

**National Aeronautics and Space Administration**  
***Expansion of the Wallops Flight Facility Launch Range***  
***Final Environmental Assessment, August 2009***

Grammatical Corrections and Technical Clarifications, May 2010

**Executive Summary**

Summary of Environmental Impacts Table (page iv) Resource: Marine Waters Alternative One

Remove the following sentence: “Dredging of the boat basin and channel would also result in temporary adverse impacts on water quality due to suspended sediments” because there is no dredging planned under the Proposed Action.

Summary of Environmental Impacts Table (page iv) Resource: Coastal Zone Management Alternative One

Remove “the” before “Alternative One” in the first sentence.

Summary of Environmental Impacts Table (page v) Resource: Wastewater Alternative Two

Change “will” to “would” in the second sentence.

Summary of Environmental Impacts Table (page vii) Resource: Vegetation Alternative Two

Remove the period at the end of the first sentence after “vegetation” and add a period to the end of the sentence after “improvements.”

Summary of Environmental Impacts Table (page ix)

Add row below to Summary of Environmental Impacts Table between “Transportation” and “Cumulative” resource rows.

|   |   |  |
|---|---|--|
| Department of Transportation Section 4(f) Lands | Closures of the southern end of Assateague Island could result in up to 18 closures of the southern end of the CNWR per year. The value of CNWR in terms of its significance and enjoyment is not substantially reduced or lost due to launch activities at WFF. Instead, the northern area of CNWR has become a popular observation location for viewing NASA and MARS launches. | Impacts would be the same as those described under Alternative One; however, there would be fewer times CNWR closures would be needed due to fewer launches. |
|---|---|--|

## Acronyms and Abbreviations

page xx

Add ft: feet

Add GHe: Gaseous Helium

Add GN<sub>2</sub>: Gaseous Nitrogen

Add HESS: High Energy Second Stage

Add LO<sub>2</sub>: Liquid Oxygen

Add LN<sub>2</sub>: Liquid Nitrogen

Add m: meters

page xxi

Add NH<sub>4</sub>ClO<sub>3</sub>: Ammonium Perchlorate

page xxii

Remove duplicate occurrence of “PTE Potential to Emit”

Remove duplicate occurrence of “REC Record of Environmental Consideration”

## SECTION TWO Alternatives

paragraph 2 page 15

*Original Text:* Because Congress allocated funding specifically to WFF in the Omnibus Appropriations Act of 2009 to improve launch pad infrastructure, WFF contains the only NASA-owned and operated launch range, and hundreds of millions of dollars in existing NASA and MARS infrastructure are already available for use, WFF is the only launch site that can meet the Purpose and Need of the proposed action.

*Updated Text:* WFF is the only launch site that can meet the Purpose and Need of the Proposed Action because it houses the only NASA-owned and operated launch range, hundreds of millions of dollars in existing NASA and MARS infrastructure are already available for use at WFF, and Congress specifically allocated funding to WFF in the Omnibus Appropriations Act of 2009 to improve launch pad infrastructure.

2.2.1.2 Payload Processing Facility page 16

*Original Text:* “Following fueling, the fueled payload could be transported back for final assembly...”

*Updated Text:* “Following fueling, the fueled payload could be transported back to the PPF for final assembly...”

#### 2.2.1.4 Horizontal Integration Facility

##### paragraph 1 page 21

*Original Text:* A HIF that will support the pre-flight processing, horizontal integration, and preparation of launch vehicles and payloads would be constructed in the middle of Wallops Island (Figure 7). The HIF will cover approximately 2,322 square meters (25,000 square feet) and has been designed to accommodate temporary storage of fueled spacecraft and vehicle stages. It will be 21 meters (70 feet) tall and include a cooling tower that will run approximately six months per year.

*Updated Text:* A HIF that would support the pre-flight processing, horizontal integration, and preparation of launch vehicles and payloads would be constructed in the middle of Wallops Island (Figure 7). The HIF would cover approximately 2,322 square meters (25,000 square feet) and would be designed to accommodate temporary storage of fueled spacecraft and vehicle stages. It would be 21 meters (70 feet) tall and include a cooling tower that would run approximately six months per year.

