



## **POLICY ISSUE**

(NEGATIVE CONSENT)

December 31, 1990

SECY-90-426

For: The Commissioners

From: James R. Shea, Director  
International Programs  
Office of Governmental and Public Affairs

Subject: PROPOSED IMPORT OF SOVIET "TOPAZ" REACTOR

Purpose: To inform the Commission of the staff's intention to issue an import license to a Department of Defense contractor to allow a Soviet-designed thermionic device (reactor) to enter the U.S. to be displayed as an exhibit at the 8th Space Nuclear Power Symposium in Albuquerque, New Mexico, on January 6-10, 1991.

Background: In a meeting on December 21, followed by a letter on December 24, 1990, the NRC staff was advised by representatives of the Strategic Defense Initiative Office (SDIO) of the Department of Defense, of their plans to sponsor an exhibit of Soviet space technology and components in Albuquerque in early January, including a TOPAZ reactor system without its fuel, moderator, and coolant materials. The letter, its attachment, and other descriptive information, are found in Enclosure 1.

The NRC staff determined in a meeting on December 27, 1990 that the TOPAZ "model" was a utilization facility as defined in the Atomic Energy Act of 1954, as amended, and 10 CFR 110.2, and thus could not come into the United States

**CONTACT:**  
R. Hauber, IP  
x20344

NOTE: TO BE MADE PUBLICLY AVAILABLE WHEN THE FINAL SRM IS MADE AVAILABLE.

without a specific import license issued by the NRC or an exception authorized by the President pursuant to Section 91 of the Act. This determination was conveyed by telephone on the 27th and in a letter to SDIO (Enclosure 2) on the 28th.

On December 28, IP received a second letter from SDIO (Enclosure 3), requesting urgent consideration of an application for the import of the TOPAZ exhibit by Space Power, Inc., a U.S.-owned and controlled company acting on behalf of SDIO. The letter confirmed that the components being imported have never been operated as a reactor and contain no induced, or other, radioactivity. The letter also said that SDIO understood that "any subsequent disposition of the reactor would require further advance consultations and mutual agreement with the Commission." The letter requested issuance of the import license on an urgent basis and no later than January 4, 1991.

Discussion:

In issuing an import license, the NRC must find that the proposed import would not be inimical to the common defense and security or constitute an unreasonable risk to the public health and safety. The staff does not see any such adverse effects from the proposed import. Operational scenarios contingent upon further importation or development by the United States of the fuel, moderator, and other materials required to convert the current TOPAZ "exhibit" into an operating reactor, are considered by the staff to be outside the scope of the current import licensing review.

The staff notes that importation of a utilization facility does not require an Agreement for Cooperation with the exporting country (Section 123 of the Atomic Energy Act), but exportation of a utilization facility does require such an agreement. The staff has advised SDIO that the absence of such an agreement between the U.S. and the USSR would block NRC issuance of an export license to return the TOPAZ reactor to the Soviet Union.

There is no requirement to solicit or consider the views of the Executive Branch in regard to import licensing; however, copies of the enclosures to this paper were telefaxed on December 28 to the Department of State coordinator who handles NRC export cases. We asked that if he saw any issue that should be considered in our review to inform us as soon as possible. If this or other Executive Branch contacts by

the staff before January 4, lead to the identification of any adverse information or policy issues in this case, the staff will inform the Commission without delay.


The letters of application from SDIO and related information were sent to the Public Document Room on December 31, 1990.

Conclusion:

The staff is prepared to issue an import license to Space Power, Inc., as requested in General O'Neill's December 28 letter, and will do so if there is no objection on the part of the Commission.

Coordination:

The EDO concurs in this paper; OGC has no legal objection.

  
for James R. Shea, Director  
International Programs  
Office of Governmental and Public Affairs

Enclosures:  
(3) As stated

SECY NOTE: In the absence of instructions to the contrary, SECY will notify the staff on Friday, January 4, 1991 that the Commission, by negative consent, assents to the action proposed in this paper.

DISTRIBUTION:  
Commissioners  
OGC  
OIG  
GPA  
EDO  
SECY



DEPARTMENT OF DEFENSE  
STRATEGIC DEFENSE INITIATIVE ORGANIZATION  
WASHINGTON, DC 20301-7100

December 24, 1990

Mr. Ronald Hauber  
Assistant Director, International Affairs  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Hauber:

I am writing you to inform you of the Strategic Defense Initiative Organization (SDIO) plans to sponsor an exhibit reflecting Soviet space nuclear technology and components at the 8th Symposium on Space Nuclear Power Systems at Albuquerque, New Mexico on January 6-10, 1991.

