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SPACE AND THE ENVIRONMENT: PUBLIC PERCEPTIONS AND POLICY CONSIDERATIONS

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ABSTRACT

The movement of mankind into space has not occurred in a political vacuum, as public perceptions have and will continue to influence national and international policy decisions. The activities of man in space can have a dramatic impact upon the natural environments of Earth and outer space. The American judiciary increasingly is being utilized as a forum in which national policy may be scrutinized and measured against the yardstick of transient public perceptions, particularly in relation to environmental concerns. Thus, mission profiles must be designed to anticipate and prepare for potential legal challenges which may delay, hinder or prevent specific missions.

This article examines the factors which have been identified and analyzed by the courts when faced with challenges to scientific programs based on the potential for harm to a natural environment. Although such challenges generally have been limited to narrow factual contexts, the principles established by the courts may be applied to a variety of future missions. The study of previous litigation experiences may provide valuable insights into public policy considerations which may influence courts to judicially review or revise a mission profile.

INTRODUCTION

The realm of space long has captivated public interest and popular culture. Numerous groups have emerged in recent years with specialized interests in space. The development of such specialized interest groups has been paralleled in almost every aspect of human endeavor, and many of these organizations seek

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to influence public policy and act as self-appointed watchdogs promoting their perception of the public good. It is inevitable that this plethora of interest groups will lead to conflict, both between the groups themselves, as well as between a specific group and the government. It is just as inevitable that these conflicts can reach the courts for judicial determination and resolution.

Space missions, by their nature, attract public attention and seek public approval and support. Opposition to a mission can take many forms, and come from many quarters. Mission planners and policymakers must anticipate not only that potential challenges to agency decisions can be made, but also that the probability of such challenges is much greater in today's political and socio-economic climate than existed previously. Within the United States, legal challenges to government action frequently have been brought on the basis of environmental concerns, particularly after the adoption of the National Environmental Protection Act.[1] In the context of space activities, environmental concerns perhaps are best examined in relation to a manned mission to Mars. The most probable scenario for such a program presently under study envisions an international effort involving several precursor missions.[2] Environmental concerns would be heightened by a sample return mission, transporting Martian soil and other materials back to Earth for study and analysis, prior to the first manned mission.

Opposition to an international manned mission to Mars can be anticipated on a number of environmental as well as political grounds, although the distinction between the two may not always be clear.[3] Challenges could be based on objections to the source of power on board a spacecraft, such as a nuclear power supply.[4] Additional challenges could be brought on the basis of the combined environmental effect of the numerous launches required for the complete mission profile. Unique environmental issues will be raised by a mission purposed to include the transportation of Martian materials back to the Earth.[5] Litigation can be based on regulations originating at every layer of government, from the federal level to local zoning and permit ordinances. Conflicting regulation and overlapping jurisdiction add to the uncertain legal and social milieu within which mission planners must operate. Failure to anticipate the public scrutiny and debate these issues will generate likely will result in administrative delays, as well as protracted litigation, jeopardizing launch windows and increasing costs.[6]

This article briefly examines the factors which have contributed to the extensive public participation that can be anticipated in the development of environmental policies and plans regarding an international manned mission to Mars. The "trans-scientific" nature of regulation of complex scientific phenomena briefly is discussed, as is the proliferation of legislation contributing to administrative overlap in jurisdiction and uncertainty of effectiveness. In addition, certain judicial actions based on the National Environmental Protection Act are reviewed and discussed relating to the use of nuclear power sources in space, and the analogous area of biotechnology and the release of organisms derived through the use of recombinant DNA. Finally, observations are submitted and general principles identified by which the probability of challenges to future mission profiles may be lessened.

FEDERAL REGULATION OF COMPLEX TECHNOLOGIES

The environmental concerns of a Mars sample return mission can be divided into two categories: the introduction of terrestrial organisms into the Martian environment (forward contamination), and conversely, the importation of Martian organisms into the Earth's environment (back contamination). In both situations, the potential for harm by mutation, interaction or other process cannot be disregarded. Furthermore, in both situations, the integrity of scientific investigation forever can be compromised.[7] Extraterrestrial

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1. 42 U.S.C. §§ 4321 *et seq.* (1970)[hereinafter referred to as the "NEPA"].

2. *See generally* IAA Committee on International Space Plans and Policies, *International Exploration of Mars: A Mission Whose Time Has Come*, 31 ACTA ASTRONAUTICA 1 (1993).

3. See text & notes 7-24, *infra*.

4. See text & notes 15-18, 55-72, *infra*.

5. *See* Margaret S. Race, *Mars Sample Return and Biohazards: A Source of Public Concern and Controversy*, CASE FOR MARS V CONFERENCE ___, at 4 (1993)(copy on file in the Law Offices of Sterns and Tennen).

6. *Id.* at 9-10.

7. *Id.* at 2-3; *see generally*, Sterns & Tennen, *Preserving Pristine Celestial Environments: The Planetary Protection Policy*, 77 SCIENCE AND TECHNOLOGY SERIES, SPACE SAFETY & RESCUE 1988-1989 399 (1990); Sterns & Tennen, *Principles Of Protection Of The Outer Space Environment In The Corpus Juris Spatialis*, PROCEEDINGS

materials were returned to Earth only during the Apollo program, and the matter of back contamination has not been regulated by the federal government outside of that limited context. On the other hand, the National Aeronautics and Space Administration (NASA) has extensively regulated the issues of forward contamination, through the use of internal policy directives and management instructions.[8] NASA placed great reliance on the studies and reports of the Space Sciences Board of the National Academy of Sciences (NAS) in the development of these policies.[9]

The experience of NASA has been consistent with the general regulatory structure utilized by the agencies and departments of the U.S. government during the last half of the twentieth century. This structure has been characterized as the "New Deal model," in which increasing reliance has been placed on experts from the scientific community to establish factual parameters to define and quantify complex phenomena.[10] The legacy of this model is that the process encounters significant difficulty when the policymakers are faced with substantial scientific uncertainty.[11] Indeed, in regard to inherently complex phenomena, a substantial grey area exists between scientific resolution and political choice.[12] Although all available scientific data must be considered, a residual level

