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# NATIONAL SCIENCE POLICY AND PRIORITIES ACT OF 1972

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## HEARINGS

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BEFORE THE

### SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT

OF THE

### COMMITTEE ON SCIENCE AND ASTRONAUTICS HOUSE OF REPRESENTATIVES

NINETY-SECOND CONGRESS

SECOND SESSION

SEPTEMBER 26 AND 27, 1972

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# NATIONAL SCIENCE POLICY AND PRIORITIES ACT OF 1972

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TUESDAY, SEPTEMBER 26, 1972

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON SCIENCE AND ASTRONAUTICS,  
SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT,  
*Washington, D.C.*

The subcommittee met pursuant to notice, in room 2325, Rayburn House Office Building, Hon. James Symington presiding.

Mr. SYMINGTON. Good morning, ladies and gentlemen. The Subcommittee on Science, Research, and Development of the Science and Astronautics Committee is in session today to begin 2 days of hearings on an important bill, the National Science Policy and Priorities Act of 1972.

Our chairman, Congressman John W. Davis, regrets very much that he cannot be with us today. His interest in the health and progress of science is well known, and his interest in the subject before us was evident in the hearings which the subcommittee held last year on an earlier version of the bill, H.R. 34.

Without objection the S. 32 bill before us today, will be inserted in the record at this point.

(1)



1           (2) the manpower pool of scientists and engineers  
2           constitutes an invaluable national resource which should  
3           be utilized to the maximum extent possible at all times;

4           (3) the Nation's scientific resources can contribute  
5           significantly to meeting America's human needs in such  
6           priority problem areas as health care, poverty, public  
7           safety, pollution, unemployment, productivity, housing,  
8           education, transportation, nutrition, communications, and  
9           energy resources; and

10          (4) at this time of maximum need, much of the  
11          Nation's technical talent is being wasted or misapplied  
12          because of inadequate programs of civilian science and  
13          technology.

14          (b) The Congress declares that it is the continuing pol-  
15          icy and responsibility of the Federal Government to take  
16          appropriate measures directed toward achieving the following  
17          goals—

18               (1) the total Federal investment in science and  
19               technology must be raised to an expenditure level which  
20               is adequate to the human needs of the Nation, and then  
21               continue to increase to the degree required to achieve an  
22               annual qualitative growth in the gross national product  
23               needed to sustain a full employment economy;

24               (2) scientists, engineers, and technicians must have  
25               continuing opportunities for socially useful employment

1 in positions commensurate with their professional, tech-  
2 nical capabilities;

3 (3) Federal obligations for civilian research and  
4 engineering activities must be increased so as to reach a  
5 level of parity with Federal obligations for defense  
6 research and engineering activities, whereupon the level  
7 of parity must be maintained or exceeded, except when  
8 inconsistent with overriding considerations of national  
9 security; and

10 (4) Federal programs for civilian research and en-  
11 gineering must be focused on meeting the human needs  
12 of the Nation in such priority problem areas as health  
13 care, poverty, public safety, pollution, unemployment,  
14 productivity, housing, education, transportation, nutri-  
15 tion, communications, and energy resources.

16 TITLE I—SCIENCE POLICY AND PRIORITIES  
17 FOR CIVILIAN RESEARCH AND ENGINEERING

18 SHORT TITLE

19 SEC. 101. This title may be cited as the "Science Policy  
20 Act".

21 AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION

22 SEC. 102. Section 3 of the National Science Foundation  
23 Act of 1950 is amended by striking out subsection (d) and  
24 inserting in lieu thereof the following:

25 "(d) The Foundation shall recommend and encourage

1 the pursuit of national policies designed to foster research  
2 and education in science and engineering, and the application  
3 of scientific and technical knowledge to the solution of  
4 national problems.”

5 RESEARCH AND ENGINEERING PRIORITIES

6 SEC. 103. (a) The Foundation shall identify priority  
7 areas of civilian research and engineering likely to contribute  
8 to the resolution of national problems in areas such as health  
9 care, poverty, public safety, pollution, unemployment, hous-  
10 ing, education, transportation, nutrition, communications,  
11 and energy resources. In making such identifications, the  
12 Foundation shall—

13 (1) take account of the results of its programs con-  
14 ducted or assisted under section 207;

15 (2) consult with appropriate scientific and tech-  
16 nical organizations such as the National Academy of  
17 Sciences, the National Academy of Engineering, and  
18 the National Institute of Medicine; and

19 (3) coordinate and correlate its activities with re-  
20 spect to such identification with other agencies of the  
21 Federal Government undertaking programs relevant to  
22 these problems.

23 (b) From funds available pursuant to section 107,  
24 the Foundation may employ by grant or contract such con-

1 sulting services as it deems necessary to carry out the func-  
2 tions assigned to the Foundation under this section.

3 RESEARCH PROGRAM

4 SEC. 104. From funds available pursuant to section 107,  
5 the Foundation is authorized to make grants to, or enter into  
6 contracts with, appropriate organizations for the conduct of  
7 basic and applied research and engineering designed to  
8 advance the scientific and technical state-of-the-art in such  
9 priority areas as are identified under section 103.

10 NATIONAL SCIENCE BOARD

11 SEC. 105. Section 4 of the National Science Foundation  
12 Act of 1950 is amended—

13 (1) by inserting before the period at the end of  
14 subsection (a) a comma and the following: “within the  
15 framework of applicable national policies as set forth  
16 by the President and the Congress” and

17 (2) by striking out subsection (c) and inserting in  
18 lieu thereof the following:

19 “(c) The persons nominated for appointment as mem-  
20 bers of the Board (1) shall be eminent in the fields of science,  
21 social science, engineering, agriculture, industry, education,  
22 or public affairs; (2) shall be selected solely on the basis of  
23 established records of distinguished service, and (3) shall be  
24 so selected as to provide representation of the views of leaders

1 from a diversity of fields from all areas of the Nation. The  
2 President is requested, in the making of nominations of  
3 persons for appointment as members, to give due considera-  
4 tion to any recommendations for nomination which may be  
5 submitted to him by the National Academy of Sciences, the  
6 National Academy of Engineering, the National Association  
7 of State Universities and Land-Grant Colleges, the Associa-  
8 tion of American Universities, the Association of American  
9 Colleges, the Association of State Colleges and Universities,  
10 or by other scientific, technical, or educational associations.”

11

## POLICY APPRAISAL AND REPORTING

12 SEC. 106. In order to carry out the purposes of this Act,  
13 the National Science Foundation shall—

14 (1) analyze information regarding Federal expend-  
15 itures for research and engineering activities, and the  
16 employment and availability of scientific, engineering,  
17 and technical manpower, which the Foundation has  
18 assembled pursuant to paragraphs (1), (5), (6), and  
19 (7) of section 3 (a) of the National Science Foundation  
20 Act of 1950 in order to appraise the implementation of  
21 the policies set forth in section 2 of this Act;

22 (2) develop and recommend to the President and  
23 the Congress programs and activities which will contrib-  
24 ute to carrying out the policies set forth in section 2 of  
25 this Act; and

1           (3) prepare and submit to the President for trans-  
2           mittal to the Congress not later than January 31 of each  
3           calendar year, a report on its activities under this Act  
4           and an appraisal of the extent to which the policies set  
5           forth in section 2 are being successfully implemented,  
6           together with such recommendations, including recom-  
7           mendations for additional legislation, as it deems ap-  
8           propriate.

9           AUTHORIZATION OF APPROPRIATIONS

10          SEC. 107. (a) To carry out the provisions of sections  
11          103 and 104 of this title, there are authorized to be appro-  
12          priated \$5,000,000 for the fiscal year ending June 30, 1973,  
13          \$10,000,000 for the fiscal year ending June 30, 1974, and  
14          \$15,000,000 for the fiscal year ending June 30, 1975.

15          (b) Funds appropriated pursuant to subsection (a)  
16          of this section shall remain available for obligation, for  
17          expenditure, or for obligation and expenditure, for such  
18          period or periods as may be specified in Acts making such  
19          appropriations.

20          TITLE II—DESIGN AND DEMONSTRATION OF  
21                                  CIVIL SCIENCE SYSTEMS

22                                  SHORT TITLE

23          SEC. 201. This title may be cited as the "Civil Science  
24          Systems Act".

## 1 AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION

2 SEC. 202. (a) (1) The Foundation is authorized to initi-  
3 ate and support programs which use science, technology, and  
4 advanced analytical techniques, such as systems analysis, to  
5 design civil science systems which are capable of providing  
6 improved public services in such areas as health care de-  
7 livery, public safety, public sanitation, pollution control,  
8 housing, transportation, public utilities, communications, and  
9 education.

10 (2) The Foundation, insofar as is practicable, is author-  
11 ized and directed to develop alternative civil science systems  
12 in order to promote a wider range of choice for the applica-  
13 tion of such systems.

14 (b) The Foundation is authorized to initiate and sup-  
15 port the public demonstration of civil science systems which  
16 have been designed under this title.

17 (c) Section 5 (e) of the National Science Foundation  
18 Act of 1950 is amended by adding at the end thereof the  
19 following new sentence: "The provisions of this subsection  
20 shall not apply to the authority granted to the Director  
21 under title II of the National Science Policy and Priorities  
22 Act of 1972."

## 23 PROGRAMS AUTHORIZED

24 SEC. 203. In order to carry out the purposes of this  
25 title, the Foundation is authorized and directed to—

26 (a) initiate and support programs of applied re-

1 search and experimentation, in order to design civil  
2 science systems capable of providing improved public  
3 services;

4 (b) test and evaluate the alternative civil science  
5 systems designed under this title, and appraise the results  
6 of such tests in terms of applicable technical, environ-  
7 mental, economic, social, and esthetic factors;

8 (c) disseminate and demonstrate the results of pro-  
9 grams conducted or assisted under this title so that such  
10 civil science systems may be effectively utilized in the  
11 development of new communities, and in the improve-  
12 ment of living conditions in existing communities; and

13 (d) assure that the programs conducted or assisted  
14 under this title make maximum effective use of the Na-  
15 tion's scientists, engineers, and technicians, including  
16 those who are unemployed.

17 ESTABLISHMENT OF THE CIVIL SCIENCE SYSTEMS

18 ADMINISTRATION

19 SEC. 204. There is hereby established within the Na-  
20 tional Science Foundation, the Civil Science Systems Ad-  
21 ministration to administer Federal programs carried out  
22 under this title.

23 ADMINISTRATION OFFICERS

24 SEC. 205. (a) The Administration shall be headed by  
25 an Associate Director for Civil Science Systems who shall

1 be appointed by the President by and with the advice and  
2 consent of the Senate.

3 (b) The functions of the Director under this title and  
4 any other functions of the Civil Science Systems Adminis-  
5 tration shall be carried out through the Administration by the  
6 Associate Director, who shall be responsible to and report  
7 to the Director.

