

104<sup>TH</sup> CONGRESS  
1<sup>ST</sup> SESSION

# S. 1048

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## AN ACT

To authorize appropriations for fiscal year 1996 to the National Aeronautics and Space Administration for human space flight; science, aeronautics, and technology; mission support; and Inspector General; and for other purposes.

1        *Be it enacted by the Senate and House of Representa-*  
2        *tives of the United States of America in Congress assembled,*

3        **SECTION 1. SHORT TITLE.**

4        This Act may be cited as the “National Aeronautics  
5        and Space Administration Authorization Act, Fiscal Year  
6        1996”.

1 **SEC. 2. DEFINITIONS.**

2 For the purposes of this Act—

3 (1) the term “Administrator” means the Ad-  
4 ministrator of the National Aeronautics and Space  
5 Administration;

6 (2) the term “NASA” means the National Aer-  
7 onautics and Space Administration; and

8 (3) the term “institution of higher education”  
9 has the meaning given such term in section 1201(a)  
10 of the Higher Education Act of 1965 (20 U.S.C.  
11 1141(a)).

12 **TITLE I—AUTHORIZATION OF APPROPRIATIONS**

13 **SEC. 101. HUMAN SPACE FLIGHT.**

14 There are authorized to be appropriated to the Na-  
15 tional Aeronautics and Space Administration for Human  
16 Space Flight the following amounts, to become available  
17 October 1, 1995:

18 (1) Space Station, \$1,818,800,000.

19 (2) Russian Cooperation, \$129,200,000.

20 (3) Space Shuttle, \$3,031,800,000.

21 (4) Payload and Utilization Operations,  
22 \$293,000,000.

23 **SEC. 102. SCIENCE, AERONAUTICS, AND TECHNOLOGY.**

24 There are authorized to be appropriated to the Na-  
25 tional Aeronautics and Space Administration for Science,

1 Aeronautics, and Technology the following amounts, to be-  
2 come available October 1, 1995:

3 (1) Space Science, \$1,958,900,000, of which  
4 \$48,700,000 shall be allocated to the Stratospheric  
5 Observatory for Infrared Astronomy, \$15,000,000  
6 shall be allocated to the Space Infrared Telescope  
7 Facility, and \$30,000,000 shall be allocated to the  
8 New Millennium initiative.

9 (2) Life and Microgravity Sciences and Applica-  
10 tions, \$507,000,000, of which \$3,000,000 shall be  
11 allocated for the construction of an addition to the  
12 Microgravity Development Laboratory, Marshall  
13 Space Flight Center.

14 (3) Mission to Planet Earth, \$1,360,100,000,  
15 of which \$17,000,000 shall be allocated to the con-  
16 struction of the Earth Systems Science Building,  
17 Goddard Space Flight Center, and of which  
18 \$2,000,000 shall be allocated in fiscal year 1996,  
19 and such sums as are necessary thereafter, for the  
20 operation of the Upper Midwest Aerospace Consor-  
21 tium (UMAC) of institutions in the Upper Great  
22 Plains Region for the purpose of making information  
23 derived from Mission to Planet Earth data available  
24 to the general public.

1           (4) Aeronautical Research and Technology,  
2           \$891,300,000, of which \$5,400,000 shall be allo-  
3           cated to the modernization of the Unitary Plan  
4           Wind Tunnel Complex, Ames Research Center.

5           (5) Space Access and Technology,  
6           \$766,600,000, of which at least \$70,000,000 shall  
7           be allocated to support a shuttle flight for the Shut-  
8           tle Imaging Radar-C, of which \$5,000,000 shall be  
9           used to establish a Rural Technology Transfer and  
10          Commercialization Center for the Rocky Mountains  
11          and Upper Plains States region, and of which  
12          \$159,000,000 shall be allocated to the Reusable  
13          Launch Vehicle program.

14          (6) Mission Communications Services,  
15          \$461,300,000.

16          (7) Academic Programs, \$104,700,000, of  
17          which \$3,000,000 shall be allocated to support the  
18          establishment of an Upper Plains States regional  
19          science education and outreach center and of which  
20          \$1,000,000 shall be allocated to establish a Rural  
21          Teacher Resource Center.

22 **SEC. 103. MISSION SUPPORT.**

23          There are authorized to be appropriated to the Na-  
24          tional Aeronautics and Space Administration for Mission

1 Support the following amounts, to become available Octo-  
2 ber 1, 1995:

3 (1) Safety, Reliability, and Quality Assurance,  
4 \$37,600,000.

5 (2) Space Communications Services,  
6 \$219,400,000.

7 (3) Research and Program Management, in-  
8 cluding personnel and related costs, travel, and re-  
9 search operations support, \$2,047,800,000.

10 (4) Construction of Facilities, including land  
11 acquisition, \$135,000,000, including the following:

12 (A) Restoration of Flight Systems Re-  
13 search Laboratory, Ames Research Center;

14 (B) Restoration of chilled water distribu-  
15 tion system, Goddard Space Flight Center;

16 (C) Replace chillers, various buildings, Jet  
17 Propulsion Laboratory;

18 (D) Rehabilitation of electrical distribution  
19 system, White Sands Test Facility, Johnson  
20 Space Center;

21 (E) Replace main substation switchgear  
22 and circuit breakers, Johnson Space Center;

23 (F) Replace 15kv load break switches,  
24 Kennedy Space Center;

1 (G) Rehabilitation of Central Air Equip-  
2 ment Building, Lewis Research Center;

3 (H) Restoration of high pressure air com-  
4 pressor system, Marshall Space Flight Center;

5 (I) Restoration of Information and Elec-  
6 tronic Systems Laboratory, Marshall Space  
7 Flight Center;

8 (J) Restoration of canal lock, Stennis  
9 Space Center;

10 (K) Restoration of primary electrical dis-  
11 tribution system, Wallops Flight Facility;

12 (L) Repair of facilities at various locations,  
13 not in excess of \$1,500,000 per project;

14 (M) Rehabilitation and modification of fa-  
15 cilities at various locations, not in excess of  
16 \$1,500,000 per project;

17 (N) Minor construction of new facilities  
18 and additions to existing facilities at various lo-  
19 cations, not in excess of \$1,500,000 per project;

20 (O) Facility planning and design, not oth-  
21 erwise provided for; and

22 (P) Environmental compliance and restora-  
23 tion.

