NASA and Ethics: Training and Practice

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ABSTRACT

This paper is about the National Aeronautics and Space Administration (NASA) and the practice of professional ethics. It has been eleven years (Jan 28, 1986) since the Challenger accident and the past decade has been a time of investigation, assessment, and finger-pointing, as well as a time for introspection and internal reform. While there has been a lot of rhetoric about ethical commitments at NASA there has also been a dearth of empirically-based knowledge about what NASA and its various contractors are doing about professional ethics and what decisionmaking criteria are being used. It has also been a decade of cost-cutting and personnel cut-backs. One has to wonder what, in all this time, NASA has done to create an ethical climate in which events like the Challenger accident are less likely to happen.

In the fall of 1995, as a part of competition for a mini-grant from NASA, a request for funding to complete an ethical profile of the space agency was submitted. This paper contributes to knowledge about NASA and ethics by reporting on the results of the first year of research which was spent in doing a comprehensive literature and web-site review along with phone interviews and e-mail correspondence with NASA ethics officers. The goal of this first year was to see what ethics activity has been documented and to ascertain what work is being done to raise the ethical question with NASA.

Questions for which answers were sought include:

1. What is NASA now doing regarding ethics?

2. What training is being provided? By whom? For whom?

3. Are the answers to these questions different at different NASA installations?

The next section of this paper describes the information discovery process. The section following it summarizes the literature and interviews, then discusses implications. Tentative answers to the research questions are supplied, along with a summary and conclusions.

INFORMATION DISCOVERY PROCESS

The first step toward discovering information about NASA's administrative ethics practices was a comprehensive literature review. The second step was to search the Internet for web sites related to NASA and ethics. Identified NASA officials were then contacted by e-mail. The next part of this section describes the search for relevant literature. The one following it explains the Internet search and the use of e-mail as a part of the data gathering which occurred.

Literature Review

The literature review about NASA and ethics practices utilized both computerized and bound databases. Computer databases searched were the Public Affairs Information Service (PAIS), First Search, Uncover, and InfoTrac General Periodical Index. Paper indices searched were the Reader's Guide (1995-September 1996), the New York Times Index (1994-July 1996), the Washington Post Index (1994-August 1996), and United States Government Documents. Key word pairs chosen for the initial search were: NASA and ethics, government and ethics, NASA and morals.

Searches of key words NASA and ethics uncovered two articles in the PAIS, one in the InfoTrac Index, one in the Uncover index and one in the First Search databases. Compared to over 2,000 articles referencing key words government and ethics, this suggests very little research dedicated to ethics and NASA. When key words NASA and morals were run, First Search's twenty-eight million record collection returned no articles, while PAIS reflected five articles and InfoTrac showed two. Number of articles about NASA and ethics, by database are shown in Table 1.

Table 1
Number of Articles about NASA and Ethics

	FirstSearch	Genisys	InfoTtrac	PAIS	Uncover
NASA* and Ethics	2	0	1	2	1

*"National Aeronautics and Space Administration" also searched to arrive at hit numbers.

The disappointingly small number of articles found under the above named pairs of key words led to computer searches under a host of other key words thought to address dimensions of ethics, including: ethics and space, science and ethics, NASA and human resources, NASA and management, NASA and plan*, NASA and policy, NASA and strategic plan, NASA and standards, NASA and risk management, NASA and corruption, NASA and finance, NASA and conflict of interest, NASA and decision, and NASA and whistle blowing. These search combinations identified many more articles. The most prolific categories are illustrated in Table 2. These results suggest the literature about NASA focuses on finance, policy, planning and management.

Paper indices do not allow for key word pairs, so similar categories were researched, and redirections were followed to other topics. Because of the broad classifications, numbers found were not recorded and only those articles which appeared applicable to the topic of NASA and ethics were reviewed.

All material found prior to February, 1995 was read and summarized in an annotated bibliography (Russell and Bruce, 1996). Additional material, through September, 1996, is cited in this article.

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Table 2
Sources of Articles about NASA Practices

	FirstSearch	Genisys	InfoTrac	PAIS	Uncover
NASA* and Finances	1		149	25	0
NASA and Management	18	8	154	16	30
NASA and Policy	106	0	118	68	16
NASA and Plan	17	73	0	31	27

*"National Aeronautics and Space Administration" searched as well as NASA.