> [of] uncertainty means that decisionmakers cannot determine policy on purely scientific grounds. At this point uncertainty itself becomes an aspect of the factual picture, and the question of what level of risk is acceptable in light of the uncertainty becomes a question of value, requiring political determination. . . Failure to recognize the trans-scientific character of such questions too often lends 'scientific' credibility and authority as well as an air of 'factuality' to assertions or determinations that are at least as dependent on value choices as they are on 'scientific fact.'[13]

Thus, issues necessarily are framed in scientific terms, and demand a scientific response. But the response of science is uncertain, at least in specific, not insubstantial details. Both the scientist and the policymaker rely upon, yet influence the other, and it is not possible to completely separate the two. The credibility of both suffers. Non-scientific and social factors become inseparable components of the debate.[14]

OF THE 30TH COLLOQUIUM ON THE LAW OF OUTER SPACE 172 (1988); *see also* XIV, THE PLANETARY REPORT, No. 4, *Planetary Protection: Safeguarding Islands of Life* (1994).

8. *See generally Outbound Spacecraft: Basic Policy Relating to Lunar and Planetary Contamination Control*, NASA Pub. No. NPD 8020.7 (1957); *Outbound Planetary Biological and Organic Control: Policy and Responsibility*, NASA Pub. No. NPD 8020.10a (1972); *Quarantine Provisions for Unmanned Extra-terrestrial Missions*, NASA Pub. No. NPD 8020.12a (1976); *see also* papers presented by various authors to recent colloquia of the IISL, in PROCEEDINGS OF THE 33RD COLLOQUIUM ON THE LAW OF OUTER SPACE 131-89, 399-428 (1991), PROCEEDINGS OF THE 32ND COLLOQUIUM ON THE LAW OF OUTER SPACE 57-200 (1990), and PROCEEDINGS OF THE 30TH COLLOQUIUM ON THE LAW OF OUTER SPACE 121-90 (1988).

9. *See generally* SPACE STUDIES BOARD, NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, BIOLOGICAL CONTAMINATION OF MARS ISSUES AND RECOMMENDATIONS 1-3, 43-45 (1992). Current recommendations of the NAS are sterilization for *in-situ* experiments to search for extant life, and pre-sterilization techniques for all other craft. *Id.* at 10. The implementation of these policy directives and management instructions generally is viewed as consistent with scientifically imposed planetary quarantine or protection policies, as well as international legal obligations. *See generally* COSPAR Res. 26, COSPAR INFOR. BULL. at Annex 4 (1964), Fifth International Space Science Symposium, Florence, Italy; M. WERBER, OBJECTIVES AND MODELS OF THE PLANETARY QUARANTINE PROGRAM 35 (1975), NASA Pub. No. SP-344, U.S. GPO Stock No. 3300-00588; *see also* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. IX, *opened for signature* January 27, 1967, [1967] 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205.

10. *See* Yellin, *Science, Technology, and Administrative Government: Institutional Designs for Environmental Decisionmaking*, 92 YALE L.J. 1300, 1301-16 (1983).

11. Allen, *The Current Federal Regulatory Framework for Release of Genetically Altered Organisms into the Environment*, 42 FLORIDA L. REV. 531, 537 (1990).

12. *Id.*, *citing* Weinberg, *Science and Trans-Science*, 10 MINERVA 209 (1972).

13. *Id.* at 538-39, *citing* Yellin, *supra* note 10, at 1300.

14. *See* Race, *supra* note 5, at 5-6.

An example of this incongruity can be found in the debate over the use of nuclear power sources in spacecraft,[15] specifically Radioisotope Thermal Generators (RTG's). Although fueled by plutonium 238 dioxide, a highly toxic substance, an RTG does not utilize nuclear reactions, but rather produces electricity from the heat generated by the natural decay of the fuel source. The plutonium is encapsulated into small containers designed to inhibit the release of the fuel in the event of a catastrophic failure or explosion of the craft.[16] Fears have been expressed concerning the risk to human health that such a catastrophic event would cause,[17] to which one commentator responded: "Every *successful* Shuttle launch probably causes more cancer (through release of toxics (sic) from the Solid Rocket Boosters and through damage to the ozone layer) than would a failed launch involving the release of plutonium from RTGs (emphasis supplied)."[18] Although expressed in purely scientific terms, it is clear that the underlying hypothesis of this assertion cannot be tested. In addition, it is implicit that the presumed risks of a successful Shuttle launch are deemed acceptable, and therefore provide a reasonable benchmark against which to measure other inherently uncertain risks.

The weakness of the New Deal model of regulation generally invites public scrutiny and debate over complex or otherwise trans-scientific issues. Specialized interest groups, with their own political agenda, have accepted this invitation, and routinely monitor government agencies in an effort to ensure that no actions or regulations are taken or adopted which are deemed to be detrimental to the organization's aims, purposes, or constituents. Frequently, public opposition is motivated by, or at least expressed as, a perceived fear of harm to the public at large from government action. In addition, the public may be seen as becoming increasingly more "risk adverse" and skeptical of government authorities. Moreover, these fears can be magnified by misperception, misunderstanding, or manipulation.[19] The timing of policy decisions will be related to mission objectives, launch windows, and other criteria not necessarily related to public perceptions, whereas the scientists' practical concerns about making quick decisions to proceed with an action could be misinterpreted as forcing a questionable decision on an unwilling public.[20] The convergence of these factors will be magnified in the context of an international manned mission to Mars, whose objectives will include experiments to search for evidence of past or present forms of life on the red planet. The mission, by its very nature, will attract global interest by both the professional space community and the general public.