SDIO has an ongoing interest in the development of survivable and long-lived space nuclear power sources, and to this end has been a major participant with NASA and DOE in the SP-100 Thermoelectric Space Nuclear Power Source program and with DOE in the Thermionic Fuel Element (TFE) verification program. Recent encouraging results from the TFE program, and an emerging interest by the U.S. Air Force in development of space nuclear power reactors using thermionic power conversion have engendered additional SDIO support for thermionic development. This support consists of funding an Air Force program which is studying thermionic systems concepts and developing components for a nuclear thermionic space reactor power system.

The USSR has had recent successful flight experience in testing TOPAZ class thermionic reactors in orbit. After discussions with senior officials from Kurchatov Institute, we have initiated discussions toward DOD purchase of unfueled TOPAZ reactor thermionic testbeds, components, and supporting technical services. If we are successful in this endeavor, DOD plans to begin electrically heated testing

EXPORT IMPORT

90 DEC 24 PM 2:21

RECEIVED  
U.S. AIR FORCE

Enclosure 1

Mr. Ronald Hauber  
Page 2  
December 24, 1990

To further dissemination and technical transfer of TOPAZ reactor system information for the benefit of the U.S. scientific and engineering community, SDIO is sponsoring an exhibit of TOPAZ-related equipment at the 8th Space Nuclear Power Symposium in Albuquerque on January 6-10, 1991. A significant item of this exhibition is an inoperative model of a TOPAZ reactor system from which all moderator material and coolant have been removed. The exhibit is presently enroute to New York for transshipment under seal to Albuquerque, New Mexico where it is planned to be presented to U.S. Customs Officials for entry and subsequent SDIO sponsored exhibition at the meeting.

At all times while in the United States the exhibit will be securely monitored under DOD auspices in an inoperable condition with no fuel or moderator or coolant installed. Indeed, the zirconium hydride moderator plates -- which will not be included in the exhibit but are essential to operation -- are unique. They are produced by a process known only in the Soviet Union, and are not available in the United States.

SDIO would very much appreciate whatever prompt assistance the NRC can provide to assure that this equipment can be placed on display at the Symposium by January 6, 1991.

A description of the TOPAZ space nuclear power system from which this exhibit has been derived is attached. Further information covering the exhibit can be obtained by calling Mr. Richard Verga of my staff at 703-693-1655 or in his absence Mr. Robert Wiley of W.J. Schafer Associates Inc. at 703-558-7900. We will be pleased to meet with you or other representatives of NRC should you deem it necessary.