Most striking in this research was the meager amount of scholarly literature devoted to NASA and ethics and the tenacity required to uncover it. The comprehensive, year-long search yielded only three scholarly books (Hoban, 1989, 1993, and Vaughan, 1996) and nine academic journal articles confined to three journals: Journal of Business Ethics, Public Administration Review, and Space Policy. Most of what has been written about NASA is found in popular and trade magazines and newspapers.

After searching scholarly databases, the inquiry moved to the World Wide Web in an attempt to identify specific persons who might be knowledgeable about NASA and the practice of ethics. The next paragraphs describe that search.

World Wide Web Search

Specifically, for this paper, fifteen NASA related web sites were identified. All were searched for employees with the word ethics in their title or job descriptions. When ethics identified no one, the phrase employee development was searched. When neither of these returned a candidate, as a last resort, an e-mail was sent to the person listed as responsible for the human resources section of a web site. The e-mail request is shown in Figure 1.

Each web site was searched for mission statements, value statements and codes of ethics. Searches on the key words Ethics and Values resulted in security-forbidden messages on these sites. A search of the NASA Headquarters web site revealed one ethics course associated with contract management. It is offered as a part of the Project Management Development Process for NASA employees on the management career track.

Eleven installations were queried via the World Wide Web. Four did not respond. Of the seven which did respond, five installations gave usable information, though not all gave the same amount. Table 3 lists the installations and the titles of the officers to whom an e-mail message was sent. Table 4 identifies the installations which provided information.

This section has described the information search process. The next section summarizes the available literature about NASA and ethics. The one following it summarizes the Internet correspondence.

Figure 1
Message to NASA Web Sites

I am a graduate fellow working on a project funded by the Nebraska Space Grant Consortium. Professor Willa Bruce, of University of Nebraska at Omaha's Department of Public Administration, is my faculty mentor for this paper on administrative ethics as it is practiced and promoted within NASA.

We have completed an extensive literature review and now ask your assistance. After sampling what's been written about NASA, we need a direct response from _____ Center to these questions:

  1. What is NASA now doing regarding ethics?

  2. What training is being provided? By whom? For whom?

Could you please answer these questions at your earliest convenience or forward this e-mail to someone who can? We are working under a very tight deadline, with a call for papers the end of October, so a response by October 7 would be greatly appreciated.

If you need any further clarification, I invite you to e-mail me, call me or Dr. Bruce at UNO (402) 554-2664.

Thank you very much for your help. We look forward to hearing from you.

Very truly yours,

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Table 3
NASA Installations and Title of Officials Contacted

NASA Headquarters	Associate General Counsel & NASA Ethics Official
	Chief Counsel
	Other - Title unknown
Ames Research Center	Human Resources - Ethics Director
Dryden Flight Research Center	Associate Director
Goddard Flight Research Center	Assistant Chief
	Chief Counsel
Jet Propulsion Lab	Manager of Business Ethics
	Other - Title unknown
Johnson Space Center	Chief Legal Counsel
Kennedy Space Center	Associate Counsel
Langley Research Center	Employee Development Specialist
Lewis Research Center	Chief of Personnel
Marshall Space Flight Center	Employee Development Specialist
Stennis Space Center	Employee Development Specialist

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Table 4
NASA Installations and Titles of Officials which Provided Information on Ethics Activities

NASA Headquarters	Spokesperson - Title unknown
Dryden Flight Research Center	Associate Director
Goddard Flight Research Center	Assistant Chief
	Chief Counsel
Jet Propulsion Lab	Manager of Business Ethics
Stennis Space Center	Spokesperson - Title unknown

NASA and Ethics: A Review of the Literature

The literature review revealed that the bulk of the published material about NASA and ethics was written in response to the Challenger disaster or to analyze changes implemented in reaction to the Challenger incident. As discussed above, much of it is in the popular press, rather than in scholarly journals. Available government documents primarily deal with investigations following Challenger, particularly those of the Augustine Commission and the Rogers Commission. Also reviewed was the Office of Government Ethics Standards of Ethical Conduct (5 CFR Part 2635) and supplemental regulations (5 CFR Part 6901) in book form (1992) and on cd-rom (1995). These minimalist legal guidelines apply to all federal employees and are not NASA specific, though, as will be discussed later, are relied upon by NASA officials as ethical standards.