8 (c) There shall be a Deputy Associate Director for Civil  
9 Science Systems who shall be appointed by the President, by  
10 and with the advice and consent of the Senate, and shall per-  
11 form such duties and exercise such powers as the Associate  
12 Director may prescribe. The Deputy Associate Director shall  
13 act for, and exercise the powers of, the Associate Director  
14 during the absence or disability of the Associate Director or  
15 in the event of a vacancy in the office of Associate Director.

16 (d) There shall be two Assistant Directors for Civil Sci-  
17 ence Systems who shall be appointed by the President, by and  
18 with the advice and consent of the Senate, and shall perform  
19 such duties and exercise such powers as the Associate Director  
20 shall prescribe, with the stipulation that one Assistant Direc-  
21 tor shall be responsible for advising and assisting the Associ-  
22 ate Director with respect to the engineering and technical  
23 aspects of the Administration's programs, and the other  
24 Assistant Director shall be responsible for advising and assist-

1 ing the Associate Director with respect to the behavioral and  
2 social science aspects of the Administration's programs.

3 (e) (1) Section 5314 of title 5, United States Code,  
4 is amended by adding at the end thereof the following new  
5 paragraph:

6 " (58) The Associate Director for Civil Science  
7 Systems of the National Science Foundation."

8 (2) Section 5315 of title 5, United States Code, is  
9 amended by adding at the end thereof the following new  
10 paragraph:

11 " (95) The Deputy Associate Director for Civil  
12 Science Systems of the National Science Foundation."

13 (3) Section 5316 of title 5, United States Code, is  
14 amended by adding at the end thereof the following new  
15 paragraph:

16 " (131) Assistant Directors for Civil Science Sys-  
17 tems of the National Science Foundation."

18 (f) Section 14 of the National Science Foundation Act  
19 of 1950 is amended by striking out subsection (b) and in-  
20 serting in lieu thereof the following:

21 " (b) Neither the Director, the Deputy Director, the  
22 Associate Director, the Deputy Associate Director, nor any  
23 Assistant Director shall engage in any other business, voca-  
24 tion, or employment while serving in such position; nor shall

1 the Director, the Deputy Director, the Associate Director,  
2 the Deputy Associate Director, or any Assistant Director,  
3 except with the approval of the Board, hold any office in,  
4 or act in any capacity for, any organization, agency, or  
5 institution with which the Foundation makes any grant,  
6 contract, or other arrangement under this Act.”

7 CIVIL SCIENCE SYSTEMS ADVISORY COUNCIL

8 SEC. 206. (a) There is hereby established a Civil  
9 Science Systems Advisory Council to be composed of  
10 thirty-one members, of whom eighteen members shall be  
11 appointed by the Director for terms of three years, and  
12 thirteen shall be ex officio members designated in subsection  
13 (c) of this section. Appointed members shall be chosen from  
14 among persons who have, by reason of experience or ac-  
15 complishments, demonstrated their qualifications to serve  
16 on the Council, in equal numbers from among the following  
17 categories—

- 18 1. business;
- 19 2. labor;
- 20 3. engineers, design professionals, and natural  
21 scientists;
- 22 4. social and behavioral scientists;
- 23 5. environmental and other community groups; and
- 24 6. consumers.

25 (b) (1) Of the members first appointed, six shall be

1 appointed for a term of one year, six shall be appointed for  
2 a term of two years, and six shall be appointed for a term  
3 of three years, as designated by the Director at the time  
4 of appointment.

5 (2) Any member appointed to fill a vacancy occurring  
6 prior to the expiration of the term for which his predecessor  
7 was appointed shall be appointed only for the remainder of  
8 such term. Members shall be eligible for reappointment and  
9 may serve after the expiration of their terms until their suc-  
10 cessors have taken office.

11 (3) Any vacancy on the Council shall not affect its  
12 powers, but shall be filled in the same manner by which the  
13 original appointment was made.

14 (4) Each appointed member of the Council shall, while  
15 serving on business of the Council, be entitled to receive  
16 compensation at a rate not to exceed the daily rate prescribed  
17 for GS-18 of the General Schedule under section 5332 of  
18 title 5, United States Code, including travelttime, and while  
19 so serving away from their homes or regular places of busi-  
20 ness, they may be allowed travel expenses, including per  
21 diem in lieu of subsistence, in the same manner as the ex-  
22 penses authorized by section 5703 (b) of title 5, United  
23 States Code, for persons in the Government service employed  
24 intermittently.

25 (5) The Council shall annually elect one of its mem-

1 bers to serve as Chairman until the next election, The Coun-  
2 cil shall meet at the call of the Chairman, but not less often  
3 than four times a year.

4 (6) Eleven of the voting members of the Council shall  
5 constitute a quorum necessary for the transaction of official  
6 business.

7 (c) The Associate Director for Civil Science Systems;  
8 the Assistant Secretary of Commerce for Science and Tech-  
9 nology; the Assistant Secretary of Health, Education, and  
10 Welfare for Health and Scientific Affairs; the Assistant  
11 Secretary of Housing and Urban Development for Research  
12 and Technology; the Administrator of the National Aero-  
13 nautics and Space Administration; the Chairman of the  
14 Atomic Energy Commission; the Assistant Secretary of  
15 Transportation for Systems Development and Technology;  
16 the Administrator of the Environmental Protection Agency;  
17 the Director of the Office of Economic Opportunity; and  
18 the Chairman of the Council on Environmental Quality shall  
19 be nonvoting ex officio members of the Council.

20 (d) A representative designated by the National Gov-  
21 ernors Conference; a representative designated by the Na-  
22 tional Association of Counties; and a representative jointly  
23 designated by the National League of Cities and the United  
24 States Conference of Mayors shall be voting ex officio  
25 members of the Council.

1 (e) The Council shall—

2 (1) advise the Director with respect to the dis-  
3 charge of his responsibilities under this title;

4 (2) review and evaluate the effectiveness of Fed-  
5 eral programs under this title;

6 (3) prepare and submit to the Director and the Na-  
7 tional Science Board such interim reports as it deems  
8 advisable, and an annual report of its findings and rec-  
9 ommendations, together with any recommendations for  
10 changes in the provisions of this title; and

11 (4) disseminate its findings and recommendations  
12 to such extent and in such manner as it deems effective  
13 and advisable.

14 (f) The Director shall make available to the Council  
15 such staff, information, and other assistance as it may require  
16 to carry out its activities.

17 PLANNING FOR CIVIL SCIENCE SYSTEMS

18 SEC. 207. (a) From funds available pursuant to section  
19 214, the Director is authorized to conduct planning studies,  
20 to transfer funds to other departments and agencies of the  
21 Federal Government, and to make grants to, or to enter into  
22 contracts with, academic institutions, nonprofit institutes and  
23 organizations, State, regional, and local governmental agen-  
24 cies, and private business firms, for the conduct of planning  
25 studies for the design and demonstration of civil science

1 systems capable of providing improved public services. Such  
2 studies will—

3 (1) be directed toward the objective of designing,  
4 testing, evaluating, and demonstrating civil science sys-  
5 tems for subsequent incorporation in new communities,  
6 and for subsequent use, with appropriate adaptations, in  
7 existing communities;

8 (2) include long-range planning studies as well as  
9 intermediate and short-range studies;

10 (3) make maximum use of the results of activities  
11 undertaken under sections 103 and 104 and the scientific  
12 and technical information provided under section 211;

13 (4) encompass studies of a wide range of public  
14 service areas, including but not limited to health care,  
15 public safety, public sanitation, pollution control, hous-  
16 ing, transportation, public utilities, communications, and  
17 education;

18 (5) include specific studies of the economic, socio-  
19 logical, psychological, legal, administrative, and politi-  
20 cal factors which affect the design, development, and  
21 implementation of civil science systems to provide public  
22 services;

23 (6) include total civil systems studies which inte-  
24 grate the specific studies carried out under paragraphs  
25 (4) and (5) of this subsection.

1 (b) In delineating the goals and establishing the priori-  
2 ties for such planning studies as are conducted under subsec-  
3 tion (a) of this section, the Director shall consult with the  
4 Civil Science Systems Advisory Council.

5 APPLIED SOCIAL RESEARCH

6 SEC. 208. (a) From funds available pursuant to section  
7 214, the Director is authorized to transfer funds to other  
8 departments and agencies of the Federal Government, and  
9 to make grants to, and to enter into contracts with academic  
10 institutions, nonprofit institutes and organizations, public  
11 agencies, and private business firms, for the conduct of ap-  
12 plied social research into the economic, sociological, political,  
13 legal, administrative, and psychological aspects of the design,  
14 development, and implementation of civil science systems  
15 capable of providing improved public services.

16 (b) The scientific information which is currently avail-  
17 able in these areas and which is generated as a result of the  
18 research undertaken under this section shall be fully taken  
19 into account by the Foundation in the development of pro-  
20 grams and the design and evaluation of civil science systems  
21 under this title.

22 (c) In making grants or entering into contracts under  
23 this section, the Director shall take appropriate account of  
24 the results of the planning studies conducted or assisted under  
25 section 207.

## 1 CIVIL SCIENCE SYSTEM RESEARCH AND DESIGN

2 SEC. 209. (a) From funds available pursuant to section  
3 214, the Director is authorized to transfer funds to other  
4 departments and agencies of the Federal Government, and to  
5 make grants to, and to enter into contracts with, academic  
6 institutions, nonprofit institutes and organizations, public  
7 agencies, and private business firms, for research with  
8 respect to, and design of, civil science systems capable of  
9 providing improved public services in areas such as health  
10 care, public safety, public sanitation, pollution control, hous-  
11 ing, transportation, public utilities, communications, and  
12 education.

13 (b) In making grants or entering into contracts under  
14 this section, the Director shall take appropriate account of  
15 the results of the planning studies conducted or assisted  
16 under section 207, and the applied social research studies  
17 conducted or assisted under section 208.

18 (c) Each contract awarded under this section shall  
19 contain provisions which assure that specific performance  
20 objectives, and any applicable physical, environmental, eco-  
21 nomic, social, and esthetic constraints are specified with  
22 particularity for each project conducted under said contract.

23 (d) To assure that civil science systems designed under  
24 this section are responsive to public needs and desires, the  
25 Director shall obtain community and public views in his

1 determination of the performance objectives and priorities to  
2 be met by such systems.

3 TESTING AND EVALUATION

4 SEC. 210. (a) (1) From funds available pursuant to  
5 section 214, the Director is authorized to transfer funds to  
6 other departments and agencies of the Federal Government,  
7 and to make grants to, and to enter into contracts with,  
8 academic institutions, nonprofit institutes and organizations,  
9 State, regional, and local governmental agencies, and private  
10 business firms for testing and evaluating civil science systems  
11 which make use of advanced science and technology.