1 **SEC. 104. INSPECTOR GENERAL.**

2 There are authorized to be appropriated to the Na-  
3 tional Aeronautics and Space Administration for Inspector  
4 General \$17,300,000, to become available October 1,  
5 1995.

6 **SEC. 105. OFFICE OF COMMERCIAL SPACE TRANSPOR-**  
7 **TATION.**

8 There are authorized to be appropriated to the Office  
9 of Commercial Space Transportation of the Department  
10 of Transportation \$7,000,000, to become available Octo-  
11 ber 1, 1995.

12 TITLE II—LIMITATIONS AND GENERAL  
13 PROVISIONS

14 **SEC. 201. SPACE STATION LIMITATION.**

15 The aggregate amount authorized to be appropriated  
16 for Space Station and related activities under sections  
17 101, 102, and 103 shall not exceed \$2,100,000,000.

18 **SEC. 202. EXPERIMENTAL PROGRAM TO STIMULATE COM-**  
19 **PETITIVE RESEARCH.**

20 Of the amounts appropriated under sections 101 and  
21 102, \$6,900,000 are authorized for the Experimental Pro-  
22 gram to Stimulate Competitive Research in accordance  
23 with title III of the National Aeronautics and Space Ad-  
24 ministration Act, Fiscal Year 1993 (Public Law 102-588;  
25 106 Stat. 5119).

1 **SEC. 203. SPECIAL TECHNOLOGY ENHANCEMENT GRANTS.**

2 (a) IN GENERAL.—

3 (1) GRANTS.—The Administrator shall make up  
4 to 4 special technology enhancement grants to areas  
5 or States that have not participated fully in the Ad-  
6 ministration's aeronautical and space programs in  
7 order to enable such areas or States to increase their  
8 capabilities in technology development, utilization,  
9 and transfer in aeronautics, space science, and relat-  
10 ed areas. At least one such grant shall be made  
11 available to a consortium of States, each one of  
12 which has an average population density of less than  
13 12.3 persons per square mile, based on data for  
14 1993 from the Bureau of the Census.

15 (2) ACTIVITIES.—Grants made under this sec-  
16 tion shall be available for—

17 (A) assessment of resources and needs;

18 (B) development of infrastructure, includ-  
19 ing incubators and prototype demonstration fa-  
20 cilities;

21 (C) collaborations with industry;

22 (D) expansion of capabilities in procure-  
23 ment;

24 (E) development of technology transfer  
25 and commercialization support capabilities;

1 (F) activities to increase participation in  
2 the Small Business Innovation Research pro-  
3 gram and other NASA research, development,  
4 and technology utilization and transfer pro-  
5 grams;

6 (G) relevant research of interest to NASA;  
7 and

8 (H) such other activities as the Adminis-  
9 trator shall deem appropriate.

10 (3) SPECIAL CONSIDERATION.—In making  
11 grants under this section, the Administrator shall  
12 give special consideration to proposals that—

13 (A) will build upon and expand a develop-  
14 ing research and technology base, and

15 (B) will insure a lasting research and de-  
16 velopment and technology development and  
17 transfer capability.

18 (b) ELIGIBLE ENTITIES.—Grants under subsection  
19 (a)(1) may be made to—

20 (1) State and local governments;

21 (2) institutions of higher education; and

22 (3) organizations with expertise in research and  
23 development, technology development, and tech-  
24 nology transfer in areas of interest to NASA.

1 (c) FUNDING OF PROGRAM.—Of the amounts author-  
2 ized in section 102 for the Space Access and Technology  
3 account, \$15,000,000 are authorized to be used for grants  
4 under subsection (a).

5 **SEC. 204. CLEAR LAKE DEVELOPMENT FACILITY.**

6 The Administrator is authorized to acquire, for no  
7 more than \$35,000,000, a certain parcel of land, together  
8 with existing facilities, located on the site of the property  
9 referred to as the Clear Lake Development Facility, Clear  
10 Lake, Texas, comprising approximately 13 acres and in-  
11 cluding a light manufacturing facility, an avionics develop-  
12 ment facility, and an assembly and test building which  
13 shall be modified for use as a neutral buoyancy laboratory  
14 in support of human space flight activities.

15 **SEC. 205. YELLOW CREEK FACILITY.**

16 Notwithstanding any other provision of law or regula-  
17 tion, the National Aeronautics and Space Administration  
18 (NASA) is authorized to convey, without reimbursement,  
19 to the State of Mississippi, all rights, title, and interest  
20 of the United States of the United States in the property  
21 known as the Yellow Creek Facility and consisting of ap-  
22 proximately 1,200 acres near the city of Iuka, Mississippi,  
23 including all improvements thereon and any personal prop-  
24 erty owned by NASA that is currently located on-site and  
25 which the State of Mississippi requires to facilitate the

1 transfer: *Provided*, That appropriated funds shall be used  
2 to effect this conveyance: *Provided further*, That  
3 \$10,000,000 in appropriated funds otherwise available to  
4 NASA shall be transferred to the State of Mississippi to  
5 be used in the transition of the facility: *Provided further*,  
6 That each Federal agency with prior contact to the site  
7 shall remain responsible for any and all environmental re-  
8 mediation made necessary as a result of its activities on  
9 the site: *Provided further*, That in consideration of this  
10 conveyance, NASA may require such other terms and con-  
11 ditions as the Administrator deems appropriate to protect  
12 the interests of the United States: *Provided further*, That  
13 the conveyance of the site and the transfer of the funds  
14 to the State of Mississippi shall occur not later than 30  
15 days after the date of enactment of this Act.

16 **SEC. 206. RADAR REMOTE SENSING SATELLITES.**

17 (a) FINDINGS.—The Congress finds that—

18 (1) radar satellites represent one of the most  
19 important developments in remote sensing satellite  
20 technology in recent years;

21 (2) the ability of radar satellites to provide  
22 high-quality Earth imagery regardless of cloud cover  
23 and to provide three-dimensional pictures of the  
24 Earth's surface when the satellites are flown in com-

1        bination dramatically enhance conventional optical  
2        remote sensing satellite capabilities and usefulness;

3            (3) the National Aeronautics and Space Admin-  
4        istration has developed a unique background and ex-  
5        pertise in developing and operating radar satellites  
6        as a result of their activities connected with its  
7        radar satellites, Shuttle Imaging Radar (SIR)-A,  
8        SIR-B, and SIR-C, which has flown twice on the  
9        Space Shuttle;

10           (4) other nations currently have operational  
11        radar satellite systems, including Japan and West-  
12        ern Europe, with other spacefaring nations expected  
13        to develop such systems in the near future; and

14           (5) the development of an operational radar  
15        satellite program at NASA featuring free-flying sat-  
16        ellites and a related ground system is critical to  
17        maintain United States leadership in remote sensing  
18        satellite technology and is important to our national  
19        security and international competitiveness.