Perhaps the showiest of the articles deal with corruption and NASA. The public demands more responsibility and accountability to prevent production of billion dollar telescopes that do not work (Wade, 1993) and $200,000 toothbrush holders (Asker, 1996). They are outraged by NASA floor checks revealing 43 percent of third shift workers reading newspapers, playing cards and sleeping (Hearing, 1992). FBI stings (Cartwright, 1996) and investigations of top contractors regarding bribes, kickbacks, mischarging, false statements and accepting gratuities (Hearing 1992) make the headlines.

Beyond Challenger, however, the greatest interest in and about NASA is neither ethics nor corruption, but costs. One scholar calls for contract penalty provisions to discourage contractors from accepting risks because that appears more cost-effective (Aller, 1989). The high expense of considering all possible abort schemes and safety factors is discussed in both the popular press and a scholarly book (Rees, 1989)(Kramer, 1990). Scientists and engineers protest financial constraints and deplore that NASA's visibility leaves them no room for errors—experiments must work the first time (Stine, 1993).

NASA has been accused of exercising poor judgement by scholars and journalists alike. It has been accused of relying too heavily on subjective judgement in choosing problems to focus on (Marshall, 1988), promising more than it can deliver and having no priorities (Katz, 1993), and of having an addiction to big ticket projects (Shafritz, 1992). An article in Science charges that NASA uses hype to keep both Congress and the public supportive of budget requests (Flam,

1993). An editorial in Aviation Week and Space Technology accuses NASA of chasing headlines (Heartburn, 1992) while Hines, in the Progressive (1994) calls the whole manned space flight program the wrong stuff.

NASA is also described as a victim of maltreatment by Congress and the public. The agency is financially punished for efficiency reforms, gets no credit for its successes (Asker, 1995), and is accused of poor judgement in setting up a centralized decision structure that critics fear could foster a repeat of the Challenger disaster (Asker, 1996).

A Rockwell representative who advocates decentralization and contracting for services suggests that NASA will only let go when they have "triple redundancy — when you have a checker checking a checker checking a checker" (Chandler, 1996, p. F1+), yet others think that "Given the aging (shuttle) hardware and the need for additional maintenance, more rather than fewer inspections are warranted" (Covault, 1996, p. 23). NASA must continually deal with the issue of whether releasing a data relay satellite is worth dying for (Easterbrook, 1991) and the reality that there is a crisis of confidence where the space agency is concerned (Kramer, 1990).

NASA budget battles are legion. Articles weigh the advantages and disadvantages of contracting for services (Anselmo, 1996b, 1996c) and blame interdependency of all NASA programs for NASA's budget problems (Mann, 1988). Senator Howell Heflin, (1990) advocates for NASA and asks Congress to give NASA enough money to do their job, though NASA's can-do spirit has been undermined by leadership squabbles, low morale, and the prospect of extended delays for cherished projects (Corrigan, 1996). The Office of Management and Budget (OMB) has designated NASA's financial systems as high risk and top contractors have been investigated for bribes, kickbacks and mischarging (Hearing, 1992).

Organizational scholars studied NASA in the wake of the Challenger disaster. Shafritz (1992) argues that NASA is disadvantaged by the civil service merit system in the acquiring and retention of high quality personnel, while Levine (1992) notes that NASA's decentralized structure extracts a price in overlapping responsibilities, redundancies, and competition. Lawbaugh (1992) believes that NASA's place in the discretionary segment of the federal budget causes it to be shortchanged. Challenges to managing NASA in the 1990s were identified by GAO as contract management and monitoring, facilities maintenance, and information management (US GAO, 1993).

Following the Challenger accident, NASA's culture became one of "backbiting, infighting, and finger pointing" (McGinley and Burrough, 1986, p. 1). McCurdy (1989, 1992) argues for a cultural shift to one with an ethos of excellence, great personal dedication, unwavering self-scrutiny and constructive questioning. Vaughan in a massive historical analysis of the Challenger, contends that NASA has a deviant culture and that:

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> The cause of disaster was a mistake embedded in the banality of organizational life and facilitated by a climate of scarcity and competition, an unprecedented, uncertain technology, incrementalism, patterns of information, routinization, organizational and interorganizational structures, and a complex culture. (1996, p. xiv)

Very little available literature on NASA deals specifically with ethics, though clearly issues about expenditures, hype, deviance, and mismanagement are at the heart of an ethics question. One wonders to what extent ethics is addressed at all by the space agency. Marshall (1989), in writing about issues in NASA program and project management, argues that there is no substitute for ethical behavior and technical integrity and managers must be prepared to make tough decisions and stick by them, but does not record what NASA's ethical practices are.

