A BRIEF HISTORY OF CONGRESSIONAL ACTIONS REGARDING THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI)

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This report is the writer's perspective on the political history of the scientific Search for Extraterrestrial Intelligence, particularly the NASA sponsored SETI effort.

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DEDICATION

To all the men and women, too many of whom are gone now, who worked so hard over all the years to begin the NASA study to detect other intelligent life in the Universe.

OBSERVATION

"It took only three years for one determined politician to offset thirty years of plans for NASA SETI. Fortunately, SETI is bigger than a single individual or group, and will go on because of its scientific merits and our curiosity about life elsewhere."

DR. LARRY LESYNA
FORMER CAL TECH INTERN
TO THE NASA SETI PROGRAM

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SUMMARY -- CONGRESSIONAL ACTIONS AND SETI

Listed below is the chronology of key Congressional actions affecting the NASA SETI program. Details are provided in the accompanying document.

1978	Proxmire gives SETI his Golden Fleece of the Month Award for February (2/16/1978)
FY82	Proxmire places an amendment on the Senate floor restricting any FY82 funds being spent on SETI (7/30/1981)
	The Proxmire amendment prevailed in the Joint House/Senate Conference on the FY82 budget (9/10/1981).
FY83	SETI's funding was restored for FY83 at the level of $1.5 million; NASA SETI R&D effort begins.
FY89	NASA SETI Microwave Observing Project (MOP) was *authorized* during the FY89 Congressional budget cycle, to receive $6.6 million; however, Congressional *appropriations* fell far short and SETI's level remained at $2.2 million and critical hardware/software development was postponed to FY90.
FY90	The NASA SETI MOP's FY90 funding level was $4.0 million.
FY91	Machtley and Conte successfully introduced a motion on the House floor removing all SETI funds from the FY91 House Appropriations bill (6/28/90)
	Joint House/Senate Conference Committee on Appropriations restored SETI funding, earmarking the $12.1 million for the SETI MOP in the FY91 NASA budget (9/10/1990). After NASA taxes, SETI got $11.5 million.

FY92	Bryan's amendment during Senate Authorization Subcommittee deliberations cut SETI's $14.5 million funding (5/14/1991)
	Joint House/Senate Conference restored SETI funding at $13.5 million.
	Following President Bush's proposed FY92 rescissions, Traxler's House Counter-Rescission Bill identified the SETI MOP for a $4 million cut.
	The actual rescission cut was $1.25 million, so SETI's actual funding in FY92 was $12.25 million.
FY93	Duncan first warned NASA about seeking funds for SETI (January 28, 1992), then later during House Authorization Committee deliberations, he successfully introduced an amendment to strike the $13.5 authorization for HRMS from the FY93 NASA bill (4/29/1992).
	Bryan succeeded in having an amendment passed in the Senate Authorization Committee which cut the HRMS $13.5 million funds (6/16/1992).
	The Senate Appropriations Subcommittee directed NASA to rename the project and to move it from life sciences into activities related to planetary exploration. The SETI MOP became the High Resolution Microwave Survey (HRMS). After NASA taxes, SETI received $13.5 million in FY93 funds.
10/12/1992	The NASA HRMS began initial observations on Columbus Day 1992 at Arecibo and Goldstone.
FY94	In initial Committee Hearings, Bryan warned NASA Administrator Goldin that he didn't like SETI in the FY94 NASA Budget. Then, just short of a year into the 10-year observing plan, Bryan introduced on the Senate floor an amendment, this time to the appropriations bill, to eliminate the HRMS program. The amendment passed by a vote of 77 to 23. (9/22/1993).
	The Joint House/Senate Conference Committee acceeded to the Bryan amendment, and the NASA HRMS project was terminated (10/1/1993).
	$1 million was allocated from FY94 funds to cover HRMS termination costs.

A BRIEF HISTORY OF CONGRESSIONAL ACTIONS REGARDING SETI

Overview

To fully comprehend the significance of Congressional activities and the Search for Extraterrestrial Intelligence (SETI), one must first understand SETI's beginnings in the scientific world and then within NASA. They are given in this overview, followed by a brief chronology of significant Congressional actions affecting SETI. Appended to this summary are pertinent documents cited in the text. To put things into their proper context when embarking on this historical journey, it is worth keeping in mind that U.S. Congressional actions regarding SETI occurred only in the last 20 years, and the question of whether we are alone in the Galaxy has been considered for millennia, by all cultures and many religions. It is also worth noting that through all the years during which SETI required federal approval, opposition was sporadic and only *five* Congressional members rose to oppose it. In fact, many Congressional members served as strong advocates for SETI over the years.

An understanding of how a small science program like SETI gets funded by Congress is essential (See App. #20.).* The process may involve ALL of the 100 U.S. Senators and the 435 members of the House of Representatives (e.g., in the case of a floor vote), or it may only involve one or more of the four Congressional subcommittees responsible for overseeing NASA's budget. First, it is important to understand the fundamental difference between authorizing and appropriations committees. In principle, the Congressional *authorizing* committees produce legislation in the form of authorization bills that are intended to set policy, establish federal agencies and programs, and recommend budgets at certain levels. The *appropriations* committees must enact legislation to appropriate the money. Often the committees do not agree on the same priorities. Thus a program can be "put on the books" by the *authorizing* committee; however, if funds are required, the program cannot proceed until a valid appropriation is enacted through the *appropriations* committees. Recently, it has happened that no authorizing legislation has been enacted, or it has been enacted *after* the appropriations legislation has been approved.

> *Authorizations*: In the current Senate, the "authorizations" for NASA are the responsibility of the *Subcommittee on Science, Technology and Space* of the Committee on Commerce, Science and Transportation. In the House they are the responsibility of the *Subcommittee on Space* of the Committee on Science, Space and Technology.
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> *Appropriations*: In the Senate and the House, the *appropriations* functions for NASA are the responsibility of the *Subcommittee on Veterans Affairs, Housing and Urban Development and Independent Agencies* of their respective Committees on Appropriations.
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> *Conference Committees*: Joint Conference Committees are convened to resolve differences between measures passed by the Senate and the House. These decisions are incorporated into the final bill that is passed on both floors and sent to the President for signature.

* This was the system as of 1993, after which SETI dropped from the Federal funding cycle.

Government employees are prohibited by law from contacting the elected members of Congress or their staffs to explain their programs and to solicit support (such actions are interpreted as lobbying). Instead, they can be called to testify or to brief individual members, committees, or the full houses on any matters the Congressional members deem to be important. Opportunities for scientific experts or the general public to participate in the work of budget committees and appropriations committees and their associated hearings are limited. Outside or public witnesses presenting expert testimony are rare. Congressional hearings typically begin in February, after the President submits the budget to the Congress, and often continue through May and June. Floor action on legislation takes place during July and August. The definition of the Federal Fiscal Year calls for all actions on appropriations bills to be completed in time for presidential signature by September 30 of each year — although in recent years it rarely happens by that date.

Being unable to present factual information to the Congressional members who cast the critical votes has been extremely frustrating for many years to those involved in governmental science programs such as SETI. It is important to assure that the appropriate Subcommittee members are well informed, if possible. However, it is *impossible* to fully brief all 100 Senators and 435 members of the House; and the inability to do so means *any* program can be an easy target for a headline-seeking Congressional member who chooses to propose an amendment on either Congressional floor, which is then acted upon by an uninformed Congressional body. Further, Congressional members often focus on "what's in it" for constituents in their state; they're interested in what gets them votes. Unfortunately, most scientific programs having importance for the entire nation (and even for all people in the World) may have no chance of survival in the Congressional budget process because their constituency base may be limited to one or two states. In the case of SETI, add to this dilemma the "giggle factor" so easily paraded via tabloid newspaper headlines by publicity seeking Congressional members. Good science, without a strong industrial or university lobby, often has only a small chance of getting through the budget process unscathed.

SETI's Beginnings

As the 1900's draw to a close, the idea of life on other worlds has become commonplace through science fiction stories and movies such as "ET" and "Star Trek." The actual proof of its existence is one of the most challenging explorations of our species. In this century Earthlings have watched in amazement as our sophisticated telescopes finally probed the outer reaches of our Solar System, our Galaxy, and the edges of the Universe itself. The Milky Way Galaxy is made up of hundreds of billions of stars, and there are hundreds of billions of galaxies in the observable Universe. Thus, the possible number of life sites is immense; however the distance between stars is vast. Science fiction stories aside, the facts are that there will be no travel to the stars in our day — if ever.

So, how will we know if anyone is out there? Experts have reasoned that Earthlings may not be able to travel the distances to other stars and planetary systems because of the enormous resources and time required for a round-trip. But *knowledge* can travel through interstellar space at the speed of light. In fact, in recent decades the advent of digital signal processing and ever more powerful computer technology has, for the first time in Earth's history, provided the means to detect intelligence elsewhere. The modern era had its immediate origins in the development of radio astronomy and the recognition of the distinctive properties of electromagnetic radiation traveling through

space. In 1931 Karl Jansky discovered the existence of radio waves coming from the direction of the center of our Galaxy. Years passed, though, before Giuseppe Cocconi and Philip Morrison published their landmark paper in the September 1959 issue of *Nature*, entitled "Searching for Interstellar Communications." Their paper suggested that of the whole electromagnetic spectrum, the best wavelengths for interstellar communication were in the microwave region (1 to 10 GHz). Specifically, they recommended the hydrogen line at 21 cm. (This was a Mecca for radio astronomers at that time.).

(see App. #1, Cocconi and Morrison paper)

Working independently at the National Radio Astronomy Observatory (NRAO) in Green Bank, West Virginia, Frank Drake was developing equipment to search for interstellar communication when Cocconi and Morrison's article appeared in *Nature*. Drake named his project "Ozma", because it was searching for exotic beings far away. Project Ozma began on April 8, 1960, and the single channel search of the solar-type stars Tau Ceti and Epsilon Eridani lasted 200 hours. His search revealed no evidence of extraterrestrial intelligence (and considering the technology then, he understands today why it was unlikely to succeed at that time). But together with the paper of Cocconi and Morrison, Drake's experiment raised many questions, and demonstrated the challenges inherent in such a search.

There followed in November 1961, a meeting sponsored by the National Academy of Sciences held at the NRAO in Green Bank. The meeting was chaired by Otto Struve of NRAO and, in addition to pioneers Morrison and Drake, the attendees included astronomers Su-Shu Huang and Carl Sagan, biochemist Melvin Calvin, dolphin specialist John C. Lilly, electrical engineer Bernard M. Oliver, D.W. Atchley who had supplied equipment for Project Ozma, and J.P.T. Pearman of the Academy staff who played a catalytic role in organizing the meeting. The purpose of the meeting was to examine the prospects for the existence of other societies in the Galaxy with whom communications might be possible. It was at this meeting that Frank Drake wrote the agenda on the board, which has become known as the "Drake Equation". The Green Bank conference provided the endorsement by this body of experts to the theory of Cocconi and Morrison, and the observational approach of Drake.

(see App. #2 -- Drake Equation and description)

Ten years later an international meeting was held at Byurakan, organized by the National Academies of Science of the United States and the Soviet Union. The Drake equation was the organizing principle for the 1971 meeting, and attendees represented a wide variety of disciplines and included 15 Americans, 28 Soviets, and 4 from other nations.

(reference *Intelligent Life in the Universe*, edited by Shklovskii and Sagan, 1971)

SETI's Beginnings in NASA

In the 1960's, the Life Sciences Laboratory at NASA Ames Research Center in California had carried out experiments on the origin of life in our planetary system. The search for an understanding of the origin of life led to the realization that life should be common in the universe, which subsequently led to NASA's first publicly expressed interest in SETI. In the summer of 1970, a series of NASA-sponsored lectures on cosmic evolution was held at NASA's Ames Research Center in California. The lectures were organized by John Billingham, a

physician who headed the Biotechnology Division at Ames and who was intrigued with the prospect of interstellar communication.

Several early pioneers participated in the summer series, one of whom was Bernard Oliver (who had attended the Green Bank meeting). The following year Oliver was sufficiently interested in the topic to take a leave of absence from his duties as Vice President for Research and Development at Hewlett-Packard to lend his technical leadership to the NASA/Stanford/American Society of Engineering Education summer faculty fellowship program held at Ames Research Center in the summer of 1971. The resulting engineering design study, Project Cyclops, addressed the technical challenges and search strategies, as well as the probability of life in the Universe. It concluded that the search for extraterrestrial intelligence should be established "as an ongoing part of the total NASA space program, with its own funding and budget."

(reference *Project Cyclops* report, edited by B.M. Oliver and J. Billingham, NASA CR-114445, 1972)

Toward this end, in late 1972 a Committee on Interstellar Communication was formed at NASA's Ames Research Center, under the chairmanship of Billingham. As a result of the Billingham group's proposals and briefings, in August, 1974, NASA agreed to provide $140K to Ames to conduct an Interstellar Communication Feasibility Study. Billingham was named Chief of the newly established Interstellar Communication Study Office at Ames in 1975, and Philip Morrison (now Institute Professor and Professor of Physics at MIT) accepted Billingham's invitation to chair a series of SETI workshops over the next two years. The workshops concluded that:

> *"It is particularly appropriate for NASA to take the lead in the early activities of a SETI program. SETI is an exploration of the Cosmos, clearly within the intent of legislation that established NASA in 1958. SETI overlaps and is synergistic with long-term NASA programs in space astronomy, exobiology, deep space communication and planetary science. NASA is qualified technically, administratively, and practically to develop a national SETI strategy based on thoughtful interaction with both the scientific community and beyond to broader constituencies."*
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> (reference *SETI Report*, edited by P.M. Morrison, J. Billingham and J. Wolfe, NASA SP 419, 1977)

For the next few years, NASA scientists at both Ames Research Center and the Jet Propulsion Laboratory (JPL) at Pasadena, California, studied the SETI challenge, and proposed various search strategies for detecting extraterrestrial intelligence. NASA continued to provide a small level of funding for the study phase at both Centers.

CONGRESSIONAL ACTIONS

Proxmire's Golden Fleece - 1978

On February 16, 1978, an unbriefed Senator William Proxmire (DWI) announced:

> "I am giving my Golden Fleece of the Month award for February to the National Aeronautics and Space Administration, which, riding the wave of popular enthusiasm for 'Star Wars' and 'Close Encounters of the

In the interim for FY82, SETI was funded by FY81 carryover funds. NASA accepted Proxmire's invitation, and returned to Congress for full funding for SETI in FY83. NASA was supported by a report of the National Academy of Sciences that recommended SETI as one of seven moderate programs that NASA should implement (see App. #22). Senators Proxmire and Jake Garn (R-UT) submitted questions to NASA regarding SETI. Having become more knowledgeable about the SETI program during this year, Proxmire muted his criticisms. After further Congressional review, SETI's funding was restored for FY83 at the level of $1.5 million.

(reference *Astronomy and Astrophysics for the 1980's,* report of the National Research Council, National Academy of Science, 1982)

(see App. #7 -- NASA's responses to Congressional Questions about SETI, 6/82)

With resumption of funding, the NASA SETI R&D effort started in 1983, and continued through 1987 at an annual funding level of $1.5 to $2.2 million. The R&D phase progressed to the point that in 1988, NASA proposed to implement the 10-year observational phase of the program to detect evidence of extraterrestrial intelligence. The NASA SETI Microwave Observing Project was *authorized* during the FY89 Congressional budget cycle, and it was scheduled to receive $6.6 million (a $4.4 million augmentation above the former R&D baseline) to begin the equipment development and testing phase. However the FY89 Congressional budget *appropriations* for the NASA Life Sciences fell far short of the request. Therefore, SETI's funding level was held at $2.2 million with no augmentation, and the actual system hardware/software development was postponed to FY90.

The FY90 SETI budget profile was adjusted for inflation and the budget request was for $6.8 million. Although approved by Congress, SETI's budget was reduced by NASA to $4.0 million, again due to a shortfall in the NASA Life Sciences Budget.

Machtley and Conte - FY91 Budget

The NASA SETI program was again stunned when on June 28, 1990, with almost no warning, Reps. Ronald Machtley (R-RI) and Silvio Conte (R-MA) successfully introduced a motion on the floor of the House of Representatives which removed all funding for the NASA SETI program from the FY91 House appropriations bill for NASA. The SETI project was again attacked by non-briefed Congressmen. As Frank Drake summarized it, "The actual event is an embarrassment to our way of government (all that took place is recorded in the Congressional Record). Machtley introduced his amendment primarily as a money-saving step, and his discussion of the scientific aspects of the project show that he actually had not determined what the project was, nor does he understand very basic astronomy. Conte attempted to ridicule the project through a more naive, lengthy, and actually irrelevant discussion. Only a few members of the House were present, and they acceded to the proposed amendment without any serious discussion whatsoever." Conte's question, "can we afford curiosity?" is spine-chilling to the country's researchers.

(see App. #8 -- Congressional Record - House, H4356-9, 6/28/90)

Fortunately the nature of SETI was more fully understood by the Congressional Committees responsible for administering the NASA funds. Committee members had done their homework via briefings and informational

meetings between Congressional staffers and knowledgeable SETI scientists. In particular, during the FY91 budget deliberations, SETI enjoyed strong support from Senator Garn, the Minority Chair of the Senate Appropriations Subcommittee on VA, HUD and Independent Agencies. The Subcommittee Chair, Senator Barbara Mikulski (D-MA) was also becoming informed and supportive. Nowhere is the Committee's understanding of SETI more clearly stated than in the Senate's Report of the FY91 NASA Bill, when the Committee restored SETI's full budget request, and stated:

> *"In recommending the full budget request of $12,100,000* for the SETI program, the Committee reaffirms its support of the basic scientific merit of this experiment to monitor portions of the radio spectrum as an efficient means of exploring the possibility of the existence of intelligent extraterrestrial life. While this speculative venture stimulates widespread interest and imagination, the Committee's recommendation is based on its assessment of the technical and engineering advances associated with the development of the monitoring devices needed for the project and on the broad educational component of the program. The fundamental character of the SETI program provides unique opportunities to explain principles of such scientific disciplines as biology, astronomy, physics, and chemistry, in addition to exposing students to the development and application of microelectronic technology."*

SETI's Life in the Universe curriculum development project (begun in 1991 with a grant from the National Science Foundation) struck a positive cord with Senator Mikulski and others, who recognized the value of this educational project – it turned out to be timely since this emerged when NASA was encouraging programs to look for effective, worthwhile "spin-offs." In truth, SETI had proven itself to be a bona-fide NASA science project, and the informed Congressional members agreed that it was worthy of funding. After NASA taxes, the SETI program received $11.5 million in FY91.

(see App. #9 -- Senate Report 101-474, to accompany H.R. 5158, September 10, 1990)

Bryan - FY92 Budget

As the R&D phase of SETI continued in earnest, pot-shotting SETI began to take on the look of a Congressional gambit. As outlined in the original SETI Microwave Observing Project plan, NASA had requested a peak level of funding for FY92 ($14.5 million) to procure hardware and software, and to prepare for the initial deployment of the NASA SETI systems on Columbus Day, 1992. In mid-May 1991, freshman Senator Richard Bryan (D-NV), during Senate Authorization Committee deliberations on the FY92 NASA budget, introduced an amendment to "Cut $14.5 Million Martian Hunt," thereby terminating the funding for SETI. Senator John D. Rockefeller, IV (D-WV) demanded to be on record against Bryan's amendment, but no debate was possible and the amendment passed due to a rush in proceedings brought about by a roll-call vote on another matter.

(see App. #10 -- Bryan's Press Release, May 14, 1991)

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* The important point in this wording is that these funds were "fenced" and could not be raided by NASA Life Sciences for other projects.

George Knapp, a Las Vegas reporter, wrote of his surprise and disappointment with Bryan's action:

> *"Bryan referred to SETI as a 'search for Martians.' This remark generated a few headlines and several chuckles and it was politically risk-free. After all, there is no Martian lobby to raise a big stink. Scientific types aren't likely to march on Capitol Hill or fund an anti-Bryan PAC. However, there are plenty of serious, well-educated people out there who think that Bryan couldn't be more wrong on this question. We're not talking about UFOs here, and we're certainly not talking about 'Martians.' SETI is good science, a serious, straightforward science project that will have profound effects on all humans even if no evidence of extraterrestrial intelligence is ever found. Bryan's 'Martian' remark is a cheap laugh at the expense of accuracy."*
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> *(see App. #11 -- Las Vegas Sun article, May 19, 1991)*

Bryan's press release made the point that his amendment was only one step in the long process, and that attempts could be made to restore funding somewhere along the way. That did in fact happen when the informed Committee members addressed the issue, and in Joint Conference Committee SETI's funding was restored at $13.5 million for FY92.

Traxler - FY92 Budget

In early 1992, NASA/SETI learned of another unexpected threat to the FY92 funding. In an attempt to cut federal spending, President George Bush sent Congress a list of proposed "rescissions," or spending cuts to the FY92 budget. This created a political battle wherein Congress developed its own hit list. SETI was not mentioned in the President's list, but in the House Counter-Rescission Bill (April 1992) the SETI Microwave Observing Project was named for a $4 million cut. This was especially disappointing since, by that time, several members of the House Appropriations Subcommittee were very familiar with (and generally supportive of) SETI; e.g., Rep. Bill Green (RNY), the Minority Chair of the Subcommittee; Rep. Alan B. Mollohan (D-WV); and Rep. Jim Chapman (DX); as well as Rep. Jerry Lewis (R-CA), a member on the full Appropriations Committee.

The actual rescissions cut $1.25 million from SETI's appropriation, so the FY92 budget allocation for SETI was $12.25 million.

Duncan - FY93 Budget

During a one-minute address to the House on January 28, 1992, Rep. John Duncan, Jr. (R-TN) issued a warning to NASA in response to an Associated Press article that he had seen about "setting up some SETI equipment in the Mojave Desert to look for space aliens." He spoke in strong objection to the project and felt the money could be better spent taking care of poor people and on education. He had no background on SETI. The Record shows that Duncan has a record of rising to speak in opposition of many issues.

(see App. #12, Congressional Record - House, January 28, 1992)

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During House Authorization Committee deliberations on April 29, 1992, Rep. Duncan followed up the January warning by introducing an amendment on the floor of the House to strike the $13.5 million authorization for SETI from the FY93 NASA bill.

(see App. #13, Duncan's Press Release, April 29, 1992)

The amendment was strongly and eloquently opposed on the House floor by the Chairman of the House Committee on Science, Space and Technology, Rep. George Brown, Jr. (D-CA); by the Minority Chair, Rep. Robert Walker (R-PA); and by Rep. Norman Mineta (D-CA), a member of the Committee and a steadfast SETI supporter. Unfortunately, the hour was late, only a handful of people were on the floor, and the amendment passed.

(see App. #14 -- excerpts from House proceedings on H.R. 4364, the FY 93 NASA Authorization Bill,
legislative day April 29, 1992;
and Congressional Record - House, H2779-81, April 29, 1992)

A letter was sent to Rep. Traxler on June 4, 1992 by other SETI supporters in the House (Reps. Leon Panetta, David McCurdy, Norman Y. Mineta and George Brown, Jr.), urging that funding be maintained "for this exciting and worthwhile scientific endeavor."

(see App. 15 -- letter to Rep. Traxler, dated June 4, 1992

Bryan - FY93 Budget

11-6 vote

On June 16, 1992, Senator Bryan succeeded in having am amendment passed in the Senate Authorization Committee which cut from the FY93 budget the SETI funds ($13.5 million). Bryan's press release noted that he was successful in deleting funding for the SETI program during a Commerce Committee mark-up the previous year (FY92), only to see the funding restored by the conference Committee.

(see App. #16 – Congressional vote count on Bryan's Amendment and Bryan's Press Release, June 16, 1992)

Informed heads again prevailed, and the Joint House/Senate Conference Committee restored MOP funding to $13.7 for FY93 (the SETI MOP actually received $13.5 million after NASA taxes). Senator John D. Rockefeller IV (D-WV) entered into the Record a written statement supportive of SETI.

(see App. #17 -- Rockefeller's Statement, June 16, 1992)

The Senate Appropriations Subcommittee (with Senators Mikulski and Garn serving as Chair and Ranking Minority Member), directed NASA to rename the project and to move it from the Life Sciences to activities related to planetary exploration. Hence SETI had a new name (the SETI MOP became the High Resolution Microwave Survey). and a new home. (Many of the SETI team members were apprehensive of this change, feeling it could be mistakenly construed as an evasive action; but had no voice in the accomplished fact.)

AT LONG LAST! On Columbus Day in 1992, SETI's HRMS was initiated. Ames was the lead Center for the NASA HRMS project, and Project Manager David Brocker gave the go-ahead for the simultaneous initiation of the Ames' Targeted Search at the Arecibo Observatory in Puerto Rico, and JPL's Sky Survey at NASA's Goldstone Deep Space Tracking Network in California.

Bryan - FY94 Budget

Just short of a year into the 10-year observing program, on September 22, 1993, Bryan once again introduced an amendment to the appropriations bill, this time on the Senate floor, eliminating the proposed $12.3 million HRMS funding. Co-sponsors of Bryan's bill were Senators John Kerry (D-MA), Harris Wofford (D-PA), Dale Bumpers (D-AR), and Jim Sasser (D-TN).

(see App. #18 -- Bryan's Press Release, September 22, 1993)

Bryan complained that "...At the same time that legislation was moving forward to eliminate the SETI program [during the FY93 process], its supporters in NASA and some Members of Congress were moving to protect the program. By the time Congress enacted Public Law 102-588, the NASA authorization which prohibited spending for SETI, the program had been renamed and buried deep in the NASA bureaucracy."

However, later in the same session, Senate Appropriations Subcommittee Chair Barbara Mikulski set the record straight when, during her comments in opposition to the amendment, she said, "...Last year we stipulated to NASA that the formal SETI project should be renamed and taken out of the life sciences portion of their budget. Instead it should be included in the activities related to planetary exploration, because that is really what it was about."

(see App. #19 -- Excerpts from the Congressional Record - Senate, September 22, 1993, relating to the issue of renaming the SETI project)

Even with Mikulski's strong opposing statement and an equally strong opposing statement from the Minority Chair, Sen. Phil Gramm, Bryan remained unconvinced and insisted on passage of the amendment. Mikulski's motion to table Bryan's amendment failed on the Senate floor by a vote of 77 to 23. Bryan's amendment was subsequently agreed to by voice vote.

(see App. #20 – Congressional Record S-12000 and S-12151-4, September 22, 1993; and vote on Sen. Mikulski's motion to table Sen. Bryan's amendment to cut SETI)

The Joint House/Senate Conference Committee met on October 1, 1993. Mindful of Bryan's action in the Senate, Rep. Norman Mineta (D-CA) had launched a vigorous campaign to have HRMS funding restored in Conference. However, in spite of her strong personal support for HRMS, Senator Mikulski felt bound by the Senate vote, and the NASA HRMS project was terminated.

(see App. #21 – Joint House/Senate Conference Report 103-273 to accompany H.R. 2491, dated October 4, 1993)

One million dollars of FY94 funds were provided by Congress to pay for the costs involved in the HRMS termination. NASA provided an additional $1 million from FY93 funds, in recognition that the real termination costs would substantially exceed the funds which the Congress had provided.

(See App. #22 -- "Is It True That We Can't Afford Curiosity? The Search for ExtraTerrestrial Intelligence: A Case Study" by Jill C. Tarter (1994).

SETI's New Chapter

When Congressional funding for the NASA HRMS was terminated, the non-profit SETI Institute in Mountain View, California, began a campaign to raise private gifts to continue the targeted search portion of the program.* The first phase funding requirement was $7.3 million to carry the project from October 1993 through June 1995, to allow Southern Hemisphere observations to be conducted at the Parkes Observatory in Australia the first half of 1995. Follow-on observations would be scheduled at such sites as the National Radio Astronomy Observatory in Green Bank, West Virginia, the Arecibo Observatory in Puerto Rico, and the Nancay Observatory in France. This private effort became known as "Project Phoenix" as it arose from the ashes of the former Federal project. By mid-1994, the first phase funding for Project Phoenix had been secured, thanks to the major support of technical industry leaders such as David Packard and Bill Hewlett (co-founders of Hewlett Packard Company), Paul Allen (co-founder of Microsoft), Gordon Moore (co-founder of Intel), and Mitch Kapor (founder of Lotus Development Corporation). People from many walks of life also donated to the effort with smaller gifts ranging from $5 to $5,000. As this paper is being written, the SETI Institute is half-way to its near-term goal of raising operating funds of $4 million/year to carry Project Phoenix from 1995 through to the year 2000.

Project Phoenix, although the largest by far, is only one of several existing SETI observational programs underway at this time. Other programs are being conducted by the Planetary Society, Ohio State University, and the University of California-Berkeley. Over the past 30 years, more than 60 known SETI searches have been conducted, most of them being for very limited periods of time, at limited frequencies, and with limited sensitivity. As Frank Drake says, "The searches thus far should NOT have been successful because they were neither powerful enough nor sensitive enough." That was the reason for the development of the SETI/HRMS system that was deployed by NASA on Columbus Day in 1992. As John Billingham said at that time, "This search is millions of times more powerful than all previous searches combined. In terms of the amount of search volume covered, we will have overtaken the sum of all previous searches in the first few minutes of our observations." The NASA HRMS Targeted Search observed only for a couple of months during its 1992 field tests. Starting in January 1995, Project Phoenix reassumed the mantle of conducting a major search.

The cancellation of the NASA SETI program by Congress only a year into its 10-year observing program was especially disheartening because over $75 million of the public's money had already been invested over the years (since 1975) developing the SETI strategies and equipment. With the hardware and software developed and in field test, it would have cost each American taxpayer only 5 to 10 cents *per year* to finish the design upgrades and carry out the planned search.

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* With the Congressional action of October 1993, all work on the NASA HRMS program was terminated by Ames Research Center and the Jet Propulsion Laboratory. The Sky Survey was abandoned because it relied entirely on using NASA observing sites. The Targeted Search was viable because of the long-term loan of equipment to the SETI Institute by NASA and a commitment of observing time at major national facilities.

SETI and the Public

SETI has enjoyed good press coverage from responsible members of the media. The topics of SETI and Life in the Universe have dramatic educational appeal, and the SETI Institute has developed curriculum modules for grades 3 through 9 which are drawing rave reviews across the country. Opinion polls have shown over the years that a growing number of the public believe there is life elsewhere, and that we should try to detect it.

(see App. #23, Key Points regarding Media Interest, Education and Poll Information, 6/93)

In spite of the above chronicled funding problems, SETI received strong support from numerous Congressional members over the years.

(see App. #24, A Sampling of Congressional Quotes in Recent Years Regarding SETI)

SETI's technology underwent reviews and received strong endorsements by several major scientific groups.

(see App. #25, SETI Reviews and Endorsements by the National Academy of Sciences)

The editor gratefully acknowledges the valuable resources provided in the following publications:

- "The Search for Extraterrestrial Intelligence and the NASA High Resolution Microwave Survey (HRMS): Historical Perspectives", by Steven J. Dick, in *Space Science Reviews* **64**: 93-139, Kluwer Academic Publishers, Belgium (1993)."
- "*Working With Congress: A Practical Guide for Scientists and Engineers*", by William G. Wells, Jr., American Association for the Advancement of Science Publication 92-31S (1992)

This historical summary was compiled by Vera Buescher of the SETI Institute. Additional information about Project Phoenix may be obtained by writing to the SETI Institute, 2035 Landings Drive, Mountain View, California 94043.

Appendix 1

20

Giuseppe Cocconi and Philip Morrison

Searching for Interstellar Communications

No theories yet exist which enable a reliable estimate of the probabilities of (1) planet formation; (2) origin of life; (3) evolution of societies possessing advanced scientific capabilities. In the absence of such theories, our environment suggests that stars of the main sequence with a lifetime of many billions of years can possess planets, that of a small set of such planets two (Earth and very probably Mars) support life, that life on one such planet includes a society recently capable of considerable scientific investigation. The lifetime of such societies is not known; but it seems unwarranted to deny that among such societies some might maintain themselves for times very long compared to the time of human history, perhaps for times comparable with geological time. It follows, then, that near some star rather like the Sun there are civilizations with scientific interests and with technical possibilities much greater than those now available to us.

To the beings of such a society, our Sun must appear as a likely site for the evolution of a new society. It is highly probable that for a long time they will have been expecting the development of science near the Sun. We shall assume that long ago they established a channel of communication that would one day become known to us, and that they look forward patiently to the answering signals from the Sun which would make known to them that a new society has entered the community of intelligence. What sort of channel would it be?

The Optimum Channel

Interstellar communication across the galactic plasma without dispersion in direction and flight-time is practical, so far as we know, only with electromagnetic waves.

Since the object of those who operate the source is to find a newly evolved society, we may presume that the channel used will be one that places a minimum burden of frequency and angular discrimination on the detector. Moreover, the channel must not be highly attenuated in space or in the Earth's atmosphere. Radio frequencies below ~1 Mc./s., and all frequencies higher than molecular absorption lines near 30,000 Mc./s., up to cosmic-ray gamma energies, are suspect of absorption in planetary atmospheres. The band-widths which seem physically possible in the near-visible or gamma-ray domains demand either very great power at the source or very complicated techniques. The wide radio-band from, say, 1Mc. to 10^4 Mc./s., remains as the rational choice.

In the radio region, the source must compete with two backgrounds: (1) the emission of its own local star (we assume that the detector's angular resolution is unable to separate source from star since the source is likely to lie within a second of arc of its nearby star); (2) the galactic emission along the line of sight.

Let us examine the frequency dependence of these backgrounds. A star similar to the quiet Sun would emit a power which produces at a distance R (in metres) a flux of:

$$10^{-15} f^2/R^2 \quad \text{W.m.}^{-2}\text{(c./s.)}^{-1}$$

If this flux is detected by a mirror of diameter l_d, the received power is the above flux multiplied by l_d^2.

