

RECENT LITIGATION INVOLVING THE LAUNCH OF SPACECRAFT WITH NPS ON BOARD*

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Abstract

Ever since the disintegration and crash of parts of the Soviet Cosmos 954 satellite in 1978 over Canadian territory, there has been increasing concern about the use of nuclear power sources (NPS) on space missions. This concern was, *inter alia*, reflected in the work of the United Nations Committee on the Peaceful Uses of Outer Space which for many years, had under consideration the formulation of draft principles to govern such use. It was only recently that an agreement on a set of NPS principles could be achieved.

The purpose of this presentation is to review the arguments used by environmentalist groups in attempting to prevent the launch of spacecraft with NPS on board on the ground that the required environmental impact statement of the government did not adequately assess the attendant risks and failed to consider the alternatives of delay, the launching of unmanned rockets or the use of other power sources. Each of these arguments is analyzed in light of the government's position and the judicial disposition.

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In conclusion, the presentation touches briefly upon the relevant international standards and the advantages of the comparative evaluation of domestic and international space law for policy purposes.

Introduction

The dangers associated with use of nuclear power sources (NPS) in outer space were brought sharply into focus in 1978 when the Soviet Cosmos 954 satellite disintegrated and parts of it scattered over Canadian land.¹ In response to the world-wide concerns the United Nations Committee on the Peaceful Uses of Outer Space had for many years under consideration the formulation of draft principles to govern such use and the U.N. General Assembly in its resolution of December 14, 1992 adopted a set of Principles Relevant to the Use of Nuclear Power Sources in Outer Space²

The possible adverse effects of the use of spacecraft with NPS on board have also evoked strong concerns expressed in two closely connected U.S. domestic cases by a group of environmentalists, known as the Florida Coalition for Peace and Justice, in which they attempted to prevent the launch of such spacecraft. The purpose of this presentation is to review the arguments and counter-arguments used in the two cases and highlight the rationale of the judicial disposition.

The conclusion points to relevant international standards to which future studies should be directed for a comparative evaluation of domestic and international space law concerned with the environment.

The Galileo and Ulysses Missions

The first case involved the space shuttle Atlantis which was to carry the unmanned

Galileo spacecraft into Earth's orbit.³ There it was to be released to travel and arrive at Jupiter in 1995 by using close to 50 pounds of plutonium as an energy source. There have been 22 other space flights by the United States using plutonium; however, none has used as much plutonium as the Galileo mission.

The earliest time when the launch could take place was October 12, 1989 and on October 10, the countdown was already begun and the government stated that the mission was ready for launch. A "space window" allowing the launch to occur lasted for brief periods until mid-November 1989 after which time, the launch could not take place until May 1991 because the changing positions of Earth, Venus and Jupiter limited the ability to reach Jupiter to certain times.

In the second case, the launch of the space shuttle Discovery and its payload the Ulysses spacecraft which was to study the Sun, was scheduled for October 6, 1990.⁴ For the spacecraft to achieve orbit over the Sun's poles, it had first to travel to Jupiter then use Jupiter's gravitation pull to gain speed so as to propel itself toward the polar orbit around the Sun. The mission required that the Earth, Jupiter, and the Sun be in alignment when the spacecraft was launched. In 1990 the launch opportunity ran from October 5 to October 23. The next opportunity for a launch would have been November 1991.

Ulysses was powered by a Radioisotope Thermoelectric Generator (RTG) which converts heat that is generated from the radioactive decay of plutonium dioxide into electricity.

Temporary Restraining Order (TRO)

In both cases, the plaintiffs filed a motion for a Temporary Restraining Order ("TRO"). In this connection, the Court stated that to justify the grant of a TRO the plaintiffs had to show: likelihood of success on the merits, irreparable harm in the absence of the TRO, no substantial adverse impact on other parties, and that the TRO would serve the public interest. The Court added that the harm that the plaintiffs wanted to prevent was the upcoming launch and, because of this, the dispute centered around the other two factors: (A) particularly, which side was likely to prevail on the merits and (B) what

the effect of a TRO would be on the public interest.

A. Merits of the case

As to the merits, plaintiffs' legal basis for seeking an injunction was that NASA had failed to satisfy the requirements of the National Environmental Policy Act ("NEPA").⁵ Specifically, plaintiffs advanced two major complaints, namely, that (1) the Environmental Impact Statement ("EIS") did not assess all relevant risks and underestimated their magnitude and (2) it did not fully consider alternatives to the proposed plan.