Russell Boisjoly addresses individual and organizational responsibility at NASA, and raises the question of whether "existing ethical theories adequately address problems posed by new technology, new forms of organization, and evolving social systems" (1989, p. 218). In looking at the Challenger incident, Boisjoly concludes that NASA's bureaucratic structure undermined personal responsibility and accountability.

What is strikingly absent from writing about NASA and ethics is a recognition that ethical issues permeate daily organizational life. Regarding the space agency, it is as though the Challenger incident has been the only ethical quandary at NASA worth analysis. One doubts that this is the case.

This section has reported on a comprehensive literature search regarding NASA and what NASA is doing with regard to ethics. The next section presents the result of web site investigation and ethics officer responses to inquiries about NASA and ethics.

EXPLORING NASA'S ADMINISTRATIVE ETHICS PRACTICES

Since the literature search was unable to determine much about NASA and ethics, and lacking funds for site visits or surveys, the researchers turned to the Internet to continue the search for answers to the questions:

1. What is NASA now doing regarding ethics?

2. What training is being provided? By whom? For whom?

3. Are the answers to these questions different at different NASA installations?

What follows is a report of how these questions were answered by the ethics officials at NASA Headquarters and ten installations across the country. After each question is a description of how it was answered.

What is NASA now doing regarding ethics?

Answers to this question as received from each responding installation are summarized below. After the account of responses from each installation, a summary and interpretation is provided.

NASA Headquarters. The spokesperson from NASA Headquarters stated that NASA complies with the Office of Government Ethics regulations, including post employment issues personnel matters, EEO, and others. This response was almost verbatim with the NASA Chief Counsel's web page which reads "…ethics functions include counseling employees and Center management officials regarding 'The Standards of Ethical Conduct for Employees of the Executive Branch,' and the NASA supplement thereto, and include but are not limited to outside employment activities, financial conflict-of-interest issues, post-Government employment matters, and review of public and confidential financial interest reports and resolution of issues arising from the review" (NASA Headquarter's Web Page).

The Chief Counsel for each Center is the alternate ethics official, and those offices are staffed to handle questions and ethics issues, and are not just responsible for training. In-house ethics officers are in those Centers' legal offices.

Dryden Flight Research Center. The Associate Director of the Dryden Flight Research Center suggested that NASA headquarters could better answer the request "since the question is oriented toward overall NASA policy."

Goddard Flight Research Center. The Assistant Chief responded first, saying he had referred the questions to the Chief Counsel who "handles ethics training here." An e-mail was sent to the Chief Counsel whose response is similar to that of NASA Headquarters: "NASA employees are subject to the Standards of Ethical Conduct (5 CFR Part 2635), along with supplemental regulations (5 CFR Part 6901), and must file Public or Private Financial Disclosure Reports (5 CFR Part 2634), subject to post employment restrictions in (5 CFR 2637)." He also stated that NASA designates attorneys as ethics officials, whose duties are to "provide advice and guidance to employees and management." The 2,000 civil service employees are required to file financial disclosure reports annually. The Chief Counsel's office reviews them for potential financial conflicts, contacting any employee with potential financial conflicts verbally, followed by a written cautionary letter.

Outside activities of employees also require approval from the Chief Counsel's office, to avoid possible criminal violations of the law. His office also "provides voluntary general counseling to anyone who may have a question." He noted they provide many written opinions for employees regarding post employment restrictions, covering both general restrictions and specific situations.

For guidance, they turn to NASA Headquarters and the Office of Government Ethics (OGE). The position of senior ethics attorney in the Office of General Counsel will be filled shortly. That position is responsible for "providing general guidance to the General Counsel and NASA field center legal staffs . . . as well as agencies which may be appropriate or necessary."

Jet Propulsion Lab. The Manager of Business Ethics at the Jet Propulsion Lab (JPL) responded by telephone. He explained that JPL is not considered a center, but is actually a Federally Funded Research and Development Laboratory, funded primarily by NASA and operated by Caltech. Bearing this separation from NASA-proper in mind, he did not know what NASA is doing regarding ethics, and said "to the best of my knowledge there is no ethics network within NASA," other than that at JPL.

