

Federal Aviation Administration
Office of Commercial Space Transportation
FINDING OF NO SIGNIFICANT IMPACT

**Launch Operator License for Pegasus Expendable Launch Vehicles
at Wallops Flight Facility, Virginia**

OVERVIEW: The Federal Aviation Administration (FAA) Office of Commercial Space Transportation (AST) is issuing this Finding of No Significant Impact (FONSI) for renewing a Launch Operator License to Orbital Sciences Corporation for the continued operation of Pegasus expendable launch vehicles at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center Wallops Flight Facility (WFF), Virginia.

In January 2005, NASA prepared the *Final Site-Wide Environmental Assessment for Wallops Flight Facility, Virginia* (hereafter referred to as the 2005 EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code 4321-4347 (as amended) and the Council on Environmental Quality's (CEQ's) NEPA implementing regulations (40 Code of Federal Regulations [CFR parts 1500-1508]), to analyze the environmental impacts of all recurring activities and proposed future actions at WFF. Under the Proposed Action in the 2005 EA, NASA would construct new facilities, demolish old facilities, and improve existing facilities at WFF. In addition, NASA would expand operations at WFF while continuing existing operations. Operations activities considered in the EA included rocket launches of multiple vehicle types, including the Pegasus vehicle, among other flight-related activities. In order to assess the impacts of current and future operations, NASA identified a range, or "envelope," of activities for each type of operation. The 2005 EA analyzed potential impacts resulting from a total of 82 annual rocket launches, 12 of which would consist of orbital launches of the largest launch vehicle expected to be launched from WFF, the ground-launched Athena-3 vehicle, as an upper bound for environmental effects of rocket launches. The Pegasus vehicle is smaller than Athena-3 vehicle and fits within the envelope of launch vehicles addressed in the EA. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011 would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF.

On January 24, 2005, NASA issued a FONSI, which stated that the environmental impacts associated with their Proposed Action would not individually or cumulatively have a significant impact on the quality of the human environment, and therefore the preparation of an Environmental Impact Statement (EIS) was not required.

In accordance with the requirements of FAA Order 1050.1E, Change 1, paragraph 410, the FAA has independently evaluated the information contained in the 2005 EA and has verified the continued validity of the analysis contained in the EA. The FAA has determined that the 2005

EA sufficiently addresses the concerns of the FAA and complies with FAA requirements for implementing NEPA as stated in FAA Order 1050.1E, Change 1. The FAA has determined that there is no new information or analysis that would require preparation of a new or supplemental EA or Environmental Impact Statement according to the CEQ Regulations (40 CFR § 1502.9(c)(1)). Therefore, the FAA issues this FONSI concurring with the analysis of impacts and findings in the 2005 EA and formally adopts the EA in compliance with the requirements 40 CFR § 1506.3 to support renewing a Launch Operator License to Orbital Sciences Corporation for the continued operation of Pegasus expendable launch vehicles at WFF. The 2005 EA is incorporated by reference and is summarized as necessary in this FONSI.

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PURPOSE AND NEED: The purpose of FAA's Proposed Action is to fulfill FAA/AST's responsibilities under 51 U.S.C. Subtitle V, ch. 509, §§ 50901-50923 (Chapter 509) and Executive Order (EO) 12465, *Coordination and Encouragement of Commercial Expendable Launch Vehicle Activities*, for oversight of commercial space launch activities, including licensing of launch and reentry activities. The issuance or renewal of Launch Operator Licenses to Orbital Sciences Corporation for the continued operation of Pegasus expendable launch vehicles at WFF is consistent with the agency's responsibilities under Chapter 509 and EO 12465.