12 (2) Such testing and evaluation shall utilize all avail-  
13 able, applicable analytical techniques, such as computer sim-  
14 ulation, systems analysis, and technology assessment, to test  
15 and appraise such systems in terms of their conformance to  
16 performance objectives; adherence to stipulated constraints;  
17 costs and ancillary consequences; impact on the environ-  
18 ment; impact on esthetic values; responsiveness to public  
19 needs and desires; and their comparison with alternative  
20 civil science systems which may provide similar public  
21 services.

22 (b) From funds available pursuant to section 214,  
23 the Director is authorized and directed to carry out final  
24 evaluations of civil science systems which make use of ad-  
25 vanced science and technology, taking appropriate account

1 of the results of the tests conducted or assisted under sub-  
2 section (a) of this section, and the results of the applied  
3 social research conducted or assisted under section 208.

4 (c) In making grants or entering into contracts under  
5 this section, the Director shall take account of the results  
6 of the planning studies conducted or assisted under section  
7 207.

#### 8 INFORMATION DISSEMINATION

9 SEC. 211. From funds available pursuant to section 214,  
10 the Director is authorized to establish a computerized Civil  
11 Science Systems Information Service, which shall collect and  
12 integrate the scientific, technical, and social information per-  
13 taining to civil science systems resulting from programs under  
14 this title, and shall provide such information to interested  
15 organizations in Federal, State, and local government, in-  
16 dustry, academic institutions, and the nonprofit sector, upon  
17 request from such organizations, in accordance with such  
18 administrative procedures as are established by the Director.

#### 19 SYSTEMS DEMONSTRATION

20 SEC. 212. (a) From funds available pursuant to sec-  
21 tion 214, the Director is authorized to transfer funds to other  
22 departments and agencies of the Federal Government, and  
23 to make grants to, and to enter into contracts with, academic  
24 institutions, nonprofit institutes and organizations, State,  
25 regional, and local governmental agencies, and private busi-

1 ness firms, for the construction and public exhibition of civil  
2 science systems demonstration projects, which illustrate the  
3 functioning and associated benefits of alternative, effective  
4 civil science systems resulting from research and design ac-  
5 tivities conducted or assisted under this title.

6 (b) Such grants or contracts shall contain provisions  
7 which assure that such demonstration projects include—

8 (1) accurate and complete representations of the  
9 civil science systems involved in the demonstration, indi-  
10 cating the improved public services which they are capa-  
11 ble of providing; and

12 (2) public exhibitions which are announced in ad-  
13 vance and are open for inspection by any interested  
14 organization or individual in accordance with such ad-  
15 ministrative procedures as are prescribed by the Founda-  
16 tion.

17 (c) Prior to entering into any demonstration project  
18 grant or contract, the Director will consult with all State and  
19 local governments in whose jurisdictions such demonstration  
20 may occur, and will take account of the views of such govern-  
21 ments in determining to award such a grant or contract.

22 COORDINATION WITH OTHER GOVERNMENT AGENCIES

23 SEC. 213. In planning and conducting or assisting pro-  
24 grams under this title, the Director shall maintain continuing



1 TITLE III—TRANSITION OF TECHNICAL MAN-  
2 POWER TO CIVILIAN PROGRAMS

3 SHORT TITLE

4 SEC. 301. This title may be cited as the “Technical  
5 Manpower Transition Act”.

6 AUTHORITY OF THE NATIONAL SCIENCE FOUNDATION

7 SEC. 302. The Foundation is authorized to plan and  
8 assist in the transition of scientific and technical manpower  
9 from research and engineering programs which have been  
10 terminated or significantly reduced to other civilian-oriented  
11 research and engineering activities. The Foundation is fur-  
12 ther authorized to plan and assist in the transition of scien-  
13 tific and technical manpower from research and engineer-  
14 ing programs which have been terminated or significantly  
15 reduced due to the transfer abroad of technical activities of  
16 American based transnational firms to other civilian-oriented  
17 research and engineering activities.

18 ADVISORY PANEL ON TRANSITION OF SCIENTIFIC AND  
19 TECHNICAL MANPOWER TO CIVILIAN PROGRAMS

20 SEC. 303. (a) There is hereby established an Advisory  
21 Panel on Transition of Scientific and Technical Manpower  
22 to Civilian Programs to be composed of thirty-one members,  
23 of whom eighteen members shall be appointed by the Director  
24 for terms of three years, and of thirteen ex officio members  
25 designated in subsection (c) of this section. Appointed mem-

1 bers shall be chosen from among persons who have, by reason  
2 of experience or accomplishments, demonstrated their quali-  
3 fications to serve on the Panel, in equal numbers from the  
4 following categories:

5 (1) Engineering and natural sciences, including the  
6 environmental sciences;

7 (2) Economics and social sciences;

8 (3) Industry;

9 (4) Labor;

10 (5) Public affairs, education, and manpower train-  
11 ing; and

12 (6) Unemployed or underemployed scientists, engi-  
13 neers, and technicians.

14 (b) (1) Of the members first appointed, six shall be  
15 appointed for a term of one year, six shall be appointed for  
16 a term of two years, and six shall be appointed for a term  
17 of three years, as designated by the Director at the time of  
18 appointment.

19 (2) Any member appointed to fill a vacancy occurring  
20 prior to the expiration of the term for which his predecessor  
21 was appointed shall be appointed only for the remainder of  
22 such term. Members shall be eligible for reappointment and  
23 may serve after the expiration of their terms until their  
24 successors have taken office.

25 (3) Any vacancy on the Panel shall not affect its

1 powers, but shall be filled in the same manner by which  
2 the original appointment was made.

3 (4) Each appointed member of the Panel shall, while  
4 serving on business of the Panel, be entitled to receive com-  
5 pensation at a rate not to exceed the daily rate prescribed  
6 for GS-18 of the General Schedule under section 5332 of  
7 title 5, United States Code, including traveltime, and while  
8 so serving away from their homes or regular places of busi-  
9 ness, they may be allowed travel expenses, including per  
10 diem in lieu of subsistence, in the same manner as the ex-  
11 penses authorized by section 5703 (b) of title 5, United  
12 States Code, for persons in the Government service employed  
13 intermittently.

14 (5) Eleven of the voting members of the Panel shall  
15 constitute a quorum necessary for the transaction of official  
16 business.

17 (c) The Panel shall annually elect one of its appointed  
18 members to serve as chairman until the next election. The  
19 Panel shall meet at the call of the chairman, but not less  
20 often than four times a year. The Associate Director for Civil  
21 Science Systems; the Chairman of the Council of Economic  
22 Advisers; the Assistant Secretary of Commerce for Science  
23 and Technology; the Assistant Secretary of Labor for Man-  
24 power; the Assistant Director for Economic Affairs of the  
25 United States Arms Control and Disarmament Agency; the

1 Administrator of the National Aeronautics and Space Ad-  
2 ministration; the Director of Defense Research and Engi-  
3 neering; the Chairman of the Atomic Energy Commission;  
4 the Commissioner of Education; and the Assistant Secretary  
5 of Health, Education, and Welfare for Health and Scientific  
6 Affairs shall be ex officio nonvoting members of the Panel.

7 (d) A representative designated by the National Gov-  
8 ernors Conference; a representative designated by the Na-  
9 tional Association of Counties; and a representative jointly  
10 designated by the National League of Cities and the United  
11 States Conference of Mayors shall be voting ex officio mem-  
12 bers of the Panel.

13 (e) The Panel shall—

14 (1) advise the Director, with respect to the dis-  
15 charge of his responsibilities under this title;

16 (2) review and evaluate the effectiveness of Fed-  
17 eral programs under this title;

18 (3) prepare and submit such interim reports as it  
19 deems advisable, and an annual report of its findings  
20 and recommendations, together with any recommenda-  
21 tion for changes in the provisions of this title; and

22 (4) disseminate its findings and recommendations  
23 to such extent and in such manner as it deems effective  
24 and advisable.

1 (f) The Director shall make available to the Panel such  
2 staff, information, and other assistance as it may require to  
3 carry out its activities.

4 RESEARCH ON TRANSITION TO CIVILIAN PROGRAMS

5 SEC. 304. From funds available pursuant to section 313,  
6 the Foundation is authorized to—

7 (1) make grants to, or to enter into contracts with,  
8 academic institutions, nonprofit institutes and organi-  
9 zations, public agencies, and private business firms, for  
10 the conduct of research designed to study and appraise  
11 the social, economic, and managerial aspects of transi-  
12 tion from defense research and engineering activities to  
13 civilian-oriented research and engineering activities;  
14 and

15 (2) disseminate publicly, or enter into contracts  
16 with academic institutions, nonprofit institutes and or-  
17 ganizations, public agencies, and private business firms  
18 for the public dissemination of, the significant results of  
19 such research conducted under subsection (1) of this  
20 section, as appear likely to aid in the transition from  
21 defense research and engineering activities to civilian-  
22 oriented research and engineering activities, particularly  
23 those directed toward the resolution of priority national  
24 problems, as identified under section 103.

## 1 ASSISTANCE TO STATE AND LOCAL GOVERNMENTS

2 SEC. 305. (a) From funds available pursuant to section  
3 313, the Foundation is authorized to make grants to State  
4 and local governments and regional governmental agencies  
5 for—

6 (1) the conduct of programs at the State, local, or  
7 regional level, which are designed to facilitate the tran-  
8 sition of scientific and technical activities to civilian pro-  
9 grams within the particular State, local, or regional  
10 areas; and

11 (2) the hiring of currently unemployed or under-  
12 employed scientists, engineers, and technicians to work  
13 within State, local, or regional governmental agencies  
14 in positions which utilize their technical skills.

15 (b) The Director shall prescribe applicable salary rates  
16 for different types of technical positions in different areas of  
17 the country, none of which shall exceed the rate paid a per-  
18 son occupying grade GS-13, step 1.

19 (c) No one hired by a State, local, or regional govern-  
20 mental agency under this section may—

21 (1) receive compensation from Federal funds at  
22 a rate which exceeds the applicable rate as set by the  
23 Director; or

24 (2) remain in a position compensated under this  
25 section for a period in excess of two years.

## 1                    TRAINING GOVERNMENT OFFICIALS

2            SEC. 306. (a) From funds available pursuant to section  
3 313, the Foundation is authorized to make grants to, and to  
4 enter into contracts with, academic institutions, nonprofit  
5 institutes and organizations, and private business firms, for  
6 the purpose of their planning, developing, strengthening, or  
7 operating training programs for officers and employees of  
8 Federal, State, and local government who will be responsible  
9 for, or participate in, determining or administering gov-  
10 ernment-assisted or conducted programs for civilian, socially  
11 oriented research and engineering activities.