(1) Risk Assessment

The plaintiffs claimed that the Galileo mission was a hazard to the environment because the plutonium it used as a power source caused an increased risk of cancer in humans if inhaled or ingested. They argued that the risks of an accidental release of the plutonium fuel into the environment at various stages during the mission was too high. They contended that NASA failed to meet the requirements of the National Environmental Policy Act ("NEPA") which mandates that federal agencies must evaluate and report "major federal actions significantly affecting the quality of the human environment" in an Environmental Impact Statement ("EIS").⁶ Relying on the declaration of one expert, plaintiffs claimed that the risk assessments in NASA's EIS were flawed in various ways. They also argued that NASA had failed to discharge its obligations under NEPA by not providing the public with its updated risk assessments for the Ulysses Project to which defendants responded that the updated risk assessments were only a refinement of information that was previously made available to the public.

In Galileo, the plutonium was contained in capsules with a protective coating designed to protect against the release of the plutonium in all but the most severe accidents. While an accidental plutonium release at various stages of the mission might cause an increase in cancer rates, only if plutonium dioxide, the material used in spacecraft, was reduced to small respirable particles that could be ingested or inhaled, did it pose a risk to humans. NASA

concluded that the residual risks associated with the Galileo mission were two or three times less than many of the risks associated with everyday life. NASA also concluded that in the unlikely event of a crash due to a reentry during an Earth flyby, there was a one-in-ten-million chance of the possibility of 9.4 excess cancer deaths over 70 years. NASA indicated that these figures showed a very small risk when compared to the 630 million cancer fatalities that would normally occur in that time period anyway.

In addressing the complaints and issues raised, the Court found that the missions have been extensively reviewed by various government agencies to determine the likely environmental consequences. The result of this review was a final environmental impact statement (Tier 1) for the Galileo and Ulysses missions in November 1988 and a final environmental impact statement (Tier 2) for the Ulysses in June 1990. These statements concluded that the risks of cancer fatalities from an accident were extremely low. The reports estimated that the worst case accident scenario would result in only a 1-in-44-million chance of 14.5 excess cancer fatalities over a 50-year period. The reliability estimates for the shuttle ranged from 97 to 99 percent. Plaintiffs disputed these risk assessments stating that the risks were substantially higher. Plaintiffs contended that the estimates were based on incomplete data and outmoded techniques and, therefore, were not credible.

The Court, however, concluded that the lone declaration of one expert was insufficient to demonstrate that plaintiffs were likely to succeed on the merits. First, the expert's declaration addressed only the risks of Galileo and not the Ulysses project. Second, the defendants have demonstrated that their own experts have extensively considered the risks associated with an accident involving the release of nuclear materials. Third, the Court was only required to determine whether or not the agency has adequately considered the environmental risks of a particular project. The Court was not required to second guess the judgments of the agency's experts.

As to NASA's failure to provide updated risk assessment, the Court stated that under NEPA, an agency was required to solicit public comment on new information and prepare a supplement to its EIS only if there were "significant new circumstances or information

relevant to environmental concerns and bearing on the proposed action for its impact." Here also, a reviewing court may not second-guess an agency decision not to issue a supplemental EIS by substituting its own judgment for that of the agency. The standard for reviewing such a determination was whether or not it was "arbitrary or capricious" not to make the information available for public comment. Since plaintiffs have not come forward with any evidence to indicate that NASA's failure to provide the public with updated risk assessments was arbitrary or capricious, the Court concluded that plaintiffs were unlikely to succeed on the merits.

In sum, plaintiffs' claim that NASA generally failed to adequately report the true risks of the Galileo Mission in the EIS was found not to have been adequately substantiated. Plaintiffs' relevant evidence was far outweighed by that supplied by the defendants. There was simply not sufficient evidence to support plaintiffs' contention that the EIS was inadequate.

(2) Alternatives

As to alternatives, NEPA mandates that to be adequate an EIS must examine alternatives to the proposal being examined. According to the plaintiffs, there were three significant alternatives that were left out of the EIS: (a) the option of delaying the Galileo and Ulysses launches until the 1991 windows; (b) the use of a Titan IV launch vehicle instead of the space shuttle; and (c) the use of alternative power sources. In reviewing these complaints, the Court found that all three alternatives were addressed in the relevant EIS-s.

(a) Delay of Launch

Insofar as the delay alternative was concerned, that is, the option of postponing the launch until the 1991 launch opportunity, the EIS stated that, since the environmental effects of a May 1991 Galileo launch would be the same as those of a launch in the planned window, that alternative was eliminated from consideration. Plaintiffs, however, contended that the delay alternative would allow NASA to gather further information, to refine its analyses of the risks involved with this program, and to finalize

emergency response and evacuation plans. In connection with the above, the court noted that, while NASA's knowledge of the risks involved and the possible ways to mitigate the environmental impact of the mission might improve in two more years, this would probably always be true with any agency action set to begin at a specified time. The Court added that there would probably never be a time when it could be said that further delay would not allow an opportunity to increase an agency's knowledge of the environmental impact or ways to mitigate against that impact of a proposed action. Uncertainties were involved in any decision. An agency was not required to continue indefinitely to evaluate the consequences of a proposed action. If this were true, agencies would be paralyzed from ever taking action. Since the actual environmental effects of a 1991 launch would be largely the same as those of the 1989 launch, there was no need to discuss the 1991 alternative in the EIS.