Examples of trans-scientific issues abound in the context of an international Mars mission, particularly in regard to the return of extraterrestrial materials to Earth. Questions concerning the manner and method of retrieval, transport, processing, quarantine, decontamination, and many other issues will need appropriate resolution in order for the public to be reassured that back contamination controls are effective, adequate and convincing.[21] At the core of these issues is the determination of the appropriate standard of risk to be applied. The alternative approaches range from a "no-risk" model of risk

15. *See generally* the papers presented by various authors during the 36th Colloquium on the Law of Outer Space, Graz, Austria, 1993, in PROCEEDINGS OF THE 36TH COLLOQUIUM ON THE LAW OF OUTER SPACE 231-359 (1994); *see also* U.N.G.A. Res. 47/68, Principles Relevant to the Use of Nuclear Power Sources in Outer Space, December 14, 1992, *text reprinted in* PROCEEDINGS OF THE 36TH COLLOQUIUM ON THE LAW OF OUTER SPACE 240-43 (1994).

16. *See* Bowman, *The Cassini Spacecraft and Plutonium*, XI SPACE & SECURITY NEWS 3 (1994).

17. See text and notes 55-72, *infra*.

18. Bowman, *supra* note 16, at 4.

19. *See* Race, *supra* note 5, at 5-6. Dr. Race argues that the circumstances described in the text are not unique to the United States, as similar trends can be found within European nations, and people increasingly are questioning government action in the emerging democracies.

20. *Id.*

21. Dr. Race has identified the following critical engineering and scientific and management issues regarding the return of Martian materials: design of the sample canister; sterile insertion of the sample into the canister; monitoring the sample during the return flight; recovering, handling and transferring the sample on landing; design, location, construction and operation of quarantine facilities; barriers for sample handling, testing and storage; operational protocols for the quarantine facilities; testing methods; experimental protocols; bioassays; curation and control of samples; organizational and management problems, such as resistance to and unfamiliarity with quarantine procedures; and intraorganizational conflicts. *Id.* at 4. Consideration also must be given to criteria for and methods of distribution of the samples to scientists from the nations and organizations participating in the international project. Virtually every issue identified above has significant trans-scientific components.

management,[22] to a technology based standard of risk, which is designed to keep risk as low as technologically feasible.[23] A third approach manages risk based on a balancing of costs and benefits.[24] Yet the very determination of the standard to be applied is a matter of trans-science, as political values inescapably are part of the decision making process.

It is apparent that the full complement of precursor and manned flights to Mars, including the return of Martian materials, may significantly affect the quality of the environment. As such, the NEPA requires that a detailed environmental analysis be prepared.[25] Two fundamental purposes are promoted by the NEPA: federal agencies must consider the environmental implications of their actions, and the public has the right to disclosure of those agency considerations.[26] In general, an agency must prepare an Environmental Assessment in all cases in which it determines that a proposed action will not have a significant environmental impact.[27] An Environmental Assessment must briefly provide sufficient evidence and analysis to support the agency's finding.[28] However, should the agency determine that an action will significantly impact the environment, the agency must prepare an Environmental Impact Statement (EIS).[29]

The required elements of an EIS include the "environmental impact of the proposed action; . . . any adverse environmental effects which cannot be avoided should the proposal be implemented, . . . [and] alternatives to the proposed action."[30] One of the factors to be considered in determining whether an EIS is required is the degree to which possible effects to the human environment are highly uncertain or involve unique or unknown risks.[31] The NEPA has been applied to protect the nation's natural environment as well as the socio-economic stability of an urban environment.[32] The NASA management directive implementing the National Environmental Policy Act states that consideration of possible environmental effects

> must be included at the earliest stages of study and planning, . . . Decisions . . . or recommendations for decisions must be made with as full a knowledge and understanding of the likely environmental effects as is possible. . . .[33]

22. *See* von Oehsen, *Regulating Genetic Engineering in an Era of Increased Judicial Deference: A Proper Balance of the Federal Powers*, 40 ADMIN. L. REV. 303, 329 (1988), *citing* Food, Drug & Cosmetic Act, 21 U.S.C. §§ 348(c)(3)(A), 376(b)(5)(B), 360b(d)(1)(H)(Delaney Clause, forbidding the addition of any carcinogenic substance to food).

23. *Id.*, *citing* the Occupational Health and Safety Act, 29 U.S.C. § 652(8) (1982).

24. *Id.*, *citing* the Toxic Substances Control Act, 15 U.S.C. § 2601(b) (1982) and the Plant Quarantine Act, 7 U.S.C. §§ 154-55 (1982).

25. 42 U.S.C. § 4332(C). Where a series of related actions may impact the environment, a "programmatic EIS" may be required, which considers each individual action as well as the entire "program." *See* 40 C.F.R. § 1508.25.

26. *See Foundation on Economic Trends v. Heckler*, 756 F.2d 143 (D.C. Cir. 1985); *see also* 42 U.S.C. §§ 4321, 4331.

27. The NEPA established the Council on Environmental Quality, which, in turn, has promulgated regulations which must be followed by each federal agency, 40 C.F.R. §1501.2; *Andrus v. Sierra Club*, 442 U.S. 347, 351, 99 S. Ct. 2335, 2338, 60 L. Ed.2d 943, 947-48 (1979), unless it is within a "categorical exclusion" based on a finding that the actions of the agency, either individually or cumulatively, do not have a significant effect on the environment, 40 C.F.R. § 1508.4 (1983).

28. 40 C.F.R. §§ 1501.4(a)-(b).

29. 40 C.F.R. § 1508.9(1).

30. 42 U.S.C. § 4332(C).

31. 40 C.F.R. § 1508.27(b)(5).

32. von Oehsen, *supra* note 22, at 328, note 196, *citing* the following examples where an EIS was required: *City of Rochester v. United States Postal Service*, 541 F.2d 967 (2d Cir. 1976)(relocation of major postal facility which could contribute to urban decay); *City of Davis v. Coleman*, 521 F.2d 661 (9th Cir. 1975)(new highway interchange could lead to new urban growth); *Hanly v. Kleindienst*, 471 F.2d 823 (2d Cir. 1972)(construction of jail could have adverse effects on neighborhood). However, courts will not consider social and economic impacts unless associated with a primary physical impact. *Id.*, *citing Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 772-73 (1983); *Glass Packaging Inst. v. Regan*, 737 F.2d 1083, 1092-93 (D.C. Cir. 1984); *Como-Falcon Community Coalition, Inc. v. DOL*, 609 F.2d 342, 345-46 (8th Cir. 1979), *cert. den.* 446 U.S. 936, 100 S.Ct. 2154, 64 L.Ed.2d 789 (1980).