##### paragraph 2 page 21

Change “will” to “would” in the first sentence of the second paragraph.

#### 2.4.1.2 Falcon Family Figure 12 page 38

Remove asterisk after “millions” and the corresponding incomplete sentence “Prices are all in range, third party insurance a”

#### 2.4.1.2 Falcon Family, Falcon 9, page 39

Replace “54 meters (177 feet)” with “53 meters (174 feet)” in first sentence of first paragraph.

### **SECTION THREE Affected Environment**

#### 3.1.3 Air Quality first sentence of paragraph 2, page 60

Change “six principal pollutants” to “seven principal pollutants” in first sentence of second paragraph.

#### 3.1.3 Air Quality Prevention of Significant Deterioration last item in bulleted list page 62

Change “PM” to “PM<sub>2.5</sub>”

#### 3.1.3.1 Regional Meteorology third sentence of paragraph 1, page 64

*Original Text:* “...lower than 20 knots and usually dying down at dusk.”

*Updated Text:* "...lower than 37 kilometers per hour (kph, 20 knots) and usually dying down at dusk."

3.1.3.1 Regional Meteorology Table 10, column 1, page 64

Add English units after metric values for entire column: "0-500 m (0-1600 ft)", "0-1500 m (0-4900 ft)", "0.5-20 km (0.3-12 mi)", "20-67 km (12-42 mi)", "Above 67 km (42 mi)"

3.1.3.4 Prevention of Accidental Releases second sentence of paragraph 1 page 66

*Original Text:* "... threshold quantity of a toxic (ranges from 225 to 9,000 kg [500 to 20,000 lbs]) or flammable (4,500 kg [10,000 lbs])..."

*Updated Text:* "... threshold quantity of a toxic substance (ranges from 225 to 9,000 kg [500 to 20,000 lbs]) or a flammable substance (4,500 kg [10,000 lbs])..."

3.1.3.4 Prevention of Accidental Releases, footnote 1 page 66

Replace "EPCRA" with "Emergency Planning and Community Right-to-Know Act"

3.1.3.7 Climate Change Table 13: Calendar Year 2007 Greenhouse Gas Emissions at WFF Main Base in Metric Tonnes per Year (Tons per Year) Source: N<sub>2</sub>O Total GHG Emissions, page 69

Remove duplicate decimal in "0.145 (0.162)"

3.1.5 Orbital and Reentry Debris page 73

Replace "(NHBK 8719.14)" with "(NASA Handbook 8719.14)" in last sentence of paragraph 4.

3.1.6.2 Hazardous Waste Management page 74

Remove "the" before "Wallops Island" in sentence 7 of paragraph 1.

3.1.7.2 Non-Ionizing Radiation paragraph 2 page 76

*Original Text:* "...greater than 100 milliwatts per square centimeter are also potentially hazardous."

*Updated Text:* "...greater than 100 milliwatts per square centimeter (650 milliwatts per square inch) are also potentially hazardous."

3.2.1 Vegetation, Figure 20, page 79

Replace "Vegitative Areas" with "Vegetative Areas" in map legend.

3.2.3 Threatened and Endangered Species, Birds, sentence 5 of paragraph 5, page 87

*Original Text:* Biologists from the USFWS, CNWR, and VDGIF monitor piping plover nesting activities and provide advice to NASA on protection and management of the species.

*Updated Text:* Biologists from the CNWR and USDA monitor piping plover nesting activities and provide advice to NASA on protection and management of the species.

3.3.5.1 Fire and Police Protection page 94

Remove “mail delivery” from the last sentence of paragraph 3.

3.3.6 Cultural Resources page 95

Change “six” to “eight” in the first sentence of paragraph 4.

**SECTION FOUR Environmental Consequences**

4.2.1.2 Geology and Soils, Alternative 2, page 105

Insert “be” between “would” and “less” in the last sentence of paragraph 1.

4.2.2.1 Surface Water Including Wetlands, Launch Activities page 108

Replace “wave moment” with “wave movement” in second sentence of paragraph 1.