20        (b) POLICY.—It is the policy of the United States  
21        that—

22            (1) NASA should develop and operate a radar  
23        satellite program as soon as practicable;

24            (2) NASA should build on the experience and  
25        knowledge gained from its previous radar endeavors;

1           (3) NASA should work with other Federal  
2 agencies and, as appropriate, with other spacefaring  
3 nations, in its radar satellite activities; and

4           (4) NASA should make maximum use of exist-  
5 ing National remote sensing assets such as the  
6 Landsat system, activities connected with the Mis-  
7 sion to Planet Earth, and the data management fa-  
8 cilities of the Department of the Interior in all of its  
9 radar satellite activities.

10       (c) PROGRAM REQUIREMENTS.—NASA shall initiate  
11 a program to develop and operate a radar satellite pro-  
12 gram. The program shall employ the most advanced radar  
13 satellite technology currently available. To the maximum  
14 extent possible, all of the data processing, dissemination,  
15 and archiving functions shall be performed by the Depart-  
16 ment of the Interior. The program should be planned in  
17 such a way that the data from the radar satellite system  
18 are converted into a broad range of informational products  
19 with research, commercial, and government applications  
20 and any other applications that are in the public interest  
21 and that such products are distributed over the widest  
22 user community that is practicable, including industry,  
23 academia, research institutions, local and State govern-  
24 ments, and other Federal agencies. The program should  
25 coordinate with, and make appropriate use of, other re-

1 mote sensing satellite programs, such as the Landsat pro-  
2 gram.

3 (d) PLAN.—Within 90 days after the enactment of  
4 this Act, the Administrator shall submit a detailed plan  
5 for implementation of the radar satellite program to the  
6 Committee on Commerce, Science, and Transportation of  
7 the Senate and the Committee on Science of the House  
8 of Representatives. The plan should include—

9 (1) the goals and mission of the program;

10 (2) planned activities for the next 5 years to  
11 achieve such goals and mission;

12 (3) strategies for maximizing the usefulness of  
13 the satellite data to the scientific and academic com-  
14 munities, the private sector, all levels of government,  
15 and the general public;

16 (4) concepts for integrating the program with  
17 other related NASA activities (such as Mission to  
18 Planet Earth), the Landsat program, and other cur-  
19 rent and emerging remote sensing satellite programs  
20 and activities in the Federal government and all  
21 other public and private sectors so that the program  
22 complements and strengthens such programs and ac-  
23 tivities and is not duplicative of these efforts;

24 (5) concepts developed in consultation with De-  
25 partment of the Interior, for processing, archiving,

1 and disseminating the satellite data using, to the  
2 maximum extent possible, existing Federal govern-  
3 ment programs and assets at the Department of the  
4 Interior and other Federal agencies;

5 (6) targets and timetables for undertaking spe-  
6 cific activities and actions within the program;

7 (7) a 5-year budget profile for the program;  
8 and

9 (8) a comparison between the program and the  
10 radar satellite programs of other spacefaring na-  
11 tions, addressing their respective costs, capabilities,  
12 and other relevant features.

13 (e) AUTHORIZATION.—Of the funds authorized in  
14 section 102 for the Earth Probes account, the Adminis-  
15 trator shall allocate at least \$15,000,000 to the radar sat-  
16 ellite program to conduct Phase A and Phase B studies.

17 **SEC. 207. STUDY OF THE HYDROLOGY OF THE UPPER MIS-**  
18 **SOURI RIVER BASIN.**

19 The Administrator is authorized to initiate a project  
20 to conduct research on the hydrology of the Upper Mis-  
21 souri River Basin. The project shall be part of the Mission  
22 to Planet Earth program and shall employ satellite obser-  
23 vations, surface-based radar data, and ground-based  
24 hydrological and other scientific measurements to develop  
25 quantitative models that address complex atmospheric and

1 surface hydrological processes. If initiated, the project  
2 shall be incorporated into NASA's activities connected  
3 with the multiagency Global Energy and Water Cycle Ex-  
4 periment to understand the interactions between the at-  
5 mosphere and land surfaces. In implementing the project,  
6 NASA shall coordinate and consult with other appropriate  
7 federal agencies, including the Department of Commerce,  
8 the Department of the Interior, and the National Science  
9 Foundation. To the maximum extent possible, NASA shall  
10 employ the assistance of universities, local and State gov-  
11 ernments, industry, and any other appropriate entities  
12 from the Upper Missouri River Basin region to carry out  
13 this program and the Administrator is authorized to sup-  
14 port the project-related work of such entities with grants,  
15 technical advice, equipment, in-kind help, and any other  
16 type of appropriate assistance. If this project is initiated,  
17 then within 90 days after the enactment of this Act, the  
18 Administrator shall submit a plan for the implementation  
19 of this project, which shall set forth the goals, project  
20 costs, planned activities, and overall strategies for the  
21 project, to the Committee on Commerce, Science, and  
22 Transportation of the Senate and the Committee on  
23 Science of the House of Representatives. Of the funds au-  
24 thorized in section 102 for Mission to Planet Earth, at

1 least \$10,000,000 shall be allocated by the Administrator  
2 to the Upper Missouri River Basin project.

3 **SEC. 208. SHUTTLE PRIVATIZATION.**

4 (a) The Administrator is hereby directed to conduct  
5 a study of the feasibility of implementing the recommenda-  
6 tion of the Independent Shuttle Management Review  
7 Team that NASA transition towards the privatization of  
8 the Shuttle. The study shall identify, discuss, and, where  
9 possible, present options for resolving, the major policy  
10 and legal issues that must be addressed before the Shuttle  
11 is privatized, including, but not limited to, the following  
12 issues—

13 (1) whether the government or the Shuttle con-  
14 tractor should own the Shuttle orbiters and Shuttle  
15 ground facilities;

16 (2) whether the federal government should in-  
17 demnify the contractor for any third party liability  
18 arising from Shuttle operations, and, if so, under  
19 what terms and conditions;

20 (3) whether commercial payloads should be al-  
21 lowed to be launched on the Shuttle and whether  
22 any classes of payloads should be made ineligible for  
23 launch consideration;

24 (4) whether NASA and federal government pay-  
25 loads should have priority over non-federal govern-

1       ment payloads in the Shuttle launch assignments  
2       and what policies should be developed to prioritize  
3       among payloads generally;

4           (5) whether the public interest requires that  
5       certain Shuttle functions continue to be performed  
6       by the federal government; and

7           (6) whether privatization of the Shuttle would  
8       produce any significant cost savings and, if so, how  
9       much cost savings.