33. NASA Doc. NHB 8800.11 (1988).

The circumstances underlying *Foundation on Economic Trends v. Heckler*[34] are analogous to the situation which would be presented by a Mars sample return mission. In *Heckler*, researchers at the University of California sought to release a genetically engineered, recombinant DNA frost resistant strain of bacteria into crops of potatoes, tomatoes and beans. The plaintiffs filed for injunctive relief against both the University and the Department of Health and Human Services, which had approved the experiment, claiming that the agency violated the NEPA by failing to prepare any Environmental Impact Statement or even an Environmental Assessment. The Defendants admitted that there was no specific document entitled either "Environmental Assessment" or "Environmental Impact Statement," but nevertheless asserted that the required elements were contained within the administrative record and therefore, the NEPA had been satisfied. Judge Sirica granted the plaintiffs' petition for relief, and enjoined not only the University of California experiment, but also prohibited the federal agency from approving all other intentional release experiments involving recombinant DNA.[35]

On appeal, Judge Skelly Wright reviewed the requirements of the NEPA, as well as the regulatory procedures followed in approving the experiment. The court also noted that the plaintiffs had failed to participate in those procedures, but nevertheless upheld the injunction against the University experiment. The court reversed, however, the remaining portions of Judge Sirica's order regarding approval of future experiments, and remanded the case for further proceedings.

Federal regulation of genetically engineered organisms can be traced to the National Institute of Health, which in 1974 established the Recombinant DNA Advisory Committee (RAC) to consider genetic research issues. In 1976, the Director of the NIH issued Guidelines for Research on Recombinant DNA Molecules,[36] which banned, *inter alia*, all deliberate release experiments.[37] The Director stated that although deliberate release experiments were not yet feasible, it would be important to consider environmental consequences when the issue is revisited.[38] An EIS was prepared for these Guidelines which noted that dispersal of genetically engineered organisms could present potential environmental hazards,[39] but otherwise did not discuss banned deliberate release experiments.

In 1978, the NIH Guidelines were revised to allow the Director to grant exceptions to banned categories, including deliberate release experiments.[40] The general standard applicable to such waiver requests was that the Director "shall weigh each proposed action, through appropriate analysis and consultation, to determine that it complies with the Guidelines and presents no significant risk to health or to the environment."[41] This authority of the Director would be exercised with the advice of the RAC, and include careful consideration of the potential environmental impact. In addition, certain waiver decisions could be accompanied by a formal assessment or statement as determined on a case by case basis.[42] Two Environmental Assessments were prepared for these revised guidelines. The first stated that "[w]aiver decisions will include careful consideration of potential environmental impact,"[43] while the second did not mention waiver authority. The revised NIH Guidelines were declared to be applicable to all institutions receiving NIH funds, even

34. 756 F.2d 143 (D.C. Cir. 1985).

35. 587 F.Supp. 753 (1984).

36. 41 Fed. Reg. at 27902, JA 230.

37. 41 Fed. Reg. at 27915, JA 243.

38. 41 Fed. Reg. at 27907, JA 235.

39. JA 357.

40. 43 Fed. Reg. 60108 (Dec. 22, 1978), JA 478.

41. 43 Fed. Reg. at 60126, JA 496.

42. 43 Fed. Reg. at 33051, JA 442. In 1986, the White House Office of Science and Technology Policy published the Coordinated Framework for Regulation of Biotechnology, 51 Fed. Reg. 23,302 (1986). This framework provided for the regulation of biotechnology through existing regulation by the Environmental Protection Agency, the Department of Agriculture, the Food and Drug Administration, the National Institute of Health, and the National Science Foundation. Each agency is to maintain a scientific advisory committee to examine biotechnology issues on a case-by-case basis. The intended use of a substance determines which agency has jurisdiction. In the event of overlapping jurisdiction, the agencies can determine between themselves which of them shall exercise primary jurisdiction. The functions of interagency communication of scientific information, and review of procedures and risk assessment methods, are provided by the Biotechnology Science Coordinating Committee. 51 Fed. Reg. 24,221 (1986).

43. 43 Fed. Reg. at 33111, JA 466.

if the particular experiment under consideration was not funded by the NIH.[44]

Public notice of consideration of the waiver application by the RAC was duly provided. Although an opportunity was given for public comment, none was received, and the plaintiffs did not participate in the RAC proceedings. The RAC expressed concerns over the size of the experiment and a perceived lack of information, but nevertheless approved the waiver on a close vote. The Director, however, postponed approval of the application for further consideration. Subsequently, a scaled down proposal was submitted to the RAC and approved unanimously. The Director thereafter formally approved the waiver as published in the Federal Register on June 1, 1983.[45]

The opinion of Judge Wright recited the "lofty goals" of NEPA, namely, "to fulfill the responsibilities of each generation as trustees of the environment for succeeding generations."[46] The court stated that the standard of review of an agency decision not to prepare an EIS is "'to ensure that the agency has adequately considered and disclosed the environmental impact of its actions and that its decision is not arbitrary or capricious.'"[47] The role of the court is to determine that the decision accords with traditional norms of reasoned decisionmaking and that the agency has taken the "hard look" required by NEPA.[48]