4.2.2.2 Marine Waters, Alternative One, Launch Activities, page 109

Remove duplicate period from end of sentence 4 in paragraph 1.

4.2.2.2 Marine Waters, Alternative One, Launch Activities, page 109

Insert “and” between “recovered” and “returned” in the third sentence of paragraph 2.

4.2.2.3 Floodplains, Alternative One, Site Improvements paragraph 2 page 110

*Original Text:* “Access to Wallops Island is controlled...”

*Updated Text:* “Since access to Wallops Island is controlled...”

4.2.2.3 Floodplains, Alternative One, Transportation, Handling, and Storage of Materials page 111

Replace “includes” with “include” in first sentence of paragraph 1.

4.2.2.5 Stormwater, Alternative One, Transportation and Storage of Materials, page 112

Change heading from “Transportation and Storage of Materials” to “Transportation, Handling, and Storage of Materials”

4.2.2.7 Groundwater Alternative 2 Site Improvements page 116

Remove “q1`” between “per person” and “per day” in the second sentence of paragraph 1.

4.2.2.7 Groundwater Alternative 2 Combined Groundwater Withdrawal, Table 23 Column 2, Row 5 page 117

Replace “3,113,500 (422,500)” with “1,599,500 (422,543)”

4.2.2.7 Groundwater Alternative 2 Combined Groundwater Withdrawal, Table 23 Column 2, Row 7 page 117

Add a space between the two values.

4.2.3 Air Quality, Alternative One, Transportation, Handling, and Storage of Materials, Table 26 Quantification of VOCs from a Typical Taurus II Launch Preparation page 120

Column 3 heading should read: “Density kilograms per liter (pounds per gallon)” with the following values: “1.2 (10)” for column 3 rows 4 and 5, “0.79 (6.6)” for column 3 row 16, “0.67 (5.6)” for column 3 row 17, and “0.53 (4.4)” for column 3 rows 19 and 20.

4.2.3 Air Quality, Alternative One, Transportation, Handling, and Storage of Materials, Table 26 Quantification of VOCs from a Typical Taurus II Launch Preparation, page 120

Replace “SRMs” with “Sounding Rocket Motors” in Footnote 1.

4.2.3 Air Quality, Alternative One, Launch Activities, page 121

Change “two static firing test” to “two static firing tests” in first sentence of paragraph 1.

4.2.3 Air Quality, Alternative One, Launch Activities, Rocket Exhaust Effluent Dispersion Model Results paragraph 3 page 121

*Original Text:* “As the vehicle climbs to an altitude several hundred feet above the pad,…”

*Updated Text:* “As the vehicle climbs to an altitude several hundred meters (feet) above the pad,…”

4.2.3 Air Quality, Alternative One, Launch Activities, Rocket Exhaust Effluent Dispersion Model Results, page 121

Replace "...acute exposure guideline levels (AEGL-2 levels)" with "acute exposure guideline levels (AEGL)..." in the fourth sentence of paragraph 4.

Add the following between sentences 4 and 5 of paragraph 4: "AEGL-1 is the level above which non-disabling, reversible discomfort may be noted, AEGL-2 is the level above which more serious effects may occur including possible long-lasting or escape-impairing effects, and AEGL-3 is the level above which exposures may become life threatening or result in death."

4.2.3 Air Quality, Alternative One, Launch Activities, Static Fire Testing, page 122

Change "near by" to "nearby" in third sentence of paragraph 1.

4.2.3 Air Quality, Alternative One, Launch Activities, Static Fire Testing first sentence of paragraph 1, page 123

*Original Text:* "... the far field CO concentration levels predicted for launching and static test firing..."

*Updated Text:* "According to the final report summarizing the REEDM analysis for this EA, the far field ("far field" is defined as the region greater than approximately 200 meters [656 ft] from Pad 0-A) CO concentration levels predicted for launching and static test firing..."

4.2.3 Air Quality, Alternative One, Launch Activities, Static Fire Testing second sentence of paragraph 1, page 123

*Original Text:* Near-field CO concentrations (in the vicinity of Pad 0-A) may reach ..."