12            (b) Such training programs will be directed at (1)  
13 acquainting the program participants with the potential con-  
14 tributions of science and technology to the resolution of public  
15 problems in such priority areas as are identified pursuant to  
16 this Act; and (2) teaching such participants how to utilize  
17 scientific and technical talent in an effective and economical  
18 manner.

19            (c) Organizations conducting such training programs  
20 may not charge any fee to a participant or participant's  
21 agency, which is not permitted by such regulations as the  
22 Foundation may prescribe.

23            (d) Participants in such training programs will be  
24 selected by the grantee or contractor from nominations made

1 by interested government agencies, in accordance with such  
2 criteria and regulations as the Foundation may prescribe.

3 GOVERNMENT EMPLOYEE PARTICIPATION

4 SEC. 307. (a) From funds available pursuant to section  
5 313, the Foundation is authorized to transfer funds to other  
6 departments and agencies of the Federal Government, and to  
7 make grants to, and to enter into contracts with, State, re-  
8 gional, and local government agencies for the purpose of  
9 paying the travel and subsistence expenses of government  
10 employees incurred in connection with their participation in  
11 training programs carried out under section 306.

12 (b) Executive agencies of Federal, State, and local gov-  
13 ernment are encouraged, to the extent consistent with efficient  
14 administration, to provide opportunities for appropriate offi-  
15 cers and employees of such agencies to participate in train-  
16 ing programs carried out under section 306.

17 COMMUNITY CONVERSION CORPORATIONS

18 SEC. 308. (a) From funds available pursuant to sec-  
19 tion 313, the Foundation is authorized to make grants  
20 to or enter into contracts with, local governments or non-  
21 profit corporations for the establishment and operation of  
22 community conversion corporations, which—

23 (1) function as nonprofit corporations;

24 (2) operate under the direction of a Board of Di-  
25 rectors which is representative of a wide range of com-

1 munity interests, including citizen group and consumer  
2 participation, selected in accordance with such criteria  
3 as may be prescribed by the Foundation;

4 (3) conduct, contract for, or stimulate the conduct  
5 of civilian-oriented research and development activities  
6 which focus on the particular problems, or draw on the  
7 particular resources, of the community within which the  
8 corporation is located; and

9 (4) give preference in personnel recruitment to un-  
10 employed or underemployed scientists, engineers, and  
11 technicians, provided that they meet necessary quali-  
12 fications for effective job performance.

13 (b) Existing nonprofit corporations are eligible to  
14 apply as community conversion corporations for financial  
15 assistance under this section, if such corporations meet the  
16 qualifications set forth under subsection (a) of this section.

17 (c) Each community conversion corporation receiv-  
18 ing a grant or contract from the National Science Founda-  
19 tion is encouraged to seek additional financial support and  
20 payment for services from other agencies of Federal, State,  
21 or local government, private foundations, community orga-  
22 nizations, and private business firms; and the National  
23 Science Foundation will give preference in awarding such  
24 community conversion grants or contracts to those corpora-

1 tions which show a likelihood of being able to obtain such  
2 additional financial support.

3 (d) The receipt by a community conversion corpora-  
4 tion of a grant or contract from the National Science  
5 Foundation under this section does not make said corporation  
6 ineligible to receive other categories of grants and contracts  
7 from the Foundation.

8 (e) In awarding grants or contracts to community  
9 conversion corporations for specific research and develop-  
10 ment projects, the Foundation will give preference to those  
11 projects which offer the most promise of aiding in the  
12 resolution of national problems in priority areas as identified  
13 under section 103.

14 **JOB TRANSITION PROGRAMS**

15 **SEC. 309.** (a) From funds available pursuant to section  
16 313, the Foundation is authorized, upon application, to make  
17 job transition grants to nonprofit institutes and organizations  
18 and to private business firms in order to enable them to hire  
19 scientists, engineers, and technicians for work on projects for  
20 which they are not yet fully qualified. Each such application  
21 shall contain provision to assure that—

22 (1) such projects shall consist of civilian-oriented  
23 research and engineering activities;

24 (2) the personnel participating in such job transi-  
25 tion programs shall be selected from unemployed or

1 underemployed applicants by the grantees, in accord-  
2 ance with such criteria and regulations as shall be pre-  
3 scribed by the Foundation, including the requirement  
4 that the participants shall have a reasonable prospect  
5 of achieving full job qualification within a stipulated  
6 period of time;

7 (3) the personnel participating in such programs  
8 shall be afforded a reasonable opportunity to attend spe-  
9 cialized training courses when such courses are deemed  
10 by the grantee to be necessary to supplement the on-the-  
11 job training of the participant; and

12 (4) no one may continue, or be selected, to partici-  
13 pate in a job transition program under this section after  
14 such time that he receives a career transition fellowship  
15 under section 310.

16 (b) All significant scientific and technical information  
17 which is generated by the personnel participating in such  
18 programs shall be made available for public use, in accord-  
19 ance with such procedures as shall be prescribed by the  
20 Foundation.

21 CAREER TRANSITION FELLOWSHIPS

22 SEC. 310. (a) From funds available pursuant to section  
23 313, the Foundation is authorized to award career transition  
24 fellowships to unemployed or underemployed scientists, en-  
25 gineers, and technicians to enable them to pursue a course

1 of study through which they can acquire specialized tech-  
2 nical knowledge and skills in fields other than the ones in  
3 which they are already proficient.

4 (b) The Foundation shall allocate fellowships under  
5 this section in such manner, insofar as practicable, as will—

6 (1) attract highly qualified applicants; and

7 (2) provide an equitable distribution of such fel-  
8 lowships throughout those areas of the United States  
9 which are experiencing a higher than average level of  
10 technical unemployment.

11 For the purpose of this section, the Foundation shall consult  
12 with the Secretary of Labor to establish for each region in  
13 the United States the average level of technical unemploy-  
14 ment.

15 (c) The Foundation shall award at least 10 per cen-  
16 tum but not to exceed 20 per centum of the fellowships  
17 awarded under this section to scientists, engineers, and tech-  
18 nicians who have completed their formal academic educa-  
19 tion within a five-year period prior to award of the fellow-  
20 ship, as certified in accordance with such regulations as the  
21 Foundation may prescribe.

22 (d) The Foundation shall pay to persons awarded fel-  
23 lowships under this section such stipends (including such  
24 allowances for subsistence, health insurance, relocation ex-  
25 penses, job placement expenses, and other expenses for such

1 persons and their dependents) as it may prescribe by  
2 regulation.

3 (e) Fellowships shall be awarded under this section upon  
4 application made at such times and containing such informa-  
5 tion as the Foundation shall by regulation require.

#### 6 PLACEMENT ASSISTANCE

7 SEC. 311. (a) From funds available pursuant to section  
8 313, the Foundation is authorized to transfer funds to other  
9 departments and agencies of the Federal Government, and  
10 to make grants to, and to enter into contracts with scientific,  
11 professional, technical, and business associations, and labor  
12 unions in order to establish and operate placement programs  
13 for unemployed or underemployed scientists, engineers, and  
14 technicians.

15 (b) Such grants and contracts may include provision for  
16 relocation expenses of the individual participant and his  
17 family when necessary, in accordance with such regulations  
18 as the Foundation shall prescribe.

19 (c) Grantees and contractors shall select applicants for  
20 such placement assistance in accordance with such criteria  
21 and regulations as the Foundation shall prescribe.

22 (d) No one shall be eligible for placement assistance  
23 under this section when he is—

24 (1) a participant in a job transition program under  
25 section 309; or



1 TITLE IV—PROTECTION OF PENSION RIGHTS  
2 OF SCIENTISTS AND ENGINEERS

3 SEC. 401. The Congress finds that because of rapid and  
4 frequent changes in Federal procurement objectives and poli-  
5 cies, engineering and scientific personnel suffer a uniquely  
6 high rate of forfeiture of pension benefits under private pen-  
7 sion plans, as such employees tend to change employment  
8 more frequently than other workers. The Congress declares  
9 that it is the policy of the United States to seek to protect  
10 scientists and engineers from such forfeitures by making pro-  
11 tection against forfeiture of pension credits, otherwise pro-  
12 vided, a condition of compliance with Federal procurement  
13 regulations.

14 SEC. 402. The Director shall develop, in consultation  
15 with appropriate professional societies and heads of inter-  
16 ested Federal departments and procurement agencies, recom-  
17 mendations for modifications of Federal procurement regula-  
18 tions to insure that scientists, engineers, and others working  
19 in associated occupations employed under Federal procure-  
20 ment, construction, or research contracts or grants shall, to  
21 the extent feasible, be protected against forfeitures of pension  
22 or retirement rights or benefits, otherwise provided, as a  
23 consequence of job transfers or loss of employment resulting  
24 from terminations or modifications of Federal contracts or  
25 procurement policies.

1       SEC. 403. Recommended changes in procurement regu-  
2 lations shall be developed by the Director, as required by  
3 section 402, within six months after enactment of this Act,  
4 and shall be published in the Federal Register within fifteen  
5 days thereafter as proposed regulations subject to comment  
6 by interested parties.

7       SEC. 404. After publication under section 403, receipt  
8 of comments, and such modification of the published pro-  
9 posals as the Director deems appropriate, the recommended  
10 changes in procurement regulations developed under this  
11 title shall be adopted by each Federal department and pro-  
12 curement agency within sixty days thereafter unless the  
13 head of such department or agency determines that such  
14 changes would not be in the national interest or would not  
15 be consistent with the primary objectives of such department  
16 or agency.

17                   TITLE V—GENERAL PROVISIONS

18                                   DEFINITIONS

19       SEC. 501. As used in this Act:

20       (1) The term "academic institution" means any United  
21 States institution of higher education as defined in sections  
22 491 and 1201 of the Higher Education Act of 1965.

23       (2) The term "Administration" means the Civil Science  
24 Systems Administration.

1           (3) The term "Assistant Director" means an Assistant  
2 Director of the National Science Foundation.

3           (4) The term "Associate Director" means the Associate  
4 Director for Civil Science Systems of the National Science  
5 Foundation.

6           (5) The term "civil science system" means any set of  
7 interrelated technological applications which are designed  
8 to perform certain public services, as defined in subsection  
9 (11) of this section.

10          (6) The term "civilian research and engineering ac-  
11 tivities" means all nondefense research and engineering  
12 activities as determined pursuant to regulations of the Direc-  
13 tor of the Foundation after consultation with the Directors  
14 of the Office of Management and Budget and the Office of  
15 Science and Technology.

16          (7) The term "Council" means the Civil Science Sys-  
17 tems Advisory Council.

18          (8) The term "defense research and engineering activi-  
19 ties" means any activity which involves—

20           (i) research, development, or engineering, includ-  
21 ing necessary supporting services, performed under grant  
22 from, or contract with, the Department of Defense or  
23 under subcontract to such a grant or contract; or

24           (ii) the construction, reconstruction, repair, or in-  
25 stallation of any building, plant, structure, facility, or

1 equipment connected or necessary to such research, de-  
2 velopment, engineering, or supporting services.