The defendants conceded that no document formally was labelled as an Environmental Impact Statement for the proposed release of recombinant DNA. However, the defendants asserted that the minutes of the RAC meeting were sufficient to be considered as an EIS. The minutes contained only one sentence regarding the potential impact of dispersal of recombinant DNA organisms into the environment, merely that the number of such organisms released will be small and subject to processes limiting their survival. The court found that this one sentence was not legally sufficient to constitute an adequate consideration of environmental consequences of release of the genetically engineered organisms. Similarly, the Director's statement in final approval that the experiment posed "no significant risk" was inadequate as an environmental assessment. Therefore, the Court found that the NIH never addressed the issue of whether an EIS should be prepared, which is the essential purpose of an environmental assessment, and that the agency failed to adequately address a significant environmental impact in contravention of the policies expressed in the NEPA.[49]

The defendants raised procedural objections to the litigation, including a challenge to the court's jurisdiction, and the failure of the plaintiffs to exhaust administrative remedies by not participating in the RAC review process. With regard to the jurisdictional objection, the court stated that:

> judicial power to enforce NEPA extends to private parties where 'non-federal action cannot lawfully begin or continue without the prior approval of a federal agency.' *Biderman v. Morton*, 497 F.2d 1141, 1147 (2d Cir. 1974). '[W]ere such non-federal entities to act without the necessary federal approval, they obviously would be acting unlawfully and subject to injunction.' *Id.*[50]

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44. 43 Fed. Reg. at 60123, JA 493.

45. 48 Fed. Reg. 24549.

46. 42 U.S.C. § 4331(b)(1).

47. 756 F.2d at 151, *quoting Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462 U.S. 87, 97-98, 103 S.Ct. 2246, 2253, 76 L.Ed.2d 437, 446-47 (1983).

48. *Id., citing Sierra Club v. Peterson*, 717 F.2d 1409, 1413 (D.C. Cir. 1983).

49. 756 F.2d at 153, *citing Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553, 98 S.Ct. 1197, 1216, 55 L.Ed.2d 460, 485 (1978)(agency has the obligation to consider every significant aspect of the environmental impact of a proposed action).

50. 756 F.2d at 155. *Cf.* Outer Space Treaty, *supra* note 9, at art. VI (activities of non-governmental entities in space require the authorization and continuing supervision by the appropriate state party to the Treaty). For a discussion concerning the determination of the "appropriate state," *see generally* Bockstiegel, *The Terms "Appropriate State" and "Launching State" in International Space Law*, in PROCEEDINGS OF THE 37TH COLLOQUIUM ON THE LAW OF OUTER SPACE ____ (1995), IAF Paper No. IISL-94-IISL.2.828 (1994); Masson-Zwaan, *"National Activities in Outer Space" and Related Issues*, in PROCEEDINGS OF THE 37TH COLLOQUIUM ON THE LAW OF OUTER SPACE ____ (1995), IAF Paper No. IISL-94-IISL.2.830 (1994); Wirin, *Practical Implications of Launching State Appropriate State Definitions*, in PROCEEDINGS OF THE 37TH COLLOQUIUM ON THE LAW OF OUTER SPACE ____ (1995), IAF Paper No. IISL-94-IISL.2.829 (1994).

Moreover, the court declined to apply the general rule requiring exhaustion of administrative remedies, which was stated to be "ultimately an exercise of judicial discretion."[51] Such discretion can be exercised in "'exceptional cases or particular circumstances * * * where injustice might otherwise result. . . .'"[52] The court noted that this issue was of great public interest, that the environmental problem was identified in the first and only EIS done by the NIH, and that there was a complete lack of consideration of the NEPA by NIH. Thus, the court concluded that injustice would result if the plaintiffs were barred by failing to object at prior proceedings before the RAC, despite their being duly noticed by publication in the *Federal Register*. In a footnote, the court also stated that:

> the *Federal Register* was never intended to be a means of limiting public discourse and judicial access to those who scrutinize its daily notices. Such a strong-armed invocation of the *Federal Register* publication as a bar to subsequent objection raised in a reasonably timely fashion is particularly inappropriate in the context of a statute like NEPA that seeks to further public attention and debate.[53]

The court found that the plaintiffs had satisfied their burden for establishing their right to the requested injunctive relief against government action,[54] and accordingly, the injunction against the University of California experiments was upheld. However, the court reversed the district court's enjoining the NIH from approving any other intentional release experiment on the basis of the failure to previously complete an EIS, instead remanding the matter for further administrative consideration and review of environmental impacts.

In a concurring opinion, Judge MacKinnon questioned the exercise of judicial discretion to excuse plaintiff's failure to exhaust administrative remedies. The concurring opinion noted that the failure of a plaintiff to appear and participate in the underlying administrative process could hamper a court on review of an agency decision. That is, objections may have been satisfied by scientists obviously sensitive to the issues, and the court spared the necessity to rule and decide the case. Moreover, if the plaintiff was not satisfied with the agency actions, participation at the administrative level would have aided in review by having a complete record. Concern also was expressed regarding delaying tactics employed by some litigants using the NEPA, such as with the Alaska pipeline, nuclear power plants, and the Clean Air Act. However, Judge MacKinnon concurred in the opinion since the issue was remanded to the agency to do what should have been done initially, and the lower court's order was reversed in other respects.

In the case of *Florida Coalition for Peace and Justice v. George Herbert Walker Bush*,[55] Judge Gasch was presented with a motion for a Temporary Restraining Order seeking to enjoin the launch of the Galileo probe on the Space Shuttle Atlantis. The plaintiff asserted that NASA's Environmental Impact Statement was defective pursuant to the NEPA, and commenced the litigation only a few days prior to the scheduled launch.

The Galileo spacecraft is an unmanned scientific probe designed to study Jupiter. The craft is utilizing the "VEEGA" trajectory, pursuant to which it is propelled by gravitational assists obtained by circling Venus once and the Earth twice. Galileo is powered by two radioisotopic thermoelectric generators (RTG), and its instruments are heated by numerous Light Weight Heater Radioisotopic Heater Units (LWHRHU) distributed throughout the craft. The RTG's and LWHRHU's are fueled by approximately 50 pounds of plutonium, comprised of plutonium 238 (83%) and plutonium 239 (17%).

Two Environmental Impact Statements were prepared for the mission. These EIS's went through

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51. 756 F.2d at 156.

