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ON THE NECESSITY OF MODIFICATIONS TO UN PRINCIPLE III

Abstract

The United Nations has underwritten the use of nuclear power in space for peaceful uses in a comprehensive set of Principles authored by the scientific and legal subcommittees of the Committee On the Peaceful Uses of Outer Space (COPUOS). Principle III provides Guidelines and criteria for safe use of nuclear power sources in space. Section 2 of Principle III relates to nuclear reactors. Nuclear reactors may be operated: 1. On interplanetary missions; 2. In sufficiently high orbits as defined in Paragraph 2 (b); 3. In low-Earth orbits if they are stored in sufficiently high orbits after the operational part of their mission. A sufficiently high orbit is one whose lifetime is long enough for a sufficient decay of the fission products to approximately the level of the actinides; e.g.; the native source term of the reactor prior to launch. Principle III 2 (c) states that nuclear reactors shall use only highly enriched uranium as a fuel. Further section (c) states that “The design shall take into account the radioactive decay of the fission and activation products. Since 9/11, the United States, through the Department of Energy’s National Nuclear Security Administration, started the Global Threat Reduction Initiative, which has 3 primary objectives: Convert research reactors and isotope production facilities from the use of highly enriched uranium (HEU) to low enriched uranium (LEU); Remove or confirm the disposition of excess nuclear and radiological materials; and Protect high priority nuclear and radiological materials from theft. The objectives of UN Principle III 2 (c) and the GTRI are on a collision course. The UN wants HEU fuel for nuclear reactors, the objectives of the GTRI are to make reactors from LEU. Recent research by the Center for Space Nuclear Research and the Marshall Space Flight Center confirm that a LEU NTR and a LEU surface power system can be made with some mass penalty. The GTRI has placed so great an emphasis on converting and removing Category I quantities of Special Nuclear Materials (SNM), that only one location in the US is authorized to house and operate Category I quantities of SNM for operational and research purposes. From a space reactor perspective, not only does this place enormous burdens on a program for development and testing, the costs associated with such a program are virtually unknowable. This paper discusses LEU space reactors and the need to change UN Principle III.