*Updated Text:* Near-field ("near field" is defined as the region near the launch pad where the rocket exhaust cloud is formed) CO concentrations may reach ..."

4.2.2.3 Regulatory Analysis, Alternative One, Prevention of Significant Deterioration, Table 35 Potential Emissions for Proposed Stationary Sources (Metric Tonnes per Year [Tons per Year]), Footnote 1, page 129

*Original Text:* <sup>1</sup>14.4 metric tonnes (15.9 tons) for one static fire test and 74 metric tonnes (82.0 tons) from a total of six launches within 10,000 feet of the ground

*Updated Text:* <sup>1</sup>14.4 metric tonnes (15.9 tons) for one static fire test and 74 metric tonnes (82.0 tons) from a total of six launches within 3,000 meters (10,000 feet) of the ground

4.2.4 Noise, Alternative One, Launch Activities, Engine Noise, last sentence of paragraph 1, page 132

*Original Text:* Personnel outside the hazard area may be restricted to their buildings depending on the size of the hazard area.

*Updated Text:* Personnel may be restricted to their buildings depending on the size of the hazard area.

4.2.4 Noise, Alternative One, Launch Activities, Engine Noise, sentence 5 of paragraph 2, page 132

*Original Text:* "...and would occur no more than seven times per year (six launches and two static fire tests)."

*Updated Text:* "...and would occur no more than eight times per year (six launches and two static fire tests)."

4.2.5 Orbital and Reentry Debris, Alternative One, last sentence of paragraph 1, page 137

*Original Text:* "This requirement applies to both..."

*Updated Text:* "These requirements apply to both..."

4.2.5 Orbital and Reentry Debris, Alternative One, page 137

Add a period after the word "basis" in the last sentence of paragraph 3.

4.2.6 Hazardous Materials and Hazardous Waste Management, Alternative One, Site Improvements, page 138

Remove "to be developed" between "SWPPP" and "prior" in the third sentence of paragraph 1.

4.2.6 Hazardous Materials and Hazardous Waste Management, Alternative One, Transportation, Handling, and Storage of Materials, Spacecraft Processing, page 139

Change "and or" to "and/or" in sentence 4 of paragraph 1.

4.2.6 Hazardous Materials and Hazardous Waste Management, Alternative One, Transportation, Handling, and Storage of Materials, Spacecraft Processing, page 139

Change "satellite" to "spacecraft" in sentence 6 of paragraph 2.

4.2.6 Hazardous Materials and Hazardous Waste Management, Alternative One, Transportation, Handling, and Storage of Materials, Spacecraft Processing, page 140

Change “satellite” to “spacecraft” in sentence 1 of paragraph 4.

4.2.6 Hazardous Materials and Hazardous Waste Management, Alternative One, Launch Activities, page 141

Change “is” to “would be” in sentence 6 of paragraph 2.

4.2.7 Radiation, Alternative Two, Site Improvements, page 144

Insert “as” between “such” and “increasing” in the last sentence of paragraph 1.

4.2.8 Munitions and Explosives of Concern, Alternative One, Site Improvements, page 144

Change “MECs” to “MEC” in first sentence of paragraph 1.

4.3.1 Vegetation, Alternative Two, Site Improvements, first sentence of paragraph 2 page 146

*Original Text:* “...approximately 0.21 hectare (0.73 acre) of wetland...”

*Updated Text:* “...approximately 0.30 hectare (0.73 acre) of wetland...”

4.3.1 Vegetation, Figure 25 Affected Vegetation, page 147

Change “Vegitative Areas” to “Vegetative Areas” in map legend.

4.3.2 Terrestrial Wildlife and Migratory Birds, Alternative One, Launch Activities, page 149

Remove duplicate period after “Assateague Island” in last sentence of paragraph 4.

4.3.2 Terrestrial Wildlife and Migratory Birds, Alternative Two, Site Improvements, second sentence of paragraph 2 page 150

*Original Text:* Approximately 0.29 hectare (0.73 acre) of wetlands would be removed...”