52. *Id., quoting Hormel v. Helvering*, 312 U.S. 552, 557, 61 S.Ct. 719, 721, 85 L.Ed. 1037, 1041 (1941).

53. *Id.* at 156, n. 8.

54. A district court should consider the following factors in reviewing a petition for an injunction: "(1) Has the petitioner made a strong showing that it is likely to prevail on the merits? . . . (2) Has the petitioner shown that without such relief, it will be irreparably injured? (3) Would the issuance of the [injunctive relief] substantially harm other parties interested in the proceedings? . . . (4) Where lies the public interest?" *Virginia Petroleum Jobbers Association v. FPC*, 104 U.S.App.D.C. 106, 259 F.2d 921, 925 (1958); *see Hughes Network Systems, Inc. v. Interdigital Communications Corporation*, 17 F.3d 694 (4th Cir. 1994); *WMATC v. Holiday Tours*, 559 F.2d 841, 842-43 (D.C.Cir. 1977).

55. *Florida Coalition for Peace and Justice v. George Herbert Walker Bush*, Lexis 12003 (D.C. 1989)[hereinafter referred to as "Florida Coalition I"].

several stages of drafting, and opportunities were available for public review. The mission further was subjected to interagency and multi-agency reviews, as well as Presidential approval by the Office of Science and Technology. NASA's conclusions were that a worst case accident would result in a 1:10,000,000 chance of the possibility of 9.4 excess cancer deaths over a period of 70 years.

The plaintiff claimed the EIS failed to consider alternatives to the proposed plan; to incorporate interagency review findings; to clarify limitations and uncertainties of the analysis performed during the review; to address adequately emergency plans and procedures; and to address all relevant risks. The plaintiff asserted the EIS underestimated the magnitude of the risks, and lacked complete information, and therefore was inadequate pursuant to NEPA.

Judge Gasch began his analysis with a statement of the standard of review:

> This Court's only function is to ensure that the EIS contains a sufficient discussion of the environmental impacting factors to allow the agency to take a hard look at the issues and make a reasoned decision on the matter. . . . 'NEPA merely prohibits uninformed - rather than unwise - agency action.' *Robertson v. Methow Valley Citizens Council*, 109 S.Ct. 1835, 1846 (1989).[56]

With this limited role in mind, the court found that the agency had complied with the requirements of NEPA.

Judge Gasch recognized that NEPA requires consideration of alternatives in the EIS.[57] However, he stated that an agency is not required to consider every conceivable alternative device and thought. To require otherwise would mean that an agency would never be able to initiate any project.[58] Moreover, and perhaps most importantly, the court found that all of the plaintiff's proposed alternatives had been considered in one or both of the EIS's which had been prepared.

The plaintiff asserted that the EIS should have been supplemented based on the findings of an interagency review, to which the court said that an agency can apply the "rule of reason" to determine when a supplement is necessary. That is, an EIS should be supplemented only when there "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impact." An agency violates the "rule of reason" when it acts in an arbitrary or capricious manner.[59] There was no evidence presented to indicate that the agency acted arbitrarily or capriciously. In addition, the court was inclined to defer to "'informed discretion of the responsible federal agencies' since the matter 'requires a high level of technical expertise.'"[60]

The court also found that the EIS was sufficient in specifying that information which was incomplete or unavailable,[61] and that it included an adequate discussion of emergency plans and procedures.[62] With regard to the remaining contention that the EIS lacked complete information and therefore was inadequate, the court stated that the plaintiff ultimately was arguing that the EIS simply was wrong. In support of this issue, plaintiff provided the court with a "few" affidavits of experts, which, according to Judge Gasch, were "far outweighed" by the defendant's evidence.

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56. *Id.* at 2-3.

57. 42 U.S.C. §§ 4332(2)(C)(iii), 4332(2)(E).

58. Florida Coalition I, *supra* note 55, at 10-11, *citing Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551, 98 S.Ct. 1197, 1215-216, 55 L.Ed.2d 460, 484 (1978); and *Jicarilla Apache Tribe of Indians v. Morton*, 471 F.2d 1275, 1280 (9th Cir. 1973).

59. *See* Administrative Procedure Act (APA), 5 U.S.C. §706 (2)(A)(1982)(reviewing court to hold unlawful and set aside agency action, findings, and conclusions found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law).

60. Florida Coalition I, *supra* note 55, at 11-12, *quoting Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 377, 109 S.Ct. 1851, 1861, 104 L.Ed.2d 377, 394 (1989). *Cf. Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842-43, 104 S.Ct. 2778, 2781-782, 81 L.Ed.2d 694, 702-03 (1984).

61. 40 C.F.R. § 1502.22 provides that "Whenever an agency is faced with uncertainties due to incomplete or unavailable information, it must make clear that such information is lacking."

62. In Florida Coalition I, *supra* note 55, the court noted, at 12-13, that NEPA requires only that feasible mitigation plans be discussed in the EIS, 40 C.F.R. §§ 1502.11(f), 1502.16(h), but not that the agency formulate and adopt such plans, *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352-53, 109 S.Ct. 1835, 1847, 104 L.Ed.2d 351, 371-72 (1989).