The need for action results from the statutory direction from Congress, FAA's regulations, and a Presidential Executive Order, to encourage, facilitate, and promote commercial space launches and reentries by the private sector and facilitate the strengthening and expansion of the U.S. space transportation infrastructure, in accordance with the applicable requirements.¹

PROPOSED ACTION: Under the FAA's Proposed Action, FAA/AST would renew a Launch Operator License to Orbital Sciences Corporation for the continued operation of Pegasus expendable launch vehicles at WFF. A launch operator license would authorize launches of Pegasus vehicles over the 5-year term of the license. The FAA may use the analysis in the 2005 EA and this FONSI to support the issuance or renewal of Launch Operator Licenses for the operation of Pegasus expendable launch vehicles at WFF.

The activities associated with FAA's Proposed Action are described in detail in Chapter 2 of the 2005 EA and are summarized in this FONSI. In the 2005 EA, the largest launch vehicle anticipated to be launched from WFF was the Athena-3 vehicle, a ground-launched vehicle consisting of a Castor 120 main stage motor with up to eight Castor IV solid rocket motors strapped on the first stage of the launch vehicle. The Athena-3 launch vehicle would contain approximately 293,500 pounds of solid rocket propellant. In contrast, the Pegasus launch vehicle

¹ 51 U.S.C. Subtitle V, ch. 509, §§ 50901-50923 (Chapter 509), the Commercial Space Transportation Competitiveness Act of 2000 (Public Law 106-405); Executive Order 12465, *Coordination and Encouragement of Commercial Expendable Launch Vehicle Activities* (February 24, 1984); CFR Title 14, Aeronautics and Space, Parts 400-450, Commercial Space Transportation, Federal Aviation Administration, Department of Transportation; the Commercial Space Act of 1998 (Public Law 105-303); the U.S. Space Transportation Policy of 2004; and the National Space Policy of 2010.

would carry a total of approximately 43,500 pounds of solid rocket propellant in its standard three motor stages. The propellants used in both the Athena-3 and Pegasus motors would be similar (hydroxyl-terminated polybutadiene and ammonium perchlorate/aluminum powder). The Athena-3 vehicle would carry more than six times the amount of propellant carried by a Pegasus vehicle and any impacts resulting from vehicle emissions would be much greater for the Athena-3 vehicle than for the Pegasus vehicle. In addition, the Athena-3 vehicle is a ground launched launch vehicle, and thus any noise or vehicle emissions during launch would start at ground level and continue through the atmosphere as the launch vehicle travels upwards into orbit. The Pegasus vehicle is an air-launched vehicle and is carried aloft by an L-1011 aircraft. Ignition of the engines on the Pegasus vehicle would not take place until the launch vehicle was released from the aircraft over the Atlantic Ocean, approximately 150 nautical miles offshore, at an altitude of approximately 40,000 feet. As a result, the primary noise or air emissions resulting from launch of the Pegasus vehicle at ground level would result from takeoff of the L-1011 aircraft. The 2005 EA included Pegasus vehicles among the launch vehicles that would be operated at WFF and the impacts resulting from the smaller Pegasus vehicle would fit within the envelope of impacts discussed in the EA for the Athena-3 vehicle. Therefore, the FAA has determined that the 2005 EA appropriately addresses the environmental impacts that would result from Pegasus vehicle launches at WFF. As a result, the scope of operations to be covered under a Launch Operator License for Pegasus vehicles would be within the envelope of launch activities analyzed in the 2005 EA.

Alternatives Considered: Alternatives considered by FAA/AST include the Proposed Action and the No Action Alternative. Under the No Action Alternative, the FAA would not issue or renew Launch Operator Licenses to Orbital Sciences Corporation for the continued operation of Pegasus expendable launch vehicles at WFF. Without a license, there could not be any commercial launches of Pegasus vehicles from WFF; however, government launches or other launches of these vehicles that do not require a license could continue at WFF.

ENVIRONMENTAL IMPACTS: The following presents a brief summary of the potential environmental impacts considered in the 2005 EA. This FONSI incorporates NASA's 2005 EA by reference, summarizes those findings where appropriate, and is based on the potential impacts discussed in the EA. The FAA has determined the analysis of impacts presented in the 2005 EA represent the best available information regarding the potential impacts associated with the FAA's regulatory responsibilities described in this FONSI. In addition, this FONSI presents any relevant newly available data on existing conditions, potential impacts, and measures to mitigate those impacts.