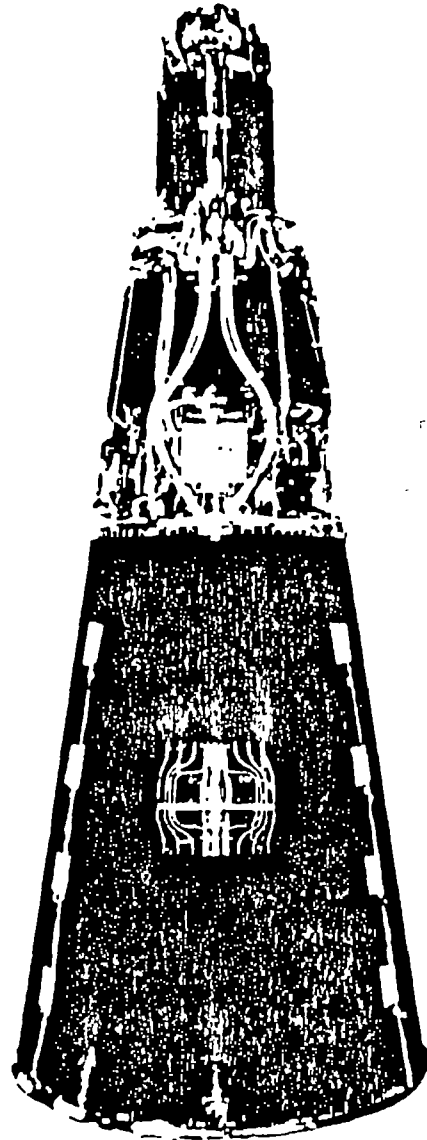
Sincerely,



MALCOLM R. O'NEILL  
Major General, USA  
Deputy Director

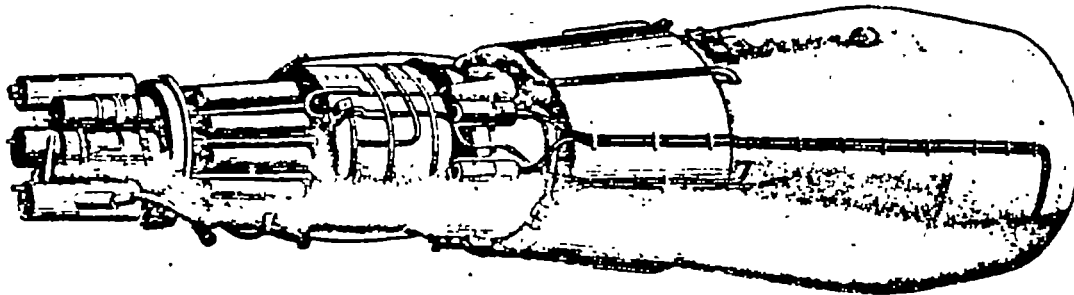
Att: TOPAZ Exhibit Features

## TOPAZ EXHIBIT FEATURES



System Length	3.9 m
Maximum Diameter	1.4 m
Mass	1000 kg
Construction	Stainless Steel
Power	NONE (Inoperative)
Conversion	Incore Thermionic
TFE	Single Cell - No Fuel
Number TFES	34 (payload) 3 (pump)
TFE Diameter	~ 2.3 cm
Emitter	Single Crystal Mo/W
Cesium Supply	Common, Static
Core	
Height	37.5 cm
Diameter	26.0 cm
Moderator	NONE (Inoperative)
Reflector	Be

provided to IRE during  
meeting on 12/21/90 with  
Sam Bassett



The Space Nuclear Power System SNPS "Topaz" is assigned for spacecraft equipment electric power feeding. Flight tests of two experimental prototypes were carried out on board spacecrafts "Cosmos" series. "Cosmos-1618" and "Cosmos-1867" in 1987 - 1988.

In the SNPS "Topaz" the direct (non-machine) energy conversion is realized in in-core thermionic miniature heat nuclear reactor.

Nuclear and radiation protection is guaranteed by the nuclear reactor construction. In case of any accidents, including the hypothetical ones with the space booster when launching and while putting into orbit, the nuclear reactor remains undercritical. The starting-up of the reactor before reaching the operating orbit is impossible due to block-systems. Block systems are switched out on radio command from Earth, but only after corroboration of putting the system into the calculated orbit by direct trajectory measurements. The orbit altitude is chosen from the condition that the spacecraft after seasing life-time, mind any accidents, is enough for fission products to decay to safe level. This time exceeds 350 years.

Thus, the guaranteed safety of Earth population, when such installations are being used, is enshured.

The nuclear power station consists of:

- the thermionic reactor-generator with zirconium hydride moderator and berillium reflector, in the side reflector there are installed the rotation control systems;

- the reactor-generator service systems: control systems gears, the electric current generating channel working body ( Cs ) supply systems arranged in a unit, placed in front of reactor-generator;

- the Lithium-hydride shade radiation protection, providing nuclear reactor radioactive irradiation attenuation to spacecraft equipment specified level;

- the reactor extra heat removal system, consisting of electromagnetic pump, electrically feeded from the reactor-generator special section, of refrigerator-irradiator for heat removal into the space and other units.

#### Specifications

SNPS (electric) power, kW	- 5
SNPS (heat) power, kW	- 150
Max. coolant temperature, °C	- 610
Mass, kg	- 980
<sup>235</sup> U mass, kg	- 11,5
Resourse, year	- 1



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

December 24, 1990

MEMORANDUM FOR: Sheldon A. Schwartz, Deputy Director  
Office of Governmental and Public Affairs

FROM: William C. Parler  
General Counsel

My conversation with Becker re. Soviet import amounted to this:

If the imports were a model and from technical standpoint could not be made to produce or utilize SNM, then I would think we would not be dealing with a production or utilization facility which must be licensed.

Whether or not the thing to be imported has or does not have such capabilities is a technical not legal call.

A handwritten signature in cursive script, appearing to read "W. C. Parler".

William C. Parler  
General Counsel



PRELIMINARY PROGRAM



# 8TH SYMPOSIUM ON SPACE NUCLEAR POWER SYSTEMS

**INSTITUTE FOR SPACE NUCLEAR POWER STUDIES**  
*Chemical and Nuclear Engineering Department*  
*The University of New Mexico*  
*Albuquerque, NM 87131*  
*(505) 277-2813, 277-2814*

*Co-sponsored by:*

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**  
HEADQUARTERS  
LEWIS RESEARCH CENTER  
**STRATEGIC DEFENSE INITIATIVE ORGANIZATION**  
**UNITED STATES DEPARTMENT OF ENERGY**  
ARGONNE NATIONAL LABORATORY  
IDAHO NATIONAL ENGINEERING LABORATORY  
LOS ALAMOS NATIONAL LABORATORY  
SANDIA NATIONAL LABORATORIES  
**UNITED STATES AIR FORCE**  
SPACE TECHNOLOGY CENTER  
WEAPONS LABORATORY  
WRIGHT RESEARCH AND DEVELOPMENT CENTER

*In cooperation with:*

**AMERICAN NUCLEAR SOCIETY**  
ANS TRINITY SECTION  
ANS ENVIRONMENTAL SCIENCES DIVISION  
ANS NUCLEAR REACTOR SAFETY DIVISION  
**AMERICAN INSTITUTE OF CHEMICAL ENGINEERS**  
HEAT TRANSFER AND ENERGY CONVERSION DIVISION  
**AMERICAN SOCIETY OF MECHANICAL ENGINEERS**  
NUCLEAR ENGINEERING DIVISION  
HEAT TRANSFER DIVISION  
**ASTM, COMMITTEE E-10 ON NUCLEAR TECHNOLOGY AND APPLICATIONS**  
**INTERNATIONAL ASTRONAUTICAL FEDERATION**  
**NEW MEXICO ACADEMY OF SCIENCE**

*Industry Affiliates:*

**BABCOCK & WILCOX COMPANY**  
**GENERAL ELECTRIC COMPANY**  
**ROCKWELL INTERNATIONAL CORPORATION**  
ROCKETDYNE DIVISION  
**WESTINGHOUSE ELECTRIC CORPORATION**

**Albuquerque Convention Center**  
*Albuquerque, New Mexico*  
*January 6-10, 1991*

Exhibitors will show the latest advancements in hardware and product applications for space power systems.

#### EXHIBITORS

Allied Signal Aerospace Company/ Garrett Fluid Systems Division	NASA Lewis Research Center Pacific Northwest Laboratory
Argonne National Laboratory	Poco Graphite, Inc.
Auburn University,	Rockwell International
Babcock & Wilcox Company	Corporation/Rocketdyne Division
General Atomics	S-Cubed, A Division of Maxwell Laboratories
General Dynamics Space Systems Division	Sandia National Laboratories
General Electric Company	→ Space Power, Inc. ←
Grumman Corporation	University of New Mexico
Idaho National Engineering Laboratory	Westinghouse Electric Corporation/ Advanced Energy Systems Division
Jet Propulsion Laboratory	
Los Alamos National Laboratory	
Mechanical Technology, Inc.	

#### NUCLEAR PROPULSION SHORT COURSE

THURSDAY, FRIDAY, AND SATURDAY

January, 3-5, 1991, 8:00 am - 6:00 pm

Hyatt Regency Hotel, Enchantment Ballroom

##### Short Course Organizer:

Professor Mohamed S. El-Genk  
Institute for Space Nuclear Power Studies  
University of New Mexico

##### Topics to be covered Thursday, January 3, 1991:

Fundamentals of orbital mechanics, nuclear propulsion, reactor design, and radiation shielding considerations.

##### Topics to be covered Friday, January 4, 1991:

Nuclear propulsion reactor concepts, nuclear fuel systems and materials technology issues, mission analysis, and vehicle integration.

##### Topics to be covered Saturday, January 5, 1991:

Energy conversion systems (potassium Rankine and Brayton), fundamentals of electric propulsion, thrusters technology, and turbo-pump design and technology.

Registrants will receive a copy of the short course notes. The course fees also include a hosted reception on Friday evening, January 4, 6:30 pm - 8:30 pm and a hosted lunch on Saturday, January 5.

##### Instructors:

Dr. John Barnett is supervisor of the Electric Propulsion and Plasma Technology Group at the Jet Propulsion Laboratory in Pasadena, California. JPL's Electric Propulsion Laboratory is presently developing ion engines, magnetoplasma-dynamic (MPD) thrusters, electron cyclotron resonance (ECR) thrusters, and

arcjets for NASA and DOD sponsors. Dr. Barnett's work over the past 11 years has included the experimental study of MPD thrusters, the development of pulsed coaxial plasma accelerators for radiation production, the study of Soviet electric propulsion, and the evaluation of various electric engines for application to robotic and piloted solar system exploration missions. He holds a B.S. degree in Mechanical Engineering from Rice University, and M.A. and Ph.D. degrees in Mechanical and Aerospace Engineering from Princeton University. Dr. Barnett is a member of the AIAA Electric Propulsion Technical Committee.

Mr. Richard J. Bohl was associated with Rover Program activities from the late 1950s until the program was terminated in 1973. He was the Test Director for the Nuclear Furnace-1 (NF-1) test series. The NF-1 was operated at full power for nearly two hours—that is the longest time at full power for any Rover/NERVA tests. He participated in the test planning and data analysis for most Rover tests. Non-linear, dynamic models were derived and simulated on electric analog and digital computers. He designed the digital flow rate and core outlet temperature controllers used in the NF-1. He is currently the technical project manager for the Thermionic Fuel Element (TFE) Verification Program at Los Alamos National Laboratory. The TFE Verification Program is basically a component development program with a demonstration of a six-cell TFE in EVR-II operating under prototype conditions of a 2-MWe point design. A seven-year lifetime will be demonstrated for all components.

Dr. Stanley K. Borowski works as a research scientist at NASA Lewis Research Center's Advanced Space Analysis Office. His area of specialization is advanced propulsion system design (with particular emphasis on nuclear thermal rocket technology), lunar and Mars mission analysis and spacecraft configurational design. Dr. Borowski received his B. S. and M. S. degrees in nuclear engineering from Pennsylvania State University and his Ph. D. from the University of Michigan also in nuclear engineering. He is a member of the American Institute of Astronautics and Aeronautics (AIAA), the American Nuclear Society (ANS), and the American Physical Society/Division of Plasma Physics (APS). He has worked as a staff scientist at Oak Ridge National Laboratory's Fusion Engineering Design Center in the area of fusion reactor design and performance and also at the Aerojet Propulsion Research Institute in the advanced propulsion systems area. Dr. Borowski will lecture on nuclear thermal rocket (NTR) technology options, their performance potential for both lunar and Mars missions in NASA's Space Exploration Initiative, and on NTR vehicle design considerations.

Dr. Stanley Gunn: Biography was not available at the time of printing.

Mr. Albert J. Juhasz is presently serving as the manager of Lewis Research Center Advanced Thermal Systems projects. In this role he is responsible for the definition, planning, organization, and implementation of multi-agency and multi-center projects, including the development of advanced radiators for SP-100, heat pipe analysis and code development, and design and construction of a heat pipe test facility. After receiving a degree in mechanical engineering from CSU in 1960, he did research in the design, fabrication, and testing of automatic and semi-automatic turret lathes. After his transfer to NASA Lewis Research Center, he performed experiments on gaseous and two-phase boiling, hydrogen heat transfer in support of the NERVA program, gas turbine combustion chamber design and testing, diffuser boundary layer flow control, and combined cycle magnetohydrodynamic power plant analysis. He developed a more energy

**PLENARY SESSION IV  
SPACE POWER PROGRAMS**

**MONDAY, January 7, 1991**

**4:00 pm - 6:00 pm**

**Upper Level, Convention Center Ballroom**

**Stephen J. Lanea, Chairman**  
Deputy Assistant Secretary,  
Space and Defense Power Programs  
United States Department of Energy  
Washington, DC

**Richard L. Verga, Co-Chairman**  
Manager of Power  
for Strategic Defense Initiative  
Strategic Defense Initiative  
Organization  
Washington, DC

1. *Realizing the Dream*  
James A. Turi, United States Department of Energy
2. *Multimegawatt and Thermionic Space Reactors Programs*  
Wade Carroll, United States Department of Energy and Michael J. Schuller,  
Weapons Laboratory, USAF
3. *Planning for the Space Exploration Initiative: The Nuclear Propulsion Option*  
Gary L. Bennett, NASA Headquarters and Thomas J. Miller, NASA Lewis  
Research Center
4. *SP-100 Systems and Technology Development Progress*  
J. Sam Armijo, General Electric Company, Astro Space Division

**POSTER SESSION**

**MONDAY, January 7, 1991**

**9:00 am - 6:30 pm**

**Upper Level, Convention Center Lobby**

**Andrew C. Klein, Chairman**  
Oregon State University  
Corvallis, OR

**Mark D. Hoover, Co-Chairman**  
Inhalation Toxicology Research  
Institute  
Albuquerque, NM

1. *Scalability of Space Reactor Power Systems in the 10 to 100 kWe Range*  
N. F. Shepard, R. E. Biddiscombe, H. Choe, F. C. Greenwood, A. S. Kirpich,  
J. D. Stephen, and S. L. Stewart, General Electric Company
2. *Novel Cecciation Approaches for Thermionic Reactors*  
Elliot B. Kennel and K. Y. Kim, Wright Research and Development Center;  
and Edward J. Britt and Hyop S. Rhee, Space Power, Inc.
3. *An Available 6-30 kWe Power System for Lunar Outposts*  
Joseph R. Wetch, Lester L. Begg, N. G. Gunther, Space Power, Inc. and Boris  
Obglobin, Central Design Bureau, Leningrad, USSR and  
Nikolai N. Ponomarev-Stepnoi, Kurchatov Institute of Atomic Energy, USSR
4. *Pu-238 Oxalate Precipitation for Direct Fabrication of General Purpose Heat Sources (GPHS)*  
E. A. Kyser, Westinghouse Savannah River Company

5. *Procurement of a Fully Licensed Radioisotope Thermoelectric Generator Transportation System*  
Harold E. Adkins, Thomas E. Bearden, and Richard J. Smith, Westinghouse  
Hanford Company
6. *An On-Line Information System for Radioisotope Thermal Generator Production*  
Gary R. Kiebel and Michael J. Wiemers, Westinghouse Hanford Company
7. *Brayton Cycle Conversion and Future French Prospects on Space Nuclear Power Systems*  
Zéphyr P. Tilliette, Jean Delaplace, and Eric Proust, Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaires de Saclay, France
8. *Bubble Membrane Radiator Modeling and Ground Testing*  
Keith A. Pauley, Pacific Northwest Laboratory and Homam Al-Baroudi and  
Andrew C. Klein, Oregon State University
9. *Water Heat Pipe Ceramic Fabric Wick Experimentation*  
Keith A. Pauley, Zenen I. Antoniuk, Matthew Cooper, and James Bates,  
Pacific Northwest Laboratory
10. *Pegasus II: A Multi-megawatt Nuclear Electric Propulsion System*  
Keith A. Pauley, Brent J. Webb, and Edmund P. Coomes, Pacific Northwest  
Laboratory
11. *Power System Limits to Growth*  
Stephen M. Slater and Andrew C. Klein, Oregon State University and  
Brent J. Webb and Keith A. Pauley, Pacific Northwest Laboratory
12. *Handling and Disposal of SP-100 Ground Test Nuclear Fuel and Equipment*  
Charles E. Wilson, Jerry D. Potter, and Richard D. Hodgson, Westinghouse  
Hanford Company
13. *SP-100 Reactor Disassembly Remote Handling Test Program*  
Charles E. Wilson, Jerry D. Potter, Glenn E. Maiden, and David P. Vader,  
Westinghouse Hanford Company
14. *Testing of SP-100 Reactor Control Approaches in the NAT*  
Sang K. Rhow, General Electric Aerospace
15. *Methods of Identification of Non-stationary Processes and Diagnostics of the State of Nuclear Power Units based on Perturbation Theory*  
Institute of Physics and Power Engineering, USSR
16. *Void Control in the Crystallization of Lithium Fluoride*  
Donald A. Jaworske, NASA Lewis Research Center, and W. D. Perry,  
Auburn University
17. *Vacuum Thermal Cycle Life Testing of High Temperature Thermal Energy Storage*  
Rengasamy Ponnappan, Universal Energy Systems, Inc. and Jerry E. Beam,  
USAF Wright Research & Development Center
18. *Application of the Monolithic Solid-Oxide Fuel Cell to Space Power Systems*  
K. M. Myles and Samit K. Bhattacharyya, Argonne National Laboratory

## HIGH SCHOOL SPECIAL SESSION

MONDAY, January 7, 1991  
8:15 am - 11:45 am  
Cochiti/Taos Room

Irene L. El-Genk, Chairwoman  
Education Outreach Committee  
Albuquerque, NM

Rose Thome, Co-Chairwoman  
Albuquerque, NM

1. *Welcome and Opening Remarks*  
Barbara Lujan, NASA
2. *Introduction of Space Design Contest Winners*  
David Kauffman, University of New Mexico
3. *Mars Exploration*  
To Be Determined
4. *Space Exploration and Development Spinoffs*  
Steve M. Riddlebaugh, NASA Lewis Research Center
5. *Soviet and American Students' Questions and Answers on Science and Education*  
Panel of Soviet College and American High School Students
6. *What Does It Take To Be An Astronaut*  
Franklin Chang-Diaz\*, NASA Astronaut

\*Invited

## UNCLASSIFIED TECHNICAL SESSIONS

### [1] SPACE APPLICATIONS/ EXPLORATION

TUESDAY, January 8, 1991  
8:00 am - 10:00 am  
Taos/Cochiti Room

Gregory Reck, Chairman  
NASA Headquarters  
Washington, DC

Mel Swerdling, Co-Chairman  
TRW, Inc.  
Sepulveda, CA

1. *NASA Mission Planning For Space Nuclear Power*  
Gary L. Bennett and A. Dan Schnyer, National Aeronautics and Space Administration Headquarters
2. *Summary of Nuclear Propulsion Workshops*  
Thomas J. Miller and John Clark, NASA Lewis Research Center, and John Barnett, Jet Propulsion Laboratory
3. *The Broad View of Nuclear Technology for Aerospace*  
David Buden, Idaho National Engineering Laboratory, and Joseph A. Angelo, Jr., EG&G, Inc.

4. *Lunar Mission Design using Nuclear Thermal Rockets*  
Michael L. Stancati and John T. Collins, Science Applications International Corporation and Stanley K. Borowski, NASA Lewis Research Center
5. *Nuclear Energy Reactor Variants for Energy Supply for Intraorbit Flights*  
Science-Production Cooperation "Krasnaya Zvezda", Kurchatov Institute of Atomic Energy, USSR

### [2] SPACE NUCLEAR SAFETY I: ULYSSES SAFETY ANALYSIS & EVALUATION

TUESDAY, January 8, 1991  
8:00 am - 10:00 am  
Santa Ana/Sandia Room

Joseph A. Sholtis, Jr., Chairman  
U. S. Air Force  
Kirtland AFB, NM

A. Thomas Clark, Co-Chairman  
U. S. Department of Energy  
Washington, DC

1. *GPHS-RTG Launch Accident Analysis for Galileo and Ulysses*  
C. Thomas Bradshaw, General Electric Astro Space Division
2. *Nuclear Risk Analysis of the Ulysses Mission*  
Bart W. Bartram, R. W. Englehart, and F. R. Vaughan, NUS Corporation
3. *SRB Burnback Fragment Analysis*  
Marshall B. Eck and M. Mikunda, Fairchild Space Company
4. *Conduct and Results of the Interagency Nuclear Safety Review Panel's Evaluation of Ulysses*  
Joseph A. Sholtis, Jr., United States Air Force and others
5. *Uncertainty Analysis for Ulysses Safety Evaluation Report*  
Michael B. Frank, Safety Factor Associates
6. *Interagency Nuclear Safety Review Panel Power System Subpanel Review for the Ulysses Mission*  
William H. McCulloch, Sandia National Laboratories
7. *Plutonium Risks for the Ulysses Mission*  
Marvin Goldman, University of California, Davis, Robert Nelson, Idaho National Engineering Laboratory, and others

### [3] MATERIALS I

TUESDAY, January 8, 1991  
8:00 am - 10:00 am  
Picuris Room

Peter J. Ring, Chairman  
General Electric Aerospace  
San Jose, CA

R. William Buckman, Co-Chairman  
Westinghouse Electric Corporation  
Pittsburgh, PA

1. *Short-Term Creep Rupture Predictions for Tantalum Alloy T-111*  
John J. Stephens, Sandia National Laboratories

2. *Effect of Thermomechanical Processing on Microstructure of PWC-11*  
Mehmet Uz, LaFayette University
3. *Microstructure and Creep Behavior of an Nb-Zr-C Alloy*  
Robert H. Titran, NASA Lewis Research Center
4. *Refractory Metal Alloy Composites*  
Toni L. Grobstein, NASA Lewis Research Center

#### [4] REACTORS AND SHIELDING I

TUESDAY, January 8, 1991  
8:00 am - 10:00 am  
Acoma Room

- |  |   |
|--|---|
| H. Sterling Bailey, Chairman<br>General Electric Aerospace<br>San Jose, CA | Russell M. Ball, Co-Chairman<br>Babcock & Wilcox Company<br>Lynchburg, VA |
|--|---|
1. *Nuclear Design of the Burst Power Ultra-High Temperature UF<sub>4</sub> Vapor Core Reactor System*  
Samer D. Kahook, University of Florida
  2. *Studies of PuF<sub>6</sub> and the Transplutonic Material's Critical Properties for Space High Power Pumped Lasers*  
Albert G. Gu and Mark S. Miller, Mississippi State University
  3. *Analysis of the Results of Calculations and Experiments on Critical Assemblies to Determine the Physical Characteristics of Reactors for Group TVS Experiments*  
Kurchatov, Institute of Atomic Energy, Moscow, USSR and Institute of Physics and Power Engineering, Obninsk, USSR
  4. *Advanced Thermionic Reactor Systems Design Code*  
Bryan R. Lewis, Ronald A. Pawlowski, Kevin J. Greek, and Andrew C. Klein, Oregon State University
  5. *Reactor and Shield Mass Minimization Models Based on RSMAS Approach*  
Albert C. Marshall, Sandia National Laboratories

#### [5] SPACE MISSIONS AND POWER NEEDS

TUESDAY, January 8, 1991  
10:30 am - 12:30 pm  
Taos/Cochiti Room

- |   |   |
|---|---|
| David Buden, Chairman<br>Idaho National Engineering Laboratory<br>Idaho Falls, ID | James H. Lee, Jr., Co-Chairman<br>Strategic Defense Initiative<br>Organization/<br>Sandia National Laboratory<br>Washington, DC |
|---|---|
1. *Scientific and Terrestrial Benefits of the Space Exploration Initiative*  
T. J. Dolan, David M Woodall, J. Negus-Devys, E. H. Ottewitte, J. S. Herring, and David Buden, Idaho National Engineering Laboratory

2. *Exploration Mission Enhancements Possible with Power Beaming*  
Judith Ann Bamberger and Edmund P. Coomes, Pacific Northwest Laboratory and Donald R. Segna, U. S. Department of Energy
3. *Overview of the Power Requirements for a Manned Mars Rover Mission using a Nuclear Reactor Power Source*  
Nicholas J. Morley and Mohamed S. El-Genk, University of New Mexico, and Robert Cataldo and Harvey Bloomfield, NASA Lewis Research Center
4. *Lunar Rover Powered by SP-100 Laser Diode Array*  
Russell J. DeYoung, M.D. Williams, G.H Walker, Gary L. Schuster, and J. H. Lee, Jr., NASA Langley Research Center
5. *Nuclear Fission Applications for Space Exploration*  
John Martinell, Jim Lake, and Jack Ramstaller, Idaho National Engineering Laboratory
6. *The Energy Propulsion Facility on the Base of the YaEU with Tubular Power Transformer for Providing an Accelerated Expedition to Mars*  
Kurchatov Institute of Atomic Energy, Moscow, USSR, Research Institute of Thermal Processes, Moscow, USSR