The court concluded that the EIS was facially valid, and the plaintiff's evidence was insufficient to establish that the EIS was not adequate. Thus, it was not necessary for the court to look behind the EIS and question its adequacy, and no authority had been cited regarding the power of the court to engage in such an analysis. The court held that NASA had complied with the NEPA, and therefore, the plaintiff was unlikely to prevail on the merits. Accordingly, the plaintiff had not met the standards for TRO relief. In view of these findings, it was not necessary for the court to address the question of the failure of plaintiff to participate in the administrative proceedings, or the asserted "unclean hands" of plaintiffs, who "slept on their remedies and chose to come before the court at the eleventh hour."[63]

The court, in *dicta*, discussed the interest of the public in regard to the requirements for issuance of a TRO. Judge Gasch stated that the launch countdown was underway, and a delay in the launch of the Galileo probe would add significantly to the combined cost of the project of $1.5 billion. In addition, the probe would yield valuable scientific information. Further, the court noted that the nation had a strong commitment to the exploration of space. The court, in a footnote, stated that the plaintiffs contend for the first time in the reply brief that "NASA violated NEPA in that it failed to provide, and OSTP [White House Office of Space and Technology Policy] failed to consider, the [Final EIS]" in approving the Galileo project, however, this argument was summarily dismissed as "without merit."[64]

Undaunted by their first experience before Judge Gasch, the plaintiffs sought a second TRO one year later, in an attempt to enjoin the launch of the Ulysses spacecraft.[65] Like Galileo, the Ulysses probe was launched by the Space Shuttle (Discovery), and is powered by RTG's. Its target, however, is the sun, and the craft will utilize a gravitational assist from both Jupiter and the Earth on its way to insertion into a heliocentric polar orbit. The action was filed one week prior to the scheduled launch, and the plaintiff contended that the EIS prepared by NASA for the mission was deficient in several respects. The court was not pleased that the matter was considered on an expedited basis, particularly when the plaintiffs had the opportunity to initiate the proceedings much earlier.

The plaintiffs raised certain issues which were presented in the first action, and the court summarily dismissed these arguments, referring to the earlier memorandum decision.[66] With regard to the remaining issues, the court summarized the applicable law as follows:

> The Court's role in evaluating a challenge under NEPA is not to 'substitute its judgment for that of the agency as to the environmental consequences of its actions.' *Klepp v. Sierra Club*, 427 U.S. 390, 410 n. 21.[67]

The court found that the plaintiffs were not likely to succeed on the merits, just as in the first case, and therefore failed to satisfy the requirements for a temporary restraining order. Further, as in the first case, the court, in *dicta*, stated that the public interest militated against the granting of the requested relief. With reference to the specific contentions, the court made the following observations:

The arguments of the plaintiffs in relation to the assessment of the risks were found to be not supported by the evidence. The one affidavit offered by the plaintiffs in support of their request related solely to the Galileo mission, and was prepared for use in the previous litigation and not the current petition for relief. Furthermore, the agency presented substantial expert evidence in contradiction to the position of the plaintiffs. The court was required to determine only whether the agency had considered a matter, not to second guess the judgments of the agency's experts.

The plaintiffs asserted that the EIS should have considered the alternative of a short delay in the mission in order to allow NASA an opportunity to address reported problems with fuel and cooling system leaks in the Space Transportation System, and to consider recommendations contained in an Office of Technology Assessment study. The EIS rejected the delay alternative, on the basis that a short delay would not yield new environmental information. The court

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63. Florida Coalition I, *supra* note 55, at 6-7.

64. *Id.* at 2, n. 1; *see also id.* at n. 6.

65. *Florida Coalition for Peace and Justice v. George Herbert Walker Bush*, 1990 WL 157934, (D.D.C. 1989)[hereinafter referred to as "Florida Coalition II"]. For a review of the two *Florida Coalition* cases, see Gorove, *Recent Litigation Involving the Launch of Spacecraft with NPS on Board*, in PROCEEDINGS OF THE 36TH COLLOQUIUM ON THE LAW OF OUTER SPACE 298 (1994).

66. Florida Coalition II, *supra* note 65, at § II(C)(1)(a).

67. *Id.* at § II(C)(1).

found that the plaintiffs failed to show that a more detailed discussion was necessary. According to the agency's experts, the fuel leaks were with the Columbia, and not the Discovery; the Discovery would be tested thoroughly pre-flight; and the Discovery cooling leaks were not a flight safety concern. Moreover, the plaintiffs failed to show any specific recommendations contained in the OTA report that could be addressed within the period of a short delay, or which would cause an environmental problem if not addressed. The court restated the standard utilized in the previous litigation, that "[u]nder NEPA, an agency is not required to have complete information in order to proceed with a project."[68] However, the court elaborated on that standard, and declared, without citation of authority, that "an agency is only required to adequately assess the information that is available."

The plaintiffs next asserted that the agency should have solicited public comment when it updated the Ulysses risk assessments. Although the court did not expressly refer to the "rule of reason" in the opinion, it treated this issue similar to the question of when a supplement to an EIS is required. That is, the agency must be granted latitude in determining whether new information significantly affects the existing environmental documentation sufficient to solicit public comment. The standard for reviewing such a determination is whether or not it was arbitrary or capricious not to make the information available for public comment.[69] The court found no evidence that the agency decision in this regard was either arbitrary or capricious.

The court, therefore, concluded that the plaintiffs were not likely to prevail on the merits, and denied the request for the TRO. Nevertheless, in *dicta*, the court discussed the public interests in a timely launch of the probe. According to the court, the mission will provide significant scientific contributions; delay would be expensive; and as a collaborative program with the European Space Agency, a delay could affect the ability of the United States to undertake such projects in the future. Finally, the court found that the potential benefit of additional environmental information was offset by the costs of delay.[70]

General Principles and Observations

The opinions of Judges Wright and Gasch present an interesting contrast in the approaches courts may utilize in reviewing challenges to new and/or complex technologies based on environmental grounds. Judge Wright was concerned with promoting the "lofty goals" of the NEPA, while Judge Gasch viewed his role as being limited to merely assuring that the government agency had compiled information in advance of making a decision, even if that decision was "unwise." This difference in approach is an intangible element frequently beyond the control of litigants. Nevertheless, the possibility of a plaintiff engaging in forum shopping should not be overlooked.

A primary factor influencing Judge Wright was that the NIH acknowledged, in the EIS for the first recombinant DNA experiment guidelines, that environmental concerns may be present in a release of recombinant DNA. However, there was no serious consideration of these environmental impacts at all in the process of approving the deliberate release experiment of the University of California. Accordingly, the "lofty goals" of the NEPA had not been met, and the agency had not reached a reasoned decision in granting the waiver application.