As part of the on-going dialogue, the Manager of Business Ethics began his own line of inquiry. He discovered that the NASA phone book does not list the word ethics, and ethics officers for the various centers are not listed as ethics officers within the phone book. When asked if JPL's ethics program was developed due to NASA or Caltech, he noted that Caltech does not have an ethics program other than JPL's, and that JPL has a much more extensive program than the NASA Centers.

Kennedy Space Center.   No one at the Kennedy Space Center responded to e-mail inquiries, but the Kennedy Space Center web site (http://www.pao.ksc.nasa.gov) did contain an article about standards of conduct which listed considerations for answering an ethical question. They are listed below. However, on July 31, 1997, the list was no longer present.

    a. Is this right?
    b. How will others see it?
    c. Am I being consistent?
    d. Should I explain?
    e. Am I beyond reproach?
    f. Would my action be 'good press'?

Stennis Space Center. Stennis Space Center's designated agency ethics official (DAEO) is responsible for "reviewing financial disclosure reports, maintenance of ethics education and training programs, and monitoring administrative actions and sanctions." The DAEO counsels employees regarding ethics standards and programs, as well as post-employment issues, and conducts the annual ethics training required under 5 CFR 2639.704 (c) to individuals covered under 5 CFR 2638.704 (b). All NASA employees receive copies of Standards of Ethical Conduct for Employees of the Executive Branch.

Answering the Question. Thus, in answer to the question about what NASA is now doing regarding ethics, one must conclude that NASA is not doing much beyond the minimum required by law. NASA employees, like other federal workers, are monitored for outside employment activities, financial conflict-of-interest, post-Government employment matters, financial interest reports and resolution of issues arising from the monitoring.

There has been a continuing debate in the ethics community since the late 1940s about which is the most effective way to insure that public administrators behave ethically. Known as the Friedrich-Finer debate, it was summarized by Finer as follows:

> My chief difference with Professor Friedrich was and is my insistence upon distinguishing responsibility as an arrangement of correction and punishment even up to dismissal both of politicians and officials, while he believed and believes in reliance upon responsibility as a sense of responsibility, largely unsanctioned, except by deference or loyalty to professional standards. (1941, p. 335)

At NASA, the debate appears not even acknowledged. Rather, NASA simply complies with the federally legislated ethics code, adhering to the letter of the law, rather than fostering dialogue about values and morals.

The next question dealt with the kinds of ethics training that NASA provides. Responses to that question are summarized in the following section.

What training is being provided? By whom? For whom?

Answers to this question as received from each responding installation are summarized below. After the account of responses from each installation, a summary and interpretation is provided.

NASA Headquarters. Each NASA Center has a designated ethics official who is mandated to do the requisite OGE ethics training which consists of one hour per year per employee on the requirements of 5 CFR Part 2635 and supplemental regulations 5 CFR Part 6901. These one-hour sessions can be in the format of lectures on the Standards of Conduct, films, or question and answer discussions. Content can vary from year-to-year. Some Centers contract this out, e.g. Johnson Space Center and, possibly, Marshall Space Flight Center. Langley has contracted out but may not at this time. The Chief Counsel for each Center is the alternate ethics official, and those offices are staffed to handle questions and ethics issues, and are not just responsible for training. In-house ethics officers are in those Centers' legal offices.

Goddard Flight Research Center. Goddard specifically implemented its requirements with mandatory annual training of 2,000 of its more than 3,000 civil service employees, where an attorney conducts an hour-long lecture and questions and answers session.

Jet Propulsion Lab. JPL is doing quite a bit of training. JPL ethics training over the past five years has been directed toward managers and supervisors, but in July 1996 they began to train rank and file employees, targeting July 1997 to have most trained. The training for new hires and employment development is done mostly through case studies.

The manager sent a copy of JPL's Ethics Handbook and JPL's 1996 Annual Ethics Refresher Training materials. The packet includes viewgraphs used in training programs, case studies, other training tools and ethics newsletters. Of particular interest are an Ethics Training Map, indicating the specific training paths for new hires, all employees, administrative aids, and management, and a map, entitled The Ethics Process tracing every step of a report to the Ethics Office. The accompanying cover letter commented on an idea inspired by the original e-mail - developing a round-table ethics training program for all NASA Centers. This idea will be explored further with JPL.

Johnson Space Center. Believed to contract out for training. No information received from JSC.