3 (9) The term "Deputy Associate Director" means the  
4 Deputy Associate Director for Civil Science Systems of the  
5 National Science Foundation.

6 (10) The term "Director" means the Director of the  
7 National Science Foundation.

8 (11) The term "Federal executive agency" means any  
9 department, agency, or independent establishment in the ex-  
10 ecutive branch of the Government, including any wholly  
11 owned Government corporation.

12 (12) The term "Foundation" means the National Sci-  
13 ence Foundation.

14 (13) The term "Panel" means the Advisory Panel on  
15 Transition of Scientific and Technical Manpower to Civilian  
16 Programs.

17 (14) The term "public service" means any set of inter-  
18 related organizations and activities which collectively per-  
19 form certain related functions normally associated with life  
20 in our society, including but not limited to such public  
21 services as health care, public safety, public sanitation, pol-  
22 lution control, housing, transportation, public utilities, com-  
23 munications, and education.

24 (15) The term "State" includes each of the several  
25 States, the District of Columbia, the Commonwealth of

1 Puerto Rico, the Virgin Islands, Guam, American Samoa,  
2 and the Trust Territory of the Pacific Islands.

3 ADMINISTRATIVE PROVISIONS

4 SEC. 502. (a) The Director of the Foundation is author-  
5 ized, in furtherance of the purposes and provisions of this Act,  
6 to—

7 (1) appoint such additional personnel as he deems  
8 necessary to carry out this Act;

9 (2) appoint such advisory committees as he deems  
10 advisable;

11 (3) procure the services of experts and consultants  
12 in accordance with section 3109 of title 5, United States  
13 Code; and

14 (4) use the services, personnel, facilities, and infor-  
15 mation of any other Federal department or agency, any  
16 agency of a State, or political subdivision thereof, or any  
17 private research agency with the consent of such agen-  
18 cies, with or without reimbursement therefor.

19 (b) Upon request by the Director, each Federal de-  
20 partment or agency is authorized to make its services, per-  
21 sonnel, facilities, and information, including suggestions, esti-  
22 mates, and statistics, available to the greatest practicable  
23 extent to the Director, or his designee, in the performance  
24 of his functions under this Act.

25 (c) The Director shall establish such additional divi-

1 sions or offices within the Foundation as he deems necessary  
2 to carry out his functions under this Act.

3 PAYMENTS AND WITHHOLDING

4 SEC. 503. (a) Payments under this Act may be made  
5 in installments, in advance, or by way of reimbursement,  
6 with necessary adjustments on account of underpayment or  
7 overpayment.

8 (b) Whenever the Director, after giving reasonable  
9 notice and opportunity for hearing to a grantee or con-  
10 tractor under this Act, finds—

11 (1) that the program or project for which such  
12 grant or contract was made has been so changed that  
13 it no longer complies with the provisions of this Act; or

14 (2) that, in the operation of the program or proj-  
15 ect, there is failure to comply substantially with any  
16 such provision—

17 the Director shall notify such grantee or contractor of his  
18 findings and no further payments may be made to such  
19 grantee or contractor by him until he is satisfied that such  
20 noncompliance has been, or will promptly be, corrected.  
21 The Director may authorize the continuance of payments  
22 with respect to any projects pursuant to this Act which are  
23 being carried out by such grantee or contractor and which  
24 are not involved in the noncompliance.

## RECORDS AND AUDIT

1  
2 SEC. 504. (a) Each recipient of assistance under this  
3 Act pursuant to grants received, agreements entered into, or  
4 contracts entered into under other than competitive bidding  
5 procedures shall keep such records as the Director shall pre-  
6 scribe, including records which fully disclose the amount  
7 and disposition of the proceeds of such assistance, the total  
8 cost of the project or undertaking in connection with which  
9 such assistance is given or used, and the amount of that  
10 portion of the cost of the project or undertaking supplied by  
11 other sources, and such other records as will facilitate an  
12 effective audit.

13 (b) The Director and the Comptroller General of the  
14 United States, or any of their duly authorized representa-  
15 tives, shall have access for the purpose of audit and exami-  
16 nation to any books, documents, papers, and records of the  
17 recipients that are pertinent to the assistance received under  
18 this Act.

## PATENT RIGHTS

19  
20 SEC. 505. (a) Each grant, contract, or other arrange-  
21 ment executed pursuant to this Act which relates to scientific  
22 research or engineering shall contain provisions governing the  
23 disposition of inventions produced thereunder in a manner  
24 calculated to protect the public interest and the equities of

1 the individual or organization with which the grant, contract,  
2 or other arrangement is executed. Nothing in this Act shall  
3 be construed to authorize the Foundation to enter into any  
4 contractual or other arrangement inconsistent with any pro-  
5 vision of law affecting the issuance or use of patents.

6 (b) No officer or employee of the Foundation shall  
7 acquire, retain, or transfer any rights, under the patent laws  
8 of the United States or otherwise, in any invention which he  
9 may make or produce in connection with performing his  
10 assigned activities and which is directly related to the subject  
11 matter thereof. This subsection shall not be construed to pre-  
12 vent any officer or employee of the Foundation from execut-  
13 ing any application for patent on any such invention for the  
14 purpose of assigning the same to the Government or its  
15 nominee in accordance with such rules and regulations as the  
16 Director may establish.

Passed the Senate August 17, 1972.

Attest:

FRANCIS R. VALEO,

*Secretary.*

Mr. SYMINGTON. Two very notable developments in our society have led to the introduction of this bill. One is the emergence of a broad range of technology-related problems ranging from poor transportation, housing and health care to energy shortages, pollution, and low-productivity growth. Many of these problems are brought on by advances in technology and by the vast proliferation of technology throughout our society. The solutions to these problems will require more and better technology in order to achieve a reduction in the adverse effects they produce without curtailing the beneficial effects they yield.

The other development which has led to this bill is a growing unemployment among scientists, engineers, and technicians. This has been particularly evident in the high-technology defense and space sectors of industry, but other sectors of industry are also experiencing unemployment of their technical people. It is clear that the unemployment or underemployment of our technological manpower is a waste of a valuable national resource. In the light of the problems we face, it is a luxury we can ill afford.

The National Science Policy and Priorities bill deals with both of these developments. It proposes policies and organizational arrangements for dealing with the demand for new and better technology, and for dealing with the underutilization of our technical manpower. In the hearings today and tomorrow, we will examine these proposals. We will hear witnesses from the other body, from the National Science Foundation, from the National Academy of Engineering, from industry, professional societies, and local government.

In the House, three versions of the bill have been referred to the Committee on Science and Astronautics. H.R. 15789 was introduced by Congressman Davis; H.R. 16344, by Congressman Roe; H.R. 16756 was introduced by our colleagues on this subcommittee, Congressman Bell and Congressman Hanna, who has now joined us here. The Senate version of the bill is S. 32. It was passed by that body on August 17 and it also has been referred to this committee.

The subcommittee expects to evaluate both the general concepts of these bills and the specific provisions which they contain. Our aim is to determine the best way in which the Government can bring its resources to bear on what is recognized as two closely related problem areas.

It is fortuitous that we are joined at this point by the chairman of our full committee, the Hon. George P. Miller of California. Welcome and good morning to you.

The CHAIRMAN. Good morning.

Senator TUNNEY. Good morning, Mr. Chairman.

Mr. SYMINGTON. I was just about to place into the record the testimony of our first witness. Do you care to make any remarks in advance?

The CHAIRMAN. No; only that I am very happy to see Senator Tunney here. He is always interested in the welfare of the people of California, and inasmuch as we have a great many people in California who are affected by this bill, it is natural that Senator Tunney would be here.

(A biographical sketch of Senator Tunney follows:)

JOHN V. TUNNEY, U.S. SENATOR FROM CALIFORNIA

California Senator John V. Tunney, in his first year in the upper house, fought for and won Senate passage for 16 of his bills and amendments. These included a national water quality standard, extended unemployment and child care benefits, increased Social Security, strengthened consumer protection and an assault on sickle cell anemia.

His bill for reconstruction funds for medical facilities damaged by earthquakes or other natural disasters was his first signed into law by the President. The Senate plans action on other of his bills, including jury duty for young voters and drug abuse research.

The Senator, after six years in the House of Representatives, was elected to the Senate in 1970 by the largest margin ever given a Democratic candidate in California this century—619,000 votes. He was sworn in January 2, 1971 and serves on the Senate's Judiciary, Public Works and District of Columbia committees.

Tunney, son of former world heavyweight boxing champion Gene Tunney, was born in New York City and was graduated from Yale University and from the University of Virginia Law School, where he won the Appellate Court Competition. He also studied at the Academy of International Law at the Hague. He married the former Mieke Sprengers of Nijmegen, Netherlands, and they have two boys, Edward, 10, and Mark, 7 and a daughter, Arianne, 4.

He was admitted to the bar in Virginia and New York in 1959 and practiced law in New York City until he joined the U.S. Air Force as a Judge Advocate in 1960.

He was stationed at March Air Force Base near Riverside, California where he taught Business Law at the University of California. Discharged as a Captain in 1963, he passed the California Bar, practiced law in Riverside and was elected to Congress from there in 1964, and re-elected by increasing majorities in 1966 and 1968.

In the House, Tunney served on the influential House Committee on Foreign Affairs, and attended various international conferences. Among them the Anglo-American Parliamentarian conferences on Africa (Washington 1965, London 1966, and Bermuda 1967); The Ditchley Foundation Conferences, Ditchley, England, 1966 and 1968 and the American Assembly Conference (co-sponsored by Columbia University), Shimoda, Japan, 1969.

He was honored with selection as a Chubb Fellow at Yale University in 1967. He is a member of the Board of Councilors of the Center for Urban Affairs of the University of Southern California, and also a member of the Board of Trustees for the California Indian Legal Services.

STATEMENT OF HON. JOHN V. TUNNEY, U.S. SENATOR FROM THE  
STATE OF CALIFORNIA

Senator TUNNEY. Thank you, very much, Mr. Chairman.

I cannot tell you how pleased I am that you have been chairman of this committee, I believe, since it was founded as a committee in the Congress. You have become inextricably tied into the space program that our country has known in the past 10 years and the success that it has enjoyed, and it is a real honor for me to have the opportunity to present testimony before the father of the space program.

The CHAIRMAN. Thank you.

Mr. SYMINGTON. On behalf of the subcommittee, Senator Tunney, we join you in the gratitude that the chairman of the full committee is with us today.

I wish to extend to you a warm welcome. You are missed in this body, and we know that our loss is the Senate's gain. We are glad to

get you back now and then at least for your advice and counsel. Senator Tunney served in the House from 1965 to 1970, and he is a cosponsor of S. 32 in the Senate.