*Updated Text:* “Approximately 0.30 hectare (0.73 acre) of wetlands would be removed...”

4.3.2 Terrestrial Wildlife and Migratory Birds, Alternative Two, Site Improvements, last sentence of paragraph 2 page 150

*Original Text:* “...would minimize the impacts from loss of habitat at the PPF and Pad 0-A.”

*Updated Text:* "...would minimize the impacts from loss of habitat at V-45 and its related improvements and Pad 0-A."

4.3.3 Threatened and Endangered Species, Alternative One, Site Improvements, Terrestrial Mammals page 151

*Original Text:* Because the Delmarva Peninsula Fox Squirrel habitat is located outside of the proposed action area, therefore Alternative One site improvements would have no effect on the species.

*Updated Text:* Alternative One site improvements would have no effect on the Delmarva Peninsula Fox Squirrel habitat because it is located outside of the Proposed Action area.

4.3.3 Threatened and Endangered Species, Alternative One, Launch Activities, Sea Turtles, page 155

Change "1,000 meters (41,980 feet)" to "1,000 meters (3,280 feet)" in last sentence of paragraph 2.

4.3.3 Threatened and Endangered Species, Alternative One, Launch Activities, Sea Turtles, page 156

Change "1,000 meters (41,980 feet)" to "1,000 meters (3,280 feet)" in second sentence of paragraph 1.

Change "Launch P0-A" to "Launch Pad 0-A" in second sentence of paragraph 1.

4.3.3 Threatened and Endangered Species, Alternative One, Launch Activities, Sea Turtles, sentence 2 of paragraph 2, page 156

*Original Text:* "...tire ruts can trap hatchlings attempting the reach the ocean."

*Updated Text:* "...tire ruts can trap hatchlings attempting to reach the ocean."

4.3.4 Marine Mammals and Essential Fish Habitat, Alternative One, Launch Activities, page 160

Change "300 kilometers (500 nautical miles)" to "925 kilometers (500 nautical miles)" in second sentence of paragraph 1.

4.4.1 Population, Employment, and Income, Alternative Two, Launch Activities, page 163

Remove errant "t" between "activities" and "would" in second sentence of paragraph 3.

4.4.1 Population, Employment, and Income, Alternative Two, Summary of Jobs and Economic Growth, last sentence of paragraph 1, page 163

*Original Text:* “Table 38 shows a summary and comparison between of the proposed action alternatives.”

*Updated Text:* “Table 38 shows a summary and comparison of jobs and economic growth for the proposed action alternatives.”

4.4.3 Health and Safety, Alternative One, Transportation and Handling of Materials, page 165

Change heading from “Transportation and Handling of Materials” to “Transportation, Handling, and Storage of Materials”

4.4.3 Health and Safety, Alternative One, Transportation and Handling of Materials, Handling of Hypergolic Propellants, page 166

Change “are” to “would be” in second sentence of paragraph 4.

Change “are not” to “would not be” in third sentence of paragraph 4.

4.4.3 Health and Safety, Alternative One, Transportation, Handling, and Storage of Materials, Areal Locations of Hazardous Atmospheres Model (ALOHA) Results, first sentence of paragraph 2, page 167

*Original Text:* “...of MON-3 were the basis for the analysis.”

*Updated Text:* “...of MON-3 (the number following “MON” indicates the percentage of nitric oxide by weight) were the basis for the analysis.”

4.4.3 Health and Safety, Alternative One, Transportation, Handling, and Storage of Materials, Areal Locations of Hazardous Atmospheres Model (ALOHA) Results, Table 39 Title, page 168

*Original Text:* Maximum Threat Zone Distances Predicted by ALOHA for Various Meteorological Conditions (Wind Speeds Constant at 4 meters/second)

*Updated Text:* Maximum Threat Zone Distances Predicted by ALOHA for Various Meteorological Conditions (Wind Speeds Constant at 4 meters [13 feet]/second)

4.4.3 Health and Safety, Alternative One, Launch Activities, Medical, Fire and Police Protection, page 171

Add a period after “area” in the last sentence of paragraph 1.