Air Quality

Pegasus launch operations at WFF would not result in significant impacts to air quality. As stated in the 2005 EA, solid propellant launch vehicle emissions or accidental release of toxic gases during failed vehicle launches could result in exhaust emissions of aluminum oxide particles, carbon monoxide, hydrogen chloride, nitrogen gas, water, and carbon dioxide. These substances could impact air quality through minor contributions to acid rain, smog, ozone depletion and greenhouse gas emissions. However, launches would be infrequent, emissions would be temporary, and resulting concentrations were estimated to be within applicable ambient air quality standards. In addition, all emissions from sources for which emission limitations have been established would be within regulated levels for all pollutants. As a result, the 2005 EA

concluded that no significant impacts to air quality would result from rocket launches. Impacts resulting from Pegasus vehicle launches would be less than those evaluated for the Athena-3 vehicle in the 2005 EA. The Pegasus vehicle would carry substantially smaller quantities of solid rocket propellant than the Athena-3 vehicle and propellant emissions would all occur in the upper atmosphere as opposed to at ground level for the Athena-3 vehicle. Therefore, impacts on air quality resulting from Pegasus vehicle launches would be substantially less than for launches of Athena-3 vehicles. Emissions from takeoff and landing of the L-1011 aircraft would have negligible impacts on local air quality, as these impacts would be intermittent and temporary and the impact of a single aircraft would not be distinguishable from the impacts of other flight operations at WFF. Although PM 2.5 standards came into effect after the 2005 EA, because PM 2.5 is a subset of PM 10 and PM 10 impacts will be insignificant, PM 2.5 impacts will be insignificant as well.

Biological Resources (Fish, Wildlife, and Plants)

No impacts to biological resources (fish, wildlife, and plants) are expected from Pegasus launch operations at WFF. As stated in the 2005 EA, exhaust products of ground-level rocket launches, such as gases, high temperature, and fire, could impact vegetation in the vicinity of launch pads. These impacts could include localized, foliar scorching and spotting of vegetation due to high temperatures and fire, and defoliation of vegetation due to acid deposition from exhaust emissions of hydrogen chloride. However, as these impacts would be temporary due to the infrequencies of launches and the observed recovery of vegetation between launches, the 2005 EA concluded that these impacts would not be significant. As Pegasus vehicles would be air-launched and no launch exhaust products would be produced in the vicinity of launch pads or runways, launches of Pegasus vehicles would also not significantly impact vegetation at WFF.

According to the 2005 EA, noise and vibration produced by ground-level rocket launches could disturb or startle wildlife and migratory birds at WFF, leading to temporary interruption of foraging and nesting activities in the immediate area of the launch pads. However, as noise generated from rocket launches is generally of low frequency and short duration, no significant impacts are anticipated. Impacts to wildlife and migratory birds resulting from Pegasus vehicle launches are expected to be less than those discussed for the Athena-3 vehicle. The Pegasus vehicle is an air-launched vehicle and therefore, the primary noise impact would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level noise in the vicinity of launch pads. This impact would be negligible, as L-1011 noise levels do not differ substantially from other aircrafts currently flying from the runway at WFF. Noise resulting from ignition of the engines on the Pegasus vehicle, which would take place at an altitude of about 40,000 feet from a site 150 nautical miles offshore, would not significantly impact wildlife and migratory birds at WFF.

