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Statement of
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Chairman and Chief Executive Officer
SPACEHAB, Inc.

before the

Subcommittee on Space and Aeronautics
Committee on Science and Technology
U.S. House of Representatives

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to make my first appearance before you today as the Chairman and CEO of SPACEHAB, Inc. to discuss the significance of NASA's International Space Station Program - not just as it applies to a commercial aerospace company - but also for its tremendous potential to benefit mankind.

SPACEHAB, Inc. (NASDAQ: SPAB), was incorporated in 1984 and made its initial public offering in 1995. The Company flew its first module on a space shuttle mission in 1993. To date, SPACEHAB modules and carriers, which fly in NASA's Space Shuttle cargo bay, have been the primary payload on 23 Space Shuttle missions, including research missions on-board the fleet of orbiters, resupply missions to both the Russian space station *Mir*, and the International Space Station (ISS). The modules doubled the amount of working and living space available to the astronaut crews. Over the course of our pressurized module program, SPACEHAB has been involved in the analytical and physical integration and operation of hundreds of microgravity research and science payloads.

SPACEHAB has long known the value of microgravity; however there has never been the environment to commercially exploit these opportunities as the priorities of the international space partners have been the construction of the ISS while performing rudimentary experiments in microgravity. Additionally, until this year, the ISS has simply not been in the state of completion that would have been able to sustain repeated processing of microgravity products. And, until the NASA Authorization Act of 2005, NASA has never considered commercial ventures to profit from ISS produced products. Now that the International Space Station is nearly complete, and the ISS has been designated as a National Laboratory available for commercial endeavors, the next obvious direction for SPACEHAB is to utilize its experience in microgravity and commercial practices in forming a partnership with NASA to demonstrate the efficacy of the commercial space industry. This goal is achieved by the enhancement of life on Earth through the advancement of a wide range of microgravity technologies from a "demonstrated" state to a production state.

To take advantage of these unparalleled space based resources SPACEHAB has initiated a new division. SPACEHAB's Microgravity Processing division is uniquely qualified to identify commercial microgravity processing opportunities through our history of supporting microgravity research activities and our wide range of partnerships with agency and industry leaders. Additionally, SPACEHAB's Microgravity Processing division is ideally positioned to implement these commercial microgravity opportunities through the company's core capability of planning, integrating, operating payloads and its proven experience in commercial business practices. This division focuses on commercial R&D activities that are aligned with the National Lab capabilities, transportation opportunities and market demand.

SPACEHAB's Microgravity Processing division serves to advance both the business and technical state-of-the-art. With the designation of the ISS as a National Lab, SPACEHAB is establishing a broad portfolio of commercialization initiatives that will advance the state of the commercial space business sector to a level only previously theorized by commercial space advocates. By migrating microgravity processing initiatives from demonstration and validation to commercial production initiatives, substantial progress is made in sample throughput by adding to existing microgravity processing hardware the advanced automation systems necessary for higher volumes.

To assist SPACEHAB in identifying those high-value opportunities for commercialization, a team of our nation's leading microgravity researchers has been formed. This Science Advisory Council, chaired by SPACEHAB's MGP Program Manager, is comprised of experts in microgravity life sciences, biotechnology and material sciences. The majority of the council members are affiliated with educational institutions and will also provide significant guidance and contribution to SPACEHAB-developed educational programs used to motivate the next generation of science and engineering professionals. Members of this council include:

Science Advisory Council	
Member	**Affiliation**
Jeanne Becker, Ph.D.	National Space Biomedical Research Institute
Tim Hammond, MB, BS	Duke University
Neal Pellis, Ph.D.	NASA- Johnson Space Center
Louis Stodiek, Ph.D.	BioServe, University of Colorado
Wagner Vendrame, Ph.D.	University of Florida
Xing Wang, Ph.D.	Alfred University

Once a commercial opportunity has been identified, SPACEHAB will develop a unique business plan to ensure the viability of the proposed opportunity. Each business will utilize a systematic process to assure all technical and financial aspects of each opportunity are aligned with the goals and objectives of the National Lab and have a high probability of success.