We are glad to have you with us this morning.

Senator TUNNEY. Thank you very much, Mr. Chairman, for your generous remarks. I am very pleased and honored to be the first witness before your subcommittee as it considers S. 32, the National Science Policy and Priorities Act.

I was a cosponsor of the legislation in the Senate, and enthusiastically supported the version of the bill which passed the Senate by a vote of 70 to 8 on August 17.

With the legislative session soon drawing to a close, it is important that the House take swift action, in order that the bill may become law this year. I understand that there may be some difficulties with it becoming law this year because of the policy of the Rules Committee not to give a rule to any more legislation, but I feel that if there is any exception to that rule, I hope that S. 32 will be the beneficiary.

I am here this morning to stress how important the legislation is to California—and the Nation.

S. 32 is one of the most far-reaching, progressive pieces of legislation to combat the social problems that affect our country that has come through the Senate in a long time. The legislation recognizes that technology does not have to malfunction in this country, that technology does not have to be developed just for the sake of development, but that it can be used for solving many of the pressing, urgent problems that we face.

For the first time, in this legislation, we would develop a mechanism at the Federal level to determine what we are going to do in human terms with our technical resources now that space funds and defense funds have been cut back.

It is a national disgrace that planning for conversion did not occur when decisions were made to cut back funds from these programs; instead, there was a lot of weeping and moaning and gnashing of teeth—and no action. Now we have a long overdue chance to deal with the problem—and we must not let it pass us by.

But let me not focus exclusively on the possibilities for employment afforded by the mechanism in S. 32. It also affords the unique chance to apply systems analysis to our pressing domestic problems.

Just the other day, I spoke to the director of Cal Tech's Jet Propulsion Laboratory, Dr. Pickering. As many of you know, JPL has done significant work under contract to NASA and other agencies. We spoke of the use of advanced technology to solve our mass transportation needs. Imagine how much we could do if we undertook a comprehensive program to evaluate the efficiency of our roads and bus services, the utility of and possibilities for subways or feeder systems, et cetera.

Another issue which must be tackled—and could be tackled more effectively if the latest scientific and technical insights were brought to bear on it—is the energy crisis. I can imagine no sounder way to deal with formulating both administrative and regulatory aspects of a national energy policy than to apply systems analysis to both supply and demand questions, and to ways to better coordinate and utilize domestic and foreign energy resources.

These are just two issues; others which were mentioned at length in the Senate floor debate include health, sanitation, pollution control, et cetera.

To return to the possibilities for employment of unemployed or underemployed manpower, it is estimated that approximately 25,000 jobs will be created for engineers by virtue of the funding level established in the Senate-passed legislation. Because research and training programs are also supported, and because backup will be necessary for the professional jobs involved, a ripple effect will be set up and will result in several hundred thousand additional jobs.

These jobs are essential—especially to a State like California where, earlier this year, over 400,000 aerospace workers were unemployed. I should point out as well that 17 percent of the engineers and scientists in the country are employed in California.

In conclusion, I think it might be helpful if I anticipate and answer some of the major arguments concerning the legislation which were raised in the Senate.

First, it was argued that the country did not need the program—that a general upturn in the economy would provide jobs for the technically unemployed. The evidence from past performance and the administration's own budget request convinces me that few additional technical jobs will become available. Present best estimates show that 200,000 technical people are unemployed or underemployed.

Second, some said the country is not capable of carrying out such programs effectively. I agree that we have a lot of planning to do, but the NASA experience shows us how effectively we can use the fruits of advanced technology to solve priority needs. What greater priority is there than to deal with the pressing urban problems I have mentioned?

Third, there was talk that we would violate the administration's budget ceiling for fiscal year 1973. You are probably aware that total funding in the Senate bill was reduced from \$1.8 to \$1.025 billion—the bare bones necessary to finance the first 3 years. Expenditures in the first year would be only \$360 million, and will create thousands of jobs.

Fourth, some assert that special treatment for technical personnel is inappropriate. The bill does focus on technical personnel, but its ripple effects affect all workers. Also, our technical personnel are a national resource—and their work product has a special usefulness that should be recognized.

Fifth, some concern was raised about whether NSF should do the job. (You will recall that the Civil Science Systems Administration was set up within the NSF.) In this regard, I would point out that, traditionally, the problem has been that no agency was mandated to set up a program of sufficient size to do an adequate job of, for example, developing a pollution-free central heating/cooling system for an entire community. To do a job like this requires cutting across responsibilities of HUD, Interior, EPA, FPC, et cetera—and the Senate felt it appropriate to designate one agency as coordinator.

NSF was chosen because of its prior reputation in putting science to work in so many problem areas. Note that the bulk of S. 32 would be administered by the Civil Science Systems Administration—a new subagency with new key personnel which would have substantial

autonomy and not interfere with NSF's traditional functions. S. 32 would broaden the scope of NSF and enlarge the National Science Board to deal with the new responsibilities. I believe that the program will enhance the agency by building greater support for what science can do to help society.

I think it is clear that we will have only ourselves to blame if we allow this opportunity to pass without getting the aerospace industry and advanced technology generally involved with civil systems. I hope this legislation will pass overwhelmingly in the House of Representatives, as it did in the Senate.

Thank you very much, Mr. Chairman.

Mr. SYMINGTON. Thank you, very much.

The CHAIRMAN. Senator, I don't know of anyone who disagrees with the statement you have made here, but there are a lot of complications that come into this that will have to be worked out.

You assign to this agency certain functions that are well founded in other different agencies. Are these agencies going to stand by and see their authority and their money taken away from them? Will not the committees in the House rise up and demand that they be heard in those areas that are going to affect them?

I served on the Committee on Post Office and Civil Service for many years, and I think I know the jealousy with which that committee holds its prerogatives, and there are others.

I agree with you that we do have to attack on a broad scale these things, but I wonder if what we have gone into is deep enough to tell just how we are going to do this job. Can we approach some of these other agencies affected and get their cooperation?

That is highly essential. At this stage I don't know that we are going to have time to go into this as thoroughly as we should, but this does not mean we do not subscribe to the principle you set forth, and I don't know any agency better qualified than NSF to do this.

There also is now, the problem that you cite, attracting attention. I just received a volume yesterday from the American Society of Civil Engineers, "Research Needs and Civil Engineering Relevant to the Goals of Society." This is prepared jointly by the Colorado State University and the American Society of Civil Engineers. It is quite relevant to the thing we are talking about, and it comes from a recognized scientific society, but we certainly aren't going to have time to give it the attention that it should have, because they point out, in the little bit that I have been able to scan through it, certain features that are going to be necessary. There are other learned societies that are also concerned. It is just a job of coordinating their efforts for the success of this bill.

Incidentally, Mr. Symington, I just spoke to Dr. Holmfeld. I am going to deposit it with him for the reference of the committee.

Mr. SYMINGTON. Thank you, Mr. Chairman.

I would make one comment, Senator, and that is that I think there are two problem areas you highlight for investing in scientific disciplines, mass transportation, that is, clean rapid transit, and the energy crisis, I think those are the two top candidates, and quite honestly I would like to see emanating from the executive branch a national goals policy which would really set our sights on goals of this kind.

Wouldn't you agree that that would be a useful thing?

Senator TUNNEY. Absolutely, Mr. Chairman. I think we have learned that the only effective way to apply science to problems that affect society is to have clearly identified goals, a time limitation on achieving the goals, and the ability to evaluate the cost and efficiency of different systems as a means of constantly checking progress against the ultimate goal and against the timetable.

This is the essence of management systems control, and if you don't have it, I just don't think that we are going to be able to attack the problems that we have such as the transportation crisis the energy crisis and pollution problems.

In California, we have a very exciting experiment going on in the BART system, which is located in the district of the chairman of the full committee. It was subsidized mainly by local funding. The taxpayers of the community decided that they wanted to experiment with an alternate form of transportation other than the automobile, and about a billion and a half dollars were spent.

There was Federal money, but a majority of the money came from local taxpayers.

I think it is going to be a successful project, but other parts of the country need similar projects.

Mr. SYMINGTON. I was just about to call on Mr. Bell.

Mr. BELL. I would say, Mr. Chairman, my feeling on this thing, as you know, I brought something like this up some months ago in the committee. I want to congratulate Senator Tunney for his sponsorship of this S. 32.

You know, we talk an awful lot about all the problems we have in the cities and everybody says lets do something about it, but nobody does anything about it. I think it is time we ought to take this seriously. I think it is time we take some action in this field. I think it is a very serious problem, and really we haven't scratched the surface of accomplishing anything, and somebody has to do something some place.

So I congratulate the Senator for his move in this direction, and I think certainly the main object is you tell them what to do, but they don't object if you give them the money and point the way for them to go.

So I think your ideas have considerable merit.

The CHAIRMAN. Will the gentleman yield?

Mr. BELL. Yes.

The CHAIRMAN. I think all the mayors of the country are here today knocking at the door wanting to share the revenues of the Federal Government. They will do it if we furnish the money.

Senator TUNNEY. Thank you very much Congressman Bell. I am very impressed that there are three Californians on this committee, and I think it is probably characteristic of the interest that California has in matters relating to science and technology. I know the tremendous work that Congressman Bell and Congressman Hanna in addition to the chairman of the full committee have done on these problems. I feel humbled appearing before this committee as a witness on matters with which the members of this committee have been dealing with a lot longer than I have. There is a great deal of expertise on this committee.

I did, however, want the committee to know that the Senate feels very strongly that this is good legislation, as witnessed by the overwhelming vote, 70 to 8, in favor of it.

Mr. SYMINGTON. Thank you.

Mr. Hanna?

Mr. HANNA. Thank you, Mr. Chairman.

I know the Senator is anxious to get on to other duties. Let me just add my congratulations, Senator, for your presentations. I have on rare occasions had a rise in the minimum of high regard I hold for your body. This has occasioned some of that rise.

However, I am persuaded to be somewhat tempered by the very cogent comments of Mr. Symington.

It does appear to me that the thing that is lacking is a statement of transportation policy and a statement of energy policy on behalf of the administration. There have to be specific aims with a time frame and a funding that follows specific aims. I don't think that systems approach create these things. I think they serve these things. Therefore, they cannot bring into being that which now is absent, and that which they would serve, it seems to me, is yet to be formulated.

But I certainly—the chairman has indicated, and I am very well aware, of the fact that this committee is very deep in the energy crisis problem at the present time. It is a very complicated area. I think that the service that the Senate has done, Mr. Chairman, is in keeping our focus right where this problem is, and that it has indicated to the country that the Congress is ready to move.

Now, I hope that that message gets to the administration and that it will start to do its tandem work with us. I again commend you.

Senator TUNNEY. Thank you very much, Congressman.

Mr. SYMINGTON. Thank you, Mr. Hanna.