Marine species in the vicinity of WFF could be adversely affected by sonic booms created by launch activities. As stated in the 2005 EA, impacts resulting from launches of Athena-3 vehicles would be temporary and well below the limit established by the National Marine Fisheries Service as that which causes minimal, recoverable, auditory trauma for marine mammals. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011

would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF. Sea turtles are less sensitive to noise than marine mammals; therefore, the 2005 EA concluded that temporary impacts to marine mammals and sea turtles from sonic booms would occur but would not be considered significant. The Pegasus vehicle is smaller than the Athena-3 vehicle and therefore, Pegasus launch operations would produce less noise impact to marine species than the Athena-3 vehicle. In addition, activation of a launch vehicle's flight termination system could cause the launch vehicle to fall into the ocean, leading to release of rocket propellant into the water column and the possible strike of marine species by launch vehicle components. However, as the probability of flight termination is very low, no substantial adverse effects are expected from launch vehicle failure. As a result, Pegasus launch operations are not expected to cause significant impacts to marine species.

The 2005 EA notes that a wide variety of species listed under the Federal Endangered Species Act and/or the Virginia Endangered Species Act may be present at WFF. As discussed above, these species could be adversely affected by exhaust and noise emissions resulting from ground-level rocket launches. According to the 2005 EA, the piping plover is the only listed species likely to be affected by ground-level rocket launches as they may be disturbed by the noise produced during launches. However, through Section 7 consultation with the U.S. Fish and Wildlife Service, NASA determined that due to the short duration of disturbance, the long distance between the disturbance and the area used by piping plovers, the limited number of launches during the nesting season, and the lack of other disturbances (e.g. recreation) to piping plovers at the site, no significant impacts would be expected. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011 would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF.

Impacts to listed species were also evaluated in a Biological Assessment prepared by NASA in 2009 for new and ongoing rocket operations at WFF. The U.S. Fish and Wildlife Service issued a Biological Opinion responding to NASA's Biological Assessment on May 10, 2010. As a result of this opinion, launch operations are not expected to result in impacts to listed species at WFF.

Cultural Resources

As described in the 2005 EA, WFF prepared a *Cultural Resources Assessment of Wallops Flight Facility, Accomack County, Virginia* in November 2003 which examined each of the three areas of the facility: Wallops Main Base, Wallops Mainland, and Wallops Island. This survey consisted of background research, a windshield survey of archaeological sites and historic structures, and a selective reconnaissance level survey of above-ground structures. The *Cultural Resources Assessment* confirmed that no buildings, structures, or facilities at WFF were currently listed in the Virginia Department of Historic Resources' inventory of historic properties, listed on the National Register of Historic Places, or recognized as a National Historic Landmark. The *Cultural Resources Assessment* did determine that one resource – the Wallops Beach Lifeboat Station and its associated Coast Guard Observation Tower – was eligible for listing in the National Register of Historic Places and Virginia Landmarks Register. However, as the Proposed Action would not result in any ground disturbing activities, removal, alteration, or

physical impingement of any archaeological or historical resources at WFF, Pegasus launch operations at WFF would not result in significant impacts to cultural resources. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011 would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF.

Section 4(f) Resources

No significant adverse impacts to Section 4(f) resources are expected under the Proposed Action. Closures of the southern end of Assateague Island (in the Chincoteague National Wildlife Refuge) may result from launches of expendable launch vehicles at WFF; however, as launches are infrequent, this would only result in up to 18 closures per year,² of which Pegasus vehicle launches would represent a small component. In addition, NASA has established an agreement with the refuge for these closures and coordinates with refuge personnel to ensure that closures do not adversely affect activities at the refuge. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011 would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF.

Geology and Soils

No significant impacts to geology or soils are expected under the Proposed Action, as all Pegasus vehicle-related activities would take place at or adjacent to impervious surfaces and no new construction would occur. Any accidental release of liquid fuels would be addressed in accordance with existing hazardous materials management and spill prevention and response plans, and would not be expected to significantly impact soil resources.

Hazardous Materials and Hazardous Waste

Pegasus launch operations at WFF would not result in significant impacts to hazardous materials and hazardous waste management. As stated in the 2005 EA, the greatest impact to the environment from hazardous materials and waste would result from accidental release of hazardous materials at a storage location or during normal launch operating activities. All hazardous materials at WFF are managed using standard operating procedures, and all clean-up procedures would be adhered to in the event of a spill; therefore, no significant impacts from launch operations are expected. Assuming continued compliance with these procedures, there would be no significant impacts to human or environmental health due to hazardous materials and wastes.

