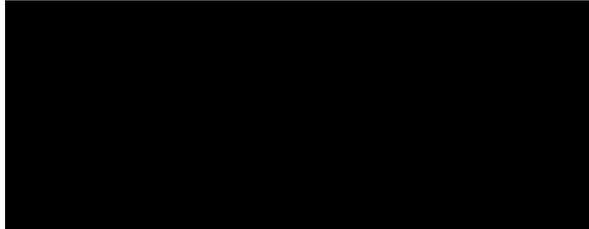
- NASA's Joint Base Operations Contractor-managed Website for *Facility Information Center*: <http://sgs.ksc.nasa.gov/sgs/apps/mis/fic/>
- Kennedy Space Center's Facilities Webpage: <http://science.ksc.nasa.gov/facilities/mlp.html>
- Wikipedia: http://en.wikipedia.org/wiki/Mobile_Launch_Platform
- NASA Facts Online: <http://www-pao.ksc.nasa.gov/kscpao/nasafact/count3teaf.htm#mlp>
- National Register of Historic Places: <http://www.nationalregisterofhistoricplaces.com/>

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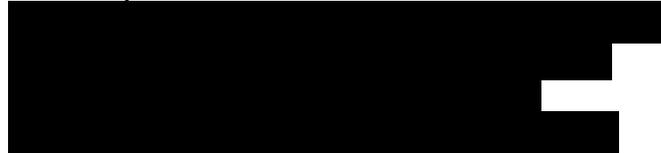
9.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONAL

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Property.

Signature:



Environmental Staff
Environmental Management Florida
United Space Alliance, LLC



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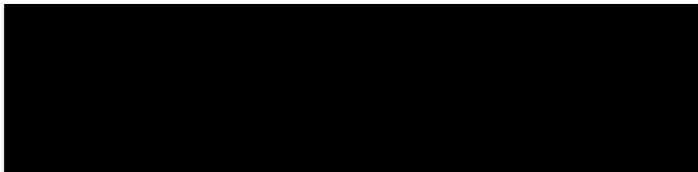
10.0 CERTIFICATION SIGNATURES

This survey was conducted in accordance with the limitations, assumptions, and exceptions described in Section 2.1 to identify Recognized Environmental Conditions at the Property and Adjoining Properties.




Environmental Staff
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United Space Alliance, LLC

Management Concurrence:



 Manager
Environmental Management Florida
United Space Alliance

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11.0 DEFINITIONS & ACRONYMS

Definitions

Recognized Environmental Condition (REC) - A condition that poses elevated risk either to human health, the environment or to regulatory compliance.

Acronyms

EAR – Environmental Aspects Review

GHe – Gaseous Helium

GN2 – Gaseous Nitrogen

MLP – Mobile Launch Platform

RCRA – Resource Conservation & Recovery Act

REC – Recognized Environmental Condition

GSWT - Ground Systems Working Team

APPENDICES

A – Location & Vicinity Maps

B – Property Photographs

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Appendix A

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Vicinity Map

(From KSC Preliminary Environmental Assessment Tool)



Location/Topography Map

(From Mapcard.com)

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Mobile Launch Platform 1 at East MLP Parksite

(File Reference: MLP-1 At Parksite.pdf)

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MLP-1 Orbiter Hydraulics System in Compartment 43B
(Reference File: OrbHyd-1.pdf)

Photograph 1

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Emergency Contingency Tank (Normally Empty) in Compartment 16B
(Reference File: EmergTank.pdf)

Photograph 2

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MLP-1 Freon R124 Tank for Over-Pressurization in Compartment 43A
(Reference File: MLP1-43AFreonTank.pdf)

Photograph 3

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Typical Back-up Battery System on MLP-1

(Reference File: MLP1-SpecPwrBattery1.pdf)

Photograph 4

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