September 22, 2009

The Honorable Bart Gordon
2306 Rayburn House Office Building
Washington, D.C. 20515

Dear Representative Gordon,

The Review of Human Space Flight Plans Committee's Executive Summary report[1] identified six options that encompass many possible futures for America's Space exploration and development program, *figure 1*. Two of the six options identified in the report (4B & 5C) are in close alignment with the Directly Shuttle Derived[2] implementation plan that I presented, on behalf of a number of concerned citizens and NASA engineers, at the first public hearing of the Commission held on June 17, 2009 in Washington DC. It's important to realize however that while all six options adhere to the same budget profile they do not enable the same policy objects nor do they achieve the same mission milestone dates.

Option 3, The Program of Record (POR): The funding needed to execute the POR requires the de-orbiting the International Space Station (ISS) in 2015. The premature disposal of the ISS will significantly reduce the United States and our International partner's ability to fully utilize this National Laboratory and thereby achieve a return from our collective and extensive investments. In addition, America will need to break important International commitments severely crippling our ability to attract their participation in future initiatives. The POR also requires the dismantling of our existing Shuttle based heavy-lift industrial base and workforce resulting in a seven-year gap in American based human access to space. Our only option at that point will be to purchase rides on Russian Soyuz vehicles in order to access the nearly complete ISS, which was largely paid for by the United States. In addition, under this option the Ares-I/Orion systems will attain operational status after the ISS is de-orbited. Even once operational, the Ares-I/Orion systems will be without a destination or purpose until the Lunar mission begins nearly a decade after the ISS is de-orbited. As a result the POR not only eliminates existing mission destinations, capabilities, industrial base and workforce but also defers any real progress towards new capabilities or mission destinations until almost two decades from now. Taken together the sustainability of the POR is highly questionable at best, especially considering the tough budget environment ahead.

	Budget	Shuttle Life	ISS Life	Heavy Launch	Crew to LEO
Moon First Options					
Option 3: Baseline - Program of Record	Less constrained	2011	2015	Ares V	Ares I + Orion
Option 4A: Moon First - Ares Lite	Less constrained	2011	2020	Ares V Lite	Commercial
Option 4B: Moon First - Extend Shuttle	Less constrained	2015	2020	Directly Shuttle Derived + refueling	Commercial
Flexible Path Options					
Option 5A: Flexible Path - Ares Lite	Less constrained	2011	2020	Ares V Lite	Commercial
Option 5B:Flexible Path - EELV Heritage	Less constrained	2011	2020	75mt EELV + refueling	Commercial
Option 5C: Flexible Path - Shuttle Derived	Less constrained	2011	2020	Directly Shuttle Derived + refueling	Commercial

Figure 1 Human Spaceflight Review Options[1]

Options 4A & 5A, Ares-V Lite: While going from the POR to Option 4A or 5A eliminates the Ares-1 and reduces the size of the Ares-V, these savings do enable the extension of the ISS mission to 2020. In addition, a new commercial market for crew and cargo delivery to the ISS is created that in time will hopefully lower the cost of accessing Low Earth Orbit (LEO). While it is certainly hoped that this new commercial capability will come to fruition, there is absolutely no guarantee that it will be successful or timely. As a result this option lacks any back-up for American based human access to Space until the Ares-V Lite arrives more than decade

from now. Because the Ares-V Lite is almost 100% new and utilizes almost none of the existing Shuttle infrastructure, tooling, flight qualified man-rated hardware and workforce experience, this option is significantly more expensive resulting in a significant delay. Ares-V Lite not only dismantles our existing Shuttle based heavy lift industrial base and workforce but will require the reconstruction of a completely different heavy lift industrial base and workforce almost two decades from now.

Options 4B & 5C, Directly Shuttle Derived: Replacing the Ares-V Lite with a Directly Shuttle Derived Heavy-Lift Launch Vehicle (SDHLV) will maximize the utilization of the existing flight qualified man-rated hardware, infrastructure, tooling and workforce experience. This is also the only option family that can be efficiently coupled with an extension of Shuttle operations because it shares the same industrial base and workforce. The Shuttle extension doesn't necessarily require any additional flights beyond those currently planned. One variant of this option is to stretch out the schedule by just lowering the Shuttle launch rate to 1 or 2 per year thereby maximizing the time frame in which the unique capabilities of the Shuttle are available for the ISS while simultaneously closing the flight gap. The developmental progress being made on the replacement systems could also serve as guide as to when the final Shuttle flight would be scheduled. Therefore this option family is the only one that can eliminate the gap in American based human access to Space and maximize the utilization of the ISS due to the unique capabilities of the Shuttle. This option family can also leverage most of the progress already made on the POR because almost all of the existing contracts can be integrated into a Directly Shuttle Derived Heavy-Lift Launch Vehicle.

Option 5B, Non-NASA Heritage: This option represents the most radical shift for the POR and the NASA organization because the heavy-lift launch system developed is largely based on non-NASA hardware, infrastructure, tooling and workforce. In addition, and in stark contrast to the Directly Shuttle-Derived options above, very little of the progress and contracts associated with the POR can be utilized by this option. As a result, the 5B option is not only the most disruptive alternative to the POR but runs counter to the existing policy of maximizing the utilization of the existing Shuttle flight qualified man-rated hardware, infrastructure, tooling and workforce.

Moving Forward: A significant conflict between those supporting the POR and those supporting a radical shift towards a Non-NASA heritage option is brewing. Ironically these polar opposites do share two characteristics in common that are at the very heart of the decisions before you now. Both polar opposites do not utilize the existing flight qualified man-rated hardware, infrastructure, tooling and workforce that has provided American based human access to Space for almost three decades nor do they minimize the gap, thereby ignoring the existing authorized policy. The Directly Shuttle Derived option family stands as a sensible compromise between these polar opposites by joining the progress already made on the POR with our existing industrial base and workforce - thereby eliminating the gap. The efficient use of all existing resources is not only inherent in the Directly Shuttle Derived option family but is also essential regardless of what the budget or our future Space exploration and development objectives may be.

I plan to be in the Washington DC area the week of October 5, 2009 if you would like to meet in person.
Thank you for your time.

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1) The Review of Human Spaceflight Plans Committee's Executive Summary Report
link (http://www.nasa.gov/pdf/384767main_SUMMARY%20REPORT%20-%20FINAL.pdf)
2) Presentation of the Directly Shuttle Derived Implementation Plan to the Commission
link (http://www.nasa.gov/pdf/361841main_14%20-%20DIRECT_HSF_Commission.pdf)