The more or less isotropic part of the galactic background yields a received power equal to:

$$\frac{10^{-12.5}}{f}\left(\frac{\lambda}{l_d}\right)^2 (l_d)^2 \quad \text{W.(c./s.)}^{-1}$$

where the first factor arises from the spectrum of the galactic continuum, the second from the angular resolution, and the third from the area of the detector. Thus a minimum in spurious background is defined by equating these two terms. The minimum lies at:

$$f_{\text{min.}} \approx 10^4 \left(\frac{R}{l_d}\right)^{0.4} \quad \text{c./s.}$$

With $R = 10$ light years $= 10^{17}$ m. and $l_d = 10^2$ m., $f_{\text{min.}} \approx 10^{10}$ c./s.

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The source is likely to emit in the region of this broad minimum.

At what frequency shall we look? A long spectrum search for a weak signal of unknown frequency is difficult. But, just in the most favoured radio region there lies a unique, objective standard of frequency, which must be known to every observer in the universe: the outstanding radio emission line at 1,420 Mc./s. ($\lambda = 21$ cm.) of neutral hydrogen. It is reasonable to expect that sensitive receivers for this frequency will be made at an early stage of the development of radio-astronomy. That would be the expectation of the operators of the assumed source, and the present state of terrestrial instruments indeed justifies the expectation. Therefore we think it most promising to search in the neighborhood of 1,420 Mc./s.

Power Demands of the Source

The galactic background around the 21-cm. line amounts to:

$$\frac{dW_b}{dS\ d\Omega\ df} \approx 10^{-21.5}\ \text{W.m.}^{-2}\ \text{ster.}^{-1}\ (\text{c./s.})^{-1}$$

for about two-thirds of the directions in the sky. In the directions near the plane of the galaxy there is a background up to forty times higher. It is thus economical to examine first those nearby stars which are in directions far from the galactic plane.

If at the source a mirror is used l_s metres in diameter, then the power required for it to generate in our detector a signal as large as the galactic background is:

$$\frac{dW_s}{df} = \frac{dW_b}{dS\ d\Omega\ df}\left(\frac{\lambda}{l_s}\right)^2 \frac{\lambda}{l_d} R^2$$
$$= 10^{-24.2}\, R^2/l_s^2 l_d^2 \quad \text{W.(c./s.)}^{-1}$$

For source and receiver with mirrors like those at Jodrell Bank ($l = 80$ m.), and for a distance $R \simeq 10$ light years, the power at the source required is $10^{2.2}$ W.(c./s.)$^{-1}$, which would tax our present technical possibilities. However, if the size of the two mirrors is that of the telescope already planned by the U.S. Naval Research Laboratory ($l = 200$ m.), the power needed is a factor of 40 lower, which would fall within even our limited capabilities.

We have assumed that the source is beaming towards all the sun-like stars in its galactic neighbourhood. The support of, say, 100 different beams of the kind we have described does not seem an impossible burden on a society more advanced than our own. (Upon detecting one signal, even we would quickly establish many search beams.) We can then hope to see a beam toward us from any suitable star within some tens of light years.

Signal Location and Band-Width

In all directions outside the plane of the galaxy the 21-cm. emission line does not emerge from the general background. For stars in directions far from the galactic plane search should then be made around that wavelength. However, the unknown Doppler shifts which arise from the motion of unseen planets suggest that the observed emission might be shifted up or down from the natural co-moving atomic frequency by $\pm\sim 300$ kc./s. (± 100 km.s.$^{-1}$). Closer to the galactic plane, where the 21-cm. line is strong, the source frequency would presumably move off to the wing of the natural line background as observed from the direction of the Sun.

So far as the duration of the scanning is concerned, the receiver band-width appears to be unimportant. The usual radiometer relation for fluctuations in the background applies here, that is:

$$\frac{\Delta B}{B} \propto \sqrt{\frac{1}{\Delta f_d\, \tau}}$$

where Δf_d is the band-width of the detector and τ the time constant of the post-detection recording equipment. On the other hand, the background accepted by the receiver is:

$$B = \frac{dW_b}{df}\Delta f_d \quad \text{and} \quad \tau \propto \frac{\Delta f_d}{(\Delta B)^2}$$

If we set ΔB equal to some fixed value, then the search time T required to examine the band F within which we postulated the signal to lie is given by:

$$T = \frac{F\tau}{\Delta f_d} \propto \frac{F}{(\Delta B)^2}$$

independent of receiver band-width Δf_d.

Of course, the smaller the band-width chosen, the weaker the signal which can be detected, provided $\Delta f_d \geqslant \Delta f_s$. It looks reasonable for a first effort to choose a band-width Δf_d normal in 21 cm. practice, but an integration time τ longer than usual. A few settings should cover the frequency range F using an integration time of minutes or hours.

Nature of the Signal and Possible Sources

No guesswork here is as good as finding the signal. We expect that the signal will be pulse-modulated with a speed not very fast or very slow compared to a second, on grounds of band-width and of rotations. A message is likely to continue for a time measured in years, since no answer can return in any event for some ten years. It will then repeat, from the beginning. Possibly it will contain

different types of signals alternating throughout the years. For indisputable identification as an artificial signal, one signal might contain, for example, a sequence of small prime numbers of pulses, or simple arithmetical sums.

The first effort should be devoted to examining the closest likely stars. Among the stars within 15 light years, seven have luminosity and lifetime similar to those of our Sun. Four of these lie in the directions of low background. They are τ Ceti, o_2 Eridani, ϵ Eridani, and ϵ Indi. All these happen to have southern declinations. Three others, α Centauri, 70 Ophiuchi and 61 Cygni, lie near the galactic plane and therefore stand against higher backgrounds. There are about a hundred stars of the appropriate luminosity among the stars of known spectral type within some fifty light years. All main-sequence dwarfs between perhaps $G0$ and $K2$ with visual magnitudes less than about $+6$ are candidates.

The reader may seek to consign these speculations wholly to the domain of science-fiction. We submit, rather, that the foregoing line of argument demonstrates that the presence of interstellar signals is entirely consistent with all we now know, and that if signals are present the means of detecting them is now at hand. Few will deny the profound importance, practical and philosophical, which the detection of interstellar communications would have. We therefore feel that a discriminating search for signals deserves a considerable effort. The probability of success is difficult to estimate; but if we never search, the chance of success is zero.

Appendix 2

THE DRAKE EQUATION

How can we estimate the number of technological civilizations that might exist among the stars? While working as a radio astronomer at the National Radio Astronomy Observatory in Green Bank, West Virginia, Dr. Frank Drake (now President of the SETI Institute) conceived an approach to bound the terms involved in estimating the number of technological civilizations that may exist in our galaxy. The Drake Equation, as it has come to be known, was first presented by Drake in 1961 and identifies specific factors thought to play a role in the development of such civilizations. Although there is no unique solution to this equation, it is a generally accepted tool used by the scientific community to examine these factors. The equation is usually written:

$$N = R_* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

Where,

N = The number of civilizations in The Milky Way Galaxy whose radio emissions are detectable

R_* = The rate of formation of stars suitable for the development of intelligent life

f_p = The fraction of those stars with planetary systems

n_e = The number of planets, per solar system, with an environment suitable for life

f_l = The fraction of suitable planets on which life actually appears

f_i = The fraction of life bearing planets on which intelligent life emerges

f_c = The fraction of civilizations that develop a technology that releases detectable signs of their existence into space

L = The length of time such civilizations release detectable signals into space

Within the limits of our existing technology, any practical search for distant intelligent life must necessarily be a search for some manifestation of a distant technology. A search for extraterrestrial radio signals has long been considered the most promising approach by the majority of the scientific community. Besides illuminating the factors involved in such a search, the Drake Equation is a simple, effective tool for stimulating intellectual curiosity about the universe around us, for helping us to understand that life as we know it is the end product of a natural, cosmic evolution, and for making us realize how much we are a part of that universe. A key goal of the SETI Institute is to further high quality research that will yield additional information related to any of the factors of this fascinating equation.

Appendix 3

2-16-78 Una

OFFICE OF

SENATOR WILLIAM PROXMIRE

WISCONSIN

FOR RELEASE AFTER 8:30 A.M. THURSDAY, FEBRUARY 16, 1978

Senator William Proxmire (D-Wis) said Thursday "I am giving my Golden Fleece of the Month award for February to the National Aeronautics and Space Administration, which, riding the wave of popular enthusiasm for 'Star Wars' and 'Close Encounters of the Third Kind,' is proposing to spend $14 to $15 million over the next seven years to try to find intelligent life in outer space. In my view, this project should be postponed for a few million light years."

The Golden Fleece of the Month Award is given for the biggest, most ironic or most ridiculous example of wasteful spending for the month. Proxmire is Chairman of the Senate Banking, Housing and Urban Affairs Committee and of the Senate Appropriations Subcommittee which has jurisdiction over NASA funds.

"NASA is proposing to pay $2 million this year and $14 to $15 million over the next seven years to Pasadena, California's, Jet Propulsion Lab to conduct 'an all-sky, all-frequency search for radio signals from intelligent extra-terrestrial life.' But this is only the foot in the door. Under the hearding of 'broad objectives' the Jet Propulsion Lab proposal indicates that the purpose of the study is to

> Build an observational and technological framework on which future, more sensitve SETI (Search for Extra-Terrestrial Intelligence) programs can be based.

"What this tells me is that while the public is intrigued by the outer space phenomena, the Space Agency is so mesmerized that it is attempting to translate the momentum into a multi-million dollar, long-range program of questionable searches for intelligence beyond our solar system.

"What's wrong with the program? Like so many other big spending projects, this is a low priority program which at this time constitutes a luxury which the country can ill afford.

"First, while theoretically possible, there is now not a scintilla of evidence that life beyond our own solar system exists. Yet NASA officials indicate that the study is predicated on the assumption that intelligent extra-terrestrial beings are out there trying to communicate with scientists here on Earth. If NASA has its way, this spending will go forward at a time when people here on Earth--Arabs and Israelis, Greeks and Turks, the United States and the Soviet Union, to name a few--are having a great difficulty in communicating with each other.

more

"Second, what if from some place, somewhere a radio message had been sent? The Earth is four and one-half billion years old. Some solar systems are 10 to 15 billion years old. If we intercept messages sent from them, they could have been sent not only before Columbus discovered America or the birth of Christ, but before the Earth itself existed. The overwhelming odds are that such civilizations, even if they once existed, are now dead and gone.

"Third, NASA didn't even select the least expensive way to do it. A less expensive, more narrowly focused SETI proposal from the Ames Research Center (cost $6.5 million over 7 years) was rejected in favor of the $14 to $15 million Jet Propulsion Lab project. However, to add insult to injury NASA has told my office that what it may do is to plug in the Ames project in the fiscal year 1980 budget so that both projects would be operating at the same time.

"At a time when the country is faced with a $61 billion budget deficit, the attempt to detect radio waves from solar systems should be postponed until right after the federal budget is balanced and income and social security taxes are reduced to zero."

##

Appendix 4

propriation, though modest, help assure that we stay ahead.

For that reason, Mr. President, I oppose the amendment of the Senator from Wisconsin.

Mr. PROXMIRE. Mr. President, I shall take only another minute or so.

I appreciate the reasons for the opposition of my friends, but I should like to point out that the amount we are talking about as far as aeronautical research is concerned is $45 million. Do you really think Boeing, McDonnell-Douglas, General Dynamics, Fairchild, Lockheed, the biggest defense manufacturers in the country, cannot afford $45 million, when they will get a tax credit, something they did not get before, a 25-percent salary tax credit for their research and development expenditures? That credit should exceed the $45 million add-on by a substantial amount.

Mr. President, we are not cutting NASA's research budget below present levels. We are still providing NASA with plenty of funding. It seems to me it makes sense for the Senate to try to comply with President Reagan's budget request. We have passed a very generous tax measure, which I supported. We have passed budget cuts in other areas, which I have supported. Now I am trying to say we should have some fairness, some equity, in the way we reduce Federal spending. That is all my amendment would do.

Mr. President, I am prepared to vote on this matter.

Mr. HAYAKAWA. Mr. President, I am opposed to Senator PROXMIRE's amendment to reduce the appropriations for the National Aeronautics and Space Administration (NASA). I am very impressed with the achievements of NASA but I do not believe we should be content to rely on past achievements.

Our Nation's space program is unequaled in its ability to take the dreams of space exploration and its potential and transform them into reality.

We have all benefited in many ways from our advancement in space. The technology generated by NASA programs and research creates many new products and jobs, and makes everyone's life safer and easier. Some of the byproducts of NASA programs and research are improved communications, better weather detection devices, more accurate naval and air navigation, and many products for medicine, computers, education, and energy. As we reflect upon these accomplishments we should not be lulled into inactivity, but invigorated by new challenges to seek new frontiers. I recognize as well as anyone that the Federal budget must be kept under control, but the HUD appropriations bill is already below the level suggested by the President. I believe that to reduce it further by cutting the appropriations for NASA would be a mistake.

We must continue to fund NASA at a level that will allow it to continue to establish the goals of the future and maintain the U.S. leadership in space and technology. I urge my colleagues to reject this amendment.

The PRESIDING OFFICER. Is there further debate? If not, the question is on agreeing to the amendment of th nator from Wisconsin.

The amendment (UP No. 335) was rejected.

Mr. GARN. Mr. President, I move to reconsider the vote by which the amendment was rejected.

Mr. HUDDLESTON. I move to lay that motion on the table.

The motion to lay on the table was agreed to.

UP AMENDMENT NO. 338

Mr. PROXMIRE. Mr. President, I send an amendment to the desk and ask for its immediate consideration.

The PRESIDING OFFICER. The amendment will be stated.

The legislative clerk read as follows:

The Senator from Wisconsin (Mr. PROXMIRE) proposes an unprinted amendment numbered 338:

On page 23, line 9, immediately before the period, insert the following:

Provided: That none of these funds shall be used to support the definition and development of techniques to analyze extraterrestrial radio signals for patterns that may be generated by intelligent sources.

Mr. PROXMIRE. Mr. President, 3 years ago, NASA requested $2 million for a program titled "Search for Extraterrestrial Intelligence" —SETI for short. The idea was that they are going to try to find intelligence outside the solar system. Our best scientists say that that intelligent life would have to be beyond our galaxy. I have always thought if they were going to look for intelligence, they ought to start right here in Washington. It is hard enough to find intelligent life right here. It may even be harder, I might say, than finding it outside our solar system. At any rate, this $2 million would have funded the initiation of an all-sky, all-frequency search for radio signals from intelligent extraterrestrial life using existing antennas of the Deep Space Network at Goldstone, Calif., and some state-of-the-art hardware that was to be developed specifically for the program. The total cost of the program was to be $15 million over 7 years.

These funds were stricken from the fiscal year 1979 HUD-independent agencies appropriation bill a few months after I gave NASA a "Golden Fleece" for the proposed project, which I thought should be postponed for a few million light-years.

I have since discovered that the project has been continued at a subsistence level despite our decision to delete these funds 3 years ago. In 1980 NASA spent $500,000 on the project. The 1981 budget was $1 million. NASA plans to spend an additional $1 million in 1982 to continue the definition and development of techniques to analyze extraterrestrial radio signals for patterns that may be generated by intelligent sources.

Mr. President, clearly the Congress intended to stop this research back in 1978 when it terminated funding for the program. However, NASA has quietly continued the work under its exobiology program. I believe the rationale for the reduction we made 3 years ago still applies, and the amendment I have just sent to the desk would reaffirm that decision by prohibiting NASA from using funding provided in today's bill to pursue the search for extraterrestrial intelligence.

Why should we stop this program, Mr. President?

First, if NASA launches a full scale SETI program the total cost will be at least $50.9 million over 10 years. This is a luxury we can ill afford at a time when we are making a herculean effort to cut Federal spending.

Second, there is an excellent chance that extraterrestrial intelligent beings do not exist. An article appearing in the April 1981 issue of Physics Today, written by a professor of mathematical physics at Tulane University, Frank J. Tipler, spelled out this thesis in great detail. Professor Tipler's central point is that if intelligent beings did exist elsewhere and possessed the technology for interstellar communication they would have developed interstellar travel and thus would already be present in our solar system. Certainly, there is not a scintilla of evidence that intelligent life exists beyond our solar system.

Third, even if a radio message had been beamed to our planet from some distant civilization, it could well have originated well over a million years ago. The Earth itself is 4½ billion years old while some solar systems are even older and millions of light-years from Earth. Thus the intelligent life that sent the message might well be extinct by the time we received it or, certainly, by the time we responded. Communication over such great distances is almost meaningless.

Finally, Mr. President, if we continue to allow NASA to pursue this effort to intercept signals from some hypothetical intelligent civilization, we are sending exactly the wrong signal to the American taxpayer.

We should worry more about improving our ability to communicate with our neighbors on planet Earth and worry a little less about interstellar conversations. In this year of all years we should not fritter away precious Federal dollars on a project that is almost guaranteed to fail. I hope my colleagues will support my amendment to stop this ridiculous waste of the taxpayer's dollars.

The PRESIDING OFFICER. Who yields time?

Mr. GARN. Mr. President, on this amendment, the Senator from Wisconsin and I do not disagree. I realize he has a great deal more experience, having been in the Senate a lot longer and I and trying to find intelligence in Washington. I suppose that, at the very least, if we were going to spend the money, it would make more sense to transfer it for that search, but that probably would be just as wasteful as the Senator has pointed out. I am willing to accept the amendment.

Mr. HUDDLESTON. Mr. President, on this side, we, too, are willing to accept the amendment of the Senator from Wisconsin and commend him for his diligence in ferreting out unnecessary expenditures and seeking to reduce them.

The PRESIDING OFFICER. The question is on agreeing to the amendment.

The amendment (UP No. 228) was agreed to.

ANNUAL LEAVE PROHIBITION WHILE ON OFFICIAL TRAVEL STATUS

Mr. CRANSTON. Mr. President, with regard to section 415 of the bill as reported, which would prohibit the employees of the agencies covered in the bill from taking annual leave while on official travel status, I share the committee's concern—and in particular the concern of the distinguished ranking minority member, Mr. PROXMIRE, about the cost to the taxpayers of official travel, and I share the committee's desire to restrain spending in that area as much as possible. In my view, the Appropriations Committees' expression of concern about this matter in recent years has resulted in the development of tighter guidelines by some agencies to curtail possible abuses that might occur by employees taking annual leave in connection with official travel.

The VA is one agency that has taken substantial steps to deal with the concerns the committee has raised.

Mr. President, I ask unanimous consent that two VA circulars entitled "Restriction On Use of Annual Leave While On Temporary Travel Duty" be printed in the RECORD at this point.

There being no objection, the circulars were ordered to be printed in the RECORD, as follows:

RESTRICTION ON USE OF ANNUAL LEAVE WHILE ON TEMPORARY DUTY TRAVEL

1. Purpose: This circular prescribes revised policy and procedure to be followed prohibiting employees, under normal circumstances, from taking annual leave while on travel status except in unique or emergency situations.

2. Background. The Joint Conference Committee on the HUD-Independent Agencies FY 1980 Appropriation Bill requested that the agencies and departments funded by the bill prohibit the taking of annual leave by employees who are in a temporary duty travel status except in unique or emergency situations.

3. General. An employee's pay and leave status during a period of official travel will be subject to the hours of duty, pay, and leave regulations of the VA. All time must be properly reported on Time and Attendance Reports, and travelers must assure that leave taken while in travel status is promptly reported to unit timekeepers for recording in official records.

4. Policy. Approving officials may not approve official travel where any extended annual leave is involved except in unique or emergency situations. The approving official is responsible for assuring that only essential travel is authorized, and that travel as stated on the travel order is the sole reason for the trip at Government expense. When annual leave is proposed to be used, the Travel Authority for Temporary Duty, VA Form 60-2016, will reflect in block 10, Remarks, the number of days that annual leave is granted and brief statement of justification. A consolidated Travel Authority may not be used for travel involving annual leave.

a. The following are examples of unique situations:

(1) Employees on temporary duty for extended periods (normally more than 2 weeks of official duty).

(2) Employees traveling under permanent change of station orders.

(3) Traveler agrees to take annual leave to take advantage of economy or other types of reduced fares which will result in significant savings to the Government in travel costs.

(4) Other situations where it is not reasonable or economical to the Government to return the person to the official duty station.

b. Annual leave for brief periods, not to exceed 3 days, may be authorized when the approving official determines that the official travel was required to be taken, both as to location and timing; that there is no additional cost to the Government; and that the requested annual leave is purely incidental to the official travel situation.

c. Emergency unscheduled annual leave necessitated by a sudden, urgent, or unforeseen occurrence is not prohibited. Post-approval of the emergency leave will be accomplished on the travel voucher and will be supported by a complete documentation of the circumstances.

5. Other requirements.

a. Each travel authorization for trips which include annual leave in other than an emergency situation must be approved prior to departure by the approving official who must be at least one level higher than normally required, unless such approving official is the head of the VA facility or the highest ranking official of the department or staff office involved. In addition, the justification for the annual leave must be documented and attached to the travel voucher.

b. See MP-1, part II, chapter 2, and MP-5 for explanation of computing per diem on days when annual leave and sick leave are taken while in travel status.

6. Effective date. The provisions of this circular are effective immediately. Management should meet their labor relation responsibilities when implementing this circular.

7. Rescission: This circular expires December 31, 1980.

By direction of the Administrator,
RUFUS H. WILSON,
Deputy Administrator.

RESTRICTION ON USE OF ANNUAL LEAVE WHILE ON TEMPORARY DUTY TRAVEL

1. The Senate Appropriations Subcommittee for HUD-Independent Agencies has requested data concerning incidents where annual leave has been taken in conjunction with official travel by VA employes. Accordingly, field station heads and each department and staff office head in VA Central Office is required to submit a report providing the following information regarding each incident of annual leave taken in conjunction with a travel assignment performed within the period beginning July 1, 1980, and ending September 30, 1980.

2. Reporting Requirements:

a. Traveler's:
(1) Name.
(2) Grade.
(3) Position.
(4) Duty station (name of VA facility).
b. Points of travel (origin, destination).
c. Purpose of travel.
d. Inclusive dates of travel.
e. Number of hours of annual leave taken in conjunction with travel assignment (for title 38 personnel, number of days of annual leave taken should be indicated and separately identified).
f. Reason for permitting annual leave to be taken (response required only for incidents of travel where annual leave in excess of 3 days was taken).

3. This information should be forwarded to reach VA Central Office Reports and Statistics Service (02B21) no later than November 4, 1980. Reports Control Symbol 64-3 has been assigned to this report. This report will be continued on a quarterly basis. Subsequent reports will be input so as to reach VA Central Office (042B21) no later than 10 workdays following the end of each fiscal year quarter, beginning with the quarter ending December 31, 1980.

4. Extension: VA Circular 00-80-38 is extended to December 31, 1981.

5. Rescission: This supplement is automatically rescinded December 31, 1981.

By direction of the Administrator:
RUFUS H. WILSON,
Deputy Administrator.

Mr. CRANSTON. Mr. President, these VA circulars contain strong guidelines that include the restriction that extended annual leave may not be approved in connection with travel except in unique or emergency situations, such as if the employee is traveling in connection with a permanent transfer to a different VA facility, is able to take advantage of reduced travel rates resulting in significant savings to the Government, is detailed on extended temporary duty, or if it is not convenient or economical to the Government for the employee to return to his or her permanent location. Clearly, these guidelines substantially restrict the situations in which annual leave in connection with a business trip would be approved for a VA employee. Thus, I am concerned that an across-the-board blanket prohibition on such travel has been included in the bill even though it is apparent that at least one agency covered by the bill has taken significant steps to curb abuses.

I ask the Senator from Wisconsin (Mr. PROXMIRE) if he agrees that the steps taken by the VA, particularly the express requirement in the guideline that the official travel in question must be the sole reason for the trip at government expense, are responsive to the concerns the committee has expressed about this issue?

Mr. PROXMIRE. The prohibition contained in section 415 of the bill is intended to curb travel-related abuses in order to cut unnecessary Federal spending to the greatest extent possible. I do, however, agree that the VA is being responsive, and congratulate the VA for its responsiveness in this connection. I thank my good friend from California, who is the ranking minority member of the Veterans' Affairs Committee, for raising this matter.

Mr. CRANSTON. I appreciate the remarks of the Senator with respect to the VA's efforts to restrict annual leave in connection with official travel. I think it is important to note that under its guidelines the VA retains some managerial flexibility that provides an opportunity to deal with employee requests for annual leave in a reasonable manner while still curbing the abuses of concern to the committee.

I believe that such managerial flexibility should be preserved especially where an agency is making every effort to place tight controls on leave requests that involve travel at Government expense. I trust that the section 415 problem is not intended to punish agencies that have complied with the committee's previous direction in this regard.

Mr. PROXMIRE. The Senator is correct as to our intention.

Mr. CRANSTON. That being the case, at the very least, I hope that the Senate conferees will make certain that any statutory provision that might be agreed to is carefully focused so as to prevent the abuses that continue to occur while

Appendix 5

Putting the Cosmos on "Hold"

by Frank D. Drake

What is life for but to dream big dreams, and to work hard to make those dreams come true? This is a very human trait, and of all our modern dreams, one of the most tantalizing is to discover other worlds in space, to be spectators of other civilizations. What an adventure it would be — to know other intelligent creatures who have struggled through an entirely different history! An impossible dream? As readers of COSMIC SEARCH know, it is within our grasp. The same know-how which has given us video-disks, communication satellites, and computers has quietly provided us with a powerful means to discover and study other civilizations in space. Indeed, for six years NASA has been quietly constructing a program of enormous promise to make a deeply sensitive search for the radio signals of other civilizations. Now, just as it is about to swing into full-scale action, this program, the Search for Extraterrestrial Intelligence (SETI), has been given the axe by a single uncomprehending U.S. senator. As of October 1, 1981, new U.S. government funds for SETI have been abruptly terminated.

What is the U.S. SETI program? Designed by a group of top NASA scientists at the Ames Research Center and the Jet Propulsion Laboratory in California, and guided by a group of eminent university scientists, the program has been designed to apply the most modern technology on large radio telescopes to search in depth in the "cosmic haystack" of almost countless stars and radio channels for intelligent signals. To make this possible, a special "spectrum analyzer" has been under construction by world-renowned experts at Stanford University. This device, when finished, can monitor almost ten million radio channels simultaneously for signs of intelligent signals. Attached to it will be a computer which can automatically analyze the data from the spectrum analyzer for a large variety of forms of intelligent transmissions: television signals, radar pulses, spacecraft telemetry, or navigation signals, for example. This computer provides an "early warning" system, so that any sign of an extraterrestrial signal can be checked out right away. These devices not only speed up the pace of the search of the cosmic haystack immensely, but allow tests of a large fraction of all the radio channels where signals might be expected, something which has not been possible before.

Frank D. Drake

The plan has been to utilize the spectrum analyzer on NASA telescopes at Goldstone, California, to search the entire sky and many radio channels for ETI. Then the equipment is to be moved to the world's most sensitive telescope, at Arecibo, Puerto Rico and to a few other large telescopes to search particularly promising regions of our Milky Way galaxy, including the directions towards the nearest sun-like stars. Radiations no stronger than the strongest we radiate could be detected from distances of many thousands of light years. The entire program would take about seven years, and would require about $2 million per year, or about 1/3000 of the typical NASA annual budget. Even though we have already searched many millions of combinations of directions in the sky and frequencies for signals, this program would accomplish more than ten million times more searching than all previous searches put together. It would be an astonishing achievement, and the cost per test of the cosmos would be remarkably low.

Now, suddenly the walls have come tumbling down. Senator William Proxmire of Wisconsin, a powerful member of the U.S. Senate Appropriations Committee, has seen fit to attack the SETI program. He has launched criticisms of the SETI program which all readers of COSMIC SEARCH will easily find ludicrous. He asks, would not any signals we receive be many hundreds of years old, and therefore not of much interest? (Of course, the signals would probably be thousands of years old, yet would very probably originate from civilizations much more advanced than we, from whom we can learn much, to say the very least.) Might the signals even come from millions of light years away, and thus be from civilizations which may now be extinct, he asks? (Well, there are no stars at that range we might listen to — all the stars in the Milky Way are within 100,000 light-years. In any case, again the signals would contain priceless information from advanced civilizations. And after all, we even learn much from studying extinct civilizations such as those of the ancient Greeks and Romans!)

And what about the science fiction speculations that any advanced civilization at some point will build omnipotent robots which will fly to all the distant planets and colonize them? In this scenario, since no such robots have come to the earth, we must be the first and only advanced civilization in the Milky Way. Then it's no use searching, he says. (Well, there are a lot of technical and sociological reasons why such robots don't make sense, as COSMIC SEARCH readers know. No matter what, they are more expensive than the wildest dreams, and return nothing to a civilization which cannot be obtained much more cheaply by other means. All it takes is one Senator Proxmire per civilization to

In a universe as complicated as ours, no amount of theorizing will tell us the nature of life in the cosmos. The answers can only come from scientific observation.

scotch this idea, and I would place my bet that there are many of him!)

In another thrust, he says there is no evidence for life in space. (True, but so there was no evidence for America when Columbus proposed a little exploring. The analog is a very close one, only this time we have much better theories to support our proposals than did Columbus.) Behind these questions there are no doubt some truly important concepts and questions, in fact some of the prime questions about extraterrestrial life. But these questions can only be answered by scientific observation. In a universe as complicated as ours, no amount of theorizing will tell us the nature of life in the cosmos.

If They and Their signals are going to be there for millions of years what is the rush? Why not wait until the interest rates go down, suggests Senator Proxmire. The answer is obvious. We live in a troubled world in which economic and technical problems enhanced by our exploding population are looming as an awesome menace to our quality of life and even our existence. We need to know all we can of our universe and of the social systems invented by other sentient beings. There is probably no quicker route to wisdom than to be the student of other civilizations. Furthermore, as humans, it is not enough just to survive, we need to enrich our lives with new knowledge, new vistas, just as our lives are enriched by music, sport, and travel, among other things. Without this a people loses its pride, dignity, and motivation to succeed. Delaying SETI is no more reasonable than turning off all the music, all the plays, all the games until interest rates come down. Besides, on a practical side, the SETI team is assembled, and any hiatus in the program will lead to the dispersal of years of human development and will cause us to have to cope with an increasing level of manmade radio interference.

Yet Senator Proxmire feels he is qualified to make the scientific decision that SETI should no longer be sponsored. Using his seniority and his muddled scientific information, he has succeeded in passing a resolution which would stop all U.S. support for SETI at least for one year, and if he has his way, forever. It is an embarrassment particularly to American history that America would turn away from one of the most promising ventures a civilization can pursue. It reflects on America's political system that basically scientific decisions can be preempted by unqualified politicians instead of scientist administrators such as those who run NASA, one of the most successful scientific organizations of all time. How can this happen? Perhaps because it all makes good publicity back in Oshkosh and Milwaukee, and the chances of the senator's reelection are enhanced, perpetuating a weakness in the system.

The ultimate irony is that while all of this has been taking place, Senator Proxmire has been frantically maneuvering to preserve excess subsidies to dairy farmers. Congress did not want this, but again he prevailed. The cost to the taxpayer, just for the *excess* subsidy, not the basic subsidy, is between $500,000 and $1,000,000 per day. Every two days enough funds to run SETI for a year are diverted to this end.

Will we eventually make the right decisions in a matter so minor financially, and yet so deeply profound in its significance? Or will this one bizarre episode delay our entrance into the galactic club? Will we have a chance to realize one of the most exciting of dreams we have dared to dream? Tune in next year, but not today. For now, Americans are not allowed to tune into the cosmos.

Based on an article by Frank Drake in the Miami Herald, October 11, 1981 — the day before Columbus Day

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Frank D. Drake is Goldwin Smith Professor of Astronomy at Cornell University and a member of the Editorial Board of **COSMIC SEARCH**. Famous for his Project Ozma and for the "Drake Equation", Dr. Drake is the author of many articles and books including "Intelligent Life in Space" (1967). His informative and provocative column has been a regular feature of **COSMIC SEARCH** since the Summer 1980 issue. His article "Reminiscence of Project Ozma" was featured in the premier issue of **COSMIC SEARCH** (January 1979).

The Extrasolar Planetary Foundation Report, The First year

October, 1981

This report covers the first year's activities of the Extrasolar Planetary Foundation.

The Extrasolar Planetary Foundation was incorporated under the laws of the Commonwealth of Pennsylvania as a nonprofit scientific foundation on September 19, 1980. Its stated purpose is to stimulate and financially support the scientific search for, and subsequent study of, the planetary systems of other stars. The Foundation is governed by a Board of Directors who serve without pay. Members are Dr. Frank D. Drake, Mr. George C. Fennell, Dr. George D. Gatewood, Dr. Bruce Hapke, Mr. Allen P. Peeley, Dr. Joost H. Kiewiet de Jonge, Jr. C. Thomas Reiland, Ms. Nancy Nowakowski Robinson and Dr. John W. Stein. All members of the Board of Directors are active in various aspects of astronomy. Dr. Drake is a former Director of the Arecibo Radio Observatory and Professor of Astronomy at Cornell University; Drs. Gatewood and Stein are directly involved in the planet detection effort having developed new instrumentation for astrometric investigations. Dr. Gatewood is also presently serving as the Director of the University of Pittsburgh's Allegheny Observatory. Dr. Hapke has been included on the scientific investigative teams of several interplanetary probes and is a Professor of Geology and Planetary Science at the University of Pittsburgh. Dr. Kiewiet de Jonge is a celestial mechanician and Associate Professor of Physics and Astronomy at the University of Pittsburgh. Also serving without pay are the members of the Advisory Panel, currently made up of Dr. Jane Russell of the University of Iowa and Dr. Allan Walstad of the University of Pittsburgh's Johnstown Campus.