Langley Research Center. Believed to contract out for training. No information received from LRC.

Marshall Space Flight Center. Believed to contract out for training. No information received from MSFC.

Stennis Space Center. The respondent from Stennis also noted that "each center is responsible for providing annual ethics training to those employees who (sic) are in positions most exposed to situations requiring good ethical judgment." Stennis has a DAEO who conducts the annual ethics training required under 5 CFR 2639.704 (c) to individuals covered under 5 CFR 2638.704 (b).

Answering the Question. Thus in answer to the question about ethics training at NASA, one can conclude that, with the exception of the Jet Propulsion Lab, NASA officials are focusing only on the requirements of 5 CFR Part 2635, Standards of Ethical Conduct for Employees of the Executive Branch and its mandate to provide one hour of ethics training per employee per year. Table 5 shows the issues addressed in the eighty-page informal computer-generated manual and the percentage of pages used to deal with each topic.

Only JPL has a strong ethics training program that appears to deal with issues of moral judgement, as well as legislated and OGE mandates. That JPL is interested in expanding their ethics networks initiating a series of ethics roundtable discussions has been an unanticipated outcome of this research that bodes well for the future of ethical reflection among NASA employees.

The JPL model is important for the future of NASA. Recent research (Bruce, 1996) on the value of education for ethics clearly indicates that education about

Table 5
Standards of Ethical Conduct for Employees of the Executive Branch
Topics Covered by Percentage of Pages

Topic	Percent of Pages which Address Topic
Gifts	25 %
Outside Activities	22 %
Conflicting Financial Interests	12 %
Seeking Other Employment	10 %
Impartially Performing Official Duties	10 %
General	09 %
Misuse of Position	08 %
Related Statutory Authorities	04 %

values and moral decision making makes a difference in the ethical climate of a jurisdiction. Education increases the ability to define corrupt acts and the willingness to report them. It fosters the feeling that whistle-blowing is safe, and the belief that action will be taken when reports are made. Education affects values as well as attitudes. Complying with law and regulations is certainly essential, but it is insufficient.

Do answers differ at different NASA installations?

The final question asked if there is a difference in ethics climate or education among the different NASA installation. Responses to that question have been included in the discussions above, so what follows is a summary and interpretation.

Answering the Question. Little difference in ethics climate or education was found among the NASA installations included in this study. Only JPL goes beyond the letter of the law. Thus, conclusions in this study can be said to be reflective of NASA as a whole.

SUMMARY AND CONCLUSIONS

The results of the review of literature for this study and the initial contacts with NASA ethics officers indicate little regard for ethics at NASA. This means that NASA uses a low road, bureaucratic approach to what constitutes ethical behavior, with emphasis on financial conduct and risk management rather than upon morals and values. The letter of the law is clearly followed. One wonders, however, if following 5 CFR Part 2635 and/or the line of inquiry listed in the Kennedy Center's "Standards of Conduct" would have prevented the Challenger disaster (OGE, 1995). One suspects not. This emphasis on bureaucratic ethics is not designed to provide moral guidance. Worse it does not, in the eyes of many constitute a bonafide ethics program.

After a study of government employees that spanned several years, Brumback argues:

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> A government program that does nothing more than keep behavior legal, while no small accomplishment, would not be a bonafide ethics program. It would be more of a law enforcement program. Laws and regulations are not the answer to keeping behavior above the bottom line of ethics. (1991, p. 354)

The kinds of projects under NASA's jurisdiction are too challenging to be handled without ethical deliberation. They are filled with moral dilemmas and many value-laden areas. The following citations are illustrative. NASA searches for the origin of life, uses animals in experimentation (Lawler, 1995, 1996), and provides complex whistle blowing programs for pilots to report hazards (Manningham, 1994). The Hubble telescope question states the quandary NASA employees must face every day: what is an acceptable, informed risk (Chaisson, 1995). Presidential policy spelled out the answer for the space shuttle: humans should not be sent on missions that do not require that risk (Anselmo, 1996a). The fact is NASA is accountable for the loss of life (Hearing, 1993). These are burdensome responsibilities.