The record before Judge Gasch, on the other hand, included extensive agency reviews of the missions and two expressly labeled Environmental Impact Statements.[71] The court found that every alternative suggested by the plaintiffs had been considered during the review process. Even if persuaded that the plaintiffs' position may have had some merit, the tenor and tone of the opinion suggest that Judge Gasch would have declined to exercise his discretion in favor of the plaintiffs, and have found that the failure to participate in the administrative proceedings and exhaust administrative remedies precluded the litigation in district court.[72]

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68. *Id., citing Jicarilla Apache Tribe of Indians v. Morton*, 471 F.2d 1275, 1280 (9th Cir. 1973).

69. *Id., citing Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989).

70. *See* Florida Coalition II, *supra* note 65, at § II(C)(2)(c).

71. The first EIS (Tier I) assessed the environmental impacts of both the Galileo and Ulysses missions. The second EIS (Tier II) was restricted to Galileo.

72. The plaintiffs may have created unnecessary difficulties by failing to comply with procedural recommendations of the court and by filing their request for relief on an accelerated basis just a few days before launch, even though, in regards to Ulysses, ample opportunity had

It is significant that Judge Gasch considered the requirements of the NEPA to be satisfied merely by the compilation of information during the review process, and it was presumed that this information had been relied upon by the appropriate agencies. When this assumption was challenged, the court summarily dismissed the issue in a footnote.[73] Perhaps a justiciable claim could be raised where it can be shown that the information was not properly or timely communicated either within or between agencies, and therefore could not have been considered during the decision-making process.

Judge Gasch noted that the crux of plaintiffs' argument was that the EIS simply was wrong. The plaintiffs, however, had failed to produce sufficient evidence, by expert affidavit or otherwise, to justify the court in substituting its judgment for that of the agency. In support of the second petition, pertaining to Ulysses, the plaintiffs produced a single affidavit, which the court pointed out was prepared for the Galileo litigation and restricted in its discussion only to that mission. In addition, the court questioned whether judges even had the authority to substitute their judgment for that of the agency, even if it were so inclined.[74]

Since Judge Gasch found that the plaintiffs were not likely to prevail on the merits, it was not necessary for the court to examine the requested relief *vis-a-vis* the public interest. Nevertheless, the court noted that the plaintiffs sought to delay the launches of the two spacecraft, yet there was no specific environmental benefit which would be promoted thereby. Moreover, the expense of even a short delay would be considerable. In the event the court had been persuaded, however, that the risks to the environment and human life were substantially greater than as stated in the EIS, it must be questioned whether the court still would have concluded that a delay in the launches would not have been in the public interest.

The contrasting opinions of Judges Wright and Gasch provide interesting insights as to when a court will entertain challenges to mission plans based on the NEPA. It is clear that a complete disregard of all environmental impacts an agency action may have will not be viewed favorably pursuant to NEPA. In addition, the failure to consider a specific risk previously identified and articulated, especially by the agency, could be considered as a contravention of the requirements of NEPA. Courts may presume that any discussion of an issue will pass muster under NEPA, and the agency decision will be upheld, even where the evidence is conflicting. Based upon the decisions rendered in the *Heckler* and *Florida Coalition* cases, Judges can be expected to grant great deference to agency consideration and determination, especially where highly complex, technological, trans-scientific issues are concerned. Except in extreme cases where an agency decision is demonstrably and clearly inadequate, courts will be reticent to substitute their singular judgment for the deliberations and findings of technically competent experts relied upon by the agency.

The relative remoteness of the risks complained of should not be overlooked as a factor which may both prompt a challenge as well as influence a court. Similarly, the perceived level of fear also could enter the debate. In *Heckler*, the fear was of a genetically altered organism with no demonstrable certainty as to its properties or the effects it may have on flora, fauna and the environment in general when released. This fear was based on the perception that the risk of detrimental consequences could be quite high. In the *Florida Coalition* cases, however, the risk was relatively low when measured against the expenditures invested by the government, the increased expense of delay, the missed launch opportunity, the commitments the nation had made in the international community, and the benefits which the programs were designed to produce. Thus, it appears that a successful challenge to an EIS must, at a minimum, articulate either a significant, non-remote environmental impact which was not considered by an agency in the EIS, or identifies a risk which is perceived to be high both in terms of probability of occurrence as well as detrimental effects. Agencies must be sensitive to potential criticism and opposition to their actions, and be certain all matters contained within their own documentation are considered adequately in the EIS, and that the administrative record supports the conclusions stated therein.

CONCLUSION

Federal regulation of complex technologies increasingly has relied upon the scientific community to articulate factual parameters to frame policy decisions. The efficacy of this reliance is directly related to the level of scientific certainty regarding a

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existed for the matter to be heard on the court's normal calendar.

73. Florida Coalition I, *supra* note 55, at 2, n. 1; *see also id.*, at n. 6.

74. *But see* Yellin, *supra* note 10, at 1312-316, for a discussion of judicial determination of trans-scientific issues.

particular issue. However, in regard to inherently complex technological phenomena, a substantial grey area exists between scientific resolution and political choice. In this realm of "trans-science," non-scientific and social factors become inseparable components of policy debates, and invite public participation and scrutiny. In addition, the development in specialized interest groups, together with laws facilitating access to the courts, heightens the probability that a particular mission or program will attract opposition and legal challenge.

Complex technologies previously have been subject to legal challenge, particularly in relation to environmental concerns under the National Environmental Protection Act. Policymakers and mission planners must be sensitive to the possibility that their decisions are subject to the public microscope. The failure to anticipate opposition can lead to unnecessary delays, increased costs and missed opportunities. Moreover, proper attention to and consideration of social and non-scientific factors can only improve a mission profile.

This article has examined legal challenges raised under NEPA in relation to a proposed release of recombinant DNA, and the launch of spacecraft carrying nuclear power sources. While by no means exhaustive, these opinions provide examples of judicial attitudes which can be anticipated by parties to such litigation. Agencies may always be subject to legal challenge at any level of government. However, both the number of challenges and the probability that they will be upheld by a court can be decreased by agency recognition that the public has a significant role to play in the development of plans and policies.