For legal assistance, the Foundation has engaged the services of the respected Pittsburgh law firm of Reding, Rea and Cooper, who besides filing the articles of incorporation have petitioned the IRS for recognition of exemption under section 501 (C) (3) of the Internal Revenue Code. The Foundation has also opened an account with the Mellon Bank of Pittsburgh and engaged the firm of Merrill Lynch, Pierce, Fenner & Smith as brokers.

Donations to the Foundation are carried in three specific funds, these are 1) Instrumentation, 2) Endowment, 3) Opera-

Continued on page 13

Appendix 6

mortgage-backed securities at $68,250,000,000, instead of $67,000,000,000 as proposed by the House and $69,500,000,000 as proposed by the Senate.

Amendment No. 11: Restores language proposed by the House and stricken by the Senate amended to appropriate $25,000,000 for assistance for solar and conservation improvements, instead of $50,000,000 as proposed by the House. The conferees direct the Secretary of HUD to expedite all Bank implementation activities by moving rapidly to publish regulations, secure an agent, staff the Bank, and disburse loans and subsidies at the earliest possible date.

Amendment No. 12: Includes the descriptive language "a community development grant program" as proposed by the House, instead of "local community and economic development programs" as proposed by the Senate.

Amendment No. 13: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment appropriating $3,566,000,000 for community development grants, instead of $3,800,000,000 as proposed by the House and $4,166,000,000 as proposed by the Senate.

The managers on the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The conferees are agreed that within the total provided, $2,000,000 from the Secretary's Discretionary Fund shall be devoted to the work study program to aid disadvantaged minority students.

Amendment No. 14: Limits total commitments to guarantee loans under Section 108 of the Housing and Community Development Act of 1974, as amended, to $225,000,000, instead of $200,000,000 as proposed by the House and $250,000,000 as proposed by the Senate.

Amendment No. 15: Restores language proposed by the House and stricken by the Senate appropriating $500,000,000 for a separate urban development action grants account.

Amendment No. 16: Appropriates $23,000,000 for research and technology, instead of $20,000,000 as proposed by the House and $30,000,000 as proposed by the Senate.

TITLE II—INDEPENDENT AGENCIES

Environmental Protection Agency

Amendment No. 17: Appropriates $583,747,000 for salaries and expenses as proposed by the Senate, instead of $583,691,000 as proposed by the House. The conferees are in agreement with the recommendations contained in the report of the House with the following changes:

+ $560,000 in program direction for the Office of Air, Noise and Radiation;

+ $56,000 in program direction for the Office of Press Services;

+ $500,000 in Office of Planning and Management contract studies;

— $370,000 in rent, communications and utilities; and

— $130,000 from the Office of Legislation.

The Committee of Conference has included $994,000 for the Great Lakes program. This amount represents the level requested in the January 1981 budget submission. Additional amounts above the budget request have been included in the research and development and abatement, control and compliance accounts. The conferees strongly believe that the Great Lakes program should be maintained as a separate program element coordinated at the Large Lakes Research Station in Grosse Ile, Michigan. The conferees reject the Administration's proposal to close the station and transfer certain functions to the Environmental Research Laboratory in Duluth, Minnesota. The Agency is directed to make available at least eight permanent full-time positions for the Grosse Ile facility.

The Administration's stated objective in closing the laboratory is to achieve monetary savings. However, according to Agency officials, closing the station will only result in savings of $250,000 in 1982. The conferees believe the benefits of the facility in its current location far exceed that amount. In addition, Canadian officials have expressed concern that the laboratory closure may signal a retreat by the United States from the joint commitment to preserve the Great Lakes.

Amendment No. 18: Appropriates $181,250,700 for research and development instead of $191,247,000 as proposed by the House and $180,750,700 as proposed by the Senate.

The Committee of Conference is in agreement with the recommendations contained in the report of the Senate. In particular, the conferees emphasize their support for the suggestion contained in the Senate report that the EPA should work more closely with the water industry to improve water service. The report noted that a part of the Federal research investment should respond to municipal water industry priorities.

Amendment No. 19: Deletes six research and development program limitations proposed by the House and stricken by the Senate.

Amendment No. 20: Appropriates $421,840,500 for abatement, control and compliance as proposed by the Senate, instead of $422,553,000 as proposed by the House. The conferees are in agreement with the recommendations contained in the report of the Senate with the following changes:

—$3,000,000 in the Clean Lakes program; and

+$3,000,000 to be applied at the Agency's discretion in programs proposed for reduction by the Senate.

Executive Office of the President

Amendment No. 21: Appropriates $1,044,000 for the Council on Environmental Quality and Office of Environmental Quality as proposed by the House, instead of $1,544,000 as proposed by the Senate.

Federal Emergency Management Agency

Amendment No. 22: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate appropriating $134,789,000 for State and local assistance as proposed by the Senate, instead of $54,084,000 as proposed by the House.

Amendment No. 23: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate with an amendment appropriating $65,456,000 for emergency planning and assistance, instead of $29,010,000 as proposed by the House and $67,456,000 as proposed by the Senated.

The managers of the part of the Senate will move to concur in the amendment of the House to the amendment of the Senate.

The Committee of Conference concurs with the recommendations contained in the report of the Senate with the following change:

—$2,000,000 for earthquake hazard mitigation.

Amendment No. 24: Restores language proposed by the House and stricken by the Senate providing $373,000,000 for the national flood insurance fund to be used to retire fund indebtedness. The conferees are concerned that premium income on flood insurance policies continues to fall short of program expenses. The Federal Government's contingent liability in the national flood insurance program will surpass $100,000,000,000 in 1982. The Committee of Conference supports the Administration's efforts to place the Fund on a more actuarily sound basis.

Public Law 97-35 amended the National Flood Insurance Act by requiring that beginning in fiscal year 1982, payments from the National Flood Insurance Fund for other than claims must be approved in appropriation acts.

In addition to payment of claims for flood losses, the Fund has paid for a contractor to operate the program, distribution of flood insurance maps and information, agents' fees and commissions, and interest on Treasury borrowings.

The combined effect of the authorization and appropriation Acts limits the Fund availability to payment of operating expenses ($34,927,000) and claims. The operating expenses limit carried in the appropriation bill will cover only payments to the contractor and map distribution expenses. The Committees on Appropriations do not intend to deny the Fund to be used to pay agents' commissions and interest on Treasury borrowings. The conferees have no objection if the Fund is used for these expenses in amounts not to exceed the budget estimates.

General Services Administration

Amendment No. 25: Appropriates $1,344,000 for the Consumer Information Center as proposed by the Senate, instead of $1,314,000 as proposed by the House.

National Aeronautics and Space Administration

Amendment No. 26: Restores language proposed by the House and stricken by the Senate limiting certain programs to the budget request without the approval of the Committees on Appropriations.

Amendment No. 27: Appropriates $4,973,100,000 for research and development, instead of $4,933,100,000 as proposed by the House and $4,994,500,000 as proposed by the Senate.

The conferees agree to add $70,000,000 above the request to be applied only for solar electric propulsion system, international solar polar mission, shuttle/spacelab payload development, upper atmospheric research satellites experiment, technology transfer, materials processing, search and rescue, technology utilization, aeronautical research and technology, and mid-level facility. In reaching this agreement, the conferees direct that additional funding be applied to each of these areas in such a manner and in such amounts as to bring about a meaningful programmatic enhancement of each of these programs.

Amendment No. 28: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate providing that none of the funds shall be used to support the definition and development of techniques to analyze extraterrestrial radio signals for patterns that may be generated by intelligent source.

Amendment No. 29: Appropriates $93,800,00 for construction of facilities, instead of $95,900,000 as proposed by the House and $104,800,000 as proposed by the Senate. The conferees agree that NASA should apply the reduction of $5,000,000 at the discretion of the agency.

Amendment No. 30: Appropriates $1,114,300,00 for research and program

Appendix 7

NASA RESPONSES TO CONGRESSIONAL QUESTIONS ABOUT SETI

Questions submitted by Senator Proxmire

1. QUESTION: As you know, I have been very critical in the past of NASA's proposed Search for Extra-Terrestrial Intelligence. I understand that you are requesting approximately $2 million for such a program in your FY 1983 budget. Can you tell me if this is correct and also indicate what the total cost of such a program would be?

ANSWER: The budget plan includes approximately $2 million for the Search for Extraterrestrial Intelligence (SETI) in FY 1983. The program is viewed as a research and development activity with the main purpose of evaluating promising data processing approaches to SETI and, at the same time, conducting some preliminary observations by using existing radio-telescopes. Our current planning assumes that approximately $2.5 million per year would be made available for this type of activity for approximately five years.

2. QUESTION: Frankly, I am very concerned over a sharp increase in the costs of the SETI program once it has been established. Why isn't it sensible to assume that we will pursue costlier and more sophisticated searches if we draw a blank with the SETI program as currently configured?

ANSWER: At the end of the currently assumed five-year period, NASA may consider proposing to undertake a search of all well-documented stars close to Earth, as well as carry out a complete survey of the sky to make sure that we are not missing any unexpectedly strong signals. This search could extend over a period of several years. However, an estimate of the required funding has not yet been made. NASA does not have any plans for pursuing SETI as a large-scale project.

3. QUESTION: I have been told that there is a great deal of international interest and activity in this area. Can you tell us briefly what sort of projects are being undertaken overseas and indicate what potential, if any, there is for international cooperation, including financial cooperation, in the SETI program?

ANSWER: There is considerable international interest in SETI. Searches have been carried out in Canada, France, Germany, Holland, and the Soviet Union, which has a vigorous SETI program. The technology available in these countries is, however, inferior to that which the United States is now capable of developing.

To date, international cooperation on SETI has been limited to the exchange of information at international scientific meetings. However, the potential does exist for other forms of cooperation, such as the exchange of data, and joint projects on telescopes located in different countries. NASA will stay abreast of other nations' activities in this field and continue to exchange scientific data.

4. QUESTION: Are dollars invested in SETI a total loss if we fail to find intelligent life or can we expect by-products from the program?

ANSWER: The funds invested in SETI should yield valuable by-products whether or not signals of intelligent origin are detected. The new technology development for the SETI efforts show significant promise for application in many other fields, such as ultrasonic spectroscopy associated with materials analysis, or the analysis of astrophysical data in radioastronomy. An equally promising, but more general application may be the solution to the problem of rapid extraction of information from very large data bases. For example, the computer-aided differential diagnosis of diseases in man and animals might significantly be enhanced by the digital electronic technology.

Question submitted by Senator Garn

QUESTION: The FY 1982 HUD and Independent Agencies Appropriations Bill contained a provision restricting the use of funds for the definition and development of techniques to analyze extraterrestrial radio signals for patterns that might be generated by intelligent sources. As part of your Life Sciences Program request for FY 1983, you request the reinstatement of a modest program effort in this area. Why do you think such a program is justifiable? How much will be devoted to this program in FY 1983? What are the out-year cost implications?

ANSWER: NASA intends to obligate approximately $2 million on the Search for Extraterrestrial Intelligence (SETI) in FY 1983. The program is viewed as a research and development activity with the main purpose of evaluating promising data processing approaches to SETI, and at the same time, conducting some preliminary observations by using existing radio telescopes. Our current planning assumes that approximately $2.5 million per year would be required for this type of activity for five years.

SETI is a modest but important venture in the exploration of space. A SETI program is considered a valid scientific enterprise by the scientific community. It has just received the endorsement of the Astronomy Survey Committee of the National Academy of Sciences, who recommended it as one of seven moderate programs for the next decade.

Appendix 8

Mr. MACHTLEY. Mr. Chairman, my amendment is quite simple. On page 31 of the report accompanying this bill, the Committee on Appropriations calls for spending $6.1 million on a program called SETI [search for extraterrestrial intelligence].

My amendment reduces the appropriations for NASA research and development by $6.1 million, and it is intended to eliminate in this fiscal 1991 budget such funding.

Mr. Chairman, no one in this body can doubt that we are in the middle of a financial crisis. The budget summit negotiations have been working to come up with an agreement to reduce the Federal deficit which, we are told, may be as high as $200 billion.

In this strapped fiscal environment, NASA has asked Congress for $12 million this year and $100 million over the next decade to search for extraterrestrial intelligence and to see, in fact, whether it is in existence.

Mr. Chairman, frankly, I would rather see a special terrestrial intelligence program in our schools and colleges in this country. We do not have to go into outer space to find minds and intelligence that need to be developed. In every State, in every city in this country there is intelligence, there are minds that need to be developed. Ask any parent who is trying to pay a tuition bill for their kids to go to college today.

We are just beginning to realize the costs associated with the S&L bailout. Might we spend some of this NASA money to find where the absence of intelligence was that led to this failure?

Does any Congressperson think that for a second he or she can explain to their constituents how important it is to spend $6.1 million to find out if ET really exists? And then we are going to have to raise their taxes to pay for it.

Indeed, former Senator William Proxmire gave this program in 1978 the Golden Fleece Award. If SETI does proceed as planned, I might suggest that we adopt the SCOTI Program. The SCOTI is the search for congressional intelligence.

This may be an oversimplification, but, frankly, when I was a kid, I wanted to go to the west coast from the east coast. It might have been exciting. I might have learned something, and I may have found another form of life. But my family could not afford it. I did not go, and, frankly, I survived.

It is frankly the same with our Nation. A search into outer space for extraterrestrial life might be exciting. We might learn something. We may even discover another form of life. But today our country just cannot afford the trip. If we do not do it, I would suggest that since we have survived for 15 billion years without knowing whether there is extraterrestrial life, we may just survive a few billion more.

There is no doubt that there is some scientific curiosity and perhaps even public curiosity as to whether ET is real. One has to only see the popularity of the movie ET and Close Encounters of the Third Kind to appreciate this fact.

As an engineer myself in undergraduate studies, I certainly appreciate and applaud scientific research and exploration. However, the question, the difficult question, that we in this body must ask is: Can we, in fact, today afford this type of expenditure?

We have no, and I repeat no, scientific evidence that there is anything beyond our galaxy except we do have some curiosity. The answer that I would suggest is that we cannot spend money on curiosity today when we have a deficit.

I would suggest that our constituents would agree that money ought not to be spent on curiosity. If there is a scientific justification for SETI, in fact, I think there is justification scientifically to not proceed.

Scientists have argued that, in fact, there is an evolutionary cycle on this Earth that if we have a 15-billion-year galaxy that probably there is an alien form of life beyond. Some of our constituents might suggest that there is an alien form of life which has already arrived here in Washington.

I might suggest that, in fact, if there is such a superintelligence form of life out there, might it be easier just to listen and let them call us?

As frivolous as part of this might have been, I think we are talking about serious dollars, and I believe that, in fact, we owe it to our constituents to cut out some of this that we just, frankly, cannot afford.

I would suggest that this is the answer to those who would argue that we should have a line-item veto. This is a specific amendment to delete a specific program that we cannot afford.

Mr. GREEN of New York. Mr. Chairman, will the gentleman yield?

Mr. MACHTLEY. I am happy to yield to the gentleman from New York.

Mr. GREEN of New York. Mr. Chairman, I have to tell the gentleman that I think there is little likelihood that a line-item veto would be exercised on this item since the administration sent us a request for $12.1 million, and we cut it to $6.1 million in the subcommittee.

Mr. MACHTLEY. Mr. Chairman, I would suggest that we in Congress can, in fact, cut it down to zero, and that is my hope today.

I would ask my colleagues respectfully to recognize the seriousness of this issue and, in fact, support my amendment.

Mr. TRAXLER. Mr. Chairman, will the gentleman yield?

Mr. MACHTLEY. I am happy to yield to the gentleman from Michigan.

Mr. TRAXLER. Mr. Chairman, of course, we did not give the President his $12 million for this research, but we did yield $6 million to him. Do I understand what the gentleman wants us to do now is take away the last penny that the President has requested for this program?

Mr. MACHTLEY. I would suggest it is NASA's, and I would say that we should take away everything.

□ 1300

Mr. CONTE. Mr. Chairman, I move to strike the last word.

(Mr. CONTE asked and was given permission to revise and extend his remarks.)

Mr. CONTE. Mr. Chairman, the honorable gentleman from Rhode Island [Mr. MACHTLEY] has offered an amendment to terminate funding for the SETI program of NASA. SETI [search for extraterrestrial intelligence] is, quite simply, an effort to locate space aliens.

Mr. Chairman, at a time when good people of America can't find affordable housing, we shouldn't be spending precious dollars to look for little green men with misshapen heads.

I commend the Subcommittee on VA, HUD, and Independent Agencies for cutting NASA's request for this program. The fiscal year 1991 budget request for this $100.5 million rip off was $12.1 million. The subcommittee, however, reduced this amount by $6 million, leaving $6.1 million in the bill currently under consideration. But it's time to put this crippled dog out of its misery and kill it with a forceful blow.

Mr. Chairman, of course, there are space aliens.

Mr. HEFNER. Mr. Chairman, will the gentleman yield?

Mr. CONTE. I yield to the gentleman from North Caroline.

Mr. HEFNER. Mr. Chairman, it has just been on the AP wire, they have located some extraterrestrial beams, and they are wearing striped coats.

Mr. CONTE. Mr. Chairman, reclaiming my time, of course there are flying saucers and advanced civilizations in outer space. But we don't need to spend $6 million this year to find evidence of these rascally creatures. We only need 75 cents to buy a tabloid at the local supermarket. Conclusive evidence of these crafty crittters can be found at checkout counters from coast to coast.

This article—Exhibit 1—from the Weekly World News, for example, describes how UFO's were poised to land at Chicago's Soldier Field during halftime of last year's Bears-Eagles game. They were scared off, though, by gridlock traffic of blimps, helicopters, and airplanes over the stadium.

Mr. Chairman, I submit the article for the RECORD.

[Exhibit 1]

BLIMP SCARED UFOs AWAY FROM STADIUM

(By Beatrice Dexter)

UFOs were poised to land during Monday Night Football at Chicago's Soldier Field—but they shied away because of the gridlock traffic of blimps, helicopters and airplanes over the stadium!

That's the contention of Ufologist Andy Reiss, whose headline-making attempt to at-

tract aliens to the October 2 game resulted in a no-show.

The Los Angeles space specialist had orchestrated an incredible national effort—featured in a recent issue of *The NEWS*—to invite aliens to Earth by sending a psychic message to them in outer space. Millions of Americans across the country are believed to have cooperated in the psychic experiment.

"I have heard from a number of Ufologists around the country that sightings in the Midwest were way up," he told *The NEWS*. "I think the aliens responded to our invitation and buzzed the planet more than once—but decided against landing during the Eagles-Bears game at halftime.

"The stadium was swarming with air traffic, including the Goodyear blimp. There's no way you could land a giant starship without causing a tragic accident. I think our space friends are going to wait for us to find a better place."

Reiss says he's trying to keep communication open with the aliens by concentrating on a friendly message to them 20 minutes each day. He plans to organize another landing effort within the next few months, he said.

"We achieved a great deal with our first effort, and even though we didn't see a landing, we did see signs of an alien response," Reiss said.

"Now that we've had so much publicity and mass cooperation, we don't need to have them land in a public place. For our next effort we're going to select a quiet, isolated place."

We also know that Noah's Ark was built by space aliens. I submit exhibit 2 that I have here in my file.

[Exhibit 2]

NOAH'S ARK WAS BUILT BY SPACE ALIENS

(By Mickey McGuire)

Pictures on an ancient stone tablet found near Mount Ararat prove beyond a doubt that Noah didn't build the ark that survived the great flood—it was brought to Earth by space aliens!

The crude pictures, which probably were carved in the tablets by Noah himself, clearly show the ark being beamed to Earth from an enormous space ship that appears to stretch from horizon to horizon.

The tablet also shows eight human figures standing beneath the ark. They are believed to represent Noah and his sons, Shem, Ham and Japhet, and their wives.

Using the human figures as a comparison scale, the ark would have been about 550 feet long, 91 feet wide and 55 feet high. "Those measurements are almost an exact match of those in the Holy Bible," declared Dr. Sabah Ozdikir, a Turkish archaeologist and Bible expert who has searched for the ark's remains for almost a half-century.

"In Genesis 6:15, the ark is described as 300 cubits long, 50 cubits wide and 30 cubits high," Dr. Ozdikir explained.

"In modern measurements, the ark shown on the stone tablet is more or less a perfect match of the one described in the Bible," Dr. Ozdikir said, compared to the size of the figures on the tablet, the spaceship would have been three miles long by one mile high.

That's roughly the same size as a UFO seen by millions of people in skies over China in the early 1980s.

"According to the Bible, God warned Noah that a great flood would cover the Earth and destroy all living creatures on the land," Dr. Ozdikir said. "He told Noah to build the ark and take aboard a male and female of every animal so they could replenish the Earth with their kind after the flood.

"But we're certain Noah couldn't finish the ark in time. You see, one of the pictures on the tablet clearly shows an obviously uncompleted ark being overturned by a large wave.

"More than a dozen experts in hieroglyphics have studied the picture and all reached the same conclusion: Creatures from another world brought a completed ark to Earth and saved Noah and the animals just in the nick of time.

"However, we also believe that God, seeing Noah's plight, told the space beings to deliver the ark to Earth."

Why spend $5 million to search radio waves, when we already know that space aliens are stealing our frogs. I submit for the RECORD exhibit 3.

[Exhibit 3]

WEBBED CREATURES VANISHING FROM EARTH BY LEAPS AND BOUNDS—SPACE ALIENS STEALING OUR FROGS!

(By John Stern)

A UFO researcher says space aliens are wiping out the world's frog population because they eat tadpoles and use the mature creatures for research!

The decline of frogs is a worldwide phenomenon that has repeatedly been blamed on pollution and the destruction of natural habitat.

Walter Caine contends that the environmental explanation is all hogwash.

He further claims to have the evidence to prove that extraterrestrial hunters alone are wiping frogs out. In some areas populations have declined as much as 90 percent, scientists report.

"It's the only explanation that makes any sense," said Caine, who founded the California-based research group, Extraterrestrial Today.

"I have hundreds of reports from eyewitnesses who have seen extraterrestrials gathering frogs and tadpoles all over the world.

"I can't vouch for the character and credibility of all these witnesses but I know for a fact that most of them are rock solid.

"Their independent descriptions of saucer-shaped UFOs and slender, large-headed space aliens are uncannily similar. And these people swear they saw the extraterrestrials stealing frogs and eating tadpoles."

Washington sources refused to comment on Caine's theory and report but conceded that American and other governments are investigating UFO activity in regions where frogs grow and breed.

Caine says that's evidence enough to show that world authorities are aware of alien interference in earth ecology.

And he has called on them to take "immediate steps to end the interference before the only frogs we see are in books."

"There isn't a doubt in my mind that space aliens are eating our tadpoles as a delicacy and experimenting with our frogs," said Caine.

"This is a very serious situation."

The intergalactic frog and tadpole theft, reported by hundreds of eye witnesses, has become a serious global problem. Perhaps the $6 million could be better spent by the Attorney General in bringing these orbiting scofflaws to justice.

We know that a UFO blasted out of the ocean and hovered for 15 terrifying minutes over a frightened Sri Lankan takner crew, and we also know that this UFO cured 22 sick, blind, and lame people in Turkey. I submit those exhibits for the RECORD.

[Exhibit 4]

UFO FLIES OUT OF THE OCEAN!

(By Ann Hughey)

A saucer-shaped UFO stunned the crew of a tanker when it blasted out of the ocean and circled their ship for 15 terrifying minutes before vanishing without a trace back into the sea!

According to Sri Lankan newspaper reports, the incident took place in broad daylight in late March, 210 miles south of Matara, Sri Lanka, in the Indian Ocean.

No one was injured but the 175-foot-long tanker *Kim Seng* suffered severe structural damage from the towering waves that were kicked up when the UFO rose out of and later returned to the water, the press said.

"It was enormous—at least five times the size of our ship," Rasika Mawatha, the 47-year-old captain of the *Kim Seng*, told reporters.

"I'd just come up on deck when the huge silver orb flew out of the sea and hovered just off the starboard bow of the ship. We almost sank from the waves it made as it left the water.

"At first, I was so shocked I nearly fainted from fright. My crew was terrified, too.

"They fell to the deck in shock—covering their eyes and cowering like small children.

"All the ship's instruments went haywire and the needle on the compass kept spinning around and around. I couldn't even use the radio to call for help," he said.

"The spacecraft glowed and pulsated with a silvery light and another eerie beam of light shone from the bottom of the ship. It seemed as if whoever was in the craft was scanning our ship, but for what purpose, I don't know."

After about 15 minutes, the UFO disappeared as suddenly as it had appeared.

"One minute it was there and the next it had vanished back into the sea in a blinding flash of light," said Capt. Mawatha.

"And it kicked up such huge waves that it almost capsized the ship again."

Immediately after the UFO disappeared, all the ship's instruments began working again as if nothing had happened.

"I radioed authorities about what had happened and they sent planes and ships to scan the area but they came up with nothing," said Capt. Mawatha.

Officials searched for days but not a trace of the UFO could be found anywhere.

"We spent days searching for signs of the alleged spaceship but couldn't find anything," says Adi Chandrakar, a spokesman for the coastal authority in Matara.

"Even though we couldn't find any concrete evidence of the UFO, we know that something highly unusual did happen out there because of the damage to the ship.

"Only extremely rough water like you'd experience in a severe storm could cause that kind of damage and there wasn't a cloud in the sky.

"We're calling this incident an official UFO sighting because there's no other explanation for what happened."

[Exhibit 5]

MAGIC RAY FROM THIS UFO CURES 22 PEOPLE!

(By Mickey McGuire)

At least 22 sick and crippled people were miraculously cured when they were bathed in eerie greenish light—that pulsated from a gigantic UFO hovering over their city!

Official reports from western Turkey said the incredible cures began moments after the silvery, saucer-shaped spaceship

streaked silently down from the heavens to hover for more than an hour just over the rooftops.

And what is being hailed as the most sensational photograph ever made of a flying saucer was taken by a Turkish soldier home on leave.

"There is no doubt the photograph is real," declared a Turkish official in the city of Manisa. "Hundreds of people here saw the UFO. They saw it arrive and they watched it depart.

"But even more amazing than the photograph is the overwhelming evidence that something from the ship healed at least 22 sick and crippled people."

A physician, Dr. Mehmet Nadi, said he talked to a woman named Inisa Tokap, whose 46 year-old husband Alaattin was miraculously cured of crippling arthritis that had kept him bedridden for years.

"With tears streaming from her eyes she told me how his twisted limbs slowly straightened as the UFO's greenish light washed over his frail body," Dr. Nadi recalled.

"She said when the light from the UFO touched him the pain vanished from his body and his gnarled, twisted fingers slowly began to become relaxed and began to straighten.

"His feet and toes became straight and he was able to stand and walk for the first time in years."

Dr. Nadi said he has examined several other patients and found them completely cured of their ailments, including Kamal Yilmaz, a middle-aged man who had been in a stroke-induced coma for months.

"I couldn't believe my eyes when Kamal came walking into my office as healthy as an ox," he said. "I've known him for years, but I made him show me some identification. I just couldn't believe it was true. But it was."

Medical officials from Ankara are now in the area to examine dozens of other people who also have reported being cured by the strange light.

"So far, we know of several people who were dying of cancer who now appear to be completely cured," one doctor confirmed. "But only time will tell us if the cures are permanent or merely some kind of coincidental mass remission."

Another doctor confirmed that a 9-year-old boy, identified as Hasan Koru, comatose and near death with total kidney failure, awoke and got out of bed after the mysterious light filtered through a window and swept over his still body. Other doctors verified that a woman blinded by cataracts regained her sight, a man deaf since birth had his hearing restored and a day-old infant girl dying of some undiagnosed malady now appears to be normal and healthy because of the miracle light.

The UFO, which hovered over the village for about 70 minutes, before it suddenly streaked off into space, is believed to be the same spaceship that landed in a Soviet city about 1,300 miles to the north on September 27.

The NEWS revealed in its November 7 issue that the captain of the spaceship was captured by KGB agents when the aliens left their craft after landing in a park in the city of Veronezh.

"It would be too much of a coincidence for two UFOs to be making such dramatic visits within weeks of each other," one Turkish official declared.

If we are willing to spend just a few dollars more than the 75 cents I have proposed, we could take out an advertisement in the personals to locate some of these devilish foreigners. It could read:

Single blue planet seeks out alien life forms for fun, adventure and possible romance. I am middle-aged, well-built and relatively attractive, despite premature ozone loss. I'm looking for an energetic green biped who likes to dance, cuddle and take long, romantic spacewalks—someone who will help to ease my global tension. Call 976-SETI.

This amendment gives us a chance to prove that there is still intelligent life on Earth. Let us save our hard-earned money and let the space aliens spend their currency to find us.

If we continue to fund this dog—a Golden Fleece award winner in 1978—then we should seriously consider funding of an even more ambitious program—SCI: Search for Congressional Intelligence.

Support the amendment.

Mr. TRAXLER. Mr. Chairman, the logic of the distinguished gentleman from Massachusetts [Mr. CONTE] and the maker of the amendment is irrefutable. I think we had better exercise a congressional veto on this Presidential request. We accept the amendment on this side.

The CHAIRMAN. The question is on the amendment offered by the gentleman from Rhode Island [Mr. MACHTLEY].

The amendment was agreed to.

AMENDMENT OFFERED BY MR. WALKER

Mr. WALKER. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. WALKER: On page 47, line 5, after "conclusive" insert the following: ": *Provided further*, That not more than $266,900,000 shall be made available under this heading for the Space Exploration Initiative, to be derived from transfers of funds appropriated under this title for other accounts and activities of the National Aeronautics and Space Administration."

Mr. WALKER (during the reading). Mr. Chairman, I ask unanimous consent that the amendment be considered as read and printed in the RECORD.

The CHAIRMAN. Is there objection to the request of the gentleman from Pennsylvania?

There was no objection.

POINT OF ORDER

Mr. TRAXLER. Mr. Chairman, I make a point of order against the amendment offered by the gentleman from Pennsylvania [Mr. WALKER]. In my judgment it provides for an unauthorized transfer of funds between NASA appropriations, and, therefore, the amendment violates clause 2 of rule XXI. I would ask for a ruling from the Chair.

Mr. WALKER. Mr. Chairman, I concede the point of order, and move to strike the last word.

The CHAIRMAN (Mr. BEILENSON). The point of order is conceded and sustained.

Mr. WALKER. Mr. Chairman, it has been said that a nation that lacks vision is doomed. I had hoped that this amendment would be considered today, and I am disappointed, of course, that the point of order was offered against it. Because what it sought to do was to put at least a portion of the money back in, that the President had requested for his Moon-Mars initiative. It is money that was authorized by the House last year in the House-passed authorization bill, which never got through the Senate, but which the authorizing committee felt was an important initiative for this Nation's future.

We were somewhat stunned when the Committee on Appropriations decided to completely eliminate all funding for this program. I sat here a moment ago and listened to the Committee on Appropriations decide to eliminate another program, one that has been a scientific effort that has been around for many years on the NASA agenda, and one which I realize is nice to make fun of, and I appreciated the good humor of the Members who came to the floor.

The fact is though that this is another program that was looking out beyond our galaxy, looking out to try to find out what it is that human beings should know about this final frontier on which we are engaged.

My concern about the bill that we have before us, and I do not doubt the good work of the committee, the committee has struggled hard to look at a number of things. I might say to the subcommittee, I am particularly grateful for a policy judgment that was made in the housing section that I think was particularly meritorious, and I appreciate the good humor with which that was dealt in the full committee.

But I am concerned about the priorities reflected in this particular appropriations measure, because it seems to me that where your priorities lie, as defined in this bill, is simply on funding what is and maybe even looking back.

Oh, yes, there are new initiatives in the program. You have funded things like the Earth observation system and so on, which I happen to support. But you have given it far more than the administration requested, money that many of us who have looked at it feel will be money wasted in the program because the community that has to do the work cannot absorb the money at the present time. The President's increase in funding was more than enough to take care of the program. But instead, you decided to go that route, which is essentially a program that is good science, but looks back, not forward; that looks inward, not outward.

You decided to go that direction. That is your judgment. But I have got to say that that does not reflect the judgment of the authorizing committee, and I thought maybe we had some role to play in this whole process.

Sure, we have obligations that have to be met. We have priorities to make. But I would suggest that a nation that fails to look outward, fails to show vision, is in fact a nation that is in descendancy, rather than ascendancy.

I would like to think as we head toward the next century, we are going to have a space program to be proud of somewhere there, and it ought to be one we plan for at the present time.

Mr. Chairman, when President Kennedy stood in this Chamber nearly 30 years ago to deliver in those now famous words the challenge to the Nation to land a man on the Moon by the end of the 1960's, I do not believe that he meant for us to stop our exploration when that goal was reached.

□ 1310

Although world circumstances have changed significantly since those days of the space race with the Soviet Union, President Kennedy's words still have relevance in today's climate. He said, in part:

> For while we cannot guarantee that we shall one day be first, we can guarantee that any failure to make this effort will make us last * * * space is open to us now; and our eagerness to share its meaning is not governed by the efforts of others. We go into space because whatever mankind must undertake, free men must fully share.

After 20 years of proceeding without a firm vision for our space program, President Bush has finally articulated a very specific goal, returning to the Moon and going to Mars.

As exciting as the prospect of that voyage is, the space exploration initiative will be much more than that. SEI will spur the development of new technologies to enhance U.S. competitiveness. SEI will inspire young people to pursue educations in math, science and engineering.

The CHAIRMAN. The time of the gentleman from Pennsylvania [Mr. WALKER] has expired.

(By unanimous consent Mr. WALKER was allowed to proceed for 2 additional minutes.)

Mr. WALKER. SEI will create new industries and new economic opportunities, including new sources of energy and information that will help make the Earth more environmentally sound.

Recent public opinion polls have demonstrated that Americans strongly support the space program. Nearly 69 percent of Americans surveyed indicated they supported the President's proposal to undertake a vigorous program of manned exploration. Sixty-seven percent agreed that NASA's funding should be boosted from 1 to 2 percent of the Federal budget to help pay for these new initiatives, and 87 percent stated they believe it is vitally important to them, that the space program is something which keeps America competitive.