10       (b) Within 60 days of the enactment of this Act,  
11       NASA shall complete the study and shall submit a report  
12       on that study to the Committee on Commerce, Science,  
13       and Transportation of the Senate and the Committee on  
14       Science of the House of Representatives.

15       (c) As a transitional step towards Shuttle privatiza-  
16       tion, NASA shall take all necessary and appropriate ac-  
17       tions to consolidate Shuttle contractor activities under one  
18       prime contractor and, within 180 days of the enactment  
19       of this Act, report to the Committee on Commerce,  
20       Science, and Transportation of the Senate and the Com-  
21       mittee on Science of the House of Representatives on  
22       those actions. If NASA has failed to complete such con-  
23       solidation by the expiration of the 180-day period, the re-  
24       port shall explain the reasons for that failure and describe

1 the steps being taken by NASA to finalize the consolida-  
2 tion as expeditiously as possible.

3 **SEC. 209. USE OF FUNDS FOR CONSTRUCTION.**

4 (a) AUTHORIZED USES.—The Administrator may use  
5 funds appropriate for purposes other than those appro-  
6 priated for—

7 (1) construction of facilities;

8 (2) research and program management, exclud-  
9 ing research operations support; and

10 (3) Inspector General,

11 for the construction of new facilities and additions to, re-  
12 pair of, rehabilitation of, or modification of, existing facili-  
13 ties at any location in support of the purposes for which  
14 such funds are appropriated.

15 (b) LIMITATION.—None of the funds used pursuant  
16 to subsection (a) may be expended for a project, the esti-  
17 mated cost of which to the National Aeronautics and  
18 Space Administration, including collateral equipment, ex-  
19 ceeds \$750,000, until 30 days have passed after the Ad-  
20 ministrator has notified the Committee on Science of the  
21 House of Representatives and the Committee on Com-  
22 merce, Science, and Transportation of the Senate of the  
23 nature, location, and estimated cost to the National Aero-  
24 nautics and Space Administration of such project.

1 **SEC. 210. CONSTRUCTION OF FACILITIES.**

2 (a) REPROGRAMMING FOR CONSTRUCTION OF FA-  
3 CILITIES.—If the Administrator determines that—

4 (1) new developments in the national program  
5 of aeronautical and space activities have occurred;

6 (2) such developments require the use of addi-  
7 tional funds for the purpose of construction, expan-  
8 sion, or modification of facilities at any location; and

9 (3) deferral of such action until the enactment  
10 of the next National Aeronautics and Space Admin-  
11 istration authorization Act would be inconsistent  
12 with the interest of the Nation in aeronautical and  
13 space sciences;

14 the Administrator may use the amounts authorized for  
15 construction of facilities pursuant to this Act or previous  
16 National Aeronautics and Space Administration author-  
17 ization Acts for such purposes. The amounts may be used  
18 to acquire, construct, convert, rehabilitate, or install tem-  
19 porary or permanent public works, including land acquisi-  
20 tion, site preparation, appurtenances, utilities, and equip-  
21 ment. The Administrator may use such amounts for facil-  
22 ity consolidations, closures, and demolition required to  
23 downsize the NASA physical plant to improve operations  
24 and reduce costs.

25 (c) LIMITATIONS.—

1           (1) Amounts appropriated for a construction-of-  
2 facilities project—

3           (A) may be varied upward by 10 percent at  
4 the discretion of the Administrator; or

5           (B) may be varied upward by 25 percent  
6 to meet unusual cost variations after the expi-  
7 ration of 30 days following a report on the cir-  
8 cumstances of such action by the Administrator  
9 to the Committee on Commerce, Science, and  
10 Transportation of the Senate and the Commit-  
11 tee on Science of the House of Representatives.  
12 The aggregate amount authorized to be appro-  
13 priated for construction of facilities shall not be  
14 increased as a result of actions authorized  
15 under this section.

16           (2) No amounts may be obligated for a con-  
17 struction-of-facilities project until a period of 30  
18 days has passed after the Administrator or the Ad-  
19 ministrator's designee has transmitted to the Com-  
20 mittee on Science of the House of Representatives,  
21 and to the Committee on Commerce, Science, and  
22 Transportation of the Senate, a written report de-  
23 scribing the nature of the acquisition, construction,  
24 conversion, rehabilitation, or installation, its cost,  
25 and the reasons therefor.

1 (d) TITLE TO FACILITIES.—If funds are used pursu-  
2 ant to subsection (a) for grants to institutions of higher  
3 education, or to nonprofit organizations whose primary  
4 purpose is the conduct of scientific research, for purchase  
5 or construction of additional research facilities, title to  
6 such facilities shall be vested in the United States unless  
7 the Administrator determines that the national program  
8 of aeronautical and space activities will best be served by  
9 vesting title in the grantee institution or organization.  
10 Each such grant shall be made under such conditions as  
11 the Administrator shall determine to be required to ensure  
12 that the United States will receive therefrom benefits ade-  
13 quate to justify the making of that grant.

14 **SEC. 211. AVAILABILITY OF APPROPRIATED AMOUNTS.**

15 To the extent provided in appropriations Acts, appro-  
16 priations authorized under this Act may remain available  
17 without fiscal year limitation.

18 **SEC. 212. CONSIDERATION BY COMMITTEES.**

19 Notwithstanding any other provision of this Act—

20 (1) no amount appropriated pursuant to this  
21 Act may be used for any program deleted by the  
22 Congress from requests as originally made to either  
23 the Committee on Science of the House of Rep-  
24 resentatives or the Committee on Commerce,  
25 Science, and Transportation of the Senate; and

1           (2) no amount appropriated pursuant to the  
2 Act may be used for any program in excess of the  
3 amount actually authorized for that particular pro-  
4 gram, excluding construction-of-facility projects,  
5 unless a period of 30 days has passed after the receipt  
6 by such Committee of notice given by the Administrator  
7 or the Administrator's designee containing a full and com-  
8 plete statement of the action proposed to be taken and  
9 the facts and circumstances relied upon in support of the  
10 proposed action. NASA shall keep those Committees fully  
11 and currently informed with respect to all activities and  
12 responsibilities within their jurisdiction. Except as other-  
13 wise provided by law, any Federal department, agency, or  
14 independent establishment shall furnish any information  
15 requested by either such Committee relating to any activ-  
16 ity or responsibility.