Land Use

Pegasus launch operations at WFF would not result in significant impacts to land use because all launch activities would continue to occur in their designated land use areas. Take-off of the L-1011 aircraft would continue to use existing infrastructure, and release of the Pegasus vehicle

² According to the 2005 EA, rocket launch operations would lead to a maximum of 12 beach closures per year. However, NASA's launch range expansion in 2009 led to an additional 6 projected beach closures per year, for a total of 18 closures per year.

would continue to occur over the Atlantic Ocean, approximately 150 nautical miles offshore, at an altitude of approximately 40,000 feet.

Noise

Pegasus launch operations at WFF would not result in significant noise impacts. As stated in the 2005 EA, Athena-3 vehicles launched from WFF could startle wildlife and cause temporary interruption of foraging and nesting activities in the immediate area of the launch pad. Impacts resulting from Pegasus vehicle launches are expected to be even less than those discussed in the 2005 EA. The Pegasus vehicle is an air-launched vehicle, rather than a ground-launched vehicle and therefore, the primary noise impact would be from takeoff and landing of the L-1011 carrier aircraft. This impact would be negligible as L-1011 noise levels do not differ substantially from other aircraft currently taking off from the runway at WFF. At an altitude of about 40,000 feet, approximately 150 nautical miles offshore, audible noise would be of no consequence to humans. Launch noise and sonic booms may be audible at the ocean surface; however, any disturbance would be temporary and infrequent. Therefore, launch noise and sonic booms are not expected to impact marine life.

Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety

No significant impacts to socioeconomics, environmental justice, or children's environmental health and safety are expected as a result of Pegasus launch operations at WFF. According to the 2005 EA, new or increased launch operations could lead to small increases in employment and income in the local economy. However, as issuance or renewal of the Launch Operator License for Pegasus launch operations at WFF would not represent a substantial change in existing launch vehicle operations, no impacts from Pegasus launch operations would be expected. NASA prepared an Environmental Justice Implementation Plan in 1996 in order to ensure that NASA incorporates environmental justice in all of its activities and monitoring programs in addition to considering the potential effects of Federal programs and policies on children's health and safety. The 2005 EA concluded that there would be no impact to minority and low-income populations as a result of rocket launches at WFF. A review of 2008 U.S. Census Bureau data in the vicinity of WFF demonstrates that no significant changes to the population have occurred since preparation of the 2005 EA. As a result, the Proposed Action would not be expected to have significant environmental justice impacts.

Accidents during vehicle launch activities could impact public safety and the safety of WFF personnel. However, ground and flight safety guidelines established by NASA, such as RSM-2002, the Range Safety Manual for Goddard Space Flight Center/Wallops Flight Facility; mission-specific safety plans; the Ground Safety Plan; and the Flight Safety Plan, have been established to minimize the health and safety risk resulting from launch operations at WFF. While failures have occurred in the past, there has been no evidence of acute or cumulative safety impacts as a result of launch failures.

Water Resources

No impacts to water resources (surface water, groundwater, wetlands, or floodplains) are expected from Pegasus launch operations at WFF. As stated in the 2005 EA, surface waters and groundwater in the vicinity of WFF could be contaminated in the event of an accidental release of hazardous materials, including rocket propellant and airline fuel; however, strict compliance

with WFF's Integrated Contingency Plan would minimize impacts to surface waters should an accidental release occur. The first solid rocket propellant stage of Pegasus vehicles does not ignite until it is approximately 150 nautical miles offshore, thus all deposition of exhaust emissions from Pegasus vehicles would occur over the open ocean. According to the 2005 EA, any changes in ocean water quality due to launch vehicle emissions would be negligible due to the rapid buffering capacity of saline waters; therefore, no significant impacts to water quality are expected as a result of Pegasus launch operations. No construction is associated with the launch of Pegasus vehicles and there would be no loss of wetlands or floodplains at WFF.

