To place in context the contributions of the space nuclear program, Dewar points out that it was "neither pent-up consumer demand, the automobile and housing industries, nor public works spending [that] drove the economic boom in the decades following World War II. They certainly played a major role," but "it was the development of increasingly more sophisticated nuclear weapons by the weapons and laboratory complex, and then the application of that complex to civilian purposes," plus the military and civilian space program, that "pushed the economy to greater prosperity."

Although the Rover and NERVA programs remained classified throughout their 18-year life, over 100,000 unclassified reports were produced, exchanges took place between industry and laboratory personnel, other technology transfer arrangements were made, and vendor qualification programs forced companies to learn how to do precision work they would never have otherwise attempted.

The materials developed to withstand high temperatures and corrosive nuclear environments, over a long life, revolutionized technology in medical instruments, machine tools, and industrial applications.

Dewar relates how the methodology and analytical techniques developed to manage the nuclear rocket program achieved such a high reliability and safety at Westinghouse, that the company assigned executives from other divisions to the NERVA program for several years, and then rotated them back to their former positions, to apply these new skills throughout the company.

How could a program with such a record of success, that was so vital to the future of space exploration, and had already pushed forward nuclear and industrial technologies, just simply be ended?

Dewar points to the cultural and political change in the nation, reflected by the cultural change of policymakers in Washington. Optimism, economic progress, and innovation were replaced through the 1970s by anti-technology "environmentalism," and fear. Along with this went the dismantling of the institutions that had represented traditional American values, replacing the "producer society" with a "consumer society." In 1976, the Senate abolished its Space Committee, as did the House. The Atomic Energy Commission was abolished during the Nixon Administration, to be replaced with an agency focussed on conservation, so-called "renewable" energy, and fear of anything nuclear. Tearing up these institutions ensured there would be no cohesive lobby for space or nuclear programs.

A generational difference also led to the demise of these programs, Dewar points out: "One could contrast different generations in Congress, for example, those who served [in Congress] after World War II versus those who served after

Dr. Glenn Seaborg on 'The Nuclear Space Age'

"It is indeed of epochal significance that man has recently become spaceborne after his previously long earthbound existence," wrote Nobel Laureate Glenn Seaborg in an undated pamphlet with the above title, in the late 1960s. The Apollo 11 spacecraft had not yet landed the first men on the Moon, but Dr. Seaborg, the chairman of the Atomic Energy Commission, was looking into the future. "I believe it is providential that our advancing development of the atom and our entrance into space are currently taking place side by side, in what might be called the Nuclear Space Age," he wrote. Dr. Seaborg explained that the major advantage of nuclear energy in space is its compactness, a result of its higher energy density, as compared to the burning of chemical fuels.

Electricity produced in a space nuclear reactor is crucial, where solar energy is not readily available—such as during the two-week lunar night, or at the outer planets. Nuclear reactors will also be the enabling technology for extended manned missions to the Moon and planets, where sophisticated scientific instruments, the processing of raw materials, life support systems, and industrial activity will require multi-megawatts of power.

Even close to Earth, he explains, high-powered nuclear systems producing power will enable a variety of activities at manned space stations, and perhaps in the future, Dr. Seaborg proposed in the 1960s, as author Arthur Clarke had suggested, a system of satellites to enable "communications marvels," such as an "orbital post office providing delivery of copies of letters anywhere in the world only minutes after original letters are posted."

Apart from the practical applications of space technology, however, Dr. Seaborg considers more important the "intangible reasons" for exploring space. "The Age of Space is perhaps the most exciting time in human history since the Age of Discovery that followed Columbus' voyage. . . . When it was possible to explore the atom, we did not hesitate. It has now become feasible to explore space. We dare not shrink from the adventure. We cannot draw a curtain over a New World that is within our grasp. We cannot sit at home, so to speak, and hear second hand of new wonders that men have pondered through the ages. Our enthusiastic participation on the frontier, wherever the frontier exists, is necessary for our continuation as a dynamic and creative people. If there were no other reason for space exploration—and there are a great many more—this one would be good enough for me."

—Marsha Freeman