The Appropriations Committee has determined we cannot afford the space exploration initiative. I understand that, and they did their work as best they knew how. But I say that we cannot afford not to undertake that commitment to expanding our frontiers in space, and I am sorry that the lack of vision prevailed on this other program and we instead will not move aggressively forward.

Mr. GREEN of New York. Mr. Chairman, I move to strike the last word.

Mr. Chairman, I want to thank the gentleman from Pennsylvania [Mr. WALKER] for a very thoughful statement. I think he does right to raise the issue he raises, because it is an important issue and one about which the House should hear.

I take this opportunity to try to explain, at least from my perspective, why we did not accept the administration request for the additional funding for the Moon-Mars Program. I think it is essentially a question of priorities within funds that we have, and that is spelled out in some detail on page 62 of the committee report.

From my point of view, mission to Planet Earth is the No. 1 priority of NASA. That is an effort to use NASA's look-down capability to tell us what is going on in terms of the Earth's climate.

It is extraordinary to me that scientists think they can tell us what happened in the first second of the universe, they think they can tell us what is going on in the inside of the Sun, but they really can tell us very little about how the world works as a system, and particularly about how the world's climate works.

That gap in knowledge might not have been very important some decades ago. But as the evidence is becoming very clear that with the vast explosion of human population, and the vast explosion of technology, we are having a significant impact on that system and on the Earth's climate, I think it is very important that we start to know how the world's climate functions and what we are doing to it. Mission to Planet Earth, which is a Presidential initiative, is our means of finding that out.

Yes, we did put in some extra money compared with what the President requested, but I think that is fully justified by the situation. We put in $10 million to make a start on the synthetic apperture radar, an instrument which most of the scientists in the field tell me ought to be flying at the same time as the polar orbiting platform, and which has to be a different orbit, at a different level, from the polar orbiting platform, and it is necessary in order to give us information on biomass and moisture.

We put in $10 million for a new total ozone mapping spectrometer because our capacity at the present time is rapidly deteriorating to measure the decline in the ozone, and we know that is a very important issue.

Most significantly, we put in $8 million toward trying to be able to handle the vast amount of data that this whole program is going to generate. Just by way of comparison, the entire data base of the Internal Revenue Service is said to be 30 trillion bits of information. According to what we are told by the advisory committee on this program, the polar orbiting platform will generate every day 10 trillion bits of information. In 3 days it will generate as much information as the entire data base of the Internal Revenue Service.

We have no capacity to process that information at the present time, and if Members want to talk about NASA programs that can drive technology and keep us competitive internationally, it seems to me that learning how to receive, manage, and make accessible that vast quantity of data is going to be an extraordinary challenge with extraordinary opportunities for payoffs not just in terms of science but in terms of our world competitiveness in the data processing and data management fields.

The second area of priorities is of course the shuttle itself, and I regret that we were not able to do the full amount that the President requested there. But plainly a lot remains to be done with respect to the shuttle program. We have not done everything that those who reviewed the shuttle program following the *Challenger* tragedy thought out to be done. It is our only means of getting human beings into space at the present time, so that those who are interested in the Moon-Mars Program must surely want the shuttle put in first-class reliable condition, and we know from the recent *Columbia* pullback that it is far from a reliable instrument at the present time.

Then, of course, we have the space station. There are those who have more enthusiasm for the space station than I do. But certainly if we are going to find out what happens to human beings who spend long times in space, essential for any Moon-Mars Program, we do have to move ahead with the station, and again I regret that we could not do the full amount that the administration required. But there are limits.

Have we been fair to NASA? I think we have. It is already on an upward curve. In fiscal 1988 the appropriations for NASA were $8.8 billion.

The CHAIRMAN. The time of the gentleman from New York [Mr. GREEN] has expired.

(By unanimous consent Mr. GREEN of New York was allowed to proceed for 3 additional minutes.)

Mr. GREEN of New York. In fiscal year 1989 funding for NASA was $10.7 billion. In fiscal year 1990 it was $12.2 billion, and in fiscal year 1991 it is $14.3 billion. No other agency in this bill is growing at that rate.

But we simply do not have the money to do all of the missions that NASA wants to do if we have to go ahead and do the Moon-Mars mission.

Appendix 9

Calendar No. 854

101ST CONGRESS 2d Session | SENATE | REPORT 101-474

DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING AND URBAN DEVELOPMENT, AND INDEPENDENT AGENCIES APPROPRIATION BILL, 1991

SEPTEMBER 26 (legislative day, SEPTEMBER 10), 1990.—Ordered to be printed

Ms. MIKULSKI, from the Committee on Appropriations, submitted the following

REPORT

[To accompany H.R. 5158]

The Committee on Appropriations to which was referred the bill (H.R. 5158) making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1991, and for other purposes, reports the same to the Senate with various amendments and presents herewith an explanation of the contents of the bill.

AMOUNT OF NEW BUDGET (OBLIGATIONAL) AUTHORITY

Amount of bill as recommended in House	$80,660,024,400
Amount of change by Committee	−2,069,485,000
Amount of bill as reported to Senate	78,588,479,400
Amount of appropriations to date, 1990	66,148,162,000
Amount of budget estimates, 1991	75,861,485,000
Over estimate for 1991	+2,726,994,400
Over appropriations for 1990	+12,440,817,400

84-529

been given as to why the testing devices used on the mirrors were flawed. As a result, the Committee directs the Associate Administrator for Space Science and Applications to seek a formal investigation by the NASA inspector general on this matter, and the results of that inquiry to be transmitted to the Committees on Appropriation no later than January 31, 1991.

The Committee directs NASA to do a feasibility study of an international space radio astronomy institute based at the National Radio Astronomy Observatory in Green Bank, WV, whose mission would be to help facilitate the developing of space-based radio astronomy's growing international character. The results of this study should be submitted by February 1, 1991.

For life sciences, the Committee recommends the following:

—$25,000,000 from the $168,000,000 requested for life sciences, to be taken as a general reduction, subject to the normal reprogramming guidelines. None of this reduction is to be taken from the request for the search for extraterrestrial intelligence [SETI] program.

In recommending the full budget request of $12,100,000 for the SETI program, the Committee reaffirms its support of the basic scientific merit of this experiment to monitor portions of the radio spectrum as an efficient means of exploring the possibility of the existence of intelligent extraterrestrial life. While this speculative venture stimulates widespread interest and imagination, the Committee's recommendation is based on its assessment of the technical and engineering advances associated with the development of the monitoring devices needed for the project and on the broad educational component of the program. The fundamental character of the SETI program provides unique opportunities to explain principles of such scientific disciplines as biology, astronomy, physics, and chemistry, in addition to exposing students to the development and application of microelectronic technology.

The Committee has included the full request of $2,000,000 for the Lifesat project, and recommends continuation of studies on biology archiving to determine the feasibility of establishing a center for biology archiving for interdisciplinary research in gravitational biology.

The Committee is aware of a proposal to establish an institute for life support research and technology similar to existing NASA supported activities in planetary science and other technical areas. Such an arrangement would facilitate efforts to develop an organizational structure to manage extramural science and engineering activities and eventually to become an institutional arrangement with sufficient technical capability to effectively support long-term manned space missions. Current uncertainties over budgetary support have a dramatic impact on the pace of human space exploration activities, however it is the Committee's view that NASA should continue its consideration of this proposal since such technical concerns as life support can only be effectively addressed in the context of a planned long-term research and technology development program.

The Committee is also aware of the support NASA provides for basic life sciences research that is funded in the research and analysis activity of the life sciences budget. The Committee expects

Appendix 10

NEWS BULLETIN

RICHARD BRYAN

UNITED STATES SENATOR
STATE OF NEVADA
102ND CONGRESS

FOR IMMEDIATE RELEASE
DATE: May 14, 1991

CONTACT: Jim Mulhall 202/224-6244
55/91

BRYAN ELIMINATES GOVERNMENT WASTE
Cuts $14.5 Million Martian Hunt

WASHINGTON, D.C. --- U.S. Senator Richard Bryan (D-Nevada) eliminated today a $14.5 million program designed to search for intelligent life in outerspace. Bryan offered an amendment to the NASA Authorization bill under consideration by the Senate Commerce Committee. The Committee then approved the amendment overwhelmingly.

"At a time when our country faces massive budget deficits, urgent health care needs, and inadequate educational funding, the federal government has no business financing something as superfluous as this," said Bryan. "We must learn to prioritize."

The program, known as The Search For Extraterrestrial Intelligence (SETI), would expend $80 million through the end of the decade. SETI would gather and monitor radiowaves received from outerspace. It would then analyze that data to attempt to determine the existence of technologically advanced civilizations in outerspace.

"In an ideal world with unlimited resources, this program might be worth considering," said Bryan. "I am a strong supporter of NASA and scientific research. However, with the money to be expended on this program in FY92 alone, the federal government could pay a year's tuition for almost 10,000 students at UNLV or UNR. We cannot afford a program as remote and uncertain as this."

Similar attempts failed to eliminate this program in the House of Representatives last year.

"This is the first step of the process," Bryan said. "There may be attempts made to restore the funding somewhere along the way."

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Appendix II

NASA search for alien life no laughing matter

GEORGE KNAPP

AS SENATORS GO, Richard Bryan is about as good as they get. He's honest, hardworking, has a sense of humor, and doesn't take himself too seriously – at least most of the time.

Bryan is at his best when he is bashing the bad guys – hospitals, oil companies, auto companies, nuke companies, insurance companies. They're all big, they're all bad, and they all deserve a bashing now and then. That's why it is so uncharacteristic of Bryan to bash something as small and altruistic as SETI – the Search for Extraterrestrial Intelligence.

According to news accounts, Bryan referred to SETI as a "search for Martians." This remark generated a few headlines and several chuckles and it was politically risk-free. After all, there is no Martian lobby to raise a big stink. Scientific types aren't likely to march on Capitol Hill or fund an anti-Bryan PAC. However, there are plenty of serious, well-educated people out there who think that Bryan couldn't be more wrong on this question.

We're not talking about UFOs here, and we're certainly not talking about "Martians." SETI is good science, a serious, straightforward science project that will have profound effects on all humans even if no evidence of extraterrestrial intelligence is ever found. By the way, scientists concluded years ago that there is no intelligent life on Mars at present, which exposes Bryan's "Martian" remark for what it is – a cheap laugh at the expense of accuracy. SETI is not looking for Martians.

NASA isn't exactly some fly-by-night outfit that worries about two-headed aliens raping our womenfolk. Hundreds of scientists have been toiling on SETI for more than a decade. They've been waiting for the big moment when the full SETI scanning operation would be put into action. Appropriately enough, that is scheduled to happen on Columbus Day 1992. Sen. Bryan wants to pull the plug on 13 years of scientific labor.

Bryan says the $14 million for SETI could be better spent by paying the college tuition of 10,000 Nevada students. If that was a realistic alternative, I might agree, but it isn't. Congress isn't going to shift that money to pay for college tuition. More likely, the money will disappear into a budgetary black hole, going instead to pay for the excesses of a savings and loan bigshot, or into some weapons project that will never get off the ground, or into congressional junkets.

As Bryan admits, $14 million is nothing by federal standards. It's like spitting into the budgetary ocean. But in SETI, it will be a worthwhile investment. Dr. Phillip Morrison of MIT believes that SETI will push all scientific fields to the limit and beyond, even if no contact is made with other beings. The International Academy of Astronautics believes that SETI will vastly increase our knowledge of the universe. NASA is convinced that SETI will lead to new technologies, much as the space program has.

If Sen. Bryan really wants to help education, what better way is there to interest young minds in math and science than to throw E.T. into the learning process?

Most scientists now agree that the question about extraterrestrial intelligence is no longer "if," but rather "where." In the event that a signal from another civilization was received through SETI, life on Earth would be changed forever. Everything would be different. We would look at ourselves, our institutions, our world in a much different way.

I wonder what Sen. Bryan would have said if he had been in the court of Queen Isabella? Would he have argued that Columbus was too much of a longshot and that the search for the New World could wait a few years or a few decades? Would he have dared to peer into Galileo's telescope? Would he have climbed aboard the Beagle with Charles Darwin?

Pure science is a noble pursuit. The search for knowledge is an incredible adventure. Fourteen million bucks will not solve the woes of the world, even if it was spent on truly deserving programs. But $14 million could certainly change the world if spent on SETI.

Sen. Bryan is a good and honorable man, but I don't think he has thought this one through. More than 30 years ago, a scientist summed things up this way. "Either we're alone or we're not," he said. "And either way, it boggles the mind."

Let's find out.

GEORGE KNAPP, an anchorman for KLAS Channel 8, also writes a column that appears Wednesdays on Page 3A of the afternoon Las Vegas SUN.

Appendix 12

money into our physical and social infrastructure. That will achieve a number of essential goals. It would put millions back to meaningful work. It would stop the drain on the Treasury for costly assistance programs. It would repair our crumbling roads, bridges, sewage facilities, transportation, housing, education, and health systems. And, finally, it would give us the only realistic possibility of reducing the deficit.

Let us face it: We cannot penny-pinch ourselves out of a $3.7 trillion national debt that was amassed for the most part by the Reagan-Bush administrations.

Only by putting millions of unemployed Americans back to work can we both reduce the national debt and rebuild and reinvigorate America.

The season for Santa Claus is over, and as former President Nixon once said, "We are all Keynesians now."

NASA NEEDS TO WAKE UP

(Mr. DUNCAN asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. DUNCAN. Mr. Speaker, a few days ago, NASA announced that it will begin setting up equipment this week in the Mojave Desert to look for space aliens. NASA will spend $100 million on this Star Trek-type project.

I think it is totally ridiculous that NASA would spend hard-earned taxpayer dollars in this way.

The Associated Press reported that there have been 50 similar projects, organized searches, since 1960, with nothing found so far.

The Congress has given NASA huge increases in recent years, over $5 billion in increases in just the last 5 years. If they are going to spend $100 million to try to find little green men in space, I think their budget should be cut.

Just think how many poor people could be helped with $100 million, or how much could be done for education.

The people at NASA need to wake up. They need to know that there is a recession going on with millions out of work. They surely do not need to take $100 million from American families to conduct a futile search for space aliens. I think it is just pitiful that they will arrogantly waste so much money in this way.

This project will help no one except for the bureaucrats at NASA.

INTRODUCTION OF JAPANESE TRADE RESOLUTION

(Mr. BRUCE asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. BRUCE. Mr. Speaker, I am sure you have followed the circus we are calling our trade policy with Japan. The President came back from Japan with promises that the Japanese would purchase $19 billion in auto parts and 20,000 cars. The President was scarcely back in the United States when we hear that those promises were in fact only targets. We found out that no guarantees could be made that those targets would be reached. And finally, to add insult to injury, the Speaker of the Japanese House told us that our workers were lazy and overpaid.

Well, the Speaker of the Japanese House obviously hasn't been to my district lately. Overpaid is probably the last word that comes to mind. The fact is, there are too many people looking for work, both in my district and across the country, to worry about being overpaid. Instead, they are worried about how they are going to feed their children and pay for their doctor's bills.

It is especially ironic that a Japanese official is making these claims because the Japanese are notorious for their unfair trade practices. They use import barriers to close other countries out of their markets while invading other markets with below cost products. Until now, we have allowed these practices, secure in the knowledge that our economy was a picture of health and vitality. Well, it doesn't take a genius to see that our economy is no longer so healthy. I believe our trade policies should reflect this change.

I will be introducing a resolution today which urges the President to get tough in negotiating with the Japanese. We can no longer rely on a smile and a handshake to produce open Japanese markets. Instead, we need to sit down and conduct tough negotiations in specific industries. This approach has worked in the past and will continue to work in the future if we take the initiative. It's time to stop exporting jobs and instead start taking care of our own.

HAIL TO THE REDSKINS AGAIN

(Mrs. MORELLA asked and was given permission to address the House for 1 minute and to revise and extend her remarks.)

Mrs. MORELLA. Mr. Speaker, I rise to congratulate our beloved Washington Redskins on their 37-24 victory over the Buffalo Bills in Superbowl XXVI. This win was the perfect ending to a near-perfect season for the Washington area's hometown heroes.

In Sunday's game, as well as throughout the entire season, the team that featured a Mann, a Monk, and some Hogs displayed a tremendous amount of professionalism and sportsmanship. From coach "Golly Gee" Gibbs to MVP Mark Rypien, to "the Posse," the Redskins kept a low public profile and spent their time and energy preparing for their opponent.

After losing to the Dallas Cowboys in their 12th game, ending their hopes of finishing the regular season undefeated, the Redskins rebounded to finish the year with a record of 14-2, the best in the NFL. They breezed through the playoffs, and had little trouble finishing off the Bills—a formidable opponent—for their third title in 10 years under Coach Gibbs.

However, individual records have never been an important part of this team's makeup. Although players such as Rypien, wide receiver Gary Clark, tackle Jim Lachey, cornerback Darrell Green, and defensive end Charles Mann, to name a few, had superb seasons and are among the eight Redskins playing in the Pro Bowl. However, the team concept has always prevailed. The Redskins know that teams, not individuals, win championships, and it is a tribute to the coaching staff that these high-profile athletes are able to work together in reaching a common goal. No one epitomized this attitude more than long-time NFL veteran linebacker Matt Millen, who was placed on reserve—not eligible to participate—before the Super Bowl. Millen, a veteran of Super Bowls with two other teams did not complain when he was informed of his reserve status. Instead, he worked the sidelines during the game, rooting his teammates on to victory.

These are some of the reasons we cheer the Redskins week after week. Owner Jack Kent Cooke and Coach "Hey" Gibbs are quality individuals who surround themselves with outstanding players and coaches. Talent is crucial, but it must be molded into a smooth machine to win championships. With assistant coaches like "Torgy" Torgeson and Richie Petitbon, and with General Manager Charlie Casserly continuing to oversee operations, still another NFL championship is a very realistic possibility next year.

Let's all "Hail to the Redskins," and I look forward to seeing the Redskins next year in Pasadena for Super Bowl XXVII.

DO NOT SHIFT BURDEN BACK TO WORKING FAMILIES

(Mr. DURBIN asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. DURBIN. Mr. Speaker, it is our understanding that at the President's State of the Union Address this evening right here, he will be announcing that he is calling for the repeal of the luxury tax on yachts. Now he is arguing that by repealing this tax the boating industry will be invigorated, and more people will go back to work.

He will also argue that the yacht tax has not raised much revenue, if any, for the Federal Government.

Mr. Speaker, it is hard to argue over either of those points, but I think it is only fair to recount the history of why we increased the luxury tax on yachts.

Appendix 13

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ATHENS, TN 37303-4297
PHONE: (615) 745-4871

COMMITTEES
BANKING, FINANCE AND URBAN AFFAIRS
PUBLIC WORKS AND TRANSPORTATION
INTERIOR
SELECT COMMITTEE ON AGING
REPUBLICAN TASK FORCE ON HOUSING
CO-CHAIRMAN

Congress of the United States
House of Representatives
Washington, DC 20515-4202

April 29, 1992

U.S. TAXPAYERS HAVE BEEN *ALIENATED!*

Dear Colleague:

Did you know that NASA plans on spending $100 million dollars to search for space aliens?

I think that this is one of the biggest examples of fiscal irresponsibility I have ever come across, and today I will offer an amendment to H.R. 4364 that would eliminate the authorization for this project entirely. It will also ensure that money will not be transferred from other accounts to fund the so-called "Search for Extra-Terrestrial Intelligence" (or SETI).

Today, the SETI program will be authorized for $13.5 million of this total in the NASA authorization bill, H.R. 4364.

Since 1960, there have been 50 organized searches for alien life, none of which has found any trace of life. We simply cannot afford to spend this kind of money with our enormous federal debt and annual deficits. As you well know, there are simply too many problems here at home that urgently need to be addressed.

I know this is a drop in the bucket when compared to the overall spending going on around here, but we need to start somewhere.

Vote for fiscal responsibility and reason in the NASA budget.

Support the Duncan amendment to H.R. 4364.

Sincerely,

JOHN J. DUNCAN, JR.
Member of Congress

04-29-92 12:42PM
P02

Appendix 14

Excerpts from House proceedings on H.R. 4364, the FY 93 NASA Authorization Bill.

Speakers in following excerpt:

Rep. John J. Duncan, Jr. (R TN - 2nd District)
U.S. House of Representatives

Rep. George E. Brown, Jr. (D CA - 36th District)
Chairman of the Committee on Science, Space and Technology,
U.S. House of Representatives

Rep. Robert S. Walker (R PA - 16th District)
Ranking Minority Member of the Committee on Science, Space and Technology,
U.S. House of Representatives

Rep. Norman Y. Mineta ((D CA - 13th District)
Member of the Committee on Science, Space and Technology,
U.S. House of Representatives

April 29, 1992, approx. 11:30 PM EDT

Clerk: Committee of the whole . . . will consider further amendments to Title I of the NASA Authorization bill for fiscal year 1993:

Chair: Recognizes the gentleman from Tennessee:

Duncan: Mr. Chairman I have an amendment at the desk.

Chair: The clerk will report the amendment.

Clerk: Amendment offered by Mr. Duncan of Tennessee, page 8, line 11 . . . . . .(reading of the amendment interrupted by the following statement by Mr. Duncan)

Duncan: Mr. Chairman, I ask unanimous consent that my amendment be considered as read.

Chair: Without objection, so ordered. The gentleman is recognized for five minutes on his amendment.

Duncan: Mr. Chairman, my amendment is very simple. It would strike the $13.5 million authorization for NASA's so called Search for Extraterrestrial Intelligence, or SETI program. This is a program which the Associated Press has described as a search for space aliens.

This project, if completed, is expected to cost U.S. taxpayers approximately $100 million dollars. Already, NASA has spent over $32 million dollars on this program with nothing found so far. With our nation in such financial straights as at present, I find it incredible that we are continuing on with this program, this ridiculous luxury. At a time when our country faces massive budget deficits, urgent health care needs, and inadequate educational funding, we have no business financing something as excessive as this. But in these tough

times, NASA has requested $13.5 million this year, and up to $100 million over the next few years to listen for signals from intelligent life forms in space.

Mr. Chairman, this is not the first time that we have tried to stop this program. My distinguished colleague from Rhode Island, Mr. Machtley, offered a similar amendment two years ago and the House supported his position but the SETI Program continues.

The Associated Press reported that there have been over 50 similar searches since 1960 with nothing found so far and I think with deficits of approximately $400 billion a year, losses of over $1 billion a day on top of a national debt of approximately $4 trillion, this is the very type of spending, this is the very type of program that the American people are demanding that we do away with.

I realize that this amendment will not make much of a difference when compared to these huge deficits and this tremendous national debt and that it possibly could be said that it's a drop in the bucket, but if we use that justification we would not reduce or eliminate any spending. I think unless you believe that NASA should be given a total blank check and that Congress should never question anything that they do, then you should support this amendment.

This Project really only helps just bureaucrats at NASA. It will not help the American people at all. With this much funding -- this year's funding -- we could pay the tuition at the University of Tennessee in my district for over 4,000 students. And just stop to think how many poor people could be helped with $100 million that's being spent on this program.

I urge support for this amendment. I think it is a worthwhile amendment and I urge my colleagues to support it. I yield back the balance of my time.

Brown: Mr. Chairman

Chairman: For what purpose does the gentleman from California wish to be recognized.

Brown: I wish to oppose the amendment Mr. Chairman

Chairman: The gentleman is recognized for five minutes.

Brown: Let me say in advance that I recognize that the gentleman has an amendment which is on the surface attractive to many members of this House. It's my expectation, based upon my experience with similar amendments of this sort that it would probably carry. I regret that. It is not my intention to ask for a roll call vote on the amendment, but I do want to explain why I oppose the amendment and I would hope that I could convert the gentleman to an understanding of the importance of this particular scientific research.

What we have here of course is easily parodied and is frequently parodied in the press and radio and television as looking for ET's out in space, for aliens or something of that sort and it is ridiculed because of that. Actually, what this program encompasses is a very sophisticated radio astronomy type of research aimed at determining if there are any regularities, any anomalies in the kind of data that we pick up in our radio telescopes by doing a sophisticated analysis of all of these signals using principal investigators in the universities of this country.

Now, one would argue that this is a fruitless search, that any intelligent person would know that all intelligent life is here on Earth. One has only to look at the behavior of the Congress to know that we are the most intelligent form of life in the universe and that therefore there

can be no other intelligent life in the universe. Now, I can't really mobilize an argument that will convince those who think that this is an irrational kind of an activity. If they think that, they generally are difficult to convince. But this is valid science. It is at the heart of the interests of those people who think that human beings will someday explore the entire universe and that in the cosmos, because of its size and complexity, that there must be other forms of intelligent beings which are creating an impact on the universe that can be determined.

The other side of that coin incidentally, is that we here on Earth are sending messages out to the rest of the universe. I was taken by a speech that the Administrator of NASA made last night because it had one paragraph referring to this which -- not to SETI -- but to our own sending messages out to the universe, which I'd like to read because it epitomizes the spirit with which those who are interested in space are looking outward with the kind of a perspective that you can't get in any other way. Here's the quotation from the Administrator Goldin:

> "Two years ago, little Voyager Two, one of the most priceless hunks of metal ever assembled by NASA, flew by Neptune and headed out of our solar system carrying a copper disk, a cosmic message in a bottle from planet Earth. From the very heart of all humanity, it carries this message: *'We step out of our solar system into the universe seeking only peace and friendship. To teach if we are called upon, to be taught if we are fortunate. We know full well that we are but a small part of the immense universe and it is with humility and hope that we take this step.'*"

Now that is a part of the spirit of space exploration and it is in that humble spirit that we think that we are not the only significant creatures, that there might be others influencing the cosmos and we're finding new revelations about the cosmos every week, every month, as was illustrated just within the last few days from the reports from the cosmic observer satellite.

I don't know if this is a rational appeal. To me, it is a profoundly significant emotional appeal, and it is also without question in my mind something that is subject to scientific analysis using the most refined tools that we can possibly use and it's for this reason that I support this very small expenditure and hope that I can convince my friends that there is validity to this humble effort to see if there isn't other intelligent life of some sort within the universe and to reach out and try to understand it. Have I convinced the gentleman of the merits of my position?

(pause)

Well, I tried.

Chairman: The time of the gentleman has expired.

Chairman: For what purpose does the gentleman from Pennsylvania wish to be recognized.

Walker: In opposition to the amendment.

Chairman: The gentleman is recognized for five minutes.

Walker: Thank you Mr. Chairman. I agree with much of what the Chairman of our Committee has just said and I would just like to raise a couple of other points with regard to this amendment. Really what we have here is an amendment that represents spending for a

program that is less than 1/10 of 1% of NASA's budget. One might ask in a time when we are attempting to work within a freeze budget, which this really is, why would we preserve this program as a part of our effort to try to be responsible. The reason is because it goes to the core of what NASA is supposed to be all about given its basic charter. NASA has as its job to study the origin, evolution and distribution of life in the universe. That's really what this program is all about. It's not a program at all about UFO's. This is not a search for UFO's. And it doesn't matter what the Associated Press might say, they are wrong in a lot of other things. They are terribly wrong in this one. They had some ignoramus of a reporter that hasn't figured out what this is all about and writes stupid articles that cause untold grief in an important science program.

But, let me tell you it goes beyond just that. This particular program has proven to be a very useful tool in education. If you wonder what the American people are getting out of this, it is a very useful tool in education. The SETI Institute has developed teaching material that goes to grades 3 through 9. This is one science program that over and over again has shown itself to capture the imagination of young people. And so we are gathering something in terms of our youth as a result of this work.

The Inauguration of the SETI Microwave Observing Project is scheduled for October 12, 1992 - just a few months from now. This comes after 15 years of Research and Development, so if we were to do what this amendment proposes, and that is cancel this project, we will in fact abandon 15 years of work that has gone into the project.

Finally I would say that even if no signals are ever detected under this kind of program, the fact is that the technology that has been developed as part of the R & D to search for these very faint signals in outer space, has been and will continue to be applied to things like medical diagnostic imaging for resource exploration and for aircraft safety. Those are already spin-off benefits from this. We don't know what the additional spin-off benefits may be when we actually begin to apply the technology.

So I agree with the Chairman, this may be one of those things where, because we don't have an ability to get the full understanding of the House that it will kind of easily be voted for by people, but it is an amendment I'm afraid which undermines the very core science and from that standpoint it is very disappointing that the House will probably go in the direction that it will.

Chairman: For what purpose does the gentleman from California wish to be recognized?

Mineta: To speak in opposition to the amendment, Mr. Chairman.

Chairman: The gentleman is recognized for five minutes.

Mineta: Mr. Chairman, I strongly oppose this amendment to terminate the search for extraterrestrial intelligence project and I urge my colleagues to vote against this amendment. NASA's SETI Microwave Observing Project has the resounding support of the scientific community and has received a very strong support from the House in past years.

The SETI is not a search for green men on Mars. Rather, SETI is a very valuable project that will produce a number of significant benefits, including technological and scientific advances and educational spin-offs. The SETI Program is designed to develop powerful, sophisticated radio telescopes sensitive to faint radio emissions and capable of discriminating against considerable cosmic interference.

The technical and engineering advances associated with the development of these monitoring devices are extraordinary. The custom processing chip developed for SETI and fabricated by DARPA is capable of performing almost seven times faster than the common communications chip. In addition, the SETI chip enables compact spectrum analyzers to have millions of simultaneous channels. Combined with the signal detection computers developed for SETI, this technology could produce a flight unit that would allow the FAA to continuously monitor its bands as opposed to sequentially scanning them as it must do now. Other applications of SETI technology could prove beneficial for diagnostic medicine, fault detection in materials and geochemical exploration.

Last but not least, SETI has been found to be effective as a means of increasing interest in general science education among all age levels. In 1991, the SETI Institute received a three year National Science Foundation Award for developing integrated teaching materials for elementary and middle school grades.

Mr. Chairman, SETI represents a valuable and worthwhile scientific endeavor that has countless spin-off benefits and I strongly urge my colleagues to vote against this amendment to terminate the program. I yield back the balance of my time.

Chair: The question is on the amendment from the gentlemen from Tennessee. Those in favor of the amendment vote aye.

(pause . . . no audible response)

Those opposed.

(pause . . . no audible response)

In the opinion of the Chair, the ayes have it. The amendment is passed.

assistance for family planning services, which was referred to the House Calendar and ordered to be printed.

REPORT ON RESOLUTION PROVIDING FOR CONSIDERATION OF H.R. 2056 TO PROVIDE EFFECTIVE TRADE REMEDIES UNDER COUNTERVAILING AND ANTIDUMPING DUTY LAWS AGAINST FOREIGN-BUILT SHIPS

Mr. FROST, from the Committee on Rules, submitted a privileged report (Rept. No. 102-507) on the resolution (H. Res. 443) providing for the consideration of the bill (H.R. 2056) to amend the Tariff Act of 1930 to require that subsidy information regarding vessels be provided upon entry within customs collection districts and to provide effective trade remedies under the countervailing and antidumping duty laws against foreign-built ships that are subsidized or dumped, which was referred to the House Calendar and ordered to be printed.

PERMISSION FOR COMMITTEE ON GOVERNMENT OPERATIONS TO SIT DURING 5-MINUTE RULE ON TOMORROW

Mr. CONYERS. Madam Speaker, I ask unanimous consent that the Committee on Government Operations be permitted to sit during proceedings under the 5-minute rule on Thursday, April 30, 1992.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Michigan?

There was no objection.

REMOVAL OF NAME OF MEMBER AS COSPONSOR OF H.R. 3438, H.R. 3439, H.R. 3440, H.R. 3441, H.R. 3442, AND H.R. 3605

Mr. RANGEL. Madam Speaker, I ask unanimous consent that my name be removed, which was inaccurately attached as a cosponsor to the following bills: H.R. 3438, H.R. 3439, H.R. 3440, H.R. 3441, H.R. 3442, and H.R. 3605.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from New York?

There was no objection.

PROVIDING FUNDS FOR CONTINUING EXPENSES OF STANDING AND SELECT COMMITTEES OF THE HOUSE

Mr. GAYDOS. Madam Speaker, by direction of the Committee on House Administration, I call up a privileged resolution (H. Res. 429) providing amounts from the contingent fund of the House for continuing expenses of investigations and studies by the standing and select committees of the House from May 1, 1992, through May 31, 1992, and ask for its immediate consideration.

The Clerk read the resolution, as follows:

H. Res. 429

Resolved, That there shall be available from the contingent fund of the House such amounts as may be necessary for continuance of necessary investigations and studies by each standing committee and select committee of the House in the second session of the One Hundred Second Congress for the period beginning immediately after midnight on April 30, 1992, and ending at midnight on May 31, 1992, on the same terms and conditions as amounts were available to such committees for the period beginning at noon on January 3, 1992, and ending at midnight on March 31, 1992, pursuant to clause 5(f) of rule XI of the Rules of the House, except that the entitlement percentage shall be 8.33 percent.

The SPEAKER pro tempore. The gentleman from Pennsylvania [Mr. GAYDOS] is recognized for 1 hour.

Mr. GAYDOS. Madam Speaker, for purposes of debate only, I yield the customary 30 minutes to the gentleman from Ohio [Mr. GILLMOR] pending which I yield myself such time as I may consume, with the understanding that any additional time which I may yield will be subject to the specific limitation for debate purposes only.

This resolution provides amounts from the contingent fund of the House for continuing expenses of investigations and studies by all standing and select committees of the House with the exception of the Committees on Appropriations and Budget from May 1, 1992 through midnight May 31, 1992. During this period, each committee receiving amounts under this resolution shall be entitled to an amount equal to 8.33 percent of the total amount made available to such committee under House Resolution 92, approved by the House on March 20, 1991. Furthermore, I wish to emphasize that this entitlement percentage is at the freeze level.