Mr. Mosher?

Mr. MOSHER. I have no questions at this time. I would say it is good to have a former Member of the House as a spokesman in the Senate on this very important piece of legislation.

Senator TUNNEY. Thank you, Congressman. It is good to be back.

Mr. SYMINGTON. Mr. Seiberling?

Mr. SEIBERLING. I share some of the feelings of praise for the Senate and for you, Senator Tunney. I also share the sense of complexity of this area. We had hearings for a considerable time on a similar act, a more limited one, but with the same objectives.

However, I think the Senate has moved in with this bill to fill a vacuum which needs to be filled. The vacuum, as has been brought out by our chairman and others, is that there needs to be some policy decisions, but there haven't been in a lot of areas. One of the great strengths of this bill is that it provides that the NSF shall identify priority areas of civilian research and engineering, likely to contribute to the resolution of certain national problems.

This is something that is a great contribution. What it says is—and of course the Congress can always override these decisions and to some extent the executive branch can, too—but in the absence of some decisions, at least we can have somebody who is coming up here and telling us what the problems are, and what we ought to be focusing on. At the same time it provides machinery to put the scientists and engineers to work.

We have had a great deal of testimony on this general field. I am not prepared at this time to say that we could not move ahead and get some legislation produced from this committee. Maybe it will not be in time for the close of this session, but certainly I would think we ought to be able to move along without very extensive hearings. That is obviously one man's opinion, but I think you are to be commended for coming here and giving us this push.

Senator TUNNEY. Thank you very much, Congressman. I agree with your statement on what the National Science Foundation can do. I also have to agree with the chairman of the full committee when he says that one of the great problems that we have is with legislative committees in Congress, and having an agency with responsibility to fund programs that would cut across the responsibilities of the various Federal agencies that are involved now in those fields. Naturally, there is a certain jealousy that both the agencies have as well as the congressional committees. They want to maintain responsibility for and oversight of the problems with which they have traditionally been concerned.

I do feel, however, that the only way we are going to solve these problems, some of these problems, such as the energy crisis, is to have one agency coordinating the expenditure of the funds and establishing the goals. I would point out that the Congress would always have the ability to control this coordinating agency through the appropriations process.

Thus, if Congress did not like the transfer of funds from one agency to another, they could always cut off the funds. I think that it is important that we move along, but I recognize the problems that this committee has, and I deeply appreciate the chairman giving me this opportunity to testify.

Mr. SYMINGTON. Mr. Wydler?

Mr. WYDLER. None at this time. Thank you.

Mr. SYMINGTON. Senator, we are grateful to you for joining us today and giving us your insights. I am sure we will be in rather steady consultation with you and your colleagues on this matter in the coming weeks.

Senator TUNNEY. Thank you very much, Mr. Chairman.

Mr. SYMINGTON. We are now pleased to have with us our very old and dear friend, Dr. H. Guyford Stever, Director of the National Science Foundation, whose career includes broad experience in both science and engineering.

His résumé is so lengthy and distinguished, but so well known, that we will proceed simply to welcome you here, knowing that this bill does affect, or would affect the responsibilities and jurisdiction of the National Science Foundation in many ways.

Dr. Stever, we very much welcome your comments.

(A biographical sketch of Dr. Stever follows:)

DR. H. GUYFORD STEVER  
DIRECTOR, NATIONAL SCIENCE FOUNDATION

Dr. H. Guyford Stever assumed the post of Director of the National Science Foundation on February 1, 1972. He was nominated by the President to a six-year term November 15, 1971, and unanimously confirmed by the Senate.

Before his appointment to head NSF, Dr. Stever had served as President of Carnegie-Mellon University (and one of its predecessors, Carnegie Institute of

Technology) since February, 1965. His presidency was marked by significant change and growth in the university.

In 1967, Carnegie Tech merged with Mellon Institute to form Carnegie-Mellon University, with a total endowment of almost \$120,000,000. The move to university status accelerated other changes at the new institution.

Shortly thereafter, CMU announced the creation of a new School of Urban and Public Affairs, established to meet the ever-increasing demand for persons capable of dealing with growing urban problems. A College of Humanities and Social Sciences—built on existing strengths in those fields—was also announced at the same time, and the first students in that new College are now juniors.

Among the major changes which took place during Dr. Stever's tenure as President was the establishment of new engineering and science curricula in the Carnegie Institute of Technology (for engineering) and Mellon Institute of Science (for the natural sciences), both of which are now degree granting colleges of CMU. CMU was selected in 1967 for one of the National Science Foundation's University Science Development grants. The University received \$4.3 million from the NSF to be used over a three-year period to strengthen educational and research programs in various fields of science. In addition, the University, in 1968, announced a \$55 million fund raising drive and has raised more than \$35 million in the first three years, more than ever before in a similar time period. Science Hall, a new \$15.5 million building, with over 300,000 square feet, and the largest academic building on campus, was opened in the fall of 1971.

Before going to CMU, Dr. Stever served for more than twenty years on the faculty at MIT. During that time he achieved national prominence as an educator and in his service to the Federal government. Among his governmental activities, he was appointed by the President as a member of the National Science Board in 1970, and has served as a member of the Advisory Panel to the House of Representatives on Science and Astronautics since 1959. He was Chief Scientist of the U.S. Air Force from 1955 to 1956 and served as Chairman of the President's Ad Hoc Science Panel in 1969 and as a member of the President's Commission on the Patent System from 1965 to 1967. He has headed many other aeronautical and scientific advisory committees at the Federal level.

He is an internationally respected expert on aeronautical engineering and space technology and has been often honored for his work in those fields and for his service to government. Professionally, he holds fellowships in the National Academy of Engineering, the American Institute of Aeronautics and Astronautics, the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the American Physical Society, and others.

Dr. Stever has also done extensive consulting and has served on numerous boards in industry. He has been a director of United Aircraft Corporation, Kopper's Company, Inc., and Fisher Scientific Company.

Born in Corning, N.Y., on October 24, 1916, Dr. Stever received his A.B. degree from Colgate University and his Ph. D. in physics from California Institute of Technology. He joined the faculty of MIT in 1941, and except for an assignment in the Office of Scientific Research and Development in London, from 1942 through 1945, was at MIT until his appointment as President of CMU in 1965. While at MIT he held various positions, including department head and associate dean of engineering.

Dr. Stever has received nine honorary degrees, among other honors. In Pittsburgh, he has been very active in community affairs and was a Trustee of the Sarah Mellon Scaife Foundation and a Director of the Pittsburgh Symphony Society, the Regional Industrial Development Corporation, the Pittsburgh-Allegheny County Chapter of the American Red Cross, and Metropolitan Pittsburgh Educational Television (WQED). In 1966 he was named Pittsburgh's "Man of the Year" by the Junior Chamber of Commerce.

Dr. Stever is married to Louise Risley. They have four children: Horton Guyford, Jr., Sara Newell, Margarette Risley, and Roy Risley.

#### STATEMENT OF DR. H. GUYFORD STEVER, DIRECTOR, NATIONAL SCIENCE FOUNDATION

Dr. STEVER. Mr. Chairman, and members of the subcommittee, I am pleased again to appear before this committee.

As you are aware, both Dr. McElroy, my predecessor at the National Science Foundation, and I have commented previously on aspects of the National Science Policy and Priorities Act of 1972.

The bill this committee is now considering is substantially different from the earlier versions on which we testified, but I believe that many of our past comments are still appropriate.

We recognize that this bill addresses significant, recognized needs in our society. As I will develop later in this testimony, I believe that the administration and the Congress are already taking constructive steps toward meeting the national needs which are perceived by S. 32's sponsors. The bill addresses the following:

—The use of Federal support to maximize science's contribution to the solution of national needs;

—The devotion of at least as much effort to solving domestic problems as is devoted to maintaining our national defense;

—The assurance that our scientific and technical manpower are fully and productively employed; and,

—The added emphasis upon research to help solve the high priority civilian sector problems we now face.

As this committee well realizes, most of these societal problems are highly complex, and the potential contributions of science and technology to their solution vary in degree and kind. Although I am convinced that science and technology will make major contributions toward solving many of these problems, I feel that the ways and even the problems in which science can most contribute are not always clear.

The goals and objectives of S. 32 are ones on which many reasonable men could agree. I do not think we need to discuss those here today, but rather I would like to discuss the appropriate means for achieving them.

The President, in his first science and technology message, sent to the Congress on March 16 of this year, placed heavy emphasis on the need for a strong new effort to marshal science and technology in the service of our society. In that message he described several steps that are being taken to achieve this goal, including:

—The efforts to develop a coordinated, cooperative involvement in science and technology by the Federal Government, private enterprise, State and local government, and the scientific community;

—The specific new thrusts in energy, transportation, biomedical research, and other areas; and,

—The encouragement of more widespread use of research results derived from federally sponsored research.

In the state of the Union message and the budget for fiscal year 1973, the President emphasized increased support for science and technology in the civilian sector and outlined the responsibility of all agencies—including the National Science Foundation—to encourage, focus, and support our Nation's scientific effort.

The administration has responded to the need for more civilian R. & D. through a 65-percent increase since 1969—from \$3.3 billion to \$5.4 billion. In fiscal year 1973 alone, the President requested \$700 million more than the year before in the civilian R. & D. budget.

The National Science Foundation has been responsive to national needs since its inception. In fact, the establishment of the Foundation was itself an outgrowth of a recognition by the Congress and the executive branch that Federal support would be necessary for basic research and for building the capabilities needed to keep the Nation strong in science and engineering. This mission of supporting basic

research is of continuing importance to civilian science in this country and, I believe, will be the most crucial role in the long term that the National Science Foundation can play in advancing the goals under discussion. A strong, broad base of support for science—both basic and applied—is necessary. We will see in the years ahead, as we have in the past, a continuing flow of ideas from the frontiers of basic research into applications throughout our society.

Since its establishment, the National Science Foundation has continuously demonstrated its responsiveness to national needs. For instance, early in the growing national emphasis on science and its application following World War II, and especially during the development of the space program, NSF recognized the need for major improvements in science education. This led to programs contributing to the development of the new math, physics, biology, and earth sciences curriculums as well as other inquiry-oriented courses in the sciences.

Again in the late 1950's, the increasing importance of the atmospheric sciences was recognized by the Foundation, and this area of science was established as a separate major program within the family of science programs supported by the National Science Foundation. In parallel with this development, the Foundation undertook a problem-focused program of weather modification. This was designed originally to seek methods to increase rainfall and lately to try to find ways to moderate severe thunderstorms, to reduce damage caused by hail, to dissipate fog, and otherwise to deal with weather conditions that are hazardous to man.

Later, through the initiative of this committee and the Congress, changes were made in the NSF Act in 1968 which increased NSF's capability to respond to national needs. Subsequently, the Foundation developed the program of interdisciplinary research relevant to problems of our society (IRRPOS) which in 1971 was transformed into the major program, research applied to national needs (RANN).