The first step in this process is to establish the appropriate public and private partnerships required to execute an ISS National Lab project. As an example, SPACEHAB has established a public partnership with the Department of Veterans Affairs which will

allow joint efforts in various biotechnology research and product development on the National Lab leading to commercial health care solutions. Additionally, SPACEHAB is establishing partnerships with private commercial companies to better ensure its success for the development of commercial products utilizing the National Lab. SPACEHAB has established a commercial partnership with Dynamac, the operator of the Space Life Sciences Laboratory (SLSL) at the Kennedy Space Center (KSC). For 37 years, Dynamac has been providing advanced science research and technology services related to physical, chemical, and life science research initiatives. Beginning in 1995, as the prime Life Sciences Services Contractor (LSSC) for NASA-KSC, Dynamac scientists have helped process more than 180 Shuttle and ISS flight experiments. In addition to supporting Principle Investigators (PIs) world wide, Dynamac scientists have designed, constructed, and processed over 10 flight experiments as the primary PIs. This partnership arrangement utilizes their commercial "work-for-others" allocation in their SLSL contract allowing them to support industry initiatives in microgravity research. Utilization of their skills and this state of the art facility accommodates payload preparation, in-flight data collection, payload control, and supports post flight sample recovery and evaluation. The data network system installed in the SLSL, and managed by Dynamac, allows payload monitoring and control capability to both on-site and at off-site SPACEHAB facilities.

SPACEHAB has developed a broad portfolio of opportunities in the biotech and material science markets. We are working diligently to match these opportunities with flight opportunities and funding profiles. The overall objective is to have a dynamic matrix that can quickly match opportunities with flight availability, market demand and available resources. Some near term targets include:

Infectious Disease

The space environment has been shown to induce key changes in microbial cells that are directly relevant to infectious disease, including alterations of microbial growth rates, antibiotic resistance, microbial pathogenicity (that is, the ability of the organism to invade human tissue and cause disease), organism virulence, and genetic changes within the organism. The targets identified from each of these microgravity-induced alterations represent an opportunity to develop new and improved therapeutics, including vaccines, as well as biological and pharmaceutical agents aimed specifically at eradicating the pathogen. Furthermore, these different targeted approaches each represent potential product lines of development within the microgravity environment.

Understanding virulence factors is key to developing a vaccine. Virulence refers to the degree of pathogenicity of a microbe, or in other words, the relative ability of a microbe to cause disease. Virulence factors must be identified, and either purified for use as a vaccine, or the virulence factor can be deleted from the bacterium, yielding an attenuated strain to use as a vaccine. Hence, vaccines may consist of dead or inactivated organisms, or purified products derived from them. As the development of antibiotic resistance continues to erode one of the greatest advances in modern health care, it is crucial to

identify bacterial targets that can form the basis of novel anti-infective therapies, including vaccines.

SPACEHAB has determined that one of the most valuable short-term microgravity opportunities is the development of advanced vaccines that have the potential to be worth billions of dollars and also represents one of the quickest paths to success.

No single medical advance has had a greater impact on human health than vaccines. Before vaccines, Americans could expect that every year measles would infect four million children and kill 3,000; diphtheria would kill 15,000 people, mostly teenagers; rubella (German measles) would cause 20,000 babies to be born blind, deaf, or mentally retarded; pertussis would kill 8,000 children, most of whom were less than one year old; and polio would paralyze 15,000 children and kill 1,000. Smallpox, a disease estimated to have killed 500 million people, was eradicated by vaccines. Today, vaccines continue to be developed providing hope to eradicate many diseases that continue to kill millions every year such as pandemic influenza, staphylococcus, AIDS, instruments of bioterror, and various types of cancers.

The frustration encountered by the biotech vaccine industry lays in the cost of the discovering the exact strain of virus needed to invigorate the immune system while causing no harm to the animal - including humans. On Earth this is a very arduous process typically taking many years with a low probability of success. However, an experiment that flew to the ISS in 2006 concluded that bacteria grown in microgravity are much stronger than those grown on Earth. This was a very important discovery as it signaled to scientists that microgravity, properly controlled, could be used to design vaccines much quicker and with much greater precision than ever before possible. Many other vaccine experiments have since been sent with similar findings. As a result, SPACEHAB is taking these composite findings to the next level and sponsoring a microgravity vaccine development model that was sent to space on the Space Shuttle during mission STS-123. The vaccine model is scheduled to return on the STS-124 mission in May to confirm the initial results. The selected vaccine that SPACEHAB has chosen is to combat the complex Salmonella virus that makes millions sick every year, kills thousands, and costs many millions of dollars in financial damages. SPACEHAB has teamed with the Department of Veterans Affairs in collaboration with investigators from the National Space Biomedical Research Institute at Baylor College of Medicine, Duke University Medical Center, University of Colorado at Boulder, and the Max Planck Institute for Infection Biology. Results of this infectious disease model will be made public in the coming months. Once complete this new space based model has the potential to significantly increase our ability to develop vaccines for various types of infectious disease.

PROTEINS

The cells of the human body are the mini “factories” that enable life. What drive all of those factories to perform their specific functions are the proteins that are synthesized within those cells. The body utilizes approximately 400,000 of these proteins and when certain protein/cell functions become abnormal, a wide variety of diseases and conditions

may present themselves. Drugs can be developed to alter the effects of these problem proteins, but drug development is very difficult to accomplish on Earth and for some of the more serious diseases, microgravity is thought to hold the only solution for saving millions of lives on Earth. The following is a list of those diseases that microgravity is thought to hold the potential to provide significant advancements in developing a drug treatment:

- Diabetes
- Parkinson's
- Alzheimer's
- Lou Gehrig's disease
- Pancreas Cancer
- Cystic Fibrosis
- Hemophilia

PROTEIN CRYSTAL GROWTH (PCG)

A technique has been developed on Earth to discover drug therapies that involves growing a very pure crystal that is used to obtain an image of the atomic structure of a protein. Once the crystal is obtained, a very high powered x-ray (x-ray crystallography) reads the structure of the protein and from this, a drug can be developed. This crystallography technique is routinely performed on Earth however it has been found that gravity has a limiting effect on the growth and quality of the crystals. It was discovered that when crystals are grown in microgravity, the result is often times a larger and better quality crystal that can be more easily and accurately characterized making it more possible to develop a drug treatment that can treat these diseases.

The PCG's have flown more than any other experiment with an estimated investment of over $400 million to date. SPACEHAB has identified 1,250 Membrane Proteins and 425 Aqueous Proteins that are ready for microgravity crystallization. The Company expects to send the first samples to the ISS for processing in the third quarter of 2008. Upon return from space, these crystals will be x-rayed and the data sold to drug development companies. Alternatively, the Company may choose to add more value to the discovery by pursuing its own drug development program.

Of the human body's approximately 400,000 proteins, nearly 30% are considered *membrane proteins* and are, in fact, the types of proteins involved in some of the higher mortality diseases thereby commanding significant governmental and corporate research funding. While 30% represents well over 100,000 proteins, unfortunately only about 100 membrane protein structures have been identified due to the extreme difficulty of growing membrane protein crystals of sufficient quality for crystallography. To show the importance of membrane proteins and despite low number identified, nearly 50% of the commercially available drugs target membrane proteins. Given the improvements in crystallography and drug design over the past 10 years, Vergara, notes that the

“production of well diffracting crystals of biological macromolecules remains a major impediment”.

Previous spaceflight activities indicated that growing protein crystals in the microgravity environment experienced in spacecraft offers significantly increased quality of protein crystals. These better diffracting crystals create the opportunity to increase the number of protein structures identified that can be used for new drug development efforts.

As SPACEHAB’s microgravity processing initiative gains momentum, our business model is to reinvest in our own future. SPACEHAB will continuously evaluate past microgravity research and emerging discovery opportunities to drive our next generation microgravity processing programs. This exploratory activity will be self-funded and will set as a goal the continued demonstration to the American public the value of the International Space Station.

From improved firefighting equipment derived from NASA’s advances in extravehicular mobility units (EMU’s) to satellite tracking of forest fires by NASA’s Earth Observing System, the value of NASA’s research and development activities has been manifested countless times here on Earth. Since the inception of the ISS, hundreds of experiments have been conducted giving rise to additional opportunities to provide Earth based benefit. As NASA’s mission priorities focus on exploration beyond Low Earth Orbit (LEO), the designation of the ISS as a National Lab enables non-Government entities to partner with NASA to further the benefit of space based research and development. SPACEHAB intends to conduct National Lab activities on a broad portfolio of technologies in the life sciences, biotechnology and material sciences arenas to move technology forward, provide economic growth, stimulate the minds of our future engineers and scientists, and to ultimately improve the quality to life here on Earth. The SPACEHAB microgravity processing effort directly benefits the public in multiple ways.

Through the establishment of our microgravity processing division and initial on-orbit processing opportunities, SPACEHAB will raise significant capital and re-invest this capital in established biotech companies, universities, research centers, as well as our own MGP division resulting in direct growth to local economies at our sites in Texas and Florida. Furthermore, as we incrementally increase the scale of our microgravity processing capabilities, we create job opportunities within the aerospace industry in support of the on-orbit facilities (i.e. rack facilities, etc.) development and operations, the necessary ground infrastructure to support microgravity processing preparation and flight operations, and non-traditional jobs in support of product post processing and distribution. We are actively planning the creation of new companies that are established as a result of the products developed from our space based processing; these new companies contribute positively to economic growth through additional job creation and capital investment.

An integral component of the planned activities for utilization of ISS as a National Laboratory is the development of education and outreach initiatives for the advancement of 6-12 science, technology, engineering and mathematics (STEM). An education task force convened by NASA has defined a role for private sector participation in this

important goal, and has extended this objective to also include activities ranging to university, graduate and post-doctoral studies. R&D activities in microgravity provide much opportunity in support of educational initiatives. SPACEHAB has a rich history in this area, specifically in the successful Space Technology and Research Students (STARS) program, which provided hands-on, interactive scientific learning for students from grammar through high school aboard the space shuttle missions, including STS-107. Students from six countries participated in the STS-107 mission and were directly involved in the experimental concept, design, management, set-up and data assessment of research conducted in microgravity. More than 40 countries expressed interest in participating during the development of the STARS program. This activity partnered with BioServe Space Technologies, and utilized the Isothermal Containment Module (ICM) for the experimental studies. BioServe has continued educational payload design – the Commercial Generic Bioprocessing Apparatus Insert-02 (CGB-02) was successfully deployed on STS-116 and provided data and imagery, via cameras installed within the hardware, which were downlinked directly into classrooms across the world via the World Wide Web. The CSI-02 is an educational payload designed specifically to heighten the enthusiasm of students in STEM and to provide opportunities for these students to participate in near-real time research on ISS. Moreover, these activities also raise national and international awareness of cutting edge science and technology, and opportunities for product development in microgravity. Partnerships to utilize ISS for educational endeavors can be modeled after the STARS program for 6-12, with additional outreach to the broader educator community to include teachers and scientists in both academia and industry, and can be further extended to educational program administrators for design of next-generation programs in STEM disciplines. The development of training, internship and shadowing programs designed to raise awareness of the commercial sector as it pertains to microgravity R&D would also be an important outcome of these educational initiatives.

In conjunction with the establishment of our MGP business unit, SPACEHAB has undertaken the development of our microgravity processing technology roadmap. With 23 successful SPACEHAB missions containing numerous microgravity payloads, our engineers are experienced in end-to-end microgravity payload processing including analytical integration, comprehensive payload functional and interface testing, physical integration, and payload flight operations. Leveraging this unique experience in the development of our technology roadmap, our efforts are focused on innovative concepts that move the state-of-the-art in microgravity from small scale locker processing to large scale rack processing on-orbit, on automation techniques that reduce the required on-orbit crew time requirements, and to develop new techniques for on-orbit data processing where results can be downlinked thereby reducing the downmass requirements.

Mr. Chairman and Members of the Subcommittee, I want to extend my sincere appreciation for allowing me this forum to discuss a topic as critical to our future as the International Space Station Program – as well as your continued support which is vital for its success going forward. I would be pleased to respond to any questions you may have.