Much like in the Galileo case, also in Ulysses, plaintiffs contended that the EIS was inadequate because it failed to consider the possibility of delaying the launch of the space shuttle until November 1991. The EIS had rejected the delay alternative on the basis that no new environmental information would be gained from a short delay. On their part, plaintiffs countered that a short delay (i) would provide NASA an opportunity to address its ongoing problems with fluid leaks, (ii) would allow NASA to address the recommendations contained in the report of the Office of Technology Assessment (OTA)⁷ and (iii) would not cause a loss in scientific results or data collection. The thrust of plaintiffs' NEPA argument was that it was improper for the EIS to reject the delay alternative without any discussion except for a statement that a delay would have provided no new environmental information.

In considering the delay alternative in relation to Ulysses, the Court found that plaintiffs had not come forward with any information to show that a more detailed discussion was necessary. NASA conducted several studies on the launch of payloads containing nuclear materials. These studies were included as part of the final environmental impact statement (Tier 2). In addition, the Court also noted that NASA had performed extensive

flight readiness testing of the shuttle before a launch decision was made. At any time if a problem was found, such as a fuel leak, the problem was required to be resolved before the launch process could continue. None of plaintiffs' arguments, for why delay should have been given more serious consideration, stood up to scrutiny. First, the fuel leaks, which the plaintiffs emphasized, occurred on the Columbia and not the Discovery. Moreover, the defendants stated that the Discovery was to be tested for fuel leaks prior to launch. Second, with respect to the coolant leak problem, the defendants indicated that the coolant leak in the Discovery was not a flight safety concern. Finally, with respect to the OTA report, plaintiffs brief failed to point to one recommendation in the report that both could be addressed within the short delay period and would cause an environmental problem if it was not addressed.

The Court acknowledged that any delay can always yield additional information about the environmental impact of a particular project. Under NEPA, however, an agency was not required to have complete information in order to proceed with a project. Instead, an agency was only required to adequately assess the information that was available.

In the Court's view, plaintiffs sought to prevent the launch of the Discovery by simply pointing to some areas where more information might be learned by a short delay period. Plaintiffs, however, were required to present sufficient evidence to indicate that the delay alternative deserved more serious consideration and the Court's conclusion was that plaintiffs failed to meet this burden and were, therefore, unlikely to succeed on the merits.

(b) Use of Titan IV

With respect to the use of the unmanned Titan IV rocket instead of a space shuttle, plaintiffs contended that the likelihood of a release of plutonium from an accident at launch was less with an unmanned vehicle because the plutonium would be stored further away from the area which was most likely to explode. However, the Court found that the use of Titan IV was not a feasible alternative since a minimum of three years were required to modify the basic Titan IV to make it mission-specific.

(c) Use of Other Power Sources and Alternatives

As to plaintiffs' claim that the EIS failed to consider the use of alternative power sources, the Court found that these alternatives were discussed in the Galileo EIS and ruled out because they did not meet the six performance criteria of the mission. At that time, there was no known alternative power source which was feasible for the mission. For the same reason NASA chose RTG as the power source because it was the only power source that met the performance requirements for the Ulysses mission. In view of these considerations, the Court concluded that neither one of these arguments was likely to succeed on the merits.

With respect to plaintiffs' reservations about the EIS for failing to address other alternatives, the Court noted that common sense teaches us that a detailed statement of alternatives cannot be found wanting simply because the agency failed to include every alternative device thought conceivable by the mind of man. Time and resources were simply too limited to hold that an impact statement was inadequate because the agency failed to ferret out every possible alternative.

Apart from the major complaints about the inadequacies of the risk assessments and the failure to consider alternatives to the proposed missions, a number of other contentions advanced by plaintiffs were also found to be without merit by the Court. Among them was the assertion that the EIS failed to include adequate emergency response and procedure plans. In this connection, the Court found from the EIS that NASA evaluated and considered the possibility of limiting the hazards of the Galileo Mission through the use of emergency planning. Further, the Court found that plaintiffs' fear that NASA would fail to put in place such plans was unsubstantiated.

Also, the Court found no merit in plaintiffs' argument that the EIS failed to clarify the limitations and uncertainties of the analysis used in determining the environmental impact since there was a discussion of these issues in the EIS.

As to plaintiffs' argument that NASA's withholding of the Interagency Nuclear Safety Panel's Safety Evaluation Report (SER) violated NEPA regulations concerning public participation, the Court found this to be also

without merit noting that the SER was not available to the public originally because it was a pre-decisional document but was subsequently released to the public.