#### [6] SPACE NUCLEAR SAFETY II

TUESDAY, January 8, 1991  
10:30 am - 12:30 pm  
Santa Ana/Sandia Room

- |   |   |
|---|---|
| Neil W. Brown, Chairman<br>General Electric Aerospace<br>San Jose, CA | Brian Wade, Co-Chairman<br>United Kingdom Atomic Energy<br>Harwell Laboratory<br>Oxfordshire, England |
|---|---|
1. *DIPS Human Exploration Initiative Safety*  
Terry E. Dix, Rockwell International Corporation/Rocketdyne Division
  2. *Analysis of the Survivability of Multi-Element Thermionic Power Systems at Various Disruptions of TFE*  
Institute of Physics and Power Engineering, Obninsk, USSR
  3. *Safety Provisions for the SP-100 Nuclear Assembly Test Article*  
Mark I. Temme, General Electric Aerospace
  4. *SP-100 Ground Engineering Systems Site Safety Review*  
Gary Smith, Westinghouse Hanford Company
  5. *Reactor Safety for the Human Exploration Initiative Planetary Systems*  
Terry E. Dix, Rockwell International Corporation/Rocketdyne Division

DEC 28 1990

Major General Malcolm R. O'Neill USA  
Deputy Director  
Strategic Defense Initiative Organization  
Department of Defense  
Washington, D.C. 20301-7100

Dear Major General O'Neill:

In response to your letter dated December 24, 1990 regarding the import of a TOPAZ reactor system from the USSR for exhibit at the 8th Space Nuclear Power Symposium in Albuquerque, New Mexico on January 6-10, 1991, this is to advise you that the Nuclear Regulatory Commission has made the technical determination that the TOPAZ reactor system, as described in your letter and attachment, meets the definition of a utilization facility as defined in the Atomic Energy Act of 1954, as amended, and 10 CFR § 110.2.

The import of a utilization facility is under the jurisdiction of the NRC and would require a specific import license issued by the NRC or an exemption authorized by the President under Section 91 of the Atomic Energy Act.

We again wish to remind you that, if an import license is requested by DOD, and issued by the NRC, the TOPAZ reactor system could not be reexported to the USSR under Section 104.d. of the Atomic Energy Act of 1954, due to the absence of an Agreement for Cooperation between the two countries.

Further, if you wish to apply for a specific import license from the NRC, please advise us whether or not the unit to be imported contains any radioactivity and, if it does, please specify the types and levels of this radioactivity.

Please call me on (301) 492-0724, if you need further guidance in this matter.

Sincerely,

*15/*  
Ronald D. Hauber  
Assistant Director  
Exports, Security, and  
Safety Cooperation  
International Programs  
Office of Governmental and  
Public Affairs

bcc: William C. Parler  
James M. Taylor  
Harold R. Denton  
Thomas E. Murley

Distribution:  
IP r/f  
SASchwartz  
JRShea  
RDHauber  
JBecker, OGC  
BWright

OFFICE:	GPA/IP	OGC	<i>Asst</i> GPA	GPA/IP	EDG
NAME:	<i>BWright</i> BWright:kf	<i>JBecker</i> JBecker	<i>SASchwartz</i> SASchwartz	<i>RDHauber</i> RDHauber	<i>JM Taylor</i> JM Taylor
DATE:	12/28/90	12/28/90	12/28/90	12/28/90	12/28/90



DEPARTMENT OF DEFENSE  
STRATEGIC DEFENSE INITIATIVE ORGANIZATION  
WASHINGTON, DC 20301-7100

December 28, 1990

*copies per to*  
J. Taylor  
S. Schwartz  
J. Becker  
Rd.

IR 90002

11004387

Mr. Ronald Hauber  
Assistant Director, International Affairs  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Hauber:

In our December 24, 1990 letter to you, we requested approval for bringing an inoperative model of the TOPAZ II reactor system into the United States for exhibit at the 8th Space Nuclear Power Symposium in Albuquerque on January 6-10, 1991. We understand that you have decided the exhibit should be treated as a utilization facility, for which an import license should be obtained.

Given the extremely short suspense, we request that our previous letter, as supplemented by this letter, be considered an urgent application for the import of that exhibit by Space Power, Inc. Space Power, Inc., of 621 River Oaks Parkway, San Jose, California 95134, is a U.S.-owned and controlled company acting on behalf of SDIO for this purpose. While in the United States, the exhibit will be maintained at all times in the custody and control of Space Power, Inc., acting under our auspices. It is requested that this import license be issued on an urgent basis and not later than January 4, 1991.

With respect to the question you raised as to whether there is any radioactivity associated with the exhibit, the answer is there is none. The model has never been operated as a reactor, and there is no radioactivity, induced or otherwise, involved.

We recognize that any subsequent disposition of the reactor will require further advance consultations and mutual agreement with the Commission.

Sincerely yours,

Malcolm R. O'Neill  
Major General, USA  
Deputy Director

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INT'L SAFEGUARDS

90 DEC 28 P3:57

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