With the concurrence of Congress, the Foundation is undertaking two new programs in fiscal year 1973—the experimental R. & D. inventives program and the national R. & D. assessment program. Both of these programs, in different ways, are designed to identify, assess, test, and evaluate the opportunities and incentive mechanisms available for the Government to use in stimulating research and innovation aimed at achieving major goals.

It is within the context of these significant executive and congressional activities that we must consider S. 32.

Title I of this bill would formally assign responsibility to the National Science Foundation for developing recommendations on priorities and policies in civilian-oriented science. The authority needed to fulfill the role of recommending national policies for the promotion of basic science research was contained in National Science Foundation's original legislation. The role of developing broader national policies and priorities was assigned in 1962 to the Office of Science and Technology (OST) by Reorganization Plan No. 2.

The Foundation has for some time been active in this area and supportive of other agencies, notably OST. For instance, the National Science Board has a responsibility to render an annual report on the status and health of science. Earlier this year you received the fourth report of the National Science Board.

This report, *The Role of Engineers and Scientists in a National Policy for Technology*, emphasized the need for a strong commitment to civilian technologies and identified steps necessary to provide a favorable climate and a broad base of support for science and technology in the civilian sector. The report by the Board indicates the current broad interpretation of their science responsibilities, a matter which is discussed in S. 32.

Another example of responsiveness to need is the now-familiar RANN program. The distinguishing characteristics of this program of research applied to national needs is that the Foundation is sponsoring assessments, studies, and research on selected national problems which meet three or four criteria:

- Fall between or outside the areas of responsibility of other agencies;
- Span the areas of responsibility of other agencies;
- Relate to meeting longer range and special requirements of other agencies; and
- Are uniquely suited to solution by NSF-supported university teams working with industries, national laboratories, and nonprofit organizations.

Under NSF sponsorship, a number of study reports are prepared each year by scientists at universities and other research institutions. For example, we supported research on technology assessment leading to the report, *Technology and Public Policy, the Process of Technology Assessment in the Federal Government*—a study published in July 1972 by George Washington University—and, *A Survey of Technology Assessment Today*, a study completed in June 1972.

In May 1972 a report, *Power to the State: Mobilized Public Technology*, was prepared by the Council of State Governments under the sponsorship of the National Science Foundation. This report contained recommendations designed to bring the benefits of science and technology to the operation of State and local governments.

I hardly need to comment on our Nation's energy problem, since the members of the committee have been particularly aware of the impending crisis and have been leaders in the effort to develop public awareness and programs to deal with it. The National Science Foundation has supported a major effort to examine this problem, resulting in a number of reports containing specific recommendations for action. In conjunction with those recommendations, the National Science Foundation is sponsoring significant research on conversion of solar energy to meet future needs.

These few examples amply illustrate my earlier statement that the National Science Foundation is doing the kind of work contemplated in part by title I.

Within the executive branch, the identification of priority areas of civilian R. & D. which would be assigned by S. 32 to the National Science Foundation is currently a continuing responsibility of the Office of Science and Technology, Office of Management and Budget, and other elements of the White House staff.

I would note that many of the problem areas identified in S. 32 are already the responsibility of a mission agency of the Government. These agencies are closer than the National Science Foundation to the problems and to the environment in which specific solutions must be applied. Consistent with our decentralized Federal organization for

funding research and development, mission agencies should conduct problem assessment and sponsor the research and development necessary to resolve these problems. Without assuming the supra-agency role envisioned for the National Science Foundation by title I, the Foundation can continue to contribute to the objectives of title I by conducting studies on the applications of science and technology to the solutions of national needs.

Title II, as proposed, would establish the Civil Science System Administration within the National Science Foundation to support and administer programs authorized under the title. As I mentioned earlier, the National Science Foundation has been increasing its programs in civilian science through RANN and the new R. & D. incentives and assessment programs.

Title II would increase the rate at which that change is occurring and provide for the National Science Foundation's increased involvement in the development, testing, and evaluation phases of civil science systems. I believe that development, testing, and evaluation activities of major civil science systems are in most cases more appropriately done in mission agencies responsible for implementing the systems.

No one agency can successfully pursue major civil science systems in all of the areas suggested in S. 32.

One of the key factors in the success of RANN has been its ability to select those problems where the National Science Foundation could make a unique contribution and focus its efforts.

In short, the Foundation is concerning itself with those civil science areas for which the National Science Foundation has a unique capability. Generally, we believe that many of the CSSA-type development activities should be done by mission agencies.

Title III, the Technical Manpower Transition Act, contains many of the provisions of H.R. 34 upon which the Foundation has previously commented. The problems addressed in title III extend far beyond scientists and technicians.

Any solution to these problems must include other groups of the unemployed. Without reiterating earlier comments, let me again emphasize that the solution to the manpower problems in science and technology lies in the creation of specific new job opportunities. These must be found through programs in the civilian sector and through a revitalized economy. Many of these jobs will be provided by the \$1.4 billion increase in the President's fiscal year 1973 R. & D. budget if it is approved by the Congress.

You may recall that in his science message the President directed his science adviser, in cooperation with the Office of Intergovernmental Relations, to serve as a focal point for discussions among various Federal agencies and representatives of State and local governments. These discussions are to lay the basis for development of a better means for collaboration and consultation of scientific and technological questions in the future.

For its part, the National Science Foundation, through its intergovernmental science program, is already working with State, local, and regional governments to identify areas where scientific and technical skills and manpower can contribute to the effectiveness and efficiency of their operations. We are providing funds to assist these non-Federal government groups in designing programs and hiring scientific manpower at the local level. The challenges faced by State, local,

and regional governments are large, and science and technology alone cannot meet them all.

However, science and technology can assist in the solution of these problems, and it is fair to note that the use of scientific and technical capabilities in this regard is only beginning.

Let me repeat my reservations about the feasibility of one feature of title III, the community conversion corporations. First, I believe this would be an artificial and far less effective way of creating meaningful jobs than by providing incentives for use of skilled people with expanded private and public programs. I am advised that the current Federal efforts include job assistance and placement under the Emergency Employment Act; special Department of Labor programs, such as the technical mobilization and reemployment program, funded at \$42 million; the national registry of engineers; the voluntary engineers, scientists and technicians program; and other efforts.

Second, I believe that the manpower problem is temporary. Thus, when we are again enjoying full employment these corporations, which would have been developed as Government-supported bodies, would themselves pose a problem as a proliferation of government and quasi-government agencies.

Title IV addresses the very real concern of forfeiture of important pension and retirement benefits which often results from job transfer or loss of employment. The administration and the Foundation are deeply concerned over this problem and are aware that scientists, engineers, and other related employees working on Government contracts are often among those affected.

However, the problem extends beyond this group and I feel that protection from such losses should be provided to all workers. The administration is taking the lead on this matter through other agencies, principally the Departments of Labor and Treasury, and has sent to Congress two pension reform bills, the Individual Retirement Benefits Act, H.R. 12272, S. 3012; and the Employees Benefit Protection Act, H.R. 12337, S. 3024.

In summary, the bill which we are discussing is another expression of the fact that there are urgent needs and problems in areas where civil science can contribute. These needs are being approached in a variety of ways by many agencies of Government. For example, the National Science Foundation RANN program is being prudently expanded. We are continuing to assemble the institutional capabilities and the skilled personnel to undertake the work that must be done.

We are increasing our support of fundamental science in recognition that this research provides the basis on which future contributions from science must come. The President has launched a major effort in civilian science. The funds going into this area in fiscal year 1973 are more than 65 percent greater than those in fiscal year 1969, and it is the most rapidly expanding sector of the Federal R. & D. budget. We must understand that the progress we are seeking in our society will require a new partnership among science, government, and the rest of society.

I believe that the programs and activities which I have mentioned, and the many others being supported by the administration, are the appropriate approach to the problems and challenges we face.

Mr. SYMINGTON. Thank you very much, Dr. Stever.

I gather from your statement, taken as a whole, that you are not embracing this legislation with warmth. Would that be a fair statement?

Dr. STEVER. Well, cutting my usual longwindedness short, the answer is yes.

Mr. Chairman, I would point out that I am very strongly in support of the point that these are national needs and that we have got to do better and more effective work.

Mr. SYMINGTON. You have an intriguing little comment in your statement, where you say that you believe the manpower problem is temporary.

What encourages you to believe that?

Dr. STEVER. Well, for one thing, I think the statistics on unemployment in the science and engineering fields have already indicated an improvement.

At the worst point, a couple of years back or so, it ran about 3 percent, and in the first quarter of this last year I think it is down to 2 percent. This indicated improvement in science and technology fields.

The CHAIRMAN. Would it be fair to say that the pendulum always swings back and forth? We are in one phase of it now. Those of us who have lived a little longer remember from time to time the demand for engineers and scientists was great and then dropped off, and then came back again. So it is part of the natural phenomenon, isn't it?

Dr. STEVER. In that respect, I was encouraged to read in the Monday (September 25, 1972) *New York Times*, a report by Mr. Bienstock, an official of the Labor Department, in which the predictions for employment in many, many professions and for highly educated, highly trained people were made for the 1970's. I was very pleased to see that it gave quite an optimistic employment picture for many fields of science and engineering in the article. Tighter than the 1960's but much more optimistic than recent predictions.

Mr. SYMINGTON. Isn't there a relationship between the Federal investment in R. & D. and these employment prospects?

Dr. STEVER. Yes, sir; I believe there is.

Mr. SYMINGTON. Then how do you account for what appears to be the fact that in constant 1967 dollars, according, I think, to NSF's own figures, R. & D. has apparently declined since 1967?

Dr. STEVER. The decline in R. & D. during that period was primarily because of fairly large changes in space and defense employment and R. & D. in those areas, and I believe that if we look at the research part of that spectrum, not simply the development, one finds that there was a slight decline in the physical sciences, but a gain in the biological sciences, the environmental sciences, the earth sciences, and so on.

There is definitely in the last budget proposed by the President and the administration and being worked on now by the Congress, there is definitely an increase in total R. & D., civil R. & D. and research for this year, fiscal year 1973.

Mr. SYMINGTON. With respect to the hard science and technology development drop, when those areas were prospering, it was in large part due, wasn't it, to the tasks we assigned ourselves with respect to the space program?

Dr. STEVER. Yes, sir; and our defense program as well.

Mr. SYMINGTON. And defense. Wouldn't you agree that if we assign tasks of that dimension, and I have heard the figures concerning, let's say, rapid transit in 20 or 30 major metropolitan areas, this might well absorb these talents and these disciplines?

Dr. STEVER. Yes, sir. In fact, such civilian needs would require more than those that are unemployed. In fact, it isn't only in transportation. The very large increase in the health area, the life sciences, