Statement by Kevin Conole, United States Representative,
on "Space and Global Health," April 20, 2021

Thank you, Madame Chair. The United States Delegation appreciates the subcommittee noting the crucial role of space data and technology in the public health domain through this agenda item on "Space and global health." The U.S. is a world leader in this field.

This has been an unprecedented year, with a worldwide pandemic taking hold and having a profound impact on global public health. Yet, even in the midst of a pandemic, spaceflight technology has been used to help alleviate the suffering and toll of COVID-19. Engineers from NASA and the Jet Propulsion Laboratory developed a ventilator early in the pandemic that used less parts than traditional ventilators, was less costly, and was aimed at the specific physiologic concerns and lung abnormalities seen in COVID-19. From the drawing board to emergency use certification of the ventilator took 37 days. These engineering plans and schematics for this ventilator were made available to any country who had a need and willing to begin development. NASA has patented a technology to make oxygen via electrolysis, with less power, and more oxygen per unit than currently available oxygen concentrators. The result would be a large oxygen concentration unit capable of providing abundant oxygen to a small hospital or clinic, with the potential to scale larger. NASA also developed Continuous Positive Airway Pressure helmets to provide oxygen and pressure to patients in order to keep them off of ventilators. We partnered with hospitals to develop atomic oxygen sterilization techniques for personal protective equipment, allowing hospitals to re-use equipment that was in short supply. We partnered with the U.S. Department of Health and Human Services to develop technologies aimed at detecting COVID-19 in a single breath test. NASA also donated critical supercomputer time to the National Institutes of Health to help model the virus. These technologies improve global health, and all of these came from spaceflight technologies or expertise.

NASA and NOAA Earth-observing satellites continue to play a key role for public health, by monitoring climate change and providing environmental data and information to help safeguard public well-being. Data has been used from these satellites to monitor environments favorable for viruses, such as Zika, and help predict risks for outbreaks of malaria. In addition, NOAA is using satellite data and information from NOAA, NASA, USGS and the European Commission's Copernicus Programme to forecast Harmful Algal Blooms, which can produce toxins that pose serious health hazards to people, pets and commercial fisheries. These data provide researchers, public health officials, and first-

responders with the information and imagery they need to anticipate and respond to health emergencies or, better yet, avoid them altogether.

In addition, NOAA operates the Search and Rescue Satellite Aided Tracking (SARSAT) system – part of the international Cospas-Sarsat Program, which helps locate lost or distressed aviators, mariners and recreationists at any time, in any condition, around the world. In 2020, NOAA satellites helped rescue 304 people in the United States alone.

The International Space Station's (ISS) National Laboratory continues to make new discoveries with profound impacts to improve global health. Space-based research has provided valuable insight into the mechanisms behind bacterial behavior, informing efforts to develop new vaccines and antibiotics. We have learned how the ISS enables the study of fundamental plant development processes without the masking effects of gravity- knowledge that can be translated to improve crops and agricultural productivity back on Earth.

Leveraging microgravity conditions on the ISS, researchers can study cells in ways not possible on the ground. We have learned that microgravity-induced changes in cardiac progenitor cells may aid in the development of cell-based regenerative therapies for heart disease. By studying bone cells in microgravity, researchers were able to uncover a potentially new avenue for drug development for diseases that cause bone loss and fragility.

There are many examples of how space research and technologies significantly improve public health. NASA recently helped develop an improved next generation life support water filter that was tested on the ISS, that uses proteins called aquaporins (which are found in virtually all life forms). These proteins embedded in a lightweight membrane showed they outperformed current filters and can be used to filter twice as much fluid with nearly double the water recovery than other home purifiers. Additionally, the lack of gravity-driven forces on ISS allow for an ideal platform to make new crystalline structures, which may be ideal for new pharmaceutical and drug development technologies. This technology and unique crystalline suspension allowed improved formulation of cancer immunotherapy medications. We have seen new targets revealed for Parkinson's Disease, and new possibilities for treatment methods gained from the insight of experiments in the microgravity environment.

Madame Chair, despite the pandemic, we have continued to make unprecedented discoveries on the ISS national lab, and continued to use space technologies to address global health issues, including COVID-19. The

accelerated pace of commercial spaceflight activities only opens more possibilities, with more companies and innovation making avail of the microgravity environment.

Thank you, Madame Chair, for the opportunity to share this information with the subcommittee and to highlight the health benefits of space exploration to the world, for the benefit of all humankind.