The adoption of this continuing expense resolution is necessary in order that committee work can proceed uninterrupted while discussions are completed regarding the final disposition of the Omnibus Primary Expense Resolution.

Finally, I urge my colleagues to vote in favor of the resolution.

Mr. GILLMOR. Madam Speaker, I yield myself such time as I may consume. I rise in support of the resolution offered by my colleagues and chairman, the gentleman from Pennsylvania [Mr. GAYDOS].

This continuing resolution is being brought to the floor to continue the funding of our committees which expires at midnight tomorrow night, and continue it in an expeditious manner until May 31. The CR freezes the committee's budgets at last year's funding levels. It is 8.33 percent of the annual amount per month, which is a hard freeze.

Hopefully, this will be the last time we will be here to request a continuing resolution. I would hope that our Chamber will be able to get together and present to this body a resolutic that will provide permanent fundin for the year, but I do support the resc lution.

Madam Speaker, I yield back th balance of my time.

Mr. GAYDOS. Madam Speaker, ask that the resolution be supported.

Madam Speaker, I yield back th balance of my time, and I move th previous question on the resolution.

The previous question was ordered.

The SPEAKER pro tempore. The question is on the resolution.

The question was taken: and the Speaker pro tempore announced that the ayes appeared to have it.

Mr. BARTON of Texas. Madam Speaker, on that I demand the yeas and nays.

The yeas and nays were ordered.

The SPEAKER pro tempore. Pursuant to clause 5 of rule I, further proceedings on this question will be postponed until some point in tomorrow's proceedings.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MULTI-YEAR AUTHORIZATION ACT OF 1992

The SPEAKER pro tempore. Pursuant to House Resolution 432 and rule XXIII, the Chair declares the House in the Committee of the Whole House on the State of the Union for the further consideration of the bill, H.R. 4364.

□ 1127

IN THE COMMITTEE OF THE WHOLE

Accordingly the House resolved itself into the Committee of the Whole House on the State of the Union for the further consideration of the bill (H.R. 4364) to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, research and program management, and inspector general, and for other purposes, with Mr. LaRocco [Chairman pro tempore] in the chair.

The Clerk read the title of the bill.

The CHAIRMAN pro tempore. When the Committee of the Whole rose earlier today, the amendment offered by the gentleman from Indiana [Mr. ROEMER] had been disposed of and title I was open for amendment at any point.

Are there further amendments to title I?

Amendment offered by Mr. DUNCAN: Page 8, line 11, strike "$177,200,000" and insert in lieu thereof "$163,700,000".

Page 8, line 14, strike "$200,500,000" and insert in lieu thereof "$187,000,000".

Page 8, line 15, strike "$245,500,000" and insert in lieu thereof "$232,000,000".

Page 8, line 15, after "fiscal year 1995." insert "None of the funds appropriated pursuant to this Act shall be used for the Search for Extraterrestrial Intelligence (SETI).".

Mr. DUNCAN (during the reading). Mr. Chairman, I ask unanimous consent that the amendment be considered as read and printed in the RECORD.

The CHAIRMAN pro tempore (Mr. LAROCCO). Is there objection to the request of the gentleman from Tennessee?

There was no objection.

Mr. DUNCAN. Mr. Chairman, my amendment is very simple. It would strike the $13.5 million authorization for NASA's so-called search for extraterrestrial intelligence or SETI Program. This is a program which the Associated Press described as a search for space aliens. This project, if completed, is expected to cost U.S. taxpayers nearly $100 million.

Already NASA has spent over $32 million on this program with nothing found so far.

With our Nation in such financial straits as at present, I find it incredible that we are continuing on with this program, this ridiculous luxury.

At a time when our country faces massive budget deficits, urgent health care needs, and inadequate educational funding, we have no business financing something as excessive as this.

In these tough times, NASA has requested $13.5 million this year, and up to $100 million over the next few years to listen for signals from intelligent life forms in space.

Mr. Chairman, this is not the first time that we have tried to stop this program My distinguished colleague from Rhode Island, Mr. MACHTLEY, offered a similar amendment 2 years ago, and the House supported his position. But the SETI Program continues.

The Associated Press reported that there have been over 50 similar searches since 1960 with nothing found so far, and I think with deficits of approximately $400 billion a year, losses of over $1 billion a day on top of a national debt of approximately $4 trillion, this is the very type of spending, this is the very type of program that the American people are demanding that we do away with.

I realize that this amendment will not make much of a difference when compared to these huge deficits and this tremendous national debt, and that it possibly could be said that it is a drop in the bucket, but if we used that justification, we would not reduce or eliminate any spending.

I think unless you believe that NASA should be given a total blank check and the Congress should never question anything that they do, then you should support this amendment.

This project really only helps just bureaucrats at NASA. It will not help the American people at all. With this much funding, this year's funding, we could pay the tuition at the University of Tennessee in my district for over 4,000 students, and just stop to think how many poor people could be helped with $100 million that is being spent on this program.

I urge support for this amendment. I think it is a worthwhile amendment. and I urge my colleagues to support it.

Mr. BROWN. Mr. Chairman, I rise in opposition to the amendment.

Mr. Chairman, let me say in advance that I recognize that the gentleman has an amendment which is, on its surface, attractive to many Members of this House. It is my expectation, based upon my experience with similar amendments of this sort, that it would probably carry. I regret that.

It is not my intention to ask for a rollcall vote on the amendment. But I do want to explain why I oppose the amendment.

I would hope that I could convert the gentleman to an understanding of the importance of this particular scientific research.

What we have here, of course, is easily parodied and is frequently parodied in the press, on radio and television as looking for E.T.'s out in space, for aliens or something of that sort, and it is ridiculed because of that.

Actually what this program encompasses is a very sophisticated radio astronomy type of research aimed at determining if there are any regularities, any anomalies in the kind of data that we pick up in our radio telescopes by doing a sophisticated analysis of all of these signals using principal investigators in the universities of this country.

One would argue that this is a fruitless search, that any intelligent person would know that all intelligent life is here on Earth, and one has only to look at the behavior of the Congress to know that we are the most intelligent form of life in the universe and that, therefore, there can be no other intelligent life in the universe.

Now, I cannot really mobilize an argument that will convince those who think that this is an irrational kind of an activity. If they think that, they generally are difficult to convince.

But this is valid science. It is at the heart of the interests of those people who think that human beings will someday explore the entire universe, and that in the cosmos, because of its size and complexity, that there must be other forms of intelligent beings which are creating an impact on the universe that can be determined.

The other side of that coin, incidentally, is that we here on Earth are sending messages out to the rest of the universe. I was taken by a speech that the Administrator of NASA made last night, because it had one paragraph referring to this, which is not to the study but our own sending of messages out to the universe, which I would like to read, because it epitomizes the spirit with which those who are interested in space are looking outward with the kind of a perspective that you cannot get in any other way.

Here is the quotation from the Administrator Golden:

> Two years ago, little Voyager II, one of the most priceless hunks of metal ever assembled by NASA, flew by Neptune and headed out of our solar system carrying a copper disk, a cosmic message in a bottle from Planet Earth. From the very heart of all humanity it carries this message: "We stop out of our solar system into the universe seeking only peace and friendship, to teach if we are called upon, to be taught if we are fortunate. We know full well that we are but a small part of the immense universe, and it is with humility and hope that we take this step.

Now, that is a part of the spirit of space exploration, and it is in that humble spirit that we think that we are not the only significant creatures, that there might be others influencing the cosmos, and we are finding new revelations about the cosmos every week, every month, as was illustrated just within the last few days from the reports from the cosmic observer satellite.

I do not know that this is a rational appeal. To me it is a profoundly significant emotional appeal, and it is also, without question in my mind, something that is subject to scientific analysis using the most refined tools that we can possibly use. It is for this reason that I support this very small expenditure and hope that I can convince my friends that there is validity to this humble effort to see if there is not other intelligent life of some sort within the universe and to reach out to try and understand it.

Have I convinced the gentleman of the merits of my position? Well, I tried.

Mr. WALKER. Mr. Chairman, I move to strike the last word.

Mr. Chairman, I agree with much of what the chairman of our committee has just said, and I would just like to raise a couple of other points with regard to this amendment.

Really what we have here is an amendment that represents spending for a program that is less than one-tenth of 1 percent of NASA's budget, and one might ask in a time when we are attempting to work within a freeze budget, which this really is, why we would preserve this program as a part of our effort to try to be responsible. The reason is because it goes to the core of what NASA is supposed to be all about given the basic charter.

NASA has as its job to study the origin, evolution, and distribution of life in the universe. That is really what this program is all about. It is not a program at all about UFO's. This is not a search for UFO's, and it does not matter what the Associated Press may say. They have been wrong on a lot of other things. They are terribly wrong on this one.

□ 2340

They have some ignoramus of a reporter who has not figured out yet what this is all about and writes stupid articles that cause us untold grief in an important science program. But let me tell you it goes beyond just that.

This particular program has proven to be a very useful tool in education.

If you wonder what the American people are getting out of this, it is a very useful tool in education. The SETI Institute has developed a teaching material that goes to grades third through ninth. This is one science program that over and over again has shown itself to capture the imagination of young people.

So we are gathering something in terms of our youth as a result of this work.

The inauguration of the SETI microwave observing project is scheduled for October 12, 1992, just a few months from now. This comes after 15 years of research and development.

So, if we were to do what this amendment proposes, and that is cancel this project, we will in fact abandon 15 years of work that has gone into the project.

Finally, I would say that even if no signals are ever detected under this kind of program, the fact is that the technology that has been developed as a part of that R&D, to search for these very faint signals in outer space, has been and will continue to be applied to things like medical diagnostic imaging, for resource exploration, and for aircraft safety. Those are already spinoff benefits from this. We do not know what the additional spinoff benefits may be and when we actually will begin to apply the technology.

So, I agree with the chairman. This may be one of those things where, because we do not have an ability to get the full understanding of the House, it will kind of easily be voted for by people, but it is an amendment I am afraid which undermines some very core science.

From that standpoint, it is disappointing that the House will probably go in the direction it will.

Mr. MINETA. Mr. Chairman, I move to strike the requisite number of words, and I rise in opposition to the amendment.

(Mr. MINETA asked and was given permission to revise and extend his remarks.)

Mr. MINETA. Mr. Chairman, I strongly oppose this amendment to terminate the search for extraterrestrial intelligence project, and I urge my colleagues to vote against the amendment.

NASA's SETI microwave observing project has the resounding support of the scientific community and has received very strong support from the House in past years. SETI is not a search for green men on Mars. Rather, SETI is a valuable project that will produce a number of significant benefits including technological and scientific advances and educational spinoffs.

The SEI program is designed to develop powerful, sophisticated radiotelescopes sensitive to faint radio emissions and capable of discriminating against considerable cosmic interference. The technical and engineering advances associated with the development of these monitoring devices are extraordinary.

The custom processing chip developed for SETI and fabricated by DARPA is capable of performing almost seven times faster than the common communications chip. In addition, the SETI chip enables compact spectrum analyzers to have millions of simultaneous channels. Combined with the signal detection computers developed for SETI, this technology could produce a flight unit that would allow the FAA to continuously monitor its bands, as opposed to sequentially scanning them as it must do now.

Other applications of SETI technology could prove beneficial for diagnostic medicine, fault detection in materials, and geochemical exploration.

Last, but not least, SETI has been found to be effective as a means of increasing interest in general science education among all age levels. In 1991, the SETI institute received a 3-year National Science Foundation award for developing integrated teaching materials for elementary and middle school grades.

Mr. Chairman, SETI represents a valuable and worthwhile scientific endeavor that has countless spinoff benefits. I strongly urge my colleagues to vote against this amendment to terminate the program.

The CHAIRMAN pro tempore (Mr. LaRocco). The question is on the amendment offered by the gentleman from Tennessee [Mr. DUNCAN].

The amendment was agreed to.

The CHAIRMAN pro tempore. If there are no further amendments to title I, the Clerk will designate title II.

The text of title II is as follows:

TITLE II—MULTIYEAR AUTHORIZATION FOR SPECIAL INITIATIVES

SEC. 201. FINDINGS.

Congress finds that—

(1) in addition to carrying out a core space program, international leadership, technological advancement, and expanded scientific knowledge will be enhanced by an expanded space program based on special initiatives in science, exploration, space transportation, space technology, and space applications;

(2) special initiatives carried out under an expanded space program should compete on an annual basis with other Federal discretionary programs, but not with core space programs;

(3) the orderly and phased transfer of funding from defense research and development to civilian research and development over the next 5 years will achieve a balance between defense and civilian investments and provide the necessary resources to undertake an expanded space program;

(4) it is in the national interest and of benefit to international agreements for the Space Station Freedom to plan for the completion of a permanent manned Space Station utilizing a crew of 8 and providing 75 kilowatts of power;

(5) the successful conduct of an aggressive yet affordable Space Exploration Initiative will critically depend on precursor demonstrations of innovative cost control measures and efficient management practices;

(6) the Administrator should undertake a focused Earth Observing System program responsive to policy needs; and

(7) inasmuch as civil launch requirements and launch rates will remain reasonably static over the next decade, the incremental improvement of current vehicles and facilities will provide a low-cost means to enhance United States launch capabilities.

SEC. 202. AUTHORIZATION OF APPROPRIATIONS.

(a) LIMITATION.—Appropriations may be made under subsections (b), (c), and (d) only to the extent that appropriations are made to the National Aeronautics and Space Administration in excess of $14,300,900,000 for fiscal year 1993, $15,090,800,000 for fiscal year 1994, and $15,724,900,000 for fiscal year 1995.

(b) RESEARCH AND DEVELOPMENT.—There are authorized to be appropriated to the National Aeronautics and Space Administration for "Research and Development" for the following special initiatives:

(1) Space Station Freedom, $60,000,000 for fiscal year 1994, and $120,000,000 for fiscal year 1995, in order to provide for an Assured Crew Return Vehicle by fiscal year 1999, a power level of 75 kilowatts, and a crew of 8.

(2) Earth Observing System, including the Earth Observing System Data Information System, $371,000,000 for fiscal year 1993, $695,000,000 for fiscal year 1994, and $1,000,000,000 for fiscal year 1995.

(A) PROGRAM OBJECTIVES.—The Administrator shall carry out an Earth Observing System program that addresses the highest priority international climate change research goals as defined by the Committee on Earth and Environmental Sciences and the Intergovernmental Panel on Climate Change.

(B) REPORTS TO CONGRESS.—(i) Within 90 days after the date of enactment of this Act, the Administrator shall submit to Congress a Resiliency Plan which sets forth technical and programmatic contingencies for the Earth Observing System in the event that funding shortfalls occur, and which will ensure that the highest priority measurements are maintained on schedule to the greatest extent practicable while lower priority measurements are deferred, deleted, or obtained through other means. The report shall specifically identify what satellites and instrument complements would be launched under various funding profiles.

(ii) Within 30 days after the award of a contract for the Core System of the Earth Observing System Data and Information System, the Administrator shall submit to Congress a Development Plan which—

(I) identifies the highest risk elements of the development effort and the key advanced technologies required to significantly increase scientific productivity;

(II) provides a plan for the development of one or more prototype systems for use in reducing the development risk of critical system elements and obtaining feedback from scientific users;

(III) provides a plan for research into key advanced technologies; and

(IV) identifies sufficient resources for carrying out the Development Plan.

(C) DATA ACCESS STUDY.—Of the funds provided for in this paragraph, up to $34,100,000 in fiscal year 1993 may be made available for the Consortium for International Earth Science Information Network. As a condition of the receipt of such funds, the Consortium shall carry out a study, with the guidance of the Administrator and the Committee on Earth and Environmental Sciences, which—

(i) specifically identifies products of the Earth Observing System Data and Information System which will be directly useful to

Appendix 15

Congress of the United States

House of Representatives

Washington, D.C. 20515
June 4, 1992

The Honorable Bob Traxler
Chairman, VA, HUD, and
Independent Agencies Subcommittee
2366 Rayburn Building
Washington, D.C. 20515

Dear Mr. Chairman:

We are writing to express support for NASA's SETI Microwave Observing Project, which we believe to be of valuable scientific, technical, and educational merit.

NASA's SETI Microwave Observing Project has broad, longstanding support within the scientific community. It represents sound and exciting scientific exploration into a question of fundamental and enduring importance to all human kind. It is good science and good radio astronomy, and it represents exactly the kind of low cost, high impact project that many Members of Congress believe NASA should pursue.

The Microwave Observing Project has pioneered many new applications of technology from custom designed VLSI signal processing chips to supercomputer pattern recognition systems at workstation prices. In part or total these advances may find applications in the fields of resource exploration, medical imaging, structural analysis of materials, and geochemical exploration.

Furthermore, SETI has been found to be effective as a means of increasing interest in general science education among youngsters who will become the next generation of engineers and scientists. In 1991, the SETI Institute received a three-year National Science Foundation award for developing integrated teaching materials for elementary and middle school grades.

We urge you to maintain funding for this exciting and worthwhile scientific endeavor.

Sincerely,

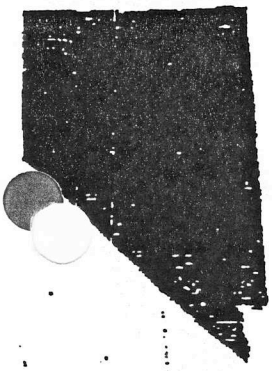
LEON E. PANETTA

NORMAN Y. MINETA

DAVE McCURDY

GEORGE E. BROWN, JR.

Appendix 16



NEWS BULLETIN

RICHARD BRYAN

UNITED STATES SENATOR
STATE OF NEVADA
102ND CONGRESS

FOR IMMEDIATE RELEASE
DATE: June 16,1992

CONTACT: Jim Mulhall 202/224-6244
79/92

SENATE COMMITTEE VOTES TO CUT ALIEN SEARCH FUNDING

Bill strips $13.5 million from SETI Program

WASHINGTON, D.C. -- The Senate Commerce Committee today voted to pass an amendment offered by United States Senator Richard Bryan (D-Nevada) to cut funding for the Search for Extraterrestrial Intelligence (SETI) program. "It is a simple matter of budget priorities," said Bryan. "If we are ever going to balance the budget we must start cutting somewhere, and a low priority program like SETI is one budget item that is just going to have to take a back seat until the budget is balanced."

The amendment was offered during consideration of a bill to authorize the National Aeronautics and Space Administration (NASA). The amendment cuts $13.5 million from the SETI program, which seeks to contact extraterrestrial forms of life. The program is expected to cost $100 million over 10 years.

"There are those in this town who say that $13 million is not a lot of money, but that shows how out of touch the process is. The $13.5 million that we save under this amendment is the equivalent of providing 10,135 students with full-tuition scholarships to UNLV, buying 115 new homes in Las Vegas or providing day care for 3,750 toddlers," Bryan said.

Bryan was successful in deleting funding for the SETI program during a Commerce Committee mark-up last year only to see the funding restored by the conference committee.

"Yesterday, the Administration reported an expected budget deficit this year of $350 billion although the real number is probably closer to $400 billion," Bryan said. "Everyone says we must cut the budget and I agree but if we cannot cut a program like SETI what can we cut."

"Nobody should think this cut will balance the budget," Bryan said. "But this is the kind of scrutiny we should apply to the budget."

-30-

Vote on Bryan amendment to cut SETI Project FY93

COMMERCE U.S. SENATE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

SD-508 (ZIP: 20510-6125) 224-5115

Y Ernest F. Hollings, SC, Chairman.

Yes 11
No 6
Absent 3

N Daniel K. Inouye, HI
Y Wendell H. Ford, KY
Y J. James Exon, NE
Y Al Gore, TN
N John D. Rockefeller, IV, WV
— Lloyd Bentsen, TX
— John F. Kerry, MA
— John B. Breaux, LA
Y Richard H. Bryan, NV
N Charles S. Robb, VA

Y John C. Danforth, MO
Y Bob Packwood, OR
Y Larry Pressler, SD
N Ted Stevens, AK
N Robert W. Kasten, Jr., WI
Y John McCain, AZ
Y Conrad Burns, MT
N Slade Gorton, WA
Y Trent Lott, MS

STAFF MEMBERS

Adams, Susan SD-554	48170
Arnold, Laura SD-554	41251
Bauroth, L A, (Spike) SH-428	44254
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Bodenhausen, Brad SD-516	44852
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Bryant, Barbara SH-427	49360
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Clkins, Sylvia A SR-254	40422
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Cook, Antoinette D SR ST SH-227	49340
Creel, Hal SR ST SH-425	44914
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Curtin, Kevin G CHF COUN & ST DIR SR-254	40427
D'Amato, Richard D PRESS SECY SR-254	40411
Dalton, Penny SH-425	44912
Drewry, James S W SD-512	41265
Dunn, Loretta L SR ST SH-428	49325
Easter, Alberta E SH-430	41673
Ferril, Donna J SH-428	44858
Foggin, Pamela C SH-428	49350
Foster, Robert L SD-508	41249
Garnett, Nancy SD-566	48172
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Graman, Mary Pat SD-554	41251
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Ingwersen, Julie R SD-508	45115
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Joseph, Kevin SH-227	49340
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Keeney, Regina M SD-554	41251
Kennedy, Joyce SD-512	41265
Kojm, Rebecca A SR-254	40411
Lance, Linda SR ST SH-227	40415
Levy, Lori C SH-428	44912
MacDonald, Susan H SR-254	40411
Maes, Michelle SD-554	41251
Maness, Alan D SD-516	44852
McCormick, Walter B, Jr MIN CHF COUN & ST DIR SD-554	45183
McManus, Mary P SD-554	41251
Moran, John A SD-554	48170
Morgan, Linda J GEN COUN SR-254	40411
Navetta, Lori SD-554	41251
Nelson, Mike R SH-427	49360
Nicholas, Valerie R SD-554	47535
Nussman, J Michael SR ST SH-425	44912
Palmer, Steven O SR ST SH-427	49360
Portes, Yvonne SH-227	49340
Post, Gretchen Stevenson SD-516	44852
Pritchard, Randolph H M SH-425	44914
Schlager, Ivan A SH-428	49325
Sidell, Arlene M SD-508	41267
Socci, Anthony SH-427	49360
Suen, Claire SH-427	49360
Turek, Mary L SR-254	40411
Turner, Roslyne D SH-428	45396
Wales, Joani SD-508	45119
Washington, Sheryl W SR ST SH-428	49350
Watson, Andriette D SH-428	49325
Whalen, Stacy SD-516	44852
Whitehorn, Samuel E SR ST SH-428	49350
Whitsett, Louis C SD-566	49172
Willis, Deral E SH-427	49360
Windham, Patrick H SR ST SH-427	49360
Windhausen, John D, Jr SH-227	49340

about June 16, 1992

This looks like telephone directory of the Senate Committee and vote of Committee members written in by hand

Appendix 17

Statement of Senator John D. Rockefeller IV
Regarding NASA's Search for Extraterrestrial Intelligence
Senate Commerce Committee Executive Session
June 16, 1992

Mr. Chairman, I strongly oppose this proposal to terminate the search for extraterrestrial intelligence project, and I urge my colleagues to vote against the amendment.

The SETI Microwave Observing Project is not a search for little green men. It is a valuable project that has already produced many significant benefits, including technological advances for American scientists and educational programs for American children. I know about the project because of the major role that the National Radio Astronomy Observatory at Green Bank, West Virginia, will play in SETI's Targeted Search phase.

If we do what this amendment proposes, and cancel the SETI project, we will abandon 15 years of work that has gone into the program. The inauguration of the SETI Microwave Observing System is scheduled for Columbus Day, 1992, just a few months from now. This comes after 15 years of research and development, and after a $35 million investment by American taxpayers.

Mr. Chairman, cutting the program's budget, just when the project team is in the home stretch to begin observations, is irresponsible -- particularly when one considers the years of review, preparation, and funding that have gone into taking SETI to the starting gate. It would be like halting construction on a bridge that spans only half the river -- you don't reap the benefits until the project is finished.

The amendment before us would terminate a program that is on the verge of realization. Moreover, SETI represents less than one-tenth of 1 percent of NASA's budget.

As I've mentioned already, the SETI program is valid science -- it's not a search for Stephen Speilberg's "E.T," it <u>is</u> a continuation of the country's commitment to research into the unknown. Actually what we have here is a very sophisticated radio astronomy program, designed to search the universe for radio emissions and capable of discriminating against considerable cosmic interference.

The technical and engineering advances associated with the SETI program are extraordinary -- including a custom processing chip developed for SETI and fabricated by DARPA that is capable of performing almost seven times faster that the common communications chip. Other applications of SETI technology could prove beneficial for diagnostic medicine, fault detection in materials, and geochemical exploration.

And, as many of you know, the SETI project has been found to inspire our students to study math and science. In 1991, the SETI Institute received a 3-year grant from the National Science Foundation to developing teaching materials for elementary and secondary schools. If we vote for the pending amendment, we also vote to shut down a program that received significant support from NSF.

In sum, Mr. Chairman, SETI represents a valuable and worthwhile scientific endeavor that has countless spinoff benefits. It has lead to important technological advances and promising educational opportunities.

American taxpayers have a right to expect a return on their investment. I urge my colleagues to support funding for the SETI Project, so that 15 years of development can be allowed to come to fruition, and so that we might enjoy some of the benefits of this important undertaking.

Appendix 18

NEWS BULLETIN

RICHARD BRYAN

UNITED STATES SENATOR
STATE OF NEVADA
103RD CONGRESS

FOR IMMEDIATE RELEASE
DATE: September 22, 1993

CONTACT: Jim Mulhall 202/224-6244
114/93

BRYAN AMENDMENT PASSES TO CUT EXPENSIVE SEARCH FOR "MARTIANS"
GREAT MARTIAN CHASE TO END?

Washington, D.C. --- The United States Senate agreed with Senator Richard Bryan (D-Nevada) today by voting by more than two to one to eliminate an expensive program to find intelligent life in outerspace. The Senate supported Bryan's position by a vote of 77 to 23.

"The Great Martian Chase may finally come to an end," Bryan said. "As of today, millions have been spent and we have yet to bag a single little green fellow. Not a single martian has said 'take me to your leader,' and not a single flying saucer has applied for FAA approval. It may be funny to some, except the punchline includes a $12.3 million price tag to the taxpayer."

Bryan offered an amendment to the NASA appropriations bill today to eliminate $12.3 million in funding for NASA's program to search for life in outer space. Bryan successfully eliminated Senate funding for the program in 1992, when the Senate Commerce Committee voted 11 to 6 in favor of a Bryan amendment to cut funding for the program, and the full Senate approved the Bryan cut. To avoid the cut, NASA simply renamed the program from the original: Search for Extraterrestrial Intelligence (SETI) to "High Resolution Microwave Survey."

"This is a horrendous case of bureaucratic arrogance that somehow by simply renaming the program NASA can avoid the cut," Bryan said. "NASA wants to spend more than $100 million and they have got to get the message that this program doesn't make the final cut. This is a low priority and should be put on the shelf."

"I hope that the conference between the Senate and the House will see this vote as a clear vote of no confidence for this program," Bryan said.

NASA officials advocate that the program is designed to search and identify signs of intelligent life in outer space by analyzing radio waves bouncing around in space.

"I don't doubt that some scientists in NASA really believe this should be funded, but this is a question of priorities," Bryan said. "Only in Washington, D.C. is $100 million considered small change. This is a lot of money, and, frankly, I think this money could better be left unspent, which means we don't have to borrow [illegible] and add to the debt. It really is that simple."

Appendix 19

REGARDING THE FY94 NASA BUDGET BEING CONSIDERED UNDER HR 2491 AND THE ISSUE OF RENAMING THE SETI PROJECT

--- EXCERPTS ---

From the CONGRESSIONAL RECORD - SENATE, September 22, 1993

From pages S12151-4, regarding Amendment No. 1 to prohibit the use of funds for NASA's Towards Other Planetary Systems/High Resolution Microwave Survey Program

(sponsored by Senator Richard Bryan from Nevada; whose co-sponsors were Senator John Kerry from Massachusetts; Senator Harris Wofford from Pennsylvania; Senator Dale Bumpers from Arkansas; and Senator Jim Sasser from Tennessee):

"MR. BRYAN: ...At the same time that legislation was moving forward to eliminate the SETI Program [during last year's budgetary process], however, its supporters in NASA and some Members of Congress were moving to protect the program. By the time Congress enacted Public Law 102-588, the NASA authorization which prohibited spending for SETI, the program had been renamed and buried deep in the NASA bureaucracy. As you will recall the name then took on a different connotation, the high-resolution microwave survey. But, Madam President, make no mistake. The high-resolution microwave survey is SETI recreated with a different name."

Later in the same session:

"MS. MIKULSKI: ...One can say, "Well, Senator Mikulski, it [SETI] is the area of speculation for science and philosophy, but do we need to bankroll it to the tune of $12 million?" Well, for our $10 to $12 million, though, we get a lot more than the search for E.T. When I took a look at this issue, I found out from a number of places what this project was all about and I have been a consistent supporter. This program is not something about pop culture and a search for E.T. It is a radio astronomy project, conducted like many radio astronomy projects, with ground-based astronomy projects in the United States and throughout the world. In fact, last year we stipulated to NASA that the formal SETI project should be renamed and taken out of the life sciences portion of their budget. Instead, it should be included in the activities related to planetary exploration, because that is really what it was about - except instead of using a traveling spacecraft like *Voyager* or *Magellan*, it used ground-based radio astronomy."

Appendix 20

I thank the Chair. I yield the floor. I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. BRYAN. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE PROGRAM

Mr. BRYAN. Mr. President, it is my intention tomorrow to offer an amendment to the appropriations bill that will delete funding for a program that historically has been characterized and known as the SETI Program. The Search for Extraterrestrial Intelligence Program has gone through a rather interesting but convoluted process by which the name is now changed.

Mr. President, this appropriation, small in the context of the overall general budget, is good this year for $12.3 million. It is not my purpose to suggest to my colleagues that this alone addresses the monumental challenge that we face in balancing the Federal budget, but I think this program is illustrative of how difficult it is to kill any kind of a program that once takes roots within the Federal bureaucracy.

This program is one that was designed historically to ascertain if there is life in outer space and on other planets. I have, since coming to the Congress, offered in the past 3 years an amendment in the Senate Commerce Committee, on which I am privileged to serve and which is the authorizing committee for this program, to delete this funding, not because of any antipathy to scientific research, but because it is a matter of priorities. Nice, but can we afford it?

My response to that is that we cannot afford it. We ought to be making some priorities, and that we have been singularly unsuccessful in doing. I think it may be instructive to share with my colleagues just the history in the last budget cycle of 1992, because in both the House authorizing committee and in the Senate authorizing committee, and indeed the authorization legislation itself that was enacted in 1992, both Houses, the other body and our own, supported the elimination of funding for this program in the authorizing legislation.

Our President and Vice President have embarked upon a noble challenge—reinventing Government, how to streamline the bureaucracy, how to make Government work better for people, how to make it more responsive, how to give the managers of the Federal programs the ability to discharge their responsibilities without being entangled in a bureaucracy and a web of redtape that threatens to strangle the ability of us to manage a program.

If only that bureaucracy would show the same type of creativity in implementing programs that they do in preserving programs once established, Mr. President, I think that the challenge that our President and Vice President have undertaken, and which I support, would be so much easier.

Let me cite an example of the history. I have indicated to you that last year, fiscal year 1993, the program was eliminated in the authorizing legislation. This program had been known for many, many years as the Search for Extraterrestrial Intelligence, the SETI Program. The response of the bureaucracy is not only instructive but is intriguing in terms of the creativity and tenaciousness in which programs, once authorized, seem to last forever—in perpetuity, our critics would say.

After this legislation was enacted, NASA failed to carry out the mandate of the Congress in eliminating the program, but rather changed the characterization—that is, the name—of the program. So no longer do we have a Search for extraterrestrial intelligence. Now we have a new program whose function is identical in all respects to the program that we have been seeking to eliminate. It is called the high resolution microwave survey.

So when I address the floor tomorrow in additional detail in terms of my reasons for eliminating that program, we will not be talking about SETI, as we have historically talked about this on the floor of this body, as well as in the committee; we will be talking about HRMS, which is the new name by which this program continues to have life. And it will be my intention, once again, to offer an amendment which specifically deletes the funding for this program in an effort to make sound, responsible judgments with respect to the priorities for Federal spending—$12 million here, $12 million there, and before long we will have some real budget savings.

I thank the Chair. I notice the distinguished floor manager has taken the floor, and I yield to him.

The PRESIDING OFFICER. The Chair recognizes the Senator from Alabama.

DEFENSE BASE CLOSURE AND REALIGNMENT COMMISSION DISAPPROVAL ACT

The Senate continued with the consideration of the joint resolution.

Mr. HEFLIN. Mr. President, in connection with the base closure resolution that we will be voting on, of course, I have mixed feelings. I have feelings that the Base Closure Commission made a mistake in closing the naval home port at Mobile, and I think it made a mistake in the question pertaining to the realignment of certain positions and functions at Redstone Arsenal dealing with the Army Materiel Command.

They, on the other hand, I think, made a wise decision not to close Fort

DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING AND URBAN DEVELOPMENT APPROPRIATIONS ACT FOR FISCAL YEAR 1994

The ACTING PRESIDENT pro tempore. The Senate will now resume consideration of H.R. 2491, which the clerk will report.

The assistant legislative clerk read as follows:

A bill (H.R. 2491) making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1994, and for other purposes.

The Senate resumed consideration of the bill.

Pending:

Bumpers amendment No. 910, to provide funding for the termination of the Advanced Solid Rocket Motor project for the purposes of reducing the deficit in the Federal budget.

The ACTING PRESIDENT pro tempore. Under the previous order, the Senator from Nevada is recognized to offer an amendment. The time allocation on the amendment is 1 hour equally divided.

Mr. BRYAN. Madam President, I suggest the absence of a quorum.

The ACTING PRESIDENT pro tempore. The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. BRYAN. Madam President, I ask unanimous consent that the order for the quorum call be rescinded.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered.

Mr. BRYAN. Madam President, a parliamentary inquiry.

The ACTING PRESIDENT pro tempore. The Senator will state it.

Mr. BRYAN. Is it necessary for the Senator from Nevada to ask unanimous consent to have the pending amendment set aside before I submit an amendment.

The ACTING PRESIDENT pro tempore. Under the previous order that has already been done.

Mr. BRYAN. I thank the Chair.

AMENDMENT NO. 911

(Purpose: To prohibit the use of funds for the Towards Other Planetary Systems/High Resolution Microwave Survey program of the National Aeronautics and Space Administration)

Mr. BRYAN. Madam President, I send an amendment to the desk and ask for its immediate consideration.

The ACTING PRESIDENT pro tempore. The clerk will report the amendment.

The assistant legislative clerk read as follows:

The Senator from Nevada [Mr. BRYAN], for himself, Mr. KERRY, Mr. WOFFORD, Mr. BUMPERS, and Mr. SASSER proposes an amendment numbered 911.

Mr. BRYAN. Madam President, I ask unanimous consent that the reading of the amendment be dispensed with.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered.

The amendment is as follows:

On page 59, line 15, strike out "$7,544,400,000" and all that follows through "*Provided*, That" and insert in lieu thereof "$7,532,100,000, to remain available until September 30, 1995: *Provided*, That none of the funds made available under this Act shall be available for the Towards Other Planetary Systems/High Resolution Microwave Survey program (also known as the Search for Extraterrestrial Intelligence project): *Provided further*, That".

Mr. BRYAN. Madam President, the amendment I am offering today will eliminate funding for what I believe to be a foolish and wasteful NASA Program which seems to have developed a life of its own—the high resolution microwave survey, or as it was referred to prior to last summer, the search for extraterrestrial intelligence, or SETI.

Madam President, this 10 year, $100 million program to scan the heavens for signs of other intelligent life has attracted ridicule and derision since it was first proposed a number of years ago.

The target of this amendment is the NASA Program which for years was called the search for extraterrestrial intelligence, or SETI.

As I will describe below, since last summer the program has been called the high-resolution microwave survey, or HRMS [HERMES].

Whatever NASA calls it, its purpose is the same—to scan the skies for signs of extraterrestrial life and civilizations.

For years, there has been a core group of scientists interested in the search for extraterrestrials.

Over the past few decades, NASA's support for SETI research has been relatively modest—in many years, substantially under a million dollars.

In recent years, however, the budget has increased dramatically, as NASA prepared to launch the most farreaching SETI search ever.

The American taxpayer suddenly began committing $10 or $12 million a year to the search for extraterrestrials. NASA's great search for extraterrestrials began its operational phase last October 12, the 500th anniversary of Christopher Columbus' discovery of the new world.

The current, $12 million version of SETI uses radio telescopes available to NASA to scan outer space for radio or other signals which do not appear to be natural.

Any such confirmed unnatural signals are assume to be signs of extraterrestrial life.

So far, the NASA SETI Program has found nothing. In fact, all the decades of SETI research have found no confirmable signs of extraterrestrial life.

Even with the current NASA version of SETI, I do not think many of its scientists would be willing to guarantee that we are likely to see any tangible results in the forseable future.

NASA has consistently defended the program, claiming that once you put aside what it calls the giggle factor, this is a serious program, with real and tangible benefits.

While I do not doubt the seriousness of the program and its researchers, I am highly skeptical of its claimed benefits.

Absent any confirmed contact with extraterrestrials, the main benefit of the program seems to be, in the words of Carl Sagan, the development of "new technology, stimulating ideas, and exciting schoolchildren." All noble goals, but hardly justification for a $12.3 million budget when so many other programs, with more direct benefits, go begging.

If we need to develop new listening technology, and if we decide the benefits are great enough that the taxpayer should foot the bill, then let us do that directly.

If we need to excite school children to study more, which I agree we should do, let us put more money into cleaning up our classrooms, improving the resources available to our teachers, and getting the guns out of our schools.

As far as stimulating ideas go, I hope that the academic and scientific communities can handle that without Government subsidy.

In the multibillion-dollar scale of the Federal Government, a mere $12.3 million budget may not seem like much.

But when we bring the spending down to a more basic level, the level that should put this matter in an appropriate perspective, the picture changes.

The $12.3 million that NASA wants to spend to look for extraterrestrials next year could purchase in my own State of Nevada 135 new homes for needy families, or send over 9,000 needy students to the University of Nevada system for a year, or provide day care for 3,400 toddlers—perhaps allowing their single parents to find gainful employment, and get off the welfare rolls.

In the years since I have learned of this program, I have not tried to make the case that this program is completely without merit.

—I take at face-value NASA's assertion that the program is based on sound scientific principles and is carried out in a professional, scientific manner.

What I have disagreed with is NASA's assertion that the program's merits justify receiving $100 million of the taxpayers' money.

—Congress, it seems, agrees that funding the SETI program is a misuse of taxpayers' money.

In fact, Congress has approved legislation in the past that should have killed the program.

Madam President, I cite the history of last year as an example of how difficult it is to eliminate any Federal program once it is established. In the context of what the President and the Vice President are trying to do with reinventing Government, one would hope that the bureaucracy, which is part of that problem, would show the

one type of innovative, creative tenaciousness in limiting red tape and trying to address the problems and the responsibilities of the agencies which they are charged with running that they have in maintaining and sustaining this program.

Last year, for example, the House of Representatives included provisions in both its appropriations and authorization bills which prohibited funding SETI.

I offered a similar amendment to the NASA authorization bill in the Commerce Committee, which was adopted by a vote of 11 to 6, to prohibit SETI funding.

Eventually both the House and the Senate authorization bill prohibited SETI funding.

At the same time that legislation was moving forward to eliminate the SETI Program, however, its supporters in NASA and some Members of Congress were moving to protect the program.

By the time Congress enacted Public Law 102-588, the NASA authorization which prohibited spending for SETI, the program had been renamed and buried deep in the NASA bureaucracy. And as you will recall the name then took on a different connotation, the high-resolution microwave survey. But, Madam President, make no mistake. The high-resolution microwave survey is SETI recreated with a different name.

In spite of obvious congressional opposition to the program, NASA began the operational phase of the program last October, as I have described.

To great fanfare, and using the 500th anniversary of Christopher Columbus' journey to the new world as a publicity backdrop, NASA scientists threw a few switches, and started listening for signs of extraterrestrials.

A few weeks later, when President Bush signed the NASA authorization into law, the NASA bureaucracy had taken care of its own—the SETI Program went forward as planned, completely unaffected by the prohibition included in Public Law 102-588.

Madam President, I support the mission and purpose of NASA.

I do not think any of us have forgotten the thrill and sense of national pride created by the ambitious NASA programs of the 1960's.

I have great respect for the new NASA Administrator, Daniel Goldin, and have been impressed by his candor and thoughtfulness during his appearances before the Commerce Committee, on which I am privileged to serve.

Nevertheless, it is obvious to me, and I am sure many other observers, that NASA is a troubled agency.

Its recent string of failures have justifiably drawn attention away from its successes.

NASA has, by all accounts, embarked upon a program of managerial reforms, and is taking a closer look at its overall mission.

The continued funding of projects such as SETI does nothing to improve the image of the agency at a crucial time in its history.

The difficulty in eliminating SETI points to a larger, and often criticized, problem with the Federal Government.

Quite simply, once a program gets started, it is almost impossible to get it stopped.

Whether it is the $12.3 million requested this year for SETI or the search for extraterrestrials, the $190 million wool and mohair subsidy, the $15 billion tax break contained in section 936 of our Tax Code with respect to Puerto Rico and other positions, or the space station debate that we had, I have learned in my brief tenure here in Congress the great difficulty of ending a program once established.

Madam President, if there were no taxpayer dollars involved, I would not be criticizing the SETI scientists or their supporters.

Most of us, at some time or another, have pondered the type of questions being examined by SETI scientists.

My disagreement with SETI supporters begins when they place a claim on $100 million of the taxpayers money. It is simply a matter of priorities.

Even strong supporters of SETI admit that producing any results will be a long shot.

Frank Drake, an astronomer with a long personal interest in SETI type research, has been quoted describing the SETI project as being "like finding a needle in a haystack."

Scientific research rarely, if ever, offers guarantees of success—and I understand that—and the full benefits of such research are often unknown until very late in the process. And I accept that, as well.

In the case of SETI, however, the chances of success are so remote, and the likely benefits of the program are so limited, that there is little justification for 12 million taxpayer dollars to be expended for this program.

Madam President, I urge my colleagues to vote in favor this amendment.

I reserve the remainder of my time and yield the floor.

I thank the Chair.

The ACTING PRESIDENT pro tempore. Who yields time?

The Senator from Maryland.

Ms. MIKULSKI. Good morning, Madam President.

The ACTING PRESIDENT pro tempore. Good morning.

Ms. MIKULSKI. I yield myself 10 minutes.

The ACTING PRESIDENT pro tempore. The Senator from Maryland is recognized for 10 minutes.

Ms. MIKULSKI. Madam President, I rise in opposition to the Bryan amendment to terminate the SETI Program.

I listened carefully to the arguments presented by the distinguished Senator from Nevada, and on first blush his arguments would be quite persuasive. I, too, know that the SETI Program has suffered from something called the giggle factor.

The SETI Program is a program that is a high-technology listening device whose purpose is to listen to see if there is life on other planets or somewhere else in the universe, maybe even out in the great galactic.

The opponents of the program have frequently poked fun at it, and one can understand why, suggesting, "Hey, we already know if extraterrestrials exist because it has been on the front page of the National Enquirer."

Have we all not seen those pictures. "Extraterrestrial alien with Bush at Camp David"; "Extraterrestrial alien with Clinton at Martha's Vineyard"; "Extraterrestrial trying to get in on the health plan proposed by Bill Clinton."

Mr. GRAMM. Bring him in.

Ms. MIKULSKI. "Extraterrestrial with Elvis and Jack Kennedy on the islands somewhere out there."

So if you look at the National Enquirer, my gosh, you actually have a picture. I have seen those pictures. But also I have seen and listened to what SETI means.

Really the search, first of all, if there is a possibility of life on other planets, is indeed a profound philosophical and scientific question. It is a question that has been asked through the ages.

At one of the hearings exactly on this issue in the U.S. Congress, one of the great thinkers said, "Either there is life on other planets or there is not." Either answer is indeed stunning.

If there is no other life on any other planet, then that means a higher power, bursting with love, created an entire universe and yet created life as we know it, intelligent life, only on one planet. That is a stunning thought. Or, that same higher power, bursting with love, creating a universe, has also intelligent life on either this solar system or beyond somewhere in the great galactic.

So the search to see if there is somebody else out there that was created by this higher power has indeed been a subject of speculation of theology, philosophy, and science.

One can then say, "Well, Senator MIKULSKI, it is the area of speculation for science and philosophy, but do we need to bankroll it to the tune of $12 million?"

Well, for our $10 to $12 million, though, we get a lot more than the search for ET.

When I took a look at this issue, I found out from a number of places what this project was all about and I have been a consistent supporter. This program is not something about pop culture and a search for E.T. It is a radio astronomy project, conducted like many radio astronomy projects, with ground-based astronomy projects in the United States and throughout the world.

In fact, last year, we stipulated to NASA that the formal SETI project should be renamed and taken out of the

life sciences portion of their budget. Instead, it should be included in the activities related to planetary exploration, because that is really what it was about—except instead of using a traveling spacecraft like *Voyager* or *Magellan*, it used ground-based radio astronomy.

Instead of sending unmanned spacecraft into space, we send radio waves. That actually is a prudent use of resources, because when you send a man into space, it is extraordinarily expensive. When you send a robot into space, it is less money, but very expensive. But when you send radio waves, you reduce the cost by tens of thousands.

We are exploring space and at the same time using the wisest and most prudent source of technology to do the search.

The program is now referred to as the high resolution microwave survey [HRMS], or the towards other planetary systems [TOPS] project.

The project uses radio telescopes to search for microwave signals which, if detected, might suggest the existence of intelligent life in some other part of the universe.

What an astounding thing it would be if we picked up such a signal. What an astounding responsibility for stewardship of our universe if there is no other intelligent life.

If we are the only ones, we really better get our act together in terms of this planet. If there are others out there, perhaps they hold the secrets or ideas that could help us save this planet.

But, at the same time, even if there is no other life anywhere except on this planet, what we can do is get the benefits from this technology.

First, is it good science?

Yes. It has been peer-reviewed by a series of panels, with endorsements from the National Academy of Sciences, the National Research Council, and five Nobel Laureates.

The technology they are now using has the ability to search tens of millions of radio channels simultaneously with computing capabilities that can process 30 million numerical values per second. No such technology has ever been used in this kind of radio astronomy.

The project has a wide-band spectrum analyzer to study and detect small-scale structures in star-forming regions. Studying the motion of these structures will help resolve questions about how stars form.

I want to stress it is an international program—we are not just in this by ourselves—with our scientific partners in Australia, France, Argentina, Russia, and Spain.

One of the real values, though, of this program is that it is an incubator of excellent technology. It has enormous potential for spinoffs in electrical engineering, software, modeling, computer science, radio astronomy, and signal processing.

For example, through a student project at Stanford University, one of the great universities in the presiding officer's own State, the SETI project has developed a high performance signal processing computer chip.

These components of the SETI observing system have a level of computational performance that would put them in a class of supercomputers. We have enhanced our supercomputer ability.

Many other applications for this technology used in this project are for diagnostic medicine.

Diagnostic medicine. Some of the most significant nonintrusive medical technologies have come through the field of radiology. The MRI, the CAT scan. We now know the miracle of these devices. When one suspects a brain tumor now, instead of having to do intrusive surgery on the spot, through the new radiology technology we have, we could image and diagnose and also perfectly identify where that tumor might exist, so that a physician would be in a position to actually plan his or her surgical intervention and get it done right and get it done right the first time. That is pretty important.

What this radio astronomy does, from what I understand, is it would enhance even more our ability to come up with new radiology and treatment tools.

There are also other breakthroughs in terms of geophysical resource exploration, and this geophysical resource exploration could also help with future predictions about earthquakes.

The listening technology developed has other applications in public safety, national defense, the monitoring of airport environments for signals that may interfere with aircraft navigation and communication.

In the area of education, this program holds great promise in getting kids interested in science. It has conducted elementary and high school education programs and teacher training workshops where they found the lure of "E.T." gets children's attention and gets them involved in a multidisciplinary forum to teach the physical, mathematical, and social sciences. So they might first get excited about looking for E.T., but then they get more excited about solving mathematical problems. It is also the type of project that can be incorporated into extracurricular activities, particularly in Boy Scouts and Girl Scouts, as we use those to again bring our young people into being interested in math and science.

Is my time up? I ask unanimous consent to proceed for 30 more seconds.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered.

Ms. MIKULSKI. Undergraduate education: The SETI has found wide acceptance as a topic of introductory astronomy courses in colleges.

I could outline this in more detail. I want people to understand this project is not a laughing matter. It is serious science with serious applications that will answer some of the most serious questions that have been asked for thousands of years.

I yield the floor.

The ACTING PRESIDENT pro tempore. Who yields time?

Ms. MIKULSKI. I yield to the Senator from Texas 2 minutes.

The ACTING PRESIDENT pro tempore. The Senator from Texas is recognized for 2 minutes.

Mr. GRAMM. Madam President, after that great speech, I think anything I would say would be redundant.

The bottom line is this: We made a commitment as a nation, 14.6 billion dollars' worth, to NASA. And the question is: In that big commitment, in all of those programs, do we want to spend $12.3 million basically engaged in research to listen, to try to find any form of communications from deep space?

We are talking about basically the development of new technology that has many uses on Earth. We are talking about trying to begin the establishment of simple, basic nonglamorous research. But I think when we are looking at the potential gain, and I can say given all the problems we have here that we are dealing with, if we can make any discoveries anywhere, I think it would be useful to tap into it.

I think when we are looking at a very modest, small program engaged in basically the activity of trying to find radio waves in deep space, I think it is a good program. I would not support a full-blown, huge program to engage in this activity, but this seems to me to be a very modest investment, given that what we are doing has other applications.

Should we have a breakthrough, should we make a discovery, it could change the whole way that we look at the universe we live in.

So I think the chairman has done an excellent job of outlining the case. It is easy to convert this into a silly little program. If we were spending $100 million, I would vote for the Senator's amendment. But the truth is, this is a very modest, small, controlled program primarily involved in creating the technology to allow listening to occur. Listening is what we all do too little of, and having the human race spend this money listening to see if radio waves or any form of communication, exists in the universe does not seem to me to be an outrageous expenditure of money.

I yield the floor.

The ACTING PRESIDENT pro tempore. Who yields time?

The Senator from Nevada.

Mr. BRYAN. I thank the occupant of the chair.

I yield myself 5 minutes.

The ACTING PRESIDENT pro tempore. The Senator from Nevada is recognized for 5 minutes.

Mr. BRYAN. Madam President, I want to make the point again that I concede the serious purpose of this un-

dertaking, and I do not denigrate the professionalism of the scientists who re involved in this program. That is ot my point.

My point is that this is a matter of priorities, and it speaks a great deal about the way we conduct business in the U.S. Senate.

A year ago, the authorizing committees of both the House and the Senate—the authorizing committees—examined this program and they made a judgment—one can quarrel with that judgment—but they made a judgment and enacted into law as part of the authorization process that this program should be eliminated. That was a pronouncement of the Congress of the United States, signed into law by the President of the United States. That process was circumvented, in effect, by recasting this as the high-resolution microwave survey. The Appropriations Committee, in effect, put the money into the program, although it is cast in a new name. So I think it says a great deal about the way in which we conduct business in the Congress and I think, Madam President, it contributes to the public skepticism and the cynicism about the way we do our business.

Let me make another point, if I may. I think all of us would concede that there are finite limits that we have in terms of our ability to underwrite and finance programs. Not every potentially worthwhile project, not every potentially worthwhile research program can be undertaken. We have to establish some priorities.

My quarrel with this program is a matter of priorities. We are not just talking about $12.3 million this year, although that is the amount, as the distinguished subcommittee Chair has pointed out, that is included in the overall NASA appropriation. We continue to commit ourselves prospectively. So we are looking at $100 million over the life of this program. Because, as I have suggested, virtually no program approved by the Congress ever seems to reach a terminal point, one might suggest that this program will continue in perpetuity, as so many of our other programs appropriated for over the years.

But there is a finite limit. The budget deficit is real. Members of both sides of the aisle have given stirring orations about this deficit and what it is doing in terms of corroding our ability as a nation to respond to so many of our other problems.

Is this a priority? How would the American public, given its choice of ranking, want to spend the American taxpayers' money? Would this program be included in that kind of approval? I suggest not, Madam President.

Finally, let me just indicate to my colleagues that this is a program that may be desirable, but when you are running a deficit as we are this year in the magnitude of $250 billion, $280 billion, $290 billion, it is one that we simply cannot afford. Now is the time to make a judgment about priorities for our expenditures.

I say to my colleagues, with great respect to the floor manager and the minority floor manager, that this is a program that we should eliminate.

I yield the floor.

I reserve the remainder of my time.

The ACTING PRESIDENT pro tempore. The Senator from Maryland.

Ms. MIKULSKI. Madam President, how much time do I have?

The ACTING PRESIDENT pro tempore. The Senator has 16 minutes 42 seconds.

Ms. MIKULSKI. Madam President, I yield myself 2 minutes.

Members of the U.S. Senate should know that after 1994 the project drops in cost by half. It will go from $12.3 to $6.4 million. The project itself, this particular project, would end in fiscal 1999. I support this. Unless we do pick up a signal from somewhere, we will then meet the goals of the project from its expiration standpoint and from the other goals that were outlined.

So this project will end in 1999. Its cost next year will drop by half. I think it is worthwhile to stay the course and maintain the project.

I yield the floor.

I have an inquiry of the distinguished Senator from Nevada. Does the Senator wish to debate anymore?

Mr. BRYAN. Madam President, responding to the distinguished subcommittee Chair, I will be happy to yield my time.

Ms. MIKULSKI. I think we are prepared to yield our time. It is our understanding that we will yield the time, but the vote itself will be postponed until noon.

Mr. ROCKEFELLER. Madam President, I strongly oppose the amendment to terminate the search for radio signals from space that could indicate the existence of intelligent life. I urge my colleagues to vote against the amendment.

Are we alone? Our Nation has been seeking an answer to this question through radio astronomy since the first search was initiated in 1960 by the National Radio Astronomy Observatory in Greenbank, WV. These early searches, a continuation of our country's commitment to explore the unknown, were of limited duration and examined only a small fraction of the radio spectrum.

Now, with the high-resolution microwave survey [HNRS], initiated exactly 500 years after another explorer of the unknown reached what he called the New World, we may get closer to answering this question, at least from the 400 billion stars in our own galaxy. In the first minutes of its observations, the HRMS scanned more space and analyzed more data that the sum of all previous searches.

Conducting the survey will cost each American about 5 cents during the coming fiscal year. I believe that is a worthwhile investment. Even if we don't get an answer next year, or at any time during the planned 8-year survey, the small amount of money we are talking about will have been well spent. The HRMS is a valuable project that has already produced many significant benefits, including technological advances for American scientists and educational programs for American children.

The technical and engineering advances associated with the HRMS program to date have been extraordinary. For example, the electronic systems developed for the HRMS are basically special-purpose supercomputers. These systems can be reprogrammed for many other applications. In another example, a customs signal processing computer chip developed for the HRMS is capable of performing almost seven times faster than the common commercial chip. Other applications of these technologies have already been found in diagnostic medicine, fault detection in materials, and geochemical exploration.

As I mentioned, the electronic systems developed for the HRMS are basically supercomputers. To design and build these supercomputers, HRMS engineers developed detailed software models of many new integrated circuits. These software models, written in a standard design language, will be useful to many electronics companies. These are only some of the many returns American taxpayers have already received from the investment in the HRMS, and the survey itself has only just begun.

In sum, HRMS represents a valuable and worthwhile scientific endeavor that has yielded, and will continue to yield, many important advances in technology. American taxpayers have a right to expect a return on the 15 years of research and development invested in this program. With the many technological developments already produced during these 15 years, the HRMS has proven its value even before the real benefits, the results of the survey itself, have begun to flow.

I urge my colleagues to support continued funding for the HRMS, a worthwhile scientific program with real and potential technology benefits.

Mr. BRYAN. I am pleased to yield the remainder of my time.

Ms. MIKULSKI. As the proponent of the bill, opponent of the amendment, I yield all the opposition time.

The ACTING PRESIDENT pro tempore. All time is yielded back.

Mr. GRAMM addressed the Chair.

The ACTING PRESIDENT pro tempore. The Senator from Texas.

Mr. GRAMM. Madam President, we have an agreement on the D'Amato amendment. I ask unanimous consent that I might offer that amendment now on behalf of Senator D'AMATO.

The ACTING PRESIDENT pro tempore. Without objection, it is so ordered.

TO: Jill Hanna / Ian Kinson
cc: S. Kohuth
2 pgs.

103rd, 1st, Vote 276
September 22, 1993, 12:36 p.m.

Daily Cong. Rec. P. S-12172

VA-HUD APPROPRIATIONS, 1994

AMENDMENT NO.: 911

BILL NO.: H.R.2491

TITLE: Departments of Veterans Affairs, and Housing and Urban Development, and Independent Agencies Appropriations Act, 1994

SUBJECT: Mikulski motion to table Bryan, et al., amendment which reduces NASA research and development funding by $12 million; and prohibits the obligation of any NASA funds for the Towards Other Planetary Systems/High Resolution Microwave Survey Program. (Subsequently, the amendment was agreed to by voice vote.)

(Text supplied by the Democratic Policy Committee).

RESULT: Motion to Table Failed

YEAS (23)

DEMOCRATS (17)	REPUBLICANS (6)
Akaka	Bond
Breaux	Brown
Daschle	Gramm
Dodd	Hatfield
Feinstein	Hutchison
Glenn	Lott
Graham	
Harkin	
Heflin	
Inouye	
Johnston	
Levin	
Mikulski	
Moynihan	
Pell	
Rockefeller	
Shelby	

NAYS (77)

DEMOCRATS (39)	REPUBLICANS (38)
Baucus	Bennett
Biden	Burns
Bingaman	Chafee
Boren	Coats
Boxer	Cochran
Bradley	Cohen
Bryan	Coverdell
Bumpers	Craig
Byrd	D'Amato
Campbell	Danforth
Conrad	Dole
DeConcini	Domenici
Dorgan	Durenberger
Exon	Faircloth
Feingold	Gorton
Ford	Grassley
Hollings	Gregg
Kennedy	Hatch
Kerrey	Helms
Kerry	Jeffords
Kohl	Kassebaum
Lautenberg	Kempthorne
Leahy	Lugar
Lieberman	Mack
Mathews	McCain
Metzenbaum	McConnell
Mitchell	Murkowski
Moseley-Braun	Nickles

Appendix 21

103D CONGRESS
1st Session
HOUSE OF REPRESENTATIVES
REPORT
103–273

MAKING APPROPRIATIONS FOR THE DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING AND URBAN DEVELOPMENT, AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS, AND OFFICES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1994, AND FOR OTHER PURPOSES

OCTOBER 4, 1993.—Ordered to be printed

Mr. STOKES, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 2491]

The Committee of Conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 2491) "making appropriations for the Departments of Veterans Affairs and Housing and Urban Development, and for sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1994, and for other purposes," having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its amendments numbered 5, 6, 7, 17, 21, 27, 29, 36, 41, 53, 54, 58, 71, 72, 75, 80, 87, 88, 91, 94, 95, 96, 99, 102, 107, 108, 109, 110, 111, 114, 118, 124, 126, 132, and 135.

That the House recede from its disagreement to the amendments of the Senate numbered 2, 3, 9, 10, 11, 13, 14, 20, 22, 24, 25, 26, 28, 30, 31, 32, 33, 34, 35, 39, 40, 42, 43, 46, 47, 48, 49, 50, 51, 56, 60, 64, 65, 66, 70, 74, 78, 82, 83, 92, 93, 97, 98, 103, 104, 105, 106, 112, 115, 117, 119, 125, 128, 130, 131, and 134, and agree to the same.

Amendment numbered 1:

That the House recede from its disagreement to the amendment of the Senate numbered 1, and agree to the same with an amendment, as follows:

In lieu of the sum proposed by said amendment, insert: *$15,622,452,000*; and the Senate agree to the same.

Amendment numbered 4:

That the House recede from its disagreement to the amendment of the Senate numbered 4, and agree to the same with an amendment, as follows:

ay other agency for not less than half of the cost of detailees. he conferees direct the Office of National Service to pay for not ess than 50 percent of the cost of personnel compensation for all etailees.

Council on Environmental Quality and Office of Environmental Quality

Amendment No. 90: Appropriates $375,000 to the Council on nvironmental Quality as proposed by the Senate instead of none s proposed by the House. The language is amended to delete the ransfer of these funds from the program and research operations ccount of the Environmental Protection Agency. The conferees ave instead provided a direct appropriation to this account.

Federal Emergency Management Agency

Amendment No. 91: Deletes language proposed by the Senate roviding an additional $400,000,000 in contingency funding for he disaster relief account. Currently, the Agency has approxiately $400,000,000 in contingency funding. This level should be ufficient to cover any unusually large increase in disaster relief ctivities until such time that the Congress could provide supplenental funding.

Amendment No. 92: Appropriates $160,409,000 for salaries and xpenses as proposed by the Senate, instead of $164,239,000 as roposed by the House.

The Committee of Conference is in agreement on the following hanges to the budget request:

−$1,000,000 from travel.

−$4,107,000 as a general reduction, to be taken at the discreion of the Director, subject to normal reprogramming procedures.

Amendment No. 93: Inserts language proposed by the Senate aking a technical correction to a citation as proposed by the louse.

Amendment No. 94: Appropriates $212,960,000 for emergency anagement planning and assistance as proposed by the House, nstead of $215,000,000 as proposed by the Senate.

The conferees are in agreement on the following changes to the udget request:

+$2,000,000 for emergency management assistance grants.

+$1,000,000 for section 305(a) grants authorized by Superfund mendments and Reauthorization Act (SARA), title III.

+$7,000,000 for "other state and local program" grants.

−$20,000,000 as a general reduction, to be taken at the discreion of the Director, subject to normal reprogramming procedures.

Amendment No. 95: Restores center heading as proposed by he House and stricken by the Senate to include only one adminisrative provision.

Amendment No 96: Deletes language proposed by the Senate rohibiting the expenditure of funds for the chauffeuring of employees.

Department of Health and Human Services

Office of Consumer Affairs

Amendment No. 97: Inserts language proposed by the Senate providing that none of the funds appropriated to the Office of Consumer Affairs may be used for other activities within the Department of Health and Human Services.

Interagency Council on the Homeless

Amendment No. 98: Deletes language proposed by the House and stricken by the Senate appropriating $910,000 for salaries and expenses of the Interagency Council on the Homeless. The conferees agree that all responsibilities should be transferred to the Department of Housing and Urban Development. The conferees note that field activities have never been funded by the Council, rather such support is provided on a nonreimbursable basis.

National Aeronautics and Space Administration

Amendment No. 99: Deletes rescission center heading proposed by the Senate.

Amendment No. 100: Appropriates $7,509,300,000 for research and development, instead of $7,475,400,000 as proposed by the House and $7,544,400,000 as proposed by the Senate. In addition, the conferees have agreed to limit the total amount available for the redesigned space station to $1,946,000,000 as proposed by the Senate instead of $2,100,000,000 as proposed by the House. The House amount did not reflect refinements of the proposed amendment to the President's budget on the space station submitted in House Document 103–103, which allocated certain station-related costs to other portions of the NASA research and development account. When the reallocation of these activities is taken together, however, the total provided for space station activities, including payloads, is $2,100,000,000.

The conferees have also agreed to include two bill language provisions carried by both the House and Senate which limit space station operations and utilization capability development costs to $172,000,000 and supporting development costs to $99,000,000. The conferees have also agreed to include a limitation on space station funds as proposed by the Senate of $160,000,000 for termination costs. The limitation proposed by the House prohibiting the use of any funds for space station NASA headquarters level I support service contracts has not been included. However, in accordance with the agreement as outlined in the letter from NASA to the Committees dated August 9, 1984, and reaffirmed by letter on September 30, 1993, the conferees have agreed to "cap" any space station funds at zero that may be used for space station engineering integration contract activities and for space station technical and management information systems contract activities after December 1, 1993.

Finally, the conferees have agreed to include a provision proposed by the Senate and modified to limit to $1,000,000 any funds made available under this act for the Towards Other Planetary Systems/High Resolution Microwave Survey Program (also known

as the Search for Extraterrestrial Intelligence Project). The $1,000,000 included for this activity is available only for termination costs.

The conference agreement reflects the following changes from the budget request:

–$50,000,000 from support service contractors.

–$25,000,000 from space capability development payload operations.

–$35,000,000 from space capability development advanced programs. The conferees agree that none of the reduction should be taken from the single-engine centaur or solid-propulsion integrity programs.

+$10,000,000 for the single-engine centaur project.

+$1,600,000 for the solid-propulsion integrity program.

–$25,000,000 from research operations support, including:

–$15,200,000 from space capability development research operations support,

–$3,100,000 from Earth Observing System research operations support, and

–$6,700,000 from aeronautical technology research operations support.

+$50,000,000 for space capability development space lab and payload operations for joint U.S./Russian activities.

+$50,000,000 for the Office of Space Science for joint U.S./Russian science missions.

–$19,000,000 from the Advanced X-Ray Astrophysics Facility (AXAF–S). The conferees direct NASA to use the remaining $16,900,000 to fly the principal AXAF/S instrument on the ASTRO–E satellite.

+$22,500,000 for physics and astronomy and planetary science mission operations and data analysis with a high priority afforded the Hubble Space Telescope repair mission.

+$64,300,000 for the Discovery program. These funds will provide $66,200,000 each in fiscal year 1994 for the Near Earth Asteroid Rendezvous (NEAR) and Mars Environmental Survey Pathfinder (MESUR) programs. The conferees agree that the $150,000,000 programmatic cost cap for these missions is based on 1992 dollars.

+$7,000,000 for the Earth Observing System Data Information System (EOSDIS) for programmatic reserves.

–$2,000,000 from the Earth Observing System "A" platform.

–$13,000,000 from the Consortium for International Earth Science Information Network (CIESIN). The committee of conference concurs with the agreement reached in the Senate on the CIESIN project. That agreement makes available $5,000,000 of fiscal year 1994 funds to establish CIESIN as a Distributed, Active Archive Center (DAAC) for socioeconomic activities within the EOSDIS program. The conferees note that approximately $13,000,000 of fiscal year 1993 funds will be available for a total 1994 program level of $18,000,000. The conferees further expect that given CIESIN's new status as a DAAC, an annual budget of $6,000,000 per annum beginning in fiscal year 1995 will be established by NASA. The conferees also expect that beginning in fiscal year 1995, the National Science Foundation will establish, through

a competitive process, a Center for the Human Dimensions of Climate Change at a level of approximately $6,000,000 annually.

–$20,000,000 from the new technology initiative science data purchases program.

–$11,300,000 from the Towards Other Planetary Systems High Resolution Microwave Survey program. A total of $1,000,000 has been made available only for termination costs.

–$5,800,000 from the Advanced Launch Technology program. The conferees agree that the $20,000,000 made available for this activity shall be allocated as follows: $8,000,000 for development of a low-cost booster program; $5,000,000 for advanced propulsion development; and $7,000,000 for hybrid rocket technology.

+$15,000,000 for the flight and ground-based NASA/NIH protocol for microgravity science.

–$17,500,000 from the small satellite technology program.