What are the implications of these activities? The literature contains some answers, as indicated below. Risk loss controls based on scientific method are called for, as is leadership to carry the ethical burden (Katz, 1993). NASA employees must weigh the expense of considering all possible abort schemes (Rees, 1989) against meeting impending deadlines (McKenna, 1996). The pressures of meeting these launch deadlines may cause people to be unable to do simple cause-effect reasoning (Lighthall, 1991), yet even after the lesson of the Challenger tragedy, directors have been forced out for refusing to approve launches based on safety concerns (Urquhart, 1991). In other words, the responsibilities and possible repercussions of NASA activities are awesome.

The reader will remember that at NASA ethics activities are not awesome, nor are they directed toward dealing with moral and life affecting decisions. Rather, they consist of one hour of ethics training per employee per year and counseling when needed on the following: outside employment activities, financial conflict-of-interest issues, post-Government employment matters, and review of public and confidential financial interest reports and resolution of issues arising from the review.

Despite the weightiness of NASA employee responsibilities, there is no apparent place to turn for moral counsel. Help on the tough, life affecting choices that permeate space agency activities does not appear to be available. Rather, NASA ethics guidelines seem to be minimalist and insufficient.

Based on the research for this article, one must conclude that a changed approach to ethics is needed at NASA. Its one-hour-of-training-per-employee-per-year program should be expanded and supplemented. Officials need to think about deterring problems, as well as detecting or ignoring them. Discussion about ethics at NASA needs to permeate the agency and include citizens who can bring concern for the public interest, social equity, and personal interest into the bureaucratic milieu. NASA needs responsive and responsible decisionmakers who are able to define the ethical dimensions of a problem and to identify and

respond to an ethic of public service as well as one of risk management. Where ethics at the space agency is concerned, to abide by the law is absolutely necessary, but it is woefully insufficient.

REFERENCES

Aller, R. (1989). The TDRSS management story. In Issues in NASA program and project management. Hoban, F.T. (Ed.). Washington DC: NASA.

Anselmo, J.C. (1996a, April 8). Shuttle fails to replace ELVs, but Pentagon eyes it again. Aviation Week & Space Technology, pp. 52–53.

Anselmo, J.C. (1996b, March 25). Clinton budget chops NASA again. Aviation Week & Space Technology, pp. 23–24.

Anselmo, J.C. (1996c, February 19). NASA issues wake-up call to industry. Aviation Week & Space Technology, pp. 20–21.

Anselmo, J.C. (1996d, February 5). NASA eyes transfer of power to centers. Aviation Week & Space Technology, p. 30.

Asker, J.R. (1995, May 29). Congress, NASA at odds on cuts. Aviation Week and Space Technology, pp. 20–22.

Asker, J. (1996, April 8). At 15, a safer, cheaper shuttle. Aviation Week & Space Technology, pp. 20–22.

Boisjoly, R., Curtis, E.F., & Mellican, E. (1989, April). Roger Boisjoly and the Challenger disaster: The ethical dimensions. Journal of Business Ethics, pp. 217–30.

Bruce, W. (1996). Ethics education in municipal government: It does make a difference. In Teaching Ethics and Values. Bowman J. (Ed.). N.Y.: State University of New York Press.

Brumback, G. Institutionalizing ethics in government. Public Personnel Management, Fall, 1991, 20 (3), 353–363.

Cartwright, G. (1996, August). The Sting: More FBI follies (heavy-handed 'Operation Lightening Strike' federal sting operation among NASA subcontractors in Houston, TX). Texas Monthly, v. 24 n. 8, p. 100–112.

Chaisson, E. (1995, January). NASA's needed vision. Astronomy, pp. 16–18.

Chandler, D. (1996, January 28). A big challenge. Oregonian, p. F1+.

Corrigan, R. (1986, March 22). NASA's mid-life crisis. National Journal, pp. 686–692.

Covault, C. (1992, April 6). NASA exploration program to pace management reform, energy consideration. Aviation Week & Space Technology, pp. 23–24.

Easterbrook, G. (1991, July 8). The case against NASA: Nowhere to go but up. The New Republic, pp. 18–24.

Finer, H. (1941). Administrative responsibility in democratic government. Public Administration Review, v1, pp. 335–350.

Flam, F. (1993, June 4). NASA PR: Hype or public education? Science, pp. 1416–1418.

Hearing before the Subcommittee on Investigations and Oversight of the Committee on Science, Space, and Technology. (1992, May 7). Window on waste: atrophy in NASA Management. Washington DC: US Government Printing Office.

Hearing before the Subcommittee on Space of the Committee on Science, Space, and Technology. (1993, October 13). Reinventing NASA. Washington DC: US Government Printing Office.

Heartburn and Hurrahs. [Editorial] (1992, May 18). Aviation Week and Space Technology, p. 11.

Heflin, H. (1990, November). Keep the dream alive. Ad Astra, pp. 38–41.

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Hines, W. (1994, July). The wrong stuff. The Progressive, pp. 28–20.

Hoban, F.T. (Ed.). (1989). Issues in NASA program and project management. Washington DC: NASA.

Hoban, F.T. (Ed.). (1993). Issues in NASA program and project management. Washington DC: NASA.

Katz, D. (1993, June 7). Risk Management at NASA: A time for leadership. National Underwriter Property and Casualty — Risk and Benefits Management, n. 23, p. 9.

Kennedy Space Center. Available: http://www.pao.ksc.nasa.gov

Kramer, L. (1990, June 30). Despite Hubble and trouble, an expert says NASA is worth it. [Interview with John Logsdon]. People Weekly, pp. 39–41.

Lawbaugh, W.M. (1993). Resources for NASA managers. In Issues in NASA program and project management. Hoban, F.T. (Ed.). Washington DC:NASA.

Lawler, A. (1995, June 23). Key NASA lab under fire for animal care practices. Science, v. 268, p. 1692.

Levine, A. (1992, March/April). NASA's Organizational Structure: The Price of Decentralization; in the future of the US Space Program: A public administration critique. Public Administration Review, pp. 183–203.

Lighthall, F.F. (1991, February). Launching the space shuttle Challenger: Disciplinary deficiencies in the analysis of engineering data. IEEE Transactions on Engineering Management, pp. 63-74.

Mann, P. (1988, May 16). Interdependence of NASA programs puts Congress in budget bind. Aviation Week & Space Technology, p. 21.

Manningham, D. (1994, July). After the accident: Now what do I do? Business & Commercial Aviation, pp. 76–81.

Marshall, E. (1988, March 11). Academy panel faults NASA's safety analysis; the agency relies too heavily on subjective judgement rather than on statistical analysis in picking problems to focus on. Science, p. 1233.

Marshall, W. (1989). Project management and people. In Issues in NASA program and project management. Hoban, F.T. (Ed.). Washington, DC: NASA.

McCurdy, H.E. (1989, November). The decay of NASA's technical culture. Space Policy, pp. 301–10.

McCurdy, H.E. (1992, March/April). NASA's Organizational Culture; in The future of the US Space program: a public administration critique. Public Administration Review, pp. 183–203.

McGinley, L., & Burrough, B. (1986, April 2). After-burn: Backbiting in NASA worsens the damage from shuttle disaster. The Wall Street Journal, sec. A, p.1+.

McKenna, J.T. (1996, April 8). Launch 'flow' highlights challenges facing NASA. Aviation Week & Space Technology, pp. 56–57.

NASA Headquarters Webpage. Available: http://www.jsc.nasa.gov/pao/org/offices/al.html

NASA Home Page. Available: http://www.hq.nasa.gov/

Rees, E. (1989). Project and systems management in the Apollo Program. In Issues in NASA program and project management. Hoban, F.T. (Ed.). Washington DC: NASA.

Russell, V. & Bruce, W. (1996, September). NASA and Ethics: An Annotated Bibliography. UNOAI Report 96-3. Omaha, NE: University of Nebraska at Omaha, Aviation Institute.

Shafritz, J.M. (1992, March/April). An Indictment of NASA's Merit System; in The future of the US Space program: a public administration critique. Public Administration Review, pp. 183–203.

Stine, G.H. (1993). Where are the real engineers? In Issues in NASA program and project management. Hoban, F.T. (Ed.) Washington DC: NASA.

United States General Accounting Office. (1993, October 6). NASA: Major challenges for management. Washington, DC: GAO.

Urquhart, S. (1991, December 23). At NASA, he who hesitated is out. Time, p. 15.

U.S. Office of Government Ethics (1992, 1995). Standards of Ethical Conduct 5 CFR Part 2635 and 5 CFR Part 6901. Washington, DC: U.S. Government Printing Office.

Vaughan, D. (1996). The Challenger Launch Decision. Chicago: University of Chicago Press.

Wade, N. (1993, November 14). Method and madness; no space for NASA. The New York Times Magazine, pp. 34–36.