Cumulative Impacts

Pegasus launch operations would not result in significant cumulative impacts to any resource. The 2005 EA analyzed the environmental impacts of all past, present, and reasonably foreseeable future activities at WFF in 2005. In addition to a variety of rocket launches, of which only one component was commercial launches of the Pegasus vehicle, the activities analyzed in the 2005 EA included extensive new construction activities, demolition of existing facilities, upgrades to the existing utility and transportation infrastructure, and continued launch or operation of weather and scientific balloons, piloted aircraft, sounding rockets, drone target flights, uninhabited aerial vehicles, autonomous underwater vehicles, and airfield operations. The 2005 EA noted that other activities in the vicinity of WFF could include ongoing military operations conducted by the U.S. Navy, commercial and recreational fishing, and development on the eastern shore of Virginia. The EA concluded that while minor impacts to land use, water quality, air quality, noise, migratory birds, marine mammals and fish could result from the activities at WFF in conjunction with these other planned activities in the vicinity of WFF, none of these impacts would be significant. In addition, the Pegasus vehicle is an air-launched vehicle and therefore, the primary impacts would be from takeoff and landing of the L-1011 carrier aircraft, rather than ground-level launch impacts produced from Athena-3 vehicle launches. The impacts from an L-1011 would be negligible because it does not differ substantially from other aircraft currently taking off from the runway at WFF.

Current planned projects in the vicinity of WFF include expansion of the WFF launch range, the Wallops Research Park, a shoreline restoration and infrastructure protection program, construction of an unmanned aerial vehicle airstrip, and an alternative energy project involving installation of solar panels and construction of wind turbines. However, all of these activities are within the envelope of activities considered in the 2005 EA and cumulative impacts resulting from all of these activities remain the same as that described in the 2005 EA. Therefore, the Proposed Action in conjunction with past, present, and reasonably foreseeable future actions is not expected to have a significant cumulative impact.

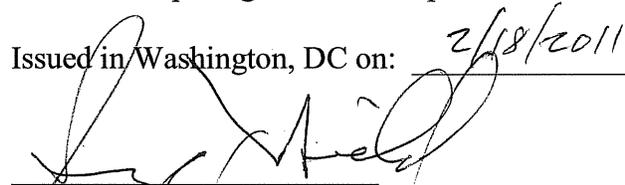
CONCLUSION: The 2005 EA examined the potential for significant environmental impacts related to rocket launch activities at WFF. The areas evaluated for environmental impacts included air quality; biological resources (fish, wildlife, and plants); cultural resources; Section 4(f) resources; geology and soils; hazardous materials and hazardous waste management; land use; noise; socioeconomics, environmental justice, and children's environmental health and safety; water resources; and cumulative impacts. The 2005 EA determined that exhaust emissions and noise produced during rocket launches could have adverse impacts on air quality, biological resources, noise and water quality at WFF. However, because launches would be

infrequent, emissions quantities would be inappreciable, and noise and air emissions would be temporary and likely to disperse quickly, rocket launch operations would not result in significant impacts to the environment. Pegasus vehicles fit within the envelope of vehicles addressed in the 2005 EA and therefore, Pegasus launch operations would not result in significant impacts to the environment.

The FAA has independently evaluated the information contained in the 2005 EA and has verified the continued validity of the analysis contained in the document. Through this re-evaluation, the FAA has determined that there is no new information or analysis that would require preparation of a new or supplemental EA or Environmental Impact Statement according to the CEQ Regulations (40 CFR § 1502.9 (c)(1)). The FAA is therefore adopting the 2005 EA, and is using this document to support its finding on the Proposed Action.

After careful and thorough consideration of the facts contained herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101 of NEPA and other applicable environmental requirements and will not significantly affect the quality of the human environment or otherwise include any condition requiring consultation pursuant to Section 102(2)(c) of NEPA.

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