–$40,000,000 from commercial use of space. Included within the funds made available are the following assumptions:

$14,500,000 for the commercial experiment transporter (COMET),

$45,000,000 for the commercial mid-deck augmentation module (CMAM), and

a $9,400,000 general reduction to be applied at the agency's discretion subject to the normal reprogramming procedures except that none of the reduction shall be applied to direct grants to centers for the commercial development of space.

The conferees recognize that the reduction of $21,500,000 in the CMAM program could cause difficult financial and technical adjustments. The conferees have agreed, therefore, after further consultations with NASA, to include an advanced fiscal year 1995 appropriation of $40,000,000 in a 1994 supplemental bill. This amount will essentially meet all 1994 and 1995 NASA commitments to the CMAM program.

–$28,700,000 as a general reduction from space research and technology to be taken subject to the normal reprogramming procedures.

–$12,000,000 as a general reduction from aeronautical supersonic research to be taken subject to the normal reprogramming procedures.

+$10,000,000 for the high-speed civil transport program.

+$1,000,000 for an assessment of whether a National Institute of Aeronautics should be established within NASA.

–$80,000,000 from the National Aerospace Plane. The conferees have made this reduction without prejudice owing to the severe budget constraints faced by all domestic discretionary programs. The NASP objective is to demonstrate the technology required to permit the Nation to develop reusable, single-stage-to-orbit (SSTO) vehicles with air-breathing primary propulsion as well as horizontal take-off and landing. The conferees continue to believe that this goal, although technically difficult, would represent an exceptional breakthrough for American aeronautics. In that context, again recognizing the goal of single-stage-to-orbit capability, the conferees urge that NASA examine carefully the importance of proceeding with the NASP project, and if it believes NASP can contribute significantly to meeting this goal, propose a reprogramming

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be available for expenditure except as authorized in appropriations Acts.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

OFFICE OF CONSUMER AFFAIRS

For necessary expenses of the Office of Consumer Affairs, including services authorized by 5 U.S.C. 3109, $2,159,000: *Provided,* That notwithstanding any other provision of law, that Office may solicit, accept and deposit to this account, during fiscal year 1994, gifts for the purpose of defraying its costs of printing, publishing, and distributing consumer information and educational materials; may expend up to $1,100,000 of those gifts for those purposes, in addition to amounts otherwise appropriated; and the balance shall remain available for expenditure for such purposes to the extent authorized in subsequent appropriations Acts: *Provided further,* That none of the funds provided under this heading may be made available for any other activities within the Department of Health and Human Services.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

For necessary expenses, not otherwise provided for, including research, development, operations, services, minor construction, maintenance, repair, rehabilitation and modification of real and personal property; purchase, lease, charter, maintenance, and operation of mission and administrative aircraft, necessary for the conduct and support of aeronautical and space research and development activities of the National Aeronautics and Space Administration; not to exceed $35,000 for official reception and representation expenses; and purchase (not to exceed thirty-three for replacement only) and hire of passenger motor vehicles; $7,509,300,000, to remain available until September 30, 1995: *Provided,* That not to exceed $1,000,000 under this Act shall be available for the Towards Other Planetary Systems/High Resolution Microwave Survey program (also known as the Search for Extraterrestrial Intelligence project): *Provided further,* That of the funds provided under this heading, $1,946,000,000 is available only for the redesigned space station, of which (1) not to exceed $160,000,000 shall be for termination costs connected only with Space Station Freedom contracts, (2) not to exceed $172,000,000 shall be for space station operations and utilization capability development, and (3) not to exceed $99,000,000 shall be for supporting development: *Provided further,* That not more than $1,100,000,000 of the amounts made available under this heading for the redesigned space station may be obligated before March 31, 1994: *Provided further,* That none of the funds made available under this heading for the space station program may be used to pay, or enter into contracts with, the Republic of Russia: *Provided further,* That of the funds made available under this heading, not to exceed $100,000,000 shall be available for activities to support cooperative space ventures between the United States and the Republic of Russia outlined in the joint agreement of September 2, 1993, of which (1) not to exceed $50,000,000 shall be only for space transportation capability development activities and (2) not to exceed $50,000,000 shall be only for space science activities other than life sciences: *Provided further,*

+$2,000,000 for emergency management assistance grants.

+$1,000,000 for section 305(a) grants authorized by Superfund Amendments and Reauthorization Act (SARA), title III.

+$7,000,000 for "other state and local program" grants.

-$20,000,000 as a general reduction, to be taken at the discretion of the Director, subject to normal reprogramming procedures.

Amendment No. 95: Restores center heading as proposed by the House and stricken by the Senate to include only one administrative provision.

Amendment No 96: Deletes language proposed by the Senate prohibiting the expenditure of funds for the chauffeuring of employees.

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-$15,200,000 from space capability development research operations support,

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+$50,000,000 for space capability development space lab and payload operations for joint U.S./Russian activities.

+$50,000,000 for the Office of Space Science for joint U.S./Russian science missions.

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-$17,500,000 from the small satellite technology program. -$40,000,000 from commercial use of space. Included within the funds made available are the following assumptions:

$14,500,000 for the commercial experiment transporter (COMET),

$45,000,000 for the commercial mid-deck augmentation module (CMAM), and

a $2,400,000 general reduction to be applied at the agency's discretion subject to the normal reprogramming procedures except that none of the reduction shall be applied to direct grants to centers for the commercial development of space.

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-$28,700,000 as a general reduction from space research and technology to be taken subject to the normal reprogramming procedures.

-$12,000,000 as a general reduction from aeronautical subsonic research to be taken subject to the normal reprogramming procedures.

+$10,000,000 for the high-speed civil transport program.

+$1,000,000 for an assessment of whether a National Institute of Aeronautics should be established within NASA.

-$80,000,000 from the National Aerospace Plane. The conferees have made this reduction without prejudice owing to the severe budget constraints faced by all domestic discretionary programs. The NASP objective is to demonstrate the technology required to permit the Nation to develop reusable, single-stage-to orbit (SSTO) vehicles with air-breathing primary propulsion as well as horizontal take off and landing. The conferees continue to believe that this goal, although technically difficult, would represent an exceptional breakthrough for American aeronautics. In that context, again recognizing the goal of single-stage-to orbit capability, the conferees urge that NASA examine carefully the importance of proceeding with the NASP project, and if it believes NASP can contribute significantly to meeting this goal, propose a reprogramming of funds to ensure the proper NASA role in the joint NASA/Department of Defense NASP program.

+$8,000,000 for minority university research, including $2,500,000 for hispanic-serving institutions; $5,000,000 for historically black colleges; and $500,000 for model institutions of excellence. The conferees urge that NASA work closely with the Environmental Protection Agency and the National Science Foundation to expand the number of historically black colleges and universities research centers in earth and space science, engineering, and mathematics, including high-performance supercomputing and scientific visualization.

+$3,000,000 for educational technology.

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+$1,000,000 for an assessment of whether a National Institute of Space Science should be established within NASA.

+$1,500,000 for the Office of Advanced Concepts and Technology for cooperative efforts by the Department of Defense in artificial intelligence and software reuse. +$2,500,000 for the Advanced Communication Technology Satellite (ACTS) program.

-$5,000,000 from the LANDSAT program.

-$5,000,000 from space capability development engineering and technical base.

-$5,000,000 from spacelab payload mission management activities.

-$5,200,000 from Life Science flight Experiments.

-$24,000,000 from the Mars Observer program. The conferees are disappointed in the recent loss of the Mars Observer. A total of $10,2000,000 has been included for a possible 1995 or 1996 reflight of the Mars mission. Based on an early review of comparative costs, it appears that a reflight of existing Mars observer instruments would represent achieving the most science at the lowest cost—particularly when launch requirements are included.

Finally, the conferees support the recommendation carried in the Senate report 103-1371 to reconvene the Augustine Commission panel to update its findings in light of new budget realities and to evaluate how successfully NASA has implemented its recommendations.

Amendment No. 101: Inserts language proposed by the Senate, amended to establish a funding limitation for space station by a date certain.

The conferees have agreed that of the $2,100,000,000 provided for the space station program, not to exceed $1,100,000,000 shall be available before March 31, 1994. The conferees have further agreed to "cap" the space station program at $1,100,000,000 in accordance with the agreement as outlined in the letter from NASA to the Committees dated August 9, 1964, and reaffirmed by letter to the Committees on September 30, 1993.

The conferees have agreed to cap the space station program in view of the continuing concern that any joint U.S./Russian space station option not compromise the long-standing goals of the American program. Fundamentally, the conferees believe that any Russian participation should enhance and not enable the space station. In that context it is important that a U.S.-led "human-tended" station with sufficient power to operate it should be the first phase of any international space station. The conferees welcome Russian participation including the use of the so-called Russian "tug" for guidance and navigation, the Russian Soyuz as a crew rescue vehicle, and other Russian docking and rendezvous technology and hardware. The conferees believe that over the coming four to six weeks a final configuration incorporating any Russian participation must be resolved in order to proceed with an amended critical design review of space station Alpha. Continued delay or uncertainty regarding what space station the United States will build can only exacerbate the problem of expending $8,000,000 a day for a program that remains undefined in terms of its final configuration. The conferees hope that the United States and Russia can agree, along with the other international partners, on an *acceptable* final configuration that will permit the lifting of the "cap" described above.

Amendment No. 102: Deletes language proposed by the Senate limiting funds for any space station with a user capability less than that available for space station Freedom.

Amendment No. 103: Inserts language proposed by the Senate limiting funds made available for the space station program to enter into contracts with the Republic of Russia.

Amendment No. 104: Inserts language proposed by the Senate limiting funds under the research and development account to $100,000,000 for activities for cooperative space ventures between the United States and the Republic of Russia including $50,000,000 for space transportation capability development activities and $50,000,000 for space science activities other than life sciences.

Amendment No. 105: Inserts language proposed by the Senate prohibiting the use of any of the $100,000,000 provided for cooperative agreements with the Republic of Russia until after December 15, 1993.

Amendment No. 106: Inserts language proposed by the Senate providing that no funds be made available under the research and development account to pay or reimburse the Department of Defense for any expenses connected with a planetary exploration mission.

Amendment No. 107: Deletes language proposed by the Senate limiting the dollars available for the mission to planet earth activities and for a socioeconomic data active archive center.

Amendment No. 108: Deletes language proposed by the Senate prohibiting the use of earth observing system data information funds for the construction of non-NASA facilities. The conferees have deleted this provision without prejudice. NASA is directed, however, to provide no funds for the construction of non-NASA facilities including the reimbursement of construction costs through annual data archive center operation budgets. The conferees further agree that all prior interagency agreements that would have permitted this are considered null and void and that facility costs should be born by the non-NASA agencies directly.

Amendment No. 109: Deletes language proposed by the Senate limiting funds available for space research and technology activities.

Amendment No. 110: Appropriates $4,878,400,000 for space flight, control and data communications as proposed by the House instead of $4,892,900,000 as proposed by the Senate. The conference agreement reflects the following changes from the budget request:

—$30,000,000 from structural spares. The conferees also agree that because of ongoing budget constraints, and the possibility of additional reductions that may have to be incurred under the shuttle production activity owning to potential future rescissions, the advanced turbo fuel pump development program should not be activated in fiscal year 1994. The 1994 budget includes no funds for the restart of the advanced fuel pump program. Although the conferees are pleased with the progress that has been made in the past nine months to correct development problems encountered with the advanced liquid oxygen turbo pump, given the increasingly limited resources available for new programs, it would not be prudent to begin a commitment to this activity.

-$2,000,000 from program support.

-$155,500,000 from the Advanced Solid Rocket Motor program.

The conferees have included $124,900,000 in fiscal year 1994 for the Advanced Solid Rocket Motor program. This is a reduction of $155,500,000 below the budget request of $280,400,000. The conferees regret that the full request for the ASRM program could not be accommodated within the severely constrained allocations available to the subcommittee—particularly in view of the more than one billion dollars that has been expended on the program to date, and also in view of the significant safety, payload, and manufacturing advantages gained with the ASRM development.

The Committee of Conference is aware, however, that NASA will soon make a final decision regarding the orbital inclination of the space station. If such decision places station in a 51.6 degree orbit to accommodate access from Russia, the shuttle will experience a significant degradation in lift capacity to station.

The conferees believe, therefore, that if the higher space station orbit is selected by NASA, the ASRM is clearly an active and viable option available to offset the loss of shuttle lift capacity. In that context, the conferees direct that NASA and the Administration determine if the ASRM is the preferred option to address the issue of diminished shuttle lift capacity should a higher space station orbit be selected. If such a determination is made, the conferees expect that NASA will submit a reprogramming by November 15, 1993 of such funds necessary to proceed with ASRM development.

If, however, NASA elects to choose an alternate approach to enhance shuttle lift capacity, then the funds provided ($124,900,000) for ASRM may be used only for termination and transferring the production of solid rocket motor nozzles and the refurbishment of solid rocket motor cases to the new ASRM production site located near Yellow Creek, Mississippi. To assure that such an option remains viable, the conferees have acceded to the Senate and restored the $32,600,000 requested for ASRM construction at Yellow Creek.

-$5,000,000 from launch and mission support.

-$200,000,000 from shuttle operations.

-$10,000,000 as a general reduction from launch services to be applied at the agency's discretion subject to the normal reprogramming procedures. The conferees are in agreement with the language contained in the House report (103-150) directing that NASA launch the AXAF-I mission on shuttle with an appropriate upper stage.

+$6,500,000 for the Discovery Near Earth Asteroid Rendezvous (NEAR) launch vehicle.

-$48,000,000 from the tracking and data relay satellite replacement new start. This reduction is made without prejudice. The conferees note that NASA has provided the historical "estimated need versus actual need" data on the TDRS system. It indicates that there has been a substantial over-estimate of future need for use of the system. Nevertheless, the Committee will entertain a reprogramming upon submission of data in the operating plan that outlines how the TDRSS will operate in conjunction with any Russian participation in the space station program.

-$11,000,000 as a general reduction from space communications, including a reduction of $8,500,000 from space communications operations activities at headquarters and at the NASA ground terminal.

-$500,000 from Mars Observer operations.

Amendment No. 111: Deletes center head proposed by the Senate.

Amendment No. 112: Appropriates $500,300,000 as proposed by the Senate instead of $512,700,000 as proposed by the House. The conferees agree that no funds provided under this heading may be used for the construction of a neutral buoyancy laboratory.

Amendment No. 113: Reported in technical disagreement. The managers on the part of the House will offer a motion to recede and concur in the amendment of the Senate, including technical language pursuant to Public Law 102-486 concerning utility energy efficiency and water conservation cash rebates received by the National Aeronautics and Space Administration.

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Amendment No. 114: Deletes language proposed by the Senate rescinding $10,000,000 of fiscal year 1993 funds provided for the Consortium for International Earth Science Information Network.

The conferees agree to fence $10,000,000 of 1993 CIESIN construction funds until the completion of the pending Inspector General report.

Amendment No. 115: Appropriates $1,635,508,000 as proposed by the Senate, instead of $1,577,500,000 as proposed by the House. The conference agreement makes the following changes to the budget request:

- $25,000,000 from space station and NASA-related employment. The May 1993 station employment level was estimated at 2,240 full-time positions. A 30 percent reduction from that level (the NASA goal) would equate to approximately 650 positions. The conferees expect that a part of that reduction will occur from closing NASA operations at the Reston Level II Space Station facility. The conferees further direct that total NASA end of year fiscal year 1994 employment shall not exceed 22,900 FTE.

- $14,492,000 as a general reduction to be taken at the agency's discretion subject to the normal reprogramming procedures.

The conferees note that as NASA reduces its programmatic activities, including personnel, it is important that the agency ensure that it does not lose sight of its responsibility to demonstrate that the cutting edge of technology reflect the full ethnic, cultural and gender diversity of the United States. The small and disadvantaged business goals and objectives should continue to reflect aggressive efforts to increase the full participation of targeted groups and contracting opportunities, 8(a) set-asides, and in training and research grants. The current goal of achieving a minority set-aside of eight percent of contract dollars should be maintained. Up to $48,400,000 of available funds may be used for minority university research and education programs in fiscal year 1994 with the intent of reaching a $101,000,000 investment level by fiscal year 1998.

The conferees also agree that up to $800,000 of available research and program management funds may be used for multicultural education and equal opportunity training programs over the next three fiscal years (1994-1996). In addition, $748,000 of available funds may be used for equal opportunity compliance activities and the processing and adjudication of matters of employment discrimination occurring under 29 CFR 1614.

The Committee of Conference agrees that in a subsequent legislative vehicle it will recommend a rescission to offset any mandatory "pay as you go" costs incurred as a result of NASA "early-out" legislation.

Finally, the conferees are concerned that the original purposes of operating plan changes have become increasingly distorted over the past three to four fiscal years. The operating plan is intended to accommodate unexpected and technical dollar change requirements in various NASA programs. It is *not and should not* be used as a vehicle for changing policy and programmatic decisions made in the conference report. The conferees expect, therefore, that except where specific reprogramming proposals may be recommended in the conference agreement, such as in the case of the NASP and ASRM programs, the operating plan adhere to those conditions for which it was originally employed.

NATIONAL SCIENCE FOUNDATION

Amendment No. 116: Appropriates $1,986,000,000 for the research and related activities of the National Science Foundation, instead of $2,045,000,000 as proposed by the House and $1,940,000,000 as proposed by the Senate.

The conferees agree with the following adjustments from the request by the Administration:

- $204,500,000 to be taken as a general reduction at the agency's discretion, subject to the normal reprogramming guidelines.

- $12,500,000 from activities connected with the Foundation's role in high-performance computing. The conferees direct the Foundation not to expend more funds on high-performance computing than it spent in fiscal year 1993 until it provides a written report to the Committees on Appropriations articulating specific and measurable goals in this area. This report must include timetables and milestones for achieving NSF's goals, and should describe how these efforts relate to the Administration's national information infrastructure initiative.

- $6,500,000 from the acquisition of an arctic research vessel.

+$5,000,000 for a second round of funding for agile manufacturing.

The conferees agree that GAO complete a study on indirect costs consistent with the guidance in both House and Senate reports. GAO should report to both Committees on Appropriations concurrently.

Amendment No. 117. Inserts language proposed by the Senate prohibiting any of the funds provided for research and related activities from being used to acquire an arctic research vessel. The conferees have deferred further action on the arctic research vessel pending receipt of a report from the General Accounting Office on the costs and benefits associated with the various acquisition strategies (including lease, purchase, debt financing, and other mechanisms) which could be pursued by the NSF or its institutional operator.

Amendment No. 118. Deletes language proposed by the Senate prohibiting expenditures for the establishment of any new research centers in fiscal year 1994.

The conferees expect that beginning in fiscal year 1995, the National Science Foundation will establish, through a competitive process, a Center for the Human Dimensions of Climate Change at a level of approximately $6,000,000 annually.

Amendment No. 119: Inserts center heading proposed by the Senate, changing the account title from "Academic Research Facilities and Instrumentation" as proposed by the House to "Academic Research Infrastructure" as proposed by the Senate.

Amendment No. 120: Appropriates $100,000,000 for academic research infrastructure, instead of $56,000,000 as proposed by the House and $125,000,000 as proposed by the Senate.

The conferees note the great difficulty experienced by colleges and universities with significant populations of historically underrepresented groups in obtaining funding for research facilities and instruments. The conferees direct the Foundation to pay particular attention to the needs of these institutions when obligating funds under this title.

Amendment No. 121: Inserts language proposed by the Senate for United States Polar Research programs prohibiting the use of funds to refurbish, modernize, or build a research vessel in foreign shipyards. This is amended to reference vessels built in "a foreign shipyard", rather than vessels "not refurbished or modernized" or "not built in" the United States.

EDUCATION AND HUMAN RESOURCES

The conferees agree to the following changes from the budget request for the education and human resources account:

+$7,500,000 for the Experimental Program to Stimulate Competitive Research (EPSCoR).

+$10,000,000 for science and advanced technology grants to community colleges.

+$1,000,000 for minority summer science camps.

- $1,500,000 for systemic reform in rural areas. This program should complement the urban systemic initiative.

- $3,500,000 as a general reduction, taken at the Agency's discretion, subject to the normal reprogramming guidelines.

- $3,000,000 from curriculum development.

Amendment No. 122: Appropriates $1,500,000 for the Critical Technologies Institute, instead of $1,000,000 as proposed by the House and $2,000,000 as proposed by the Senate.

The conferees agree to the following changes to the budget request for the Critical Technologies Institute:

+$250,000 for activities focused on the development of performance goals for federal investments in science and technology.

- $250,000 for a grant to the National Academy of Public Administration (NAPA) to review NSF's various research centers, including, but not limited to, its science and technology, engineering, and supercomputer centers.

Amendment No. 123: Appropriates $118,300,000 for the salaries and expenses of the National Science Foundation, instead of $120,800,000 as proposed by the House and $115,500,000 as proposed by the Senate.

Amendment No. 124: Restores the center heading proposed by the House and deleted by the Senate naming the account "National Science Foundation headquarters relocation". Deletes center heading proposed by the Senate naming the account "National Science Foundation headquarters relocation and related activities".

Amendment No. 125: Deletes language stricken by the Senate and proposed by the House allowing funds for this activity to remain available until expended.

Amendment No. 126: Deletes language proposed by the Senate allowing the Foundation to use resources appropriated under this heading to pay for rent.

NATIONAL SERVICE INITIATIVE

CORPORATION FOR NATIONAL AND COMMUNITY SERVICE

Amendment No. 127: Appropriates $370,000,000 for the Corporation for National and Community Service as proposed by the Senate, instead of no appropriation as proposed by the House. In addition, the conferees agree to several limitations as proposed by the Senate but not proposed by the House. They are:

$14,000,000 limit on administrative expenses for the Corporation,

$11,000,000 limit on administrative expenses for State commissions,

$94,500,000 limit on appropriations to the National Service Trust Fund,

$5,000,000 limit on payments to the Points of Light Foundation, and

$15,000,000 limit on subtitle H activities.

The conferees agree to amend two limitations proposed by the Senate but not proposed by the House by agreeing to:

$9,450,000 limit on educational awards for VISTA volunteers, instead of a $4,725,000 limit on educational awards for VISTA volunteers as proposed by the Senate and no limit as proposed by the House, and

$10,000,000 limit on subtitle E activities, instead of a prohibition on expenditures for this purpose as proposed by the Senate and no limitation as proposed by the House.

The conferees did not agree to several limitations as proposed by the Senate but not proposed by the House. They are:

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billion cost to complete, after we have spent $2 billion over the past 5 years. The cost to finish this program is more than the original cost estimates that were given to the Congress when the program was initially authorized and appropriated, and it is very similar to the superconducting super collider in terms of lowball estimates that Congress is being asked to agree to.

The advanced solid rocket motor will not fly even its first flight until the year 2002, after 80 percent of the space station has been completed. The proponents of the ASRM, when the program was originally authorized, said, "We need this rocket in order to reduce the number of shuttle flights necessary to assemble the station." Because this rocket is not going to be ready until most of the station is already up, it has become a rocket without a mission. That is why its funding ought to be terminated.

There were and there still are alternative programs that NASA can afford to do the job of the ASRM. That is something that is funded in this current budget, and which will be considered in future authorizations and appropriation bills.

Finally, the facilities at Yellow Creek, MS; can and should be used for a worthy public purpose, since the taxpayers have already invested $1.5 billion in constructing them, but that worthy public purpose is not the advanced solid rocket motor, nor is it some kind of resurrection or job transfer program.

The President, in his fiscal year 1995 budget submission, ought to tell Congress and the country for what purpose he intends to use that facility. If it is reasonable and does not attempt to resurrect the ASRM out of the ashes, I am certain that it will achieve support, both in the Committee on Science, Space, and Technology, in the Committee on Appropriations, and by the House of Representatives as a whole.

Again, I would urge strong support for the motion terminating the ASRM that the gentleman from Ohio [Mr. STOKES] will offer later on today.

Mr. Speaker, I reserve the balance of my time.

Mr. STOKES. Mr. Speaker, I yield 4 minutes to the distinguished ranking majority member of this subcommittee, the very able and hard-working gentleman from West Virginia [Mr. MOLLOHAN].

Mr. MOLLOHAN. Mr. Speaker, I rise in strong support of the conference report to H.R. 2491, the VA-HUD fiscal year 1994 appropriations bill. The chairman has done an outstanding job throughout the appropriations process this year, and he has enjoyed the cooperation of the ranking minority member. I am very proud of the product that we bring to the floor for the Members' consideration.

In light of the current budget environment, we were unable to fund many worthy projects, and others we funded at lower levels than we would have hoped. But in this fiscal situation, the operative word is fair, and this is a fair bill.

The programs in this bill have been authorized. The initiatives reflect the administration's priorities for the diverse agencies under the subcommittee's jurisdiction.

To address the critical needs of our Nation's veterans, I am pleased to tell my colleagues that we increased funding for veterans medical care by almost $1 billion over fiscal year 1993 amounts. This was not easy because our 602b allocation provided a funding level 2 percent less than comparable fiscal year 1993 levels.

By providing increases in Housing and Urban Development accounts the bill renews our commitment to public housing programs. I am particularly pleased that we keep in mind the special needs of rural areas. Through the increase to the Section 8 Program we improve the availability of affordable housing for the many low-income individuals waiting for assistance.

In NASA, we have successfully achieved funding for a balanced Space Program. We have included the requested amount for the redesigned space station *Alpha*, which now includes Russian participation; we have provided increases for aeronautics research and development, a key component of President Clinton's competitiveness agenda; further, we have maintained the Nation's commitment to the space shuttle, mission to plant Earth, and space science programs.

The committee appreciates the importance of basic research, so we have provided increases for the National Science Foundation's research and related activities account. And we again increase funding for NSF's K through 12 education activities.

And we provide levels for EPA above the President's request, including funds for water treatment, Superfund, leaking underground storage tank fund, and oilspill response programs.

Overall, I am pleased with our work, but I would like to take this opportunity to mention something that concerns me deeply. The Congress is responding to the current fiscal environment with a shifting mood about discretionary spending, but in our frenzy to appear fiscally responsible, we must refrain from superficial tactics to achieve our goals.

The high-resolution microwave survey is a NASA Program caught in this web. As a result, the program is being terminated in this bill. If this termination had been based on substantive issues, I would be comfortable with our actions. But unfortunately, this is not the case. HRMS has been peer reviewed; it has been authorized; it pushes state of the art technology in signal processing techniques and in radio receiver technology; and it has met its budget and its schedule for the 5 years it has been funded.

Yet in an attempt to attract attention as stewards of good government, Members of Congress have attacked the program with shallow references to little green men and ET. In my judgment, the termination of this program is a mistake. The program is being used as a scapegoat, and I want to express my sincere regret to the outstanding scientists who have dedicated their careers to the program.

Overall, however, we bring to you a responsible bill. The subcommittee has been responsive to the will of the majority of the Members of the body. I urge my colleagues to support this conference agreement.

□ 1510

Mr. LEWIS of California. Mr. Speaker, I yield 2 minutes to the gentleman from New Mexico [Mr. SKEEN].

Mr. SKEEN. Mr. Speaker, I thank the gentleman for yielding the time.

Mr. Speaker, I would like to engage in a colloquy with the chairman and the ranking member of the subcommittee.

Mr. Speaker, within the funds for NASA, the conference report directs a reduction from the NASA ground terminal facility which lies within my district. Is this correct?

Mr. STOKES. If the gentleman will yield, that is correct. The conference report reflects the sentiment of the conferees that we are not proceeding with the TDRSS replenishment new start at this time. The conference agreement reflects a specific reduction in the operating costs at both headquarters and the ground terminal.

Mr. SKEEN. Owing to my concern with the intent of the conferees, I wrote NASA Administrator Goldin asking for an agency assessment of the technical feasibility of operating cuts such as those which the conferees have reached. His response raises possible concerns and I insert Mr. Goldin's letter into the RECORD at this point.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, OFFICE OF THE ADMINISTRATOR,
Washington, DC, October 15, 1993.

Hon. JOE SKEEN,
House of Representatives,
Washington, DC.

DEAR MR. SKEEN: Thank you for your letter of October 7, signed jointly with Senators Domenici, Gramm and Bingaman and Congressmen McDade and Lewis, regarding direction concerning NASA's Space Communications activities included in the Conference Report (House Report 103-273) accompanying H.R. 2491, the VA-HUD-Independent Agencies appropriations bill. The Report directs that "$11 million [be taken] as a general reduction from space communications, including a reduction of $8.6 million from space communications operations activities at headquarters and at the NASA ground terminal."

We are currently assessing the impacts of an $8.6 million reduction directed at Headquarters support activities for Space Communications and Ground Terminal operations. As you may know, NASA is already actively endeavoring to reduce costs of Headquarters support activities in general, and we expect to absorb reductions in Headquarters support for Space Communications, among other areas. Clearly, however, a di-

Appendix 22

Is It True That We Can't Afford Curiosity?
The Search for ExtraTerrestrial Intelligence: A Case Study

Jill C. Tarter

Jill Tarter is Senior Program Scientist at the SETI Institute in Mountain View, California. Until recently she served as the Project Scientist for NASA's SETI efforts and is now the Project Manager/Project Scientist for Project Phoenix, the privately funded continuation of the search.

On September 22, 1993, the United States Senate did a curious thing to prove that it was serious about deficit reduction. Within less than one hour, it voted on three amendments proposed against the appropriation's bill that would fund NASA for fiscal year 1994. First it defeated an amendment to terminate the 2,100 million dollar Space Station, next it defeated an amendment to terminate the 660 million dollar Advanced Solid Rocket Motor for the Space Shuttle, but then it overwhelmingly adopted an amendment to terminate the 12.3 million dollar High Resolution Microwave Survey, (NASA's project to Search for Extraterrestrial Intelligence) after more than a decade of R&D investment and less than one year into it's planned ten-year observing program. Earlier that morning, the Senators who spoke (to an empty chamber) in defense of the HRMS program[1] cited a consistent history of peer review and recommendations from the scientific community, a proven record of spin-off technologies, and an exciting educational program that captivated young students and hooked them on the enjoyment of studying science and mathematics. The lone Senator who spoke against the HRMS project cited the need to reduce the federal budget deficit, his preference for spending the money to educate students at his own state university, his frustration at having been out-maneuvered by his Senate colleagues in the previous fiscal year, and "...it is simply a matter of priorities"[2], with SETI not being one of his. The eventual, lopsided vote of 77-23 guaranteed that this program could not be reinstated during the House/Senate conference committee on the bill.

[1]Senator Barbara Mikulski (D-Maryland) and Senator Phil Gramm (R-Texas); the Chair and Ranking Minority Member of the Appropriations Sub Committee. Senator Jay Rockefeller (D-West Virginia) entered a very supportive statement into the record, but was not on the floor.

[2]*Congressional Record* , September 22, 1994, S12151, amendment no. 911, remarks of Mr. Bryan

In fact the Senate vote reflected three realities: 1) that few jobs were at stake in states of most of the Senators, 2) that on its own, this small project had not been able to effectively educate and inform Members of the Senate beyond those few serving on the relevant science committees and, 3) that NASA had chosen to fight exclusively for its large, revenue generating projects, leaving HRMS without an Agency champion in the corridors of Capitol Hill.

Although he personally knew better, the political architect behind this amendment deliberately chose to crow about his success in a highly inflammatory press release by labeling this scientific project 'the Great Martian Chase', while conjuring up the images of UFO's and little green men. 'Spendaholic' [3] Senator Bryan 'saved' the US taxpayers 12.3 million dollars in FY94 and cost them some 58 million dollars of invested development and perhaps the chance to end humanity's cosmic isolation. According to the Senator from Nevada, the United States of America can no longer afford to attempt to answer the oldest of humankind's unanswered questions: Are we alone in the universe?

We have homeless people in our streets in dismaying numbers, our national debt is staggering, the unemployment rate is too high, and the country is desperately trying to claw its way out of a prolonged recession. Is the Senator from Nevada correct? Is now the time that we have to say we cannot afford to indulge our curiosity? Or is this the time to invest in our future, to follow our dreams, and perhaps to achieve one of the most important discoveries of any age? Even to this, admittedly biased, author, the answers are not clear-cut and are case-specific. In the case of HRMS, the unquantifiable chance of success must be weighed against the potentially enormous payoff, with cost being the determinant.

The case of the Superconducting Super Collider provides a good counterpoint to this discussion. Unlike HRMS, the SSC could guarantee a return on investment; increased understanding of fundamental particle physics. While the person on the street might not be able to understand the new and esoteric knowledge garnered from this powerful research tool, and might be less curious about symmetry breaking than about whether humanity has cosmic neighbors, the history of high

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[3]Time Magazine, March 14 , 1994, issue applied this title to the ten least-frugal Senators (as ranked by the nonpartisan Concord Coalition) who also voted for one of the two competing balanced-budget amendments to the Constitution. Senator Richard Bryan (D-Nevada) is number eight on that list.

energy physics research strongly suggests that some resultant application from the SSC would enrich the life of that average citizen and enhance the prestige of our nation within the global scientific and commercial communities. Yet funding for the SSC was terminated just a few weeks after termination of funds for HRMS. Part of the same phenomenon? Yes, and no. In the case of the SSC, the annual and runnout costs were significant in the face of the total national deficit. In light of this cost, various scientific and engineering groups arrived at different priorities for the SSC and so testified at the numerous Congressional hearings on this topic. Most notable in its opposition to the SSC was the Federation of American Scientists, which stated that the scientific return on the dollar would be greater if a number of smaller research efforts were supported, rather than this single example of 'big science'. On the other hand, National Academy Committees consistently listed the pursuit of the Higgs boson as a high priority for high energy physics research. The necessarily expensive generation of high energy particles within the SSC were critical to achieving this goal. By contrast, HRMS always was 'small science' (total funding of 100 million dollars over 10 years), so no division arose within the scientific community, and the search was consistently given high priority in studies by the National Academy of Science and the Space Studies Board.