With respect to plaintiffs' contention that NASA violated NEPA inasmuch as it failed to provide and consider the final EIS in issuing its final approval of the Galileo project, the Court found this argument to be equally without merit since it was not its function to decide whether the government's decision to go forward with the Galileo Mission was a good one but only to ensure that the government complied with NEPA by evaluating and weighing the environmental impact of the proposal when it made its decision. The Court would not substitute its own judgment regarding the merits of the proposed action for that of the government agencies stating that "NEPA merely prohibits uninformed - rather than unwise - agency action."

B. Public Interest

In considering Plaintiffs' claim that the proposed launch would adversely affect the public interest, the Court found that here too NASA had the better arguments. In Galileo, there would have been a costly adverse effect on the public interest if the Court had granted a TRO. Since the launch opportunity window only lasted until mid-November of 1989, the likely effect of a TRO would have been to postpone the launch at least until the May 1991 window. A delay until then was expected to cost \$164 million just to maintain the Galileo program. In addition, the shuttle flight would have had to be rescheduled, which would have cost even more. Also, the Galileo mission was an important part of NASA's Solar System Exploration Program and was expected to greatly increase our country's knowledge of space. The Galileo mission represented a huge expenditure of the country's resources with a total of over \$1.5 billion. While it was in the public interest that federal agencies comply with NEPA, the Court found that NASA complied satisfactorily with NEPA and there was nothing weighing in the plaintiffs' favor in this factor of the test.

Also in Ulysses, the Court found that a TRO would not have served the public interest because (i) the Ulysses project was anticipated to make significant scientific contributions in

relation to understanding the Sun and its effects on Earth. Being a collaborative effort between the United States and the European Space Agency ("ESA"), the Ulysses mission was expected to provide substantial new scientific information and contribute to our knowledge of solar wind, high energy particles, the solar magnetic field, and many other areas much of which having a direct impact on understanding and predicting conditions on Earth.

(ii) The Court also found that a delay until 1991 would result in substantial additional costs. NASA estimated that a delay of one year would result in a cost to the government of over \$354.6 million. In addition, since the Ulysses was a collaborative effort with ESA, a delay could have effected the United States' ability to undertake such projects in the future.

(iii) Lastly, the Court found that no significant benefits would result from a delay. Balanced against the costs of delay was plaintiffs' assertion that a one year delay would allow the government to learn more information about the likely environmental impact. Such a benefit was far offset by the costs of delay. The Court, therefore, concluded that granting a TRO would not be in the public interest.

In the overall assessment of the two cases, it was the Court's view that NASA's decision was founded on a reasoned evaluation of the relevant factors. The EIS-s met all the necessary requirements under NEPA and the environmental consequences of the proposed action were covered in the EIS-s. Thus none of plaintiffs' challenges was likely to succeed on the merits and the public interest weighed heavily against granting a TRO. In light of the foregoing, the Court concluded that plaintiffs failed to meet the standards for the issuance of a TRO and their motions for a TRO were in both cases denied.

C. Concluding Thought

The purpose of this presentation was to review the arguments used by environmentalist groups whose purpose was to prevent the launch of spacecraft with NPS on board on the ground that the required environmental impact statement of the government did not provide adequate assessment of the attendant risks and failed to consider the alternatives of delay, the

launching of unmanned rockets or the use of other power sources and alternatives.

The two cases were decided prior to the adoption of U.N. resolution on Principles Relevant to the Use of Nuclear Power Sources in Outer Space and had no foreign involvement. Nonetheless, their analysis is instructive in that it may provide the necessary background for policy makers in their comparative evaluation of the development and judicial application of national environmental law involving the launch of spacecraft with NPS on board and the safety assessment and safe use guidelines of the somewhat later adopted U.N. principles.⁸

NOTES

1 A discussion and analysis of the legal implications of the Cosmos 954 accident may be found in 6 J. SPACE L.129-69 (1978).

2 Res. A/47/68 (1992).

3 *Florida Coalition for Peace and Justice et al., v. George Herbert Walker Bush et al.*, No. 89-2682 (D.D.C., decided October 10, 1989).

4 *Florida Coalition for Peace and Justice et al. v. George Herbert Walker Bush et al.*, No. 89-2682 (D.D.C., decided October 5, 1990).

5 National Environmental Policy Act, 42 U.S.C. §§ 4321-70 (1988).

6 42 U.S.C. § 4332(C)(2) (1988).

7 The Office of Technology Assessment issued a report ("OTA Report") in April 1990 recommending that NASA take several steps to improve the space shuttle program. Among the recommendations included in the report were that NASA (i) reduce the number of launches, (ii) fund improvements in expendable launch vehicles, and (iii) fund a program to improve the safety and reliability of the shuttles.

8 U.N. Res. A/47/68 (1992), Principles 3 and 4.