17 **SEC. 213. USE OF FUNDS FOR SCIENTIFIC CONSULTATIONS**  
18 **OR EXTRAORDINARY EXPENSES.**

19 Funds appropriated under section 103 may be used  
20 for scientific consultations or extraordinary expenses upon  
21 the authority of the Administrator, but not to exceed  
22 \$35,000.

1 **SEC. 214. REPORTING REQUIREMENTS.**

2 (a) REPORTING PERIOD.—Section 206(a) of the Na-  
3 tional Aeronautics and Space Act of 1958 (42 U.S.C.  
4 2476(a)) is amended—

5 (1) by striking “January” and inserting “May”;  
6 and

7 (2) by striking “calendar” and inserting “fis-  
8 cal”.

9 (b) PROTECTION OF COMMERCIALY VALUABLE IN-  
10 FORMATION.—Section 303 of the National Aeronautics  
11 and Space Act of 1958 (42 U.S.C. 2454) is amended by  
12 adding at the end the following:

13 “(c)(1) The Administrator may delay, for a period  
14 not to exceed 5 years, the unrestricted public disclosure  
15 of technical data, related to a competitively sensitive tech-  
16 nology, in the possession of, or under the control of, the  
17 Administration that has been generated in the perform-  
18 ance of experimental, developmental, or research activities  
19 or programs conducted by, or funded in whole or in part  
20 by, the Administration, if the technical data has signifi-  
21 cant value in maintaining leadership or competitiveness,  
22 in civil and governmental aeronautical and space activities  
23 by the United States industrial base.

24 “(2) The Administrator shall publish biannually in  
25 the Federal Register a list of all competitively sensitive  
26 technology areas which it believes have a significant value

1 in maintaining the United States leadership or competi-  
2 tiveness in civil and governmental aeronautical and space  
3 activities. The list shall be generated after consultation  
4 with appropriate Government agencies and a diverse cross  
5 section of companies—

6           “(A) that conduct a significant level of re-  
7 search, development, engineering, and manufactur-  
8 ing in the United States; and

9           “(B) the majority ownership or control of which  
10 is held by United States citizens.

11           “(3) The Administrator shall provide an opportunity  
12 for written objections to the list within a 60-day period  
13 after it is published. After the expiration of that 60-day  
14 period, and after consideration of all written objections re-  
15 ceived by the Administrator during that period, NASA  
16 shall issue a final list of competitively sensitive technology  
17 areas.

18           “(4) For purposes of this subsection, the term ‘tech-  
19 nical data’ means any recorded information, including  
20 computer software, that is or may be directly applicable  
21 to the design, engineering, development, production, man-  
22 ufacture, or operation of products or processes that may  
23 have significant value in maintaining leadership or com-  
24 petitiveness in civil and governmental aeronautical and  
25 space activities by the United States industrial base.”.

1 **SEC. 215. INDEPENDENT RESEARCH AND DEVELOPMENT.**

2 The Congress finds that it is appropriate for costs  
3 contributed by a contractor under a cooperative agreement  
4 with the National Aeronautics and Space Administration  
5 to be considered as allowable independent research and de-  
6 velopment costs, for purposes of section 31.205-18 of the  
7 Federal Acquisition Regulations if the work performed  
8 would have been allowable as contractor independent re-  
9 search and development costs had there been no coopera-  
10 tive agreement. The Administration shall seek a revision  
11 to that section of the Federal Acquisition Regulations to  
12 reflect the intent of the Congress expressed in the preced-  
13 ing sentence.

14 **SEC. 216. RESTRUCTURING OF THE EARTH OBSERVING SYS-**  
15 **TEM DATA AND INFORMATION SYSTEM.**

16 The Administrator is prohibited from restructuring  
17 or downscaling the baseline plan for the Earth Observing  
18 System Data and Information System in place at the time  
19 of the President's budget submission for NASA for fiscal  
20 year 1996 unless, 60 days before undertaking such action,  
21 the Administrator has submitted to the Committee on  
22 Commerce, Science, and Transportation of the Senate and  
23 the Committee on Science of the House of Representatives  
24 a written report containing—

25 (1) a detailed description of the planned agency  
26 action;

1           (2) the reasons and justifications for such ac-  
2           tion;

3           (3) an analysis of the cost impact of such ac-  
4           tion;

5           (4) an analysis of the impact of the action on  
6           the scientific benefits of the program and the effect  
7           of the action on the expected applications of the sat-  
8           ellite data from the System in such areas as global  
9           climate research, land-use planning, state and local  
10          government management, mineral exploration, agri-  
11          culture, forestry, national security, and any other  
12          areas that the Administrator deems appropriate;

13          (5) an analysis of the impact of the action on  
14          the United States Global Climate Change Research  
15          program and international global climate change re-  
16          search activities; and

17          (6) an explanation of what measures, if any,  
18          are planned by NASA to compensate for any likely  
19          reductions in the scientific value and data collection,  
20          processing, and distribution capabilities of the Sys-  
21          tem as a result of the action.

1 TITLE III—COMMERCIAL SPACE LAUNCH ACT  
2 AMENDMENTS

3 **SEC. 301. AMENDMENT OF TITLE 49.**

4 Except as otherwise expressly provided, whenever in  
5 this title an amendment or repeal is expressed in terms  
6 of an amendment to, or repeal of, a section or other provi-  
7 sion, the reference shall be considered to be made to a  
8 section or other provision of title 49, United States Code.

9 **SEC. 302. AMENDMENT OF SECTION 70101.**

10 Section 70101 (relating to findings and purposes) is  
11 amended—

12 (1) by inserting “microgravity research,” after  
13 “information services,” in subsection (a)(3);

14 (2) by inserting “commercial space transpor-  
15 tation services, including in-space transportation ac-  
16 tivities and” after “providing” in subsection (a)(4);

17 (3) by striking “commercial launch vehicles” in  
18 subsection (a)(5) and inserting “commercial space  
19 transportation including commercial launch vehicles,  
20 in-space transportation activities, reentry vehicles,”;

21 (4) by striking “launch” in subsection (a)(6)  
22 and inserting “launch, in-space transportation, and  
23 reentry”;

1           (5) by striking “launches” each place it appears  
2 in subsection (a)(7) and inserting “launches, in-  
3 space transportation activities, reentries” after ;

4           (6) by striking “sites and complementary facili-  
5 ties, the providing of launch” in subsection (a)(8)  
6 and inserting “sites, in-space transportation control  
7 sites, reentry sites, and complementary facilities, the  
8 providing of launch, in-space transportation, and re-  
9 entry”;

10          (7) by inserting “in-space transportation con-  
11 trol sites, reentry sites,” after “launch sites,” in  
12 subsection (a)(9);

13          (8) by striking “launch vehicles” in subsection  
14 (b)(2) and inserting “commercial space transpor-  
15 tation services, including launch vehicles, in-space  
16 transportation activities, reentry vehicles,”;

17          (9) by striking “launch” the first place it ap-  
18 pears in subsection (b)(3) and inserting “launch, in-  
19 space transportation vehicle, and reentry”;

20          (10) by striking “commercial launch” the sec-  
21 ond place it appears in subsection (b)(3); and

22          (11) by inserting “in-space transportation vehi-  
23 cle control facilities, and development of reentry  
24 sites” after “facilities,” in subsection (b)(4).

1 **SEC. 303. AMENDMENT OF SECTION 70102.**

2 Section 70102 (relating to definitions) is amended—

3 (1) by inserting “from Earth, including a re-  
4 entry vehicle and its payload, if any” after “and any  
5 payload” in paragraph (3);

6 (2) by striking “object” the first place it ap-  
7 pears in paragraph (8) and inserting “object, includ-  
8 ing a reentry vehicle and its payload, if any,”;

9 (3) by redesignating paragraphs (9) through  
10 (12) as paragraphs (16) through (19), respectively;

11 (4) by inserting after paragraph (8) the follow-  
12 ing:

13 “(9) ‘in-space transportation vehicle’ means any  
14 vehicle designed to operate in space and designed to  
15 transport any payload or object substantially intact  
16 from one orbit to another orbit.

17 “(10) ‘in-space transportation services’  
18 means—

19 “(A) those activities involved in the direct  
20 transportation or attempted transportation of a  
21 payload or object from one orbit to another;

22 “(B) the procedures, actions, and activities  
23 necessary for conduct of those transportation  
24 services; and

25 “(C) the conduct of transportation serv-  
26 ices.

1           “(11) ‘in-space transportation control site’  
2 means a location from which an in-space transpor-  
3 tation vehicle is controlled or operated (as such  
4 terms may be defined in any license the Secretary is-  
5 sues or transfers under this chapter).

6           “(12) ‘reenter’ and ‘reentry’ mean to return  
7 purposefully, or attempt to return, a reentry vehicle  
8 and payload, if any, from Earth orbit or outer space  
9 to Earth.

10           “(13) ‘reentry services’ means—

11                   “(A) activities involved in the preparation  
12 of a reentry vehicle and its payload, if any, for  
13 reentry; and

14                   “(B) the conduct of a reentry.

15           “(14) ‘reentry site’ means the location on Earth  
16 to which a reentry vehicle is intended to return (as  
17 defined in a license the Secretary issues or transfers  
18 under this chapter).

19           “(15) ‘reentry vehicle’ means any vehicle de-  
20 signed to return substantially intact from Earth  
21 orbit or outer space to Earth.”;

22           (5) by striking “launch” each place it appears  
23 in paragraph (18), as redesignated and inserting  
24 “launch services, in-space transportation activities,  
25 or reentry”.

1 **SEC. 304. AMENDMENT OF SECTION 70103.**

2 Section 70103(b) (relating to facilitating commercial  
3 launches) is amended—

4 (1) by striking “LAUNCHES” in the caption and  
5 inserting “SPACE ACTIVITIES”;

6 (2) by striking “commercial space launches” in  
7 paragraph (1) and inserting “commercial space  
8 transportation services”; and

9 (3) by striking “a space launch” in subsection  
10 (b)(2) and inserting “space transportation”.

11 **SEC. 305. AMENDMENT OF SECTION 70104.**

12 Section 70104 (relating to restrictions on launches  
13 and operations) is amended—

14 (1) by striking the section caption and inserting  
15 the following:

16 **“Restrictions on launches, in-space transportation  
17 activities, operations, and reentries”;**

18 (2) by striking “site” each place it appears in  
19 subsection (a) and inserting “site, an in-space trans-  
20 portation operations site, reentry site, or reenter a  
21 reentry vehicle,”;

22 (3) by striking “launch or operation” in sub-  
23 sections (a) (3) and (4) and inserting “launch, in-  
24 space transportation activity, or reentry operation”;

25 (4) by striking subsection (b) and inserting the  
26 following:

1       “(b) COMPLIANCE WITH PAYLOAD REQUIRE-  
 2 MENTS.—The holder of a license under this chapter may  
 3 launch a payload, operate an in-space transportation vehi-  
 4 cle, or reenter a payload only if the payload or vehicle com-  
 5 plies with all requirements of the laws of the United States  
 6 related to launching a payload, operating an in-space  
 7 transportation vehicle, or reentering a payload.”;

8           (5) by striking the caption of subsection (c) and  
 9 inserting the following: “(c) PREVENTING  
 10 LAUNCHES, IN-SPACE TRANSPORTATION ACTIVITIES,  
 11 OR REENTRIES.—”; and

12           (6) by striking “launch” each place it appears  
 13 in subsection (c) and inserting “launch, in-space  
 14 transportation activity, or reentry”.

15 **SEC. 306. AMENDMENT OF SECTION 70105.**

16       Section 70105 (relating to license applications and  
 17 requirements) is amended—

18           (1) by striking “site” in subsection (b)(1) and  
 19 inserting “site, an in-space transportation control  
 20 site, or a reentry site or the reentry of a reentry ve-  
 21 hicle,”; and

22           (2) by striking “or operation” and inserting in  
 23 lieu thereof “, in-space transportation activity, oper-  
 24 ation, or reentry” in subsection (b)(2)(A).

1 **SEC. 307. AMENDMENT OF SECTION 70106.**

2 Section 70106(a) (relating to monitoring activities  
3 general requirements) is amended—

4 (1) by striking “launch site” and inserting  
5 “launch site, in-space transportation control site, or  
6 reentry site”;

7 (2) by inserting “in-space transportation vehi-  
8 cle, or reentry vehicle,” after “launch vehicle,” and

9 (3) by striking “vehicle.” and inserting “vehicle,  
10 in-space transportation vehicle, or reentry vehicle.”.

11 **SEC. 308. AMENDMENT OF SECTION 70108.**

12 Section 70108 (relating to prohibition, suspension,  
13 and end of launches and operation of launch sites) is  
14 amended—

15 (1) by striking the section caption and inserting  
16 the following:

17 **“Prohibition, suspension, and end of launches, in-**  
18 **space transportation activities, reentries,**  
19 **or operation of launch sites, in-space**  
20 **transportation control sites, or reentry**  
21 **sites”;**

22 and

23 (2) by striking “site” in subsection (a) and in-  
24 serting “site, in-space transportation control site, in-  
25 space transportation activity, or reentry site, or re-  
26 entry of a reentry vehicle,”; and



1           (7) by striking “services” in the second sen-  
2           tence and inserting “services, or services related to  
3           a reentry,”;

4           (8) by inserting “or reentry” after “the sched-  
5           uled launch”; and

6           (9) by adding at the end thereof the following:  
7           “A licensee or transferee preempted from access to  
8           a reentry site does not have to pay the Government  
9           agency responsible for the preemption any amount  
10          for reentry services attributable only to the sched-  
11          uled reentry prevented by the preemption.”.

12          (c) AMENDMENT OF SUBSECTION (c).—Subsection  
13          (c) is amended by inserting “or reentry” after “prompt  
14          launching” in subsection (c).

15          **SEC. 310. AMENDMENT OF SECTION 70110.**

16          Section 70110 (relating to administrative hearings  
17          and judicial review) is amended—

18               (1) by striking “launch” in subsection (a)(2)  
19               and inserting “launch, in-space transportation activ-  
20               ity, or reentry”; and

21               (2) by striking “site” in subsection (a)(3)(B)  
22               and inserting “site, in-space transportation control  
23               site, in-space transportation activity, reentry site, or  
24               reentry of a reentry vehicle,”.

1 **SEC. 311. AMENDMENT OF SECTION 70111.**

2 Section 70111 (relating to acquiring United States  
3 Government property and services) is amended—

4 (1) by inserting “in-space transportation activi-  
5 ties, or reentry services” after “launch services,” in  
6 subsection (a)(1)(B);

7 (2) by striking “services” in subsection (a)(2)  
8 and inserting “services, in-space transportation ac-  
9 tivities, or reentry services”;

10 (3) by inserting “or reentry” after “launch” in  
11 subsection (a)(2)(A);

12 (4) by inserting “or reentry” after “launch” the  
13 first place it appears in subsection (a)(2)(B);

14 (5) by striking “launch” each place it appears  
15 in subsection (b)(1) and inserting “launch, in-space  
16 transportation activity, or reentry”;

17 (6) by striking “services” the first place it ap-  
18 pears in subsection (b)(2)(C) and inserting “serv-  
19 ices, in-space transportation activities or services, or  
20 reentry services”; and

21 (7) by striking subsection (d) and inserting the  
22 following:

23 “(d) COLLECTION BY OTHER GOVERNMENTAL  
24 HEADS.—The head of a department, agency, or instru-  
25 mentality of the Government may collect a payment for  
26 any activity involved in producing a launch vehicle, in-

1 space transportation vehicle, or reentry vehicle or its pay-  
2 load for launch, in-space transportation activity, or re-  
3 entry if the activity was agreed to by the owner or manu-  
4 facturer of the launch vehicle, in-space transportation ve-  
5 hicle, reentry vehicle, or payload.”.

6 **SEC. 312. AMENDMENT OF SECTION 70112.**

7 Section 70112 (relating to liability insurance and fi-  
8 nancial responsibility requirements) is amended—

9 (1) by inserting “one reentry, or to the oper-  
10 ations of each in-space transportation vehicle” after  
11 “launch,” in subsection (a)(3);

12 (2) by inserting “in-space transportation activi-  
13 ties, or reentry services,” after “launch services,”  
14 each place it appears in subsections (a)(4) and  
15 (b)(2);

16 (3) by striking “services” in subsection (b)(1)  
17 and the third place it appears in subsection (b)(2)  
18 and inserting “services, in-space transportation ac-  
19 tivities, or reentry services,”;

20 (4) by inserting “applicable” after “carried out  
21 under the” in subsections (b)(1) and (2);

22 (5) by striking “Science, Space, and Tech-  
23 nology” in subsection (d) and inserting “Science”;

1           (6) by striking “LAUNCHES” in the caption of  
2           subsection (e) and inserting “LAUNCHES, IN-SPACE  
3           TRANSPORTATION ACTIVITIES, OR REENTRIES”; and

4           (7) by striking “site” in subsection (e) and in-  
5           serting “site, in-space transportation control site, or  
6           control of an in-space transportation vehicle or activ-  
7           ity, or reentry site or a reentry”.

8   **SEC. 313. AMENDMENT OF SECTION 70113.**

9           Section 70113 (relating to paying claims exceeding  
10          liability insurance and financial responsibility require-  
11          ments) is amended by striking “launch” each place it ap-  
12          pears in subsections (a)(1), (d)(1), and (d)(2) and insert-  
13          ing “launch, operation of one in-space transportation vehi-  
14          cle, or one reentry”.

15   **SEC. 314. AMENDMENT OF SECTION 70115.**

16          Section 70115(b)(1)(D)(i) (relating to enforcement  
17          and penalty general authority) is amended—

18               (1) by inserting “in-space transportation con-  
19               trol site, or reentry site,” after “launch site,”;

20               (2) by inserting “in-space transportation vehi-  
21               cle, or reentry vehicle” after “launch vehicle,”; and

22               (3) by striking “vehicle” the second place it ap-  
23               pears and inserting “vehicle, in-space transportation  
24               vehicle, or reentry vehicle”.