4.4.3 Health and Safety, Alternative One, Launch Activities, Range Safety, page 171

Change “shall be” to “would be” in fourth sentence of paragraph 1.

4.4.4 Cultural Resources, Alternative One, Site Improvements, Modifications to Boat Dock, page 174

Replace “MARS project” with “Proposed Action” in first sentence of paragraph 1.

4.4.4 Cultural Resources, Alternative One, Site Improvements, Payload Fueling Facility, page 174

Replace “MARS project” with “Proposed Action” in sentence 6 of paragraph 1.

4.4.4 Cultural Resources, Alternative One, Site Improvements, Payload Fueling Facility, sentence 7 of paragraph 1, page 174

*Original Text:* “...the resources can no longer be occupied and NASA has determined that the Station and Tower will be demolished.”

*Updated Text:* “...the resources can no longer be occupied and NASA has determined that the Station and Tower will be removed or demolished.”

4.4.4 Cultural Resources, Alternative One, Site Improvements, Horizontal Integration Facility, Above-Ground Resources, page 175

Change “kilometer” to “kilometers” in first sentence of paragraph 1.

Change “Extant building” to “Extant buildings” in second sentence of paragraph 2.

*Original Text:* “...and X-140 (Electrical Storage Building/POMB Material Storage, 1970).”

*Updated Text:* “...and X-140 (Electrical Storage Building/Plant Operations and Maintenance Branch Material Storage, 1970).”

4.4.4 Cultural Resources, Alternative One, Site Improvements, Pad 0-A Improvements, Archaeological Resources, page 176

*Original Text:* “...high potential for archaeological resources...”

*Updated Text:* “...high potential for prehistoric or historic archaeological resources...”

4.4.4 Cultural Resources, Alternative Two, Site Improvements, Building V-45 High Bay, Archaeological Resources, page 178

Change “and” to “or” in the first sentence of paragraph 1.

4.4.4 Cultural Resources, Alternative Two, Site Improvements, Modifications to Buildings V-50 and V-55, Aboveground Resources, page 178

Change “are” to “and” in first sentence.

4.4.5 Transportation, Alternative One, Transportation, Handling, and Storage of Materials, first sentence of paragraph 2, page 180

*Original Text:* The largest load transported to Wallops Island under Alternative One would be the stage one core arriving by barge from the port of Newport News, Virginia, and would never be transported over a public road.

*Updated Text:* The largest load transported to Wallops Island under Alternative One would be the stage one core arriving by train, truck, or barge.

4.4.5 Transportation, Alternative Two, page 181

Change “travelling” to “traveling” in the first sentence of the first paragraph.

4.5.1.3 Shoreline Restoration and Infrastructure Protection Program, page 182

*Original Text:* “...1) dredging of approximately 3 million cubic yards of sand from a borrow site located in Federal waters...”

*Updated Text:* “...1) dredging of approximately 2.3 million cubic meters (3 million cubic yards) of sand from a borrow site located in Federal waters...”

4.5.2.3 Air Quality, Climate Change, paragraph 1, page 186

*Original Text:* “...(IPCC, 2007).”

*Updated Text:* “...(Intergovernmental Panel on Climate Change, 2007).”

4.5.2.3 Air Quality, Climate Change, page 186

Replace “(DOE, 2006)” with “(U.S. Department of Energy, 2006)” in the last sentence of paragraph 3.

4.5.2.3 Air Quality, Climate Change, page 187

Change “sea wall” to “seawall” in first sentence of paragraph 1.

4.5.2.6 Threatened and Endangered Species, page 188

Change “BO” to “Biological Opinion” in last sentence of paragraph 3.

4.5.2.8 Economic Growth, Table 44 Jobs and Economic Growth Summary for WRP and Proposed Action, page 189

*Original Text:* Source: *VEDP, 2008*

*Updated Text:* Source: *Virginia Economic Development Partnership, 2008*

4.5.2.9 Health and Safety, paragraph 2, page 189

*Original Text:* “...including tenants (USCG, U.S. Navy, MARS)...”

*Updated Text:* “...including tenants (USCG, U.S. Navy, NOAA, MARS)...”