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Ach Du Lieber Augustine: A NASA Course to Avoid Drift

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gress to upgrade Fermilab even as we requested a half billion for the SSC—a sum about equal to the annual budget for all of DOE's high-energy physics," says an OMB official. "It's no secret that DOE will be ramping up to more than a billion for SSC construction each year in 1995 and 1996."

Before Congress's Christmas recess, Representative J. Dennis Hastert, a Republican whose district includes Fermilab, learned that OMB had "zeroed out" the main injector. "We were told OMB didn't want to risk endangering the SSC appropriation by including construction of another high-energy physics facility in the same budget," Hastert recalls. When Hastert and Michel discussed the problem, they decided what was needed was friendly persuasion by the Illinois delegation. Though it was the week before Christmas, they were able to reach some of the most powerful figures in Congress. Dan Rostenkowski, the 17-term Democrat who heads the House Committee on Ways and Means and the Joint Committee on Taxation, had no trouble getting Darman on the line to protest the cut. Hastert and Paul Simon, a Democrat who serves on the Senate budget committee, made the case for the upgrade with Henson Moore, DOE's deputy secretary. Hastert and Michel lobbied members from many districts, especially those from the SSC's home on the range in Texas. Their argument, says Hastert, was that "the SSC is not a sure thing and you'll need all the help you can get as it gets more expensive year after year."

In the end it was Michel's note to Bush that made the difference. On 10 January, OMB changed its mind and added $43.5 million to the budget for the main injector. That amount is "excellent" scientifically and symbolically, says Peoples. "It's important as to whether we go forward at Fermi or we are left to wither."

—IRWIN GOODWIN

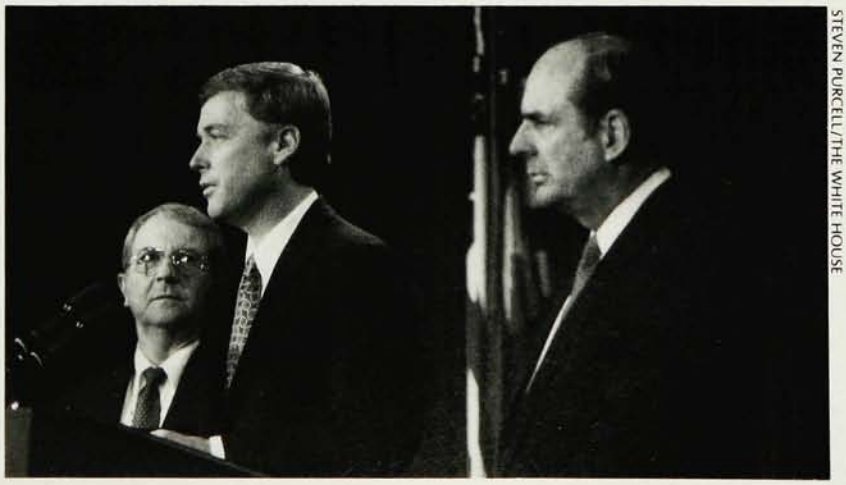
ACH DU LIEBER AUGUSTINE: A NASA COURSE TO AVOID DRIFT

With the ghost of the Challenger disaster and the specter of the flawed primary mirror on the Hubble Space Telescope and the hydrogen leaks in the space shuttles hovering over NASA, rumors persisted last summer that the White House wanted to change the course of the space agency. Sources in the Administration claimed that Vice President Dan Quayle, chairman of the National Space Council, favored an extensive inquiry into NASA's programs and performance to justify any new directions. But President Bush, who is more enthusiastic about space than any of his predecessors since Lyndon Johnson, objected to Quayle's plan, arguing that such an investigation might discredit NASA's leadership during Republican Administrations in the 1980s, when the initiative in space shifted to the Soviet Union. The President has championed space exploration as America's manifest destiny and has called for an expedition to the Moon by the year 2000 as a prelude to the main event: a mission to Mars, perhaps in 2019, the 50th anniversary of the first lunar landing. So it was agreed last July that the review should only look forward at the US space program. Even so, the report issued by a "blue ribbon" advisory committee on 10 December brought both the past and the future into sharp focus.

Only 48 pages in length, the document makes sobering and sensible points. That the panelists were drawn largely from the space establishment gives their conclusions extra force. The 12-member committee was headed by Norman Augustine, the no-nonsense chief executive of Martin Marietta, an aerospace company with many NASA contracts. Five other members are from the aerospace industry, and one of those five, Thomas O. Paine, was NASA's administrator in the Apollo years. Only three panelists can be called scientists—Laurel Wilkening, an astronomer who is now provost at the University of Washington; D. James Baker, a physicist at NASA's Jet Propulsion Laboratory at Caltech and president of the Joint Oceanographic Institutes; and Louis Lanzerotti of AT&T Bell Labs, a former chairman of NASA's space science advisory committee and current head of the National Research Council's Space Sciences Board. Lanzerotti was named at the last minute before the panel was formally announced, when the White House realized the panel lacked a "sufficient" number of scientists. Two panelists are former Congressmen: Edward P. Boland, who headed the House appropriations subcommittee that controls NASA's budget, and Don Fuqua, who led the House science committee and now heads the Aerospace Industries Association.

Lacking a clear purpose

The committee identifies the greatest failing of the US space program as its absence of a clear purpose. NASA has been trying to do too many different things with limited resources and has contributed to its own problems by underestimating project costs and safety margins, then cutting back smaller projects to keep its larger ambitions alive. The committee argues that NASA should give its highest priority to scientific research, devoting 20% of its annual appropriations to this and using unmanned rockets instead of the shuttle for most



STEVEN PURCELL/THE WHITE HOUSE

Augustine report examining NASA programs and policies is released to the news media by (left to right) NASA Administrator Richard H. Truly, Vice President Dan Quayle and the committee's chairman, Norman Augustine, CEO of Martin Marietta Corporation.

science studies. This emphasis should be "above space stations, aerospace planes, manned missions to the planets and many other major pursuits which often receive greater visibility." The report suggests that acheiving this goal will be easier if NASA is freed from participating in military programs.

NASA built its reputation by doing what was once considered impossible. It placed 15 men on the Moon and returned them safely to Earth between 1969 and 1972, sent two robot spacecraft to the surface of Mars, made important scientific and astronomical observations of the solar system and the Galaxy, and established a network of communications and observational satellites. But the agency has been spread so thin for years that it has had great trouble doing the merely necessary. In consequence, the US space program is now the butt of considerable criticism. Such criticism ranges, says the committee, "from concern over technical capability to the complexity of major space projects; from the ability to estimate and control costs to the growth of bureaucracy; and from a perceived lack of an overall space plan to an alleged institutional resistance to new ideas and changes.... Some of this concern is, in the view of the committee, deserved and occasionally even self-inflicted."

The report points out two major stumbling blocks to fundamental change at NASA: the unreliable space shuttle and the poorly conceived Freedom space station. It recommends a gradual phasing out of the first and a sweeping redesign of the second. Shuttles would be replaced largely by a fleet of heavy-lift rockets that would launch mainly robotic cargoes at first and then, after their reliability was vouchsafed, fly humans. The space station, the group says, should be stripped to more modest size and given the more narrowly defined objective of life science studies.

The committee welcomes NASA's ambitious environmental monitoring program, "Mission to Planet Earth," but isn't sure this is achievable without the enabling technologies—notably powerful new rocket engines. The report is critical of NASA's myopic vision of space technology in recent years and urges the agency to cast its net beyond the scientists and engineers at its own centers and to fish for fresh ideas in research universities, engineering schools and industry.

President Bush is said to like the report because the committee endorses the view that the long-term "magnet of the manned space program is the planet Mars." He also favors the committee's concept of "go as you pay" to get there—a concept that fiscal conservatives find less frightening than the present erratic funding scheme based on wish lists, given the cost estimate of more than $400 billion to reach Mars.

The Augustine report struck a responsive chord in Congress on at least the point of redesigning the space station to reduce costs, which have risen from the original $8 billion to nearly $38.3 billion. Appropriations committees in both houses of Congress told NASA last year to come up with a less expensive concept or they might jettison the project altogether. At the same time, the lawmakers eliminated NASA's request for $290 million to plan Moon–Mars voyages.

Unleashing opponents

The report also unleashed many scientists to challenge the space station for lacking scientific justification. Objections came from the Space Science Working Group, consisting mainly of academics, and from the American Geophysical Union and the Materials Research Society. All criticized the station as inadequate to fulfill its two principal scientific objectives of observing the effects of long periods in space on humans and studying the effects of microgravity on materials and chemicals. The council of The American Physical Society passed a resolution arguing for a vigorous space science program "without the proposed manned space station."

This position is also shared by the National Research Council's Space Sciences Board, under Lanzerotti's chairmanship. It issued a scathing indictment: "The board believes that neither the quantity nor the quality of research that can be conducted on the proposed station merits the projected investment." The board's seven-page position paper ends by declaring: "If the bulk of the microgravity research program planned for Freedom were removed, the station would then be devoted almost exclusively to life sciences research. The benefits of this action would be that (a) the *g*-level on the station would not have to be strongly controlled, thus resulting in significant cost savings, (b) some low-gravity experiments (*e.g.*, fluids handling and fire safety) could still be done on the space station and (c) the bulk of the microgravity program could be conducted using independent, more cost-effective facilities."

The space station has undergone several design changes in the past three years—often angering NASA's partners in Europe, Canada and Japan who are building logistics modules or research labs for the project. The latest redesign was revealed on 20 March, when Quayle, NASA Administrator Richard H. Truly and White House budget director Richard Darman delivered a new blueprint to key members of Congress. It outlines a space station shortened from 493 feet to 353 feet, with smaller research and living quarters. The station would be assembled in 23 to 26 flights (down from 34 in old plans). Astronauts would begin using the station during the last six to nine shuttle missions before it is ready for a permanent crew of four (half the number in earlier concepts) by the year 2000. The plan cuts the electrical power supply from 75 kW to 56.5 kW, which will reduce the station's research capabilities. Truly told lawmakers that under the new design Freedom will cost $8.3 billion less than the current estimate of $38.3 billion and that spending will remain within the $2.8 billion annual limit Congress imposed last fall.

Though he has had to lower NASA's aspirations to adjust to budget restraints and technology difficulties, Truly, a retired Navy admiral and former astronaut, still hopes to produce a station serving as "a research facility that will lead the way to sustained US leadership in space in the 21st century." Writing to Truly on 19 March, Quayle responded to the qualms of the scientific community. The argument based on scientific merit "is not entirely appropriate," Quayle wrote. In fact, "the ability of the space station to provide America with a unique research facility for microgravity and life sciences research is but *one* reason for building a space station. The most compelling reason . . . is that it is a necessary step to further American leadership in exploring space.... The importance of the space station is not the size of its span nor the power of its circuits; it is the size of the dream and the depth of the commitment it represents."

One measure of commitment is the amount of the government's funding. The Augustine committee proposes that "the NASA program be structured in scope so as not to exceed a funding profile containing approximately 10% real growth per year throughout the remainder of the decade and then remaining at that level." At 10% real growth, NASA's budget would double to $28 billion by 1999—a sum that seems unlikely in the current budget squeeze.

—Irwin Goodwin ■