During the budget process and prolonged SSC debate, Congressional staff and scientific fellows labored to assist their Members to establish a reasonable policy for support of long-term 'big science' programs, in the face of the scientific community's divided opinions on the SSC. Members themselves appear to have been more influenced by how many jobs and contracts this mega-project would translate into for their districts and states. This is understandable, given the general scientific illiteracy of the Members: a review of the bios of the 103rd Congress shows that there are more former undertakers (4) within the US Congress than there are former scientists (1) or engineers (3). In the end, not enough Members were getting a big enough piece of this substantial SSC pie. The divided scientific community provided the rationale, and the SSC could not be sustained against real deficit pressures. In spite of undivided scientific support, HRMS was sacrificed to these same deficit pressures. The reality was that there were too many Senators with no vested interests, no information and no resistance to the 'giggle factor'. It would be unfortunate if these two examples were to become precedents and mandate the way we choose to invest in our future.

In spite of deficits and homeless people, a viable and sustainable nation must make a reasonable investment in curiosity in order to enlarge the possibilities for its future. Today there is considerable discomfort within the scientific community as the balance between strategic and curiosity-driven research is being shifted by concerns about US competitiveness in a global economy. For the near term, it appears obvious that the Members of Congress and the market place will be the forces that define just how much is a 'reasonable' investment. They will do so with a shorter, rather than longer view of the world. I believe that by any rational criterion, HRMS represented a 'reasonable' investment. Unfortunately, its termination also represented an opportunity for headlines and posturing that were irresistible to those who did not know what it was all about.[4]. What might an investment in HRMS have brought, how might it have changed the future, and how might it yet do so?

HRMS -- The First Large Scale Systematic Search for Radio Signals from Distant Technologies

In 1960, Dr. Frank Drake, then at the National Radio Astronomy Observatory, made the first deliberate SETI observations with a radio telescope. He looked at two, nearby stars that are very similar to our Sun and listened at a single frequency for a few hundred hours. In the process he detected radio frequency interference (RFI) generated by human technology, but no signals of possible extraterrestrial origin. On the basis of this negative result, he did **not** conclude that extraterrestrial intelligent civilizations were absent in the vicinity of those or any other stars in our Milky Way Galaxy. His search was far too limited to allow for such a sweeping conclusion.

Over the past 34 years there have been roughly another 60 searches in eight countries. Each of them had the potential for a 'lucky' result, but none of them was

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[4]Indeed it can be argued easily that no Senator should be expected to have information on all programs down to the $10M/year level. If Congress appropriates roughly $1.5 trillion per year, then working continuously every second of the year would produce an approriation rate of $50,000/second. Micromanaging at the $10M level means that the Senators would have all of 3.3 minutes to consider the merits of this size program --- assuming they did not sleep or play golf!

very significant when compared to the overall size of a comprehensive search, so none of them provided a significant negative result. The importance of conducting a search that can yield a significant negative result is a point that has been misunderstood by many people, most recently by the Presidential Science Advisor, John Gibbons. When asked about the cancellation of HRMS, he was quoted in the San Francisco Examiner on February 17, 1994, as saying "I know this. We've done a lot of observing and listening (for alien signals) already, and if there were anything obviously out there, I think we would have gotten some signal (by now)." As the person who has for years maintained and published the archive of SETI searches to date (which probably informed Dr. Gibbons about 'a lot of observing') I am particularly chagrined that he has failed to appreciate how insignificant our exploration of the multi-dimensional search space has been thus far!

A star may be investigated for signals in two ways; a large telescope may be pointed at it for long periods of time, or it may fall within the beam of a smaller telescope that is sweeping across the heavens, eventually looking in all directions. We call the first mode a targeted search and the second one a sky survey. It should be obvious that a search cannot succeed if it doesn't look at the right frequencies with enough sensitivity to detect the types of signal that are present. Of all frequencies in the electromagnetic spectrum (X-rays, light, infra-red, radio, *etc.*) that can carry signals, the natural universe is the most quiet at microwave (short radio) frequencies. This is the reason that most SETI searches have been carried out at microwave frequencies. It is easier to hear a whisper in a quiet room than at a rock concert. For a given transmitted signal power, the maximum signal to noise ratio can be achieved at microwave frequencies -- our scientists know that and so too would theirs. On the surface of their own planet, or within their own solar system, extraterrestrials may well use higher frequency signals to accommodate broader information bandwidths or use some other type of transmission (non-electromagnetic) that we cannot yet conceive. However, for communication over interstellar distances, there is a very natural advantage to radio frequencies. So the conventional wisdom in SETI for many years has been to search for microwave radio signals from the direction of other stars.

Even with these restricting definitions, we still find that the search is vast. When the signal might be sent (or received) and its nature are just two of the other parameters to be considered. Historically, the time element has been ignored,

requiring that the signal be constantly present. Some experimentation with detection of different signal types has occurred, but the vast majority of the searches have been sensitive only to continuous wave (CW) signals, confined to a single narrow frequency band and remaining fixed at that frequency. The emphasis on narrow or bandlimited signals results from the necessity to define what an artificial, as opposed to a natural astrophysical, signal might be like. How can the two be distinguished?

Nature appears incapable of emitting a coherent, narrowband signal, rather natural emissions occupy a very wide band of frequencies. The narrowest signal ever found in nature originates in a Hydroxyl maser and occupies 300 Hz of the microwave spectrum (a Hz is a unit of frequency that corresponds to one cycle per second). By contrast, in the same microwave frequency range, our technology can generate signals that occupy no more than 1/1000 Hz. The detection of such narrowband signals would strongly suggest an artificial origin, i.e. the work of sentient beings. HRMS was the first search with the technical capability to search for narrowband pulses as well as CW signals and do so even if they change their precise frequency over time (something that might happen if the transmitter were on a rotating, planet). In addition, since more than one telescope was to be used in HRMS for simultaneous observations, it had the capability to detect, and confirm as extraterrestrial, signals that were transient, rather than continuously present. The special purpose supercomputers that the HRMS NASA team developed enabled this more comprehensive search of parameter space, and they were to be used at the worlds largest antennas to achieve high sensitivity. Compared to Drake's original search, the signal processing capability of HRMS was 14 orders of magnitude faster (that's 10^{14})! This increased processing speed translated into improved sensitivity for the search. It is futile to interrogate a star (either in a targeted search or a sky survey) with a system that lacks the sensitivity to detect the transmitters that may be located near the star. The results will be negative, but they will not be significant. That is what Dr. Gibbons failed to realize with his comments about 'lots' of past observing.

Until a successful detection occurs, we cannot know what the strength of any extraterrestrial transmitters might be. An advanced technology may well have transmitters far more powerful than those we use today, but there will always be some cost to power. 'No free lunch' is likely to be the first rule of engineering

throughout the Galaxy. What we can do is to define the size of a search that could detect an **Earth-analog** technology if it were located anywhere within the Milky Way Galaxy. If and when such a search were conducted, a negative result would indeed be significant (a positive result would be self-explanatory). HRMS was by no means such a definitive search, but it was a tens of thousands of times closer to it than any of the efforts of the past 34 years.[5]

For the sake of having a benchmark, let us estimate the scale of that definitive search. If they exist, the technologies we seek are the general outcome of star formation, planet formation, chemical evolution leading to the origin of life on a planetary surface, followed by some successful evolutionary path to intelligence. The number of stars suitable for this unfolding is only a fraction of the 400 billion stars in the Milky Way Galaxy, but since we have no way of knowing (with our current remote observational capabilities) which stars are suitable, the definitive search would have to interrogate all the stars of the Milky Way. In free space (above the Earth's atmosphere) the quiet region of the microwave spectrum extends from roughly 1 to 6o GHz (1 to 60 billion Hz), and the signal could be at any particular Hz within that whole range. In a search conducted from the surface of the Earth, the water vapor and Oxygen in our atmosphere add additional noise to the microwave background level at frequencies above 10 GHz. This is a fact of life for terrestrial SETI researchers, but should not bias the definition of the definitive search. For a negative result to be truly significant, a search must interrogate 400 billion stars over 59 GHz of spectrum with a sensitivity sufficient to detect a range of transmitter powers ranging from Earth's most numerous transmitters (10 megawatt[6] broadcast TV and FM radio stations) up to its single most powerful transmitter (the 100 terrawatt[7] planetary radar transmitter at the Arecibo Observatory in Puerto Rico). The corresponding limiting sensitivity numbers are 10^{-36} Wm^{-2} to $10^{-29}Wm^{-2}$. HRMS could have detected TV leakage from only one star, our nearest neighbor Alpha Centauri, but it had the sensitivity to detect an Arecibo planetary radar analog half way to the center of the galaxy. It would not have interrogated all those stars individually, because we don't know where they are. During the HRMS targeted search, 1000 of the nearest solar-type

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[5]SETI is one of those scientific endeavors that must justify additional expense for increased capability on the basis of previous failures. This is an unenviable situation, but not unique.

[6]1 megawatt = 1 million watts of power

[7]1 terrawatt = 1 million megawatts of power

stars would have been systematically observed over the frequency range 1 to 3 GHz, with signal processing capable of recognizing narrowband CW and pulsed signals that might drift as fast a 1 Hz per second and that might persist for no longer than half an hour. The rest of the stars would have been searched for CW signals by the HRMS sky survey with a sensitivity that was down by a factor of 1000, but a frequency coverage that extended up to 10 GHz. While the combined HRMS effort would have been far short of the definitive search, it represented the limits of our current signal processing technology. It kept within a reasonable budget by using existing antennas, rather than constructing new ones. It was such a large improvement over what had been done in the past that HRMS was certainly justified as a modest investment in the future. For SETI observations from the Earth's surface, the microwave spectrum itself must be considered a diminishing resource. By the time the technology improves enough to permit the definitive search to be undertaken, the terrestrial spectrum may be fully utilized by our own communications demands and we would therefore be deaf to the faint signals from space. The lunar farside remains an eventual radio-quiet domain, but the price of operation there makes it cost effective to search with the best available technology from the Earth's surface as long as that is possible.

The End of NASA SETI Leads to the Birth of Project Phoenix

By its very nature, SETI research requires both audacity and patience. In spite of the unexpectedness and fiscal stringency of the Congressional termination[8], the scientists and engineers who had been working on the HRMS project were not about to give up. Instead, they were galvanized into action. It was quickly realized that the sky survey portion of the search could not be continued. It relied exclusively on the antennas of NASA's Deep Space Network of tracking stations, and Congress had just told NASA that it was to get out of the SETI business. On the other hand, the more sensitive targeted search had been predicated on the use of very large antennas around the world, not NASA resources. The antenna time had already been negotiated or awarded to the HRMS science team on the basis of peer review and was still available to do the searches as proposed. Although the

[8]Instead of the orderly phase-out of a program that had been running for many years, the Congress provided only $1M for termination liability.

HRMS targeted search equipment could be described as an extremely fast supercomputer, it was too special-purpose to be useful to any other NASA project. The termination plan for HRMS called for the equipment to be put into storage, thereby providing no return on the taxpayers' years of investment. NASA, recognizing that it would be prudent to avoid such waste, agreed, in principle, to make the equipment available on long term loan to the scientific community. The scientists and engineers, who had built and were improving the capabilities of the targeted search equipment at the time of termination, were not NASA civil servants but rather employees of the non-profit SETI Institute of Mountain View, California (Silicon Valley whiz kids do not good civil servants make). The SETI Institute had been incorporated in 1984 with a fairly broad charter involving research into the origin, evolution and distribution of life in the universe. One of the Institute's objective had always been to work with NASA under a cooperative agreement to develop the targeted search capability as inexpensively as possible. In October of 1993, all the pieces for continuation of the targeted search were there, all that was needed was private funding to replace what the Congress had eliminated. The SETI Institute staff took a deep breath and undertook the challenge to raise $7.3M to cover the nineteen month period from December 1, 1994 through June 30, 1995, and thereafter an annual budget of about $3M to fund what is now called Project Phoenix These numbers are smaller than Congressional requests for HRMS, yet alarmingly large when faced with the need to raise them privately[9]. The figures reflect the fact that Project Phoenix is a targeted search only, and will be conducted within an institutional structure that is more flexible and bears less overhead costs than NASA.

During its first nineteen months, Project Phoenix will complete a substantial hardware development program begun during HRMS, and carry out an extended observing campaign in the Southern Hemisphere. The hardware development includes: doubling the capacity of the HRMS targeted search system loaned by NASA, the development of two other pieces of auxiliary equipment to deal with rapidly varying RFI (a lesson learned at Arecibo during the HRMS inaugural observations), a contract with the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) to build an improved version of their very successful wideband feed for the large, 210 foot Parkes telescope and to

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[9]As of mid-March 1994, the SETI Institute had raised $4.47 M for Project Phoenix

modify a smaller telescope for simultaneous, confirmation observations. Project Phoenix will then observe for 16 weeks in Australia, concentrating on target stars that can be seen only from the southern hemisphere. Those observations will be followed by a period of cooperative scientific observations with Australian colleagues who have successfully applied to use the Phoenix equipment. Finally, in June of 1995, when the current major upgrading project at Arecibo Observatory is complete, all the equipment will be shipped to Arecibo where it will begin observations of northern target stars. Annual funding will provide for continued improvement in processing speed and bandwidth and for the use of Arecibo and other large northern telescopes through the end of the century, until the original HRMS target list of 1000 solar-type stars (within 150 light years of Earth) have been observed at all frequencies from 1 to 3 GHz.

While the author is hopeful that Project Phoenix will succeed in detecting a signal, simple arithmetic demonstrates that the search may not be comprehensive enough (1000 stars x 2 GHz << 400 billion stars x 59 GHz), even though it is far more comprehensive than the sum of all previous searches. To make substantial progress in the future will require the construction of dedicated arrays of antennas. There is a limit to the increases that can be achieved in sensitivity by signal processing alone. Beyond that it is necessary to spend more time listening and collect more signal with numerous, large antennas. If interferometry (signals correlated between telescopes) can defeat the increasing RFI, then these antennas can be built on Earth. It remains to be seen whether the price will remain within the range of visionary philanthropists. If our own technology proves too deafening, then SETI may need to take advantage of the radio-quiet lunar farside and the government will once again be in the position to decide how much we should invest in curiosity.

1994

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KEY POINTS -- MEDIA INTEREST

Often SETI suffered unfair treatment as Congressional members enjoyed quoting from the tabloid press during their attacks on SETI, thus much of their information was garbled or was portrayed in an inaccurate manner.

The REAL story can be seen in the first-class, responsible press coverage related to the initial deployment of the NASA HRMS Project in October 1992.

The search for life in the universe was the subject of a cover story in LIFE magazine (Sept. 1992), and a major article in NEWSWEEK (Oct. 1992). It also appeared as a major story in PARADE.

TV and radio stations around the world carried the news about the start of the dual mode project, being launched at the Arecibo Observatory in Puerto Rico and at the Goldstone Deep Space Network in the Mojave Desert in California.

More than 3100 column inches were devoted to this event in newspapers and magazines around the world. In fact, the nation's leading newspapers gave thorough coverage of the event: the Washington Post, the New York Times, the Atlantic Monthly, the Boston Globe, the Los Angeles Times, etc.

Respected science writers provided indepth articles: for example, Kathy Sawyer for the Washington Post, John Noble Wilford for the New York Times, Robert C. Cowen of the Christian Science Monitor, Lee Siegel and Lee Dye for the Los Angeles Times, etc.

Rather than focusing on hype, KATHY SAWYER describes the technology of the project in the WASHINGTON POST article:

> *"The project's new spectrum analyzer can monitor tens of millions of radio channels simultaneously. A new computer program that can process 30 million numerical values per second will rapidly scan the data for continuous signals as well as those that drift, change polarization or pulse."*

In like manner, JOHN NOBLE WILFORD, in his article in THE NEW YORK TIMES, discusses the scope of the challenge:

> *"On the day marking that fateful landfall of Columbus 500 years ago, introducing American into world history, astronomers began searching the heavens for other new worlds, where there may dwell civilizations thriving in the warmth of other stars....Unlike Columbus, they set out knowing that if they succeed, there will be no pot of gold at the end, but there could be an exciting and bewildering awakening to the smallness of all previous concepts of life....Scientists also think that radio astronomy and electronic technology have [finally] reached the point of being up to such an audacious task."*

LEE DYE in the LOS ANGELES TIMES makes a dramatic observation for the entire planet:

> *"The greatest search of all will begin so quietly that it will seem almost timid. A handful of scientists in California and Puerto Rico will flip a few electronic switches and turn on a powerful computer. They will listen for some sign, some distant signal from some unknown culture that will tell us that we are not the only creatures who have stared in awe at the night sky and wondered if anyone else was out there. It is odd that it has taken so long to get this far, because the answer--whatever it turns out to be--will affect everything that human beings think about themselves and their role in the universe. Either we are the only creatures with the intelligence to pose the question, and the meaning of life is ours alone, or there are others, perhaps billions, of civilizations that have traveled this same path."*

KEY POINTS -- EDUCATION

Congressional members often use the argument that money allocated for SETI would be better spent sending students to universities in their own states. In fact, one of the most dramatic spinoffs from the SETI program is a CURRICULUM DEVELOPMENT PROJECT launched in 1991 with funding from NASA and from the National Science Foundation.

The curriculum development team consisted of NASA scientists at Ames Research Center and the Jet Propulsion Laboratory, and educational colleagues from Evergreen State College in Washington, the Lawrence Hall of Science, San Francisco State University and the SETI Institute.

Teachers from many schools helped design guides for grades 3 through 9. The "hands on" products have been tested in classrooms several times by teachers of the design team, and then tested by teachers nationwide who volunteered for a final round of testing. The guides will be available via a commercial publisher in the 1994-95 time frame.

Over 2,200 students have tested the curriculum materials in nearly 125 schools in over 25 states, plus Canada and Puerto Rico. The number of students who will ultimately benefit from this educational outreach far surpasses the number of students whom Congressmen suggested could attend universities in their states using the funds allocated for SETI.

The search for life in the universe has become a central part of GENERAL EDUCATION COURSES in a large number of universities, and has been very effective as a magnet in attracting student interest. It now appears as a major subject in most COLLEGE-LEVEL ASTRONOMY TEXTBOOKS.

TEACHERS ASSOCIATIONS:

Among the NASA programs exhibited at national teachers association meetings, the topic of SETI is extremely popular. Life in the Universe workshop sessions always draw a large attendance, and teachers literally pounce upon project material available at their conventions: e.g., the National Association of Biology Teachers, the National Science Teachers Association, etc.

TENNESSEE TEACHERS ASSOCIATION: The project was of such interest to the Tennessee Education Association that they asked the Curriculum Project to provide the feature article for their special annual Space Week issue of "Tennessee Teacher", in January 1993.

PLANETARIUM AND SCIENCE MUSEUM directors tell us that the search for life in the universe is one of the most requested topics at a host of high school, college, university and public planetaria and museums across the country. To name only a few known exhibitors: the McDonnell Star Theater at the ST. LOUIS Science Center, the SAN DIEGO Reuben Fleet Space Theater, the Griffith Observatory in LOS ANGELES, the Morrison Planetarium in SAN FRANCISCO, and the most visited museum in the United States: the NATIONAL AIR AND SPACE MUSEUM.

During the past twenty years, PUBLIC EDUCATION has been an on-going part of the NASA endeavor. By its very nature, the possibility of intelligence elsewhere in the universe is an intriguing topic, and countless lectures have been given at a variety of educational institutions, professional and civic associations, and other public and private organizations. Invitations to "tell the story" often almost overwhelm the schedules of the project team members and affiliates. Over the years many interdisciplinary scientists from universities and colleges across the country served as members of working groups and investigators for the NASA SETI project, and through their lectures and symposia they have brought SETI to their classrooms, to their academic community and to people outside the science community. Bottom line: People ARE genuinely interested, they are eager to learn about this exciting topic.

KEY POINTS -- POLL INFORMATION

In attacking SETI, Congressional members have alleged that a SETI search would not be supported by the American taxpayers. In fact repeatedly over the years, polls have indicated strong support for a program to search for life in the universe.

As an example, the PUBLIC OPINION LABORATORY at Northern Illinois University surveyed about 900 highly educated national leaders. When asked whether intelligent life exists elsewhere in the universe, the majority said yes. The breakdown by category was:

90% of the *science policy* leaders said yes,
89% of the *environmental organization* leaders said yes, as did
88% of the *religious* leaders.

For reactions from AVERAGE CITIZENS, the NATIONAL AIR AND SPACE MUSEUM, the most widely visited museum in the world, conducted a daily poll as part of the "Where Next Columbus" exhibit that opened in December 1992. As of mid-May 1993, over 30,000 people participated in the computer survey:

86% feel we should explore space, and among the six choices given as the BEST reason for exploring space, "increasing knowledge and searching for life" drew an overwhelming majority (62%) over all the other choices.

A clear 70% feel that 1% to 5% (and even more) should be spent on space exploration. In actuality, the FY94 budget request for the NASA HRMS program *was less than 1/10th of 1%* of the $15.7 billion NASA budget, and the entire NASA budget is 1% of the total $1.5 trillion Federal budget. During the Apollo era, NASA's budget was 4% of the Federal budget. The decreased support to scientific research is tragic for our nation.

The NATIONAL SPACE SOCIETY'S annual survey asks how people would distribute $100 among various space projects. The "search for life in the universe" continually pulls about 3.5% of the allocation from the four years of the survey. SETI project scientists would have been overwhelmed to have $528 million a year!! The $12.3 million requested for FY94 is modest by comparison.

The fact is that a great MAJORITY OF THE AMERICAN PEOPLE assume that NASA has been conducting a search for life in the universe for a long time. When told that we will spend less than one nickel per person annually to conduct this search, people are astonished to learn how hard we have had to fight to secure funding. Even in tight budget years, thoughtful, informed people are more than willing to pledge their 5 cents each to seek an answer to the question, "Are we alone?"

Appendix 24

A SAMPLING OF CONGRESSIONAL QUOTES IN RECENT YEARS REGARDING SETI

March 12, 1990 – Senator Albert Gore, Jr. [D-TN]
(then Chair, Senate Subcommittee on Science, Technology and Space)

"...I continue to support this [SETI] initiative, and am pleased to understand that the SETI project is now being used as an educational tool..."

September 6, 1990 – Senator Pete Wilson [R-CA]
(then California's junior Senator)

"...I share the enthusiasm of members of the scientific research community for this program [SETI]. The relatively modest investment required, now that NASA has completed its R&D activities regarding SETI, has the potential of stimulating needed academic programs in the hard sciences for millions of students across the United States. Please rest assured, therefore, of my continued support for the maximum possible SETI funding level..."

July 16, 1991 – Senator Lloyd Bentsen [D-TX]
(then Member, Senate Committee on Commerce)

"...I have been a supporter of long standing of SETI...As you may know...Senators Mikulski and Garn, the Chair and ranking minority member, respectively, of the Appropriations subcommittee in charge of NASA funding, are both supporters of SETI..."

April 29, 1992 – *Excerpts of discussions about the NASA Budget for FY93, under HR 2056 (taken from the Congressional Record - House, 4/29/93, pages H2779-81)*

Congressman George Brown [D-CA] *(then ranking chair of the House Science, Space and Technology Authorization Committee):* "...What we have here, of course, is easily parodied and is frequently parodied in the press, on radio and television as looking for ET's out in space, for aliens or something of that sort, and it is ridiculed because of that...But this is valid science. It is at the heart of the interests of those people who think that human beings will someday explore the entire universe, and that in the cosmos, because of its size and complexity, that there must be other forms of intelligent beings which are creating an impact on the universe that can be determined...To me it [SETI] has profoundly significant emotional appeal, and it is also, without question in my mind, something that is subject to scientific analysis using the most refined tools that we can possibly use. It is for this reason that I support this very small expenditure..."

Congressman Robert S. Walker [R-PA] *(ranking minority chair of the House Science, Space and Technology Authorization Committee):* "...What we have here is an amendment that represents spending for a program that is less than one-tenth of 1 percent of NASA's budget. One might ask in a time when we are attempting to work within a freeze budget,

which this really is, why we would preserve this program as a part of our effort to try to be responsible. The reason is because it goes to the core of what NASA is supposed to be all about given the basic charter. NASA has as its job to study the origin, evolution, and distribution of life in the universe. That is really what this program is all about...This is one science program that over and over again has shown itself to capture the imagination of young people...If we cancel this project, we will in fact abandon 15 years of work that has gone into the project..."

Congressman Norman Mineta [D-CA] *(then member, Subcommittee on Space of the House Science, Space and Technology Authorization Committee)*: "...I strongly oppose the amendment to terminate the search for extraterrestrial intelligence project. NASA's SETI microwave observing project has the resounding support of the scientific community, and has received very strong support from the House in past years...The custom processing chip developed for DARPA is capable of performing almost seven times faster than the common communications chip. In addition, the SETI chip enables compact spectrum analyzers to have millions of simultaneous channels...SETI technology could prove beneficial for diagnostic medicine, fault detection in materials, and geochemical exploration...In 1991, the SETI Institute received a 3-year National Science Foundation award for developing integrated teaching materials for elementary and middle school grates. SETI represents a valuable and worthwhile scientific endeavor that has countless spinoff benefits..."

July 2 and 29, 1992 -- Senator Daniel K. Inouye [D-HI]
(then Chair, Subcommittee on Defense of the Senate Appropriations Committee; and Chair, Subcommittee on Communications of the Senate Commerce, Science and Transportation Committee)

"...NASA has a most important mission as the 21st century approaches. It is important that we learn as much as possible about the galaxy in which we live. Mankind's thirst for knowledge must continue as all of us will benefit from learning more about the galaxy in which we may not be the only form of intelligent life..."

"...SETI employs NASA's existing radio astronomy facilities as well as the Deep Space Network antennas to analyze microwave signals in space for evidence of advanced life elsewhere in the galaxy. NASA programs such as SETI will ensure America's continued excellence and success in space research and technology. Please be assured that I will continue supporting SETI..."

July 20, 1992 -- Senator Jake Garn [R-UT] *(then ranking Minority Chair, Subcommittee on VA, HUD and Independent Agencies of the Senate Committee on Appropriations):*

"...I am unalterably opposed to an amendment which would terminate the SETI Microwave Observing Program, which is a highly sophisticated radio astronomy effort designed to detect signals which may have an intelligent source. It is the very type of exemplary science project, on the cutting edge of computer technology, with exciting educational applications, that our Nation must support to retain our leadership in science and technology..."

September 22, 1993 -- *Excerpts of discussions about the NASA Budget for FY94, under HR 2491 (taken from the Congressional Record, 9/22/93, pages S12151-4)*

Senator Barbara Mikulski [D-MD] *(ranking chair of the Subcommittee on VA, HUD and Independent Agencies of the Senate Committee on Appropriations)*: "...When I took a look at this [SETI] issue, I found out what this program is all about and I have been a consistent supporter. This program is not something about pop culture and a search for E.T. It is a radio astronomy project, conducted like many radio astronomy projects, with ground-based astronomy projects in the United States and throughout the world...I urge my colleagues to vote in opposition to the amendment..."

Senator John D. Rockefeller, IV [D-WV] *(ranking chair of the Subcommittee on Science, Technology and Space of the Senate Commerce, Science and Transportation Committee)*: "...I strongly oppose the amendment to terminate the search for radio signals from space that could indicate the existence of intelligent life...Conducting the survey will cost each American about 5 cents during the coming fiscal year. I believe that is a worthwhile investment...The [SETI] HRMS is a valuable project that has already produced many significant benefits, including technological advances for American scientists and educational programs for American children...In sum, HRMS represents a valuable and worthwhile scientific endeavor that has yielded and will continue to yield, many important advances in technology. American taxpayers have a right to expect a return on the 15 years of research and development invested in this program..."

October 19, 1993 -- Congressman Alan B. Mollohan [D-WV]
(Ranking majority member of the House Subcommittee of Veterans Affairs, Housing and Urban Development, and Independent Agencies)

"...I would like to take this opportunity to mention something that concerns me deeply. The Congress is responding to the current fiscal environment with a shifting mood about discretionary spending, but in our frenzy to appear fiscally responsible, we must refrain from superficial tactics to achieve our goals. The High-Resolution Microwave Survey is a NASA program caught in this web. As a result, the program is being terminated in this bill. If this termination had been based on substantive issues, I would be comfortable with our actions. But unfortunately, this is not the case. [SETI] HRMS has been peer reviewed; it has been authorized; it pushes state of the art technology in signal processing techniques and in radio receiver technology; and it has met its budget and its schedule for the five years it has been funded. Yet in an attempt to attract attention as stewards of good government, Members of Congress have attacked the program with shallow references to little green men and ET. In my judgment, the termination of this program is a mistake. The program is being used as a scapegoat, and I want to express my sincere regret to the outstanding scientists who have dedicated their careers to the program..."

Congress of the United States

House of Representatives

Washington, D.C. 20515
June 4, 1992

The Honorable Bob Traxler
Chairman, VA, HUD, and
Independent Agencies Subcommittee
2366 Rayburn Building
Washington, D.C. 20515

Dear Mr. Chairman:

We are writing to express support for NASA's SETI Microwave Observing Project, which we believe to be of valuable scientific, technical, and educational merit.

NASA's SETI Microwave Observing Project has broad, longstanding support within the scientific community. It represents sound and exciting scientific exploration into a question of fundamental and enduring importance to all human kind. It is good science and good radio astronomy, and it represents exactly the kind of low cost, high impact project that many Members of Congress believe NASA should pursue.

The Microwave Observing Project has pioneered many new applications of technology from custom designed VLSI signal processing chips to supercomputer pattern recognition systems at workstation prices. In part or total these advances may find applications in the fields of resource exploration, medical imaging, structural analysis of materials, and geochemical exploration.

Furthermore, SETI has been found to be effective as a means of increasing interest in general science education among youngsters who will become the next generation of engineers and scientists. In 1991, the SETI Institute received a three-year National Science Foundation award for developing integrated teaching materials for elementary and middle school grades.

We urge you to maintain funding for this exciting and worthwhile scientific endeavor.

Sincerely,

LEON PANETTA

DAVE McCURDY

NORMAN Y. MINETA

GEORGE E. BROWN, JR.

Appendix 25

SETI REVIEWS AND ENDORSEMENTS BY THE NATIONAL ACADEMY OF SCIENCES

REPORTS OF THE ASTRONOMY SURVEY COMMITTEE

Every ten years, the National Research Council commissions a group of astronomers and astrophysicists to survey their field and recommend new research initiatives for the coming decade. Below are excerpts from the last three decadal reports:

"Astronomy and Astrophysics for the 1970's" (Report of the Astronomy Survey Committee, Jesse L. Greenstein, Chairman), 1972:

"Our civilization is within reach of one of the greatest steps in its evolution: knowledge of the existence, nature, and activities of independent civilizations in space. At this instant, through this very document, are perhaps passing radio waves bearing the conversations of distant creatures -- conversations that we could record if we but pointed a telescope in the right direction and tuned to the proper frequency.

Indeed there exist the know-how and instruments to search for extraterrestrial civilizations. Each passing year has seen our estimates of the probability of life in space increase, along with our capabilities for detecting it. More and more scientists feel that contact with other civilizations is no longer something beyond our dreams, but a natural event in the history of mankind that will perhaps occur in the lifetime of many of us. The promise is now too great, either to turn away from it or to wait much longer before devoting major resources to a search for other intelligent beings.

In the long run, this may be one of science's most important and most profound contributions to mankind and to our civilization."

"Astronomy and Astrophysics for the 1980's" (Report of the Astronomy Survey Committee, George B. Field, Chairman), 1982:

"While the Committee recognized that this endeavor has a character different from that normally associated with astronomical research, intelligent organisms are as much a part of the universe as stars and galaxies; investigating whether some of the electromagnetic radiation now arriving at Earth was generated by intelligent beings in space may thus be considered a legitimate part of astronomy. Moreover, the techniques that can now be most effectively brought to bear on a SETI program for the 1980s are those of astronomy.

It is hard to imagine a more exciting astronomical discovery or one that would have greater impact on human perceptions than the detection of extraterrestrial intelligence."

"The Decade of Discovery in Astronomy and Astrophysics" (Report of the Astronomy Survey Committee, John H. Bahcall, Chairman), 1991:

"Ours is the first generation that can realistically hope to detect signals from another civilization in the Galaxy. The search for extraterrestrial intelligence (SETI) involves, in part, astronomical techniques and is endorsed by the Committee as a significant scientific enterprise. Indeed, the discovery in the last decade of planetary disks, and the continuing discovery of highly complex organic molecules in the interstellar medium, lend even greater scientific support to this enterprise.

Discovery of intelligent life beyond the Earth would have profound effects for all humanity."

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REPORT OF THE SPACE STUDIES BOARD

The Space Studies Board of the National Research Council has long been interested in the field of exobiology (life off of Earth). Over the years, through its Committee on Planetary Biology and Chemical Evolution, the board has developed strategies for studies in this area. Their recent report includes recommendations regarding SETI.

"The Search for Life's Origins: Progress and Future Directions in Planetary Biology and Chemical Evolution" (Report of the Space Studies Board, Harold P. Klein, Chairman), 1991:

The committee determined that to achieve an understanding of the nature and distribution of life in the universe, four discrete scientific objectives must be carried to completion:

Objective 1: To determine the frequency and morphology of nearby planetary systems.

Objective 2: To determine the frequency of occurrence of conditions suitable to the origin of life.

Objective 3: To search for presumptive evidence of life in other planetary systems.

Objective 4: To search for evidence of extraterrestrial technology:

"Because the instrumentation for detecting evidence of extraterrestrial technology is far more mature than the instrumentation necessary for examining distant planets minutely, another technology (and, by inference, another biology exhibiting intelligence) may be detected before any other evidence is found for extraterrestrial life. The examination of distant planets first requires the identification of such planets, but searches for other technologies can be made in the direction of plausible targets without *a priori* knowledge of the existence of a suitable planetary abode."