1 **SEC. 315. AMENDMENT OF SECTION 70117.**

2 Section 70117 (relating to relationship to other execu-  
3 tive agencies, laws, and international obligations) is  
4 amended—

5 (1) by striking “vehicle or operate a launch  
6 site.” in subsection (a) and inserting “vehicle, oper-  
7 ate a launch site, perform in-space transportation  
8 activities or operate an in-space transportation con-  
9 trol site or reentry site, or reenter a reentry vehi-  
10 cle.”;

11 (2) by striking “launch” in subsection (d) and  
12 inserting “launch, perform an in-space transpor-  
13 tation activity, or reentry”;

14 (3) by striking subsections (f) and (g), and in-  
15 serting the following:

16 “(f) LAUNCH NOT AN EXPORT OR IMPORT.—A  
17 launch vehicle, reentry vehicle, or payload that is launched  
18 or reentered is not, because of the launch or reentry, an  
19 export or import for purposes of a law controlling exports  
20 or imports.

21 “(g) NONAPPLICATION.—This chapter does not apply  
22 to—

23 “(1) a launch, in-space transportation activity,  
24 reentry, operation of a launch vehicle, in-space  
25 transportation vehicle, or reentry vehicle, or of a  
26 launch site, in-space transportation control site, or

1 reentry site, or other space activity the Government  
2 carries out for the Government; or

3 “(2) planning or policies related to the launch,  
4 in-space transportation activity, reentry, or oper-  
5 ation.”.

6 **SEC. 316. REPORT TO CONGRESS.**

7 Chapter 701 is amended by adding at the end thereof  
8 the following new section:

9 **“§ 70120. Report to Congress**

10 “The Secretary of Transportation shall submit to  
11 Congress an annual report to accompany the President’s  
12 budget request that—

13 “(1) describes all activities undertaken under  
14 this chapter, including a description of the process  
15 for the application for and approval of licenses under  
16 this chapter and recommendations for legislation  
17 that may further commercial launches and reentries;  
18 and

19 “(2) reviews the performance of the regulatory  
20 activities and the effectiveness of the Office of Com-  
21 mercial Space Transportation.”.

22 **SEC. 317. AMENDMENT OF TABLE OF SECTIONS.**

23 The table of sections for chapter 701 of title 49,  
24 United States Code, is amended—

1           (1) by amending the item relating to section  
2           70104 to read as follows:

“70104. Restrictions on launches, in-space transportation activities, operations,  
and reentries.”;

3           (2) by amending the item relating to section  
4           70108 to read as follows:

“70108. Prohibition, suspension, and end of launches, in-space transportation  
activities, reentries, or operation of launch sites, in-space trans-  
portation control sites, or reentry sites.”;

5           (3) by amending the item relating to section  
6           70109 to read as follows:

“70109. Preemption of scheduled launches, in-space transportation activities, or  
reentries.”;

7           and

8           (4) by adding at the end the following new  
9           item:

“70120. Report to Congress.”.

10 **SEC. 318. REGULATIONS.**

11           The Secretary of Transportation shall issue regula-  
12 tions under chapter 701 of title 49, United States Code,  
13 that include—

14           (1) guidelines for industry to obtain sufficient  
15 insurance coverage for potential damages to third  
16 parties;

17           (2) procedures for requesting and obtaining li-  
18 censes to operate a commercial launch vehicle and  
19 reentry vehicle;

1           (3) procedures for requesting and obtaining op-  
2           erator licenses for launch and reentry; and

3           (4) procedures for the application of govern-  
4           ment indemnification.

5 **SEC. 319. SPACE ADVERTISING.**

6           (a) DEFINITION.—Section 70102, as amended by sec-  
7           tion 303, is amended by redesignating paragraphs (12)  
8           through (19) as (13) through (20), respectively, and by  
9           inserting after paragraph (11) the following new para-  
10          graph:

11           “(12) ‘obtrusive space advertising’ means ad-  
12          vertising in outer space that is capable of being rec-  
13          ognized by a human being on the surface of the  
14          earth without the aid of a telescope or other techno-  
15          logical device;”.

16          (b) PROHIBITION.—Chapter 701 is amended by in-  
17          serting after section 70109 the following new section:

18 **“§ 70109a. Space advertising**

19          “(a) LICENSING.—Notwithstanding the provisions of  
20          this chapter or any other provision of law, the Secretary  
21          shall not—

22                 “(1) issue or transfer a license under this chap-  
23                 ter; or

24                 “(2) waive the license requirements of this  
25                 chapter;

1 for the launch of a payload containing any material to be  
2 used for the purposes of obtrusive space advertising.

3 “(b) LAUNCHING.—No holder of a license under this  
4 chapter may launch a payload containing any material to  
5 be used for purposes of obtrusive space advertising on or  
6 after the date of enactment of the National Aeronautics  
7 and Space Administration Authorization Act, Fiscal Year  
8 1996.

9 “(c) COMMERCIAL SPACE ADVERTISING.—Nothing in  
10 this section shall apply to nonobtrusive commercial space  
11 advertising, including advertising on commercial space  
12 transportation vehicles, space infrastructure, payloads,  
13 space launch facilities, and launch support facilities.”.

14 (c) NEGOTIATION WITH FOREIGN LAUNCHING NA-  
15 TIONS.—

16 (1) The President is requested to negotiate with  
17 foreign launching nations for the purpose of reach-  
18 ing an agreement or agreements that prohibit the  
19 use of outer space for obtrusive space advertising  
20 purposes.

21 (2) It is the sense of Congress that the Presi-  
22 dent should take such action as is appropriate and  
23 feasible to enforce the terms of any agreement to  
24 prohibit the use of outer space for obtrusive space  
25 advertising purposes.

1           (3) As used in this subsection, the term “for-  
2        foreign launching nation” means a nation—

3                   (A) which launches, or procures the  
4        launching of, a payload into outer space; or

5                   (B) from whose territory or facility a pay-  
6        load is launched into outer space.

7        (d) CLERICAL AMENDMENT.—The table of sections  
8        for chapter 701 is amended by inserting the following  
9        after the item relating to section 70109:

“70109a. Space advertising.”.

      Passed the Senate October 19 (legislative day, Octo-  
ber 18), 1995.

Attest:

*Secretary.*

104TH CONGRESS  
1ST SESSION  
**S. 1048**

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**AN ACT**

To authorize appropriations for fiscal year 1996 to the National Aeronautics and Space Administration for human space flight; science, aeronautics, and technology; mission support; and Inspector General; and for other purposes.

S 1048 ES---2  
S 1048 ES---3  
S 1048 ES---4  
S 1048 ES---5  
S 1048 ES---6  
S 1048 ES---7  
S 1048 ES---8  
S 1048 ES---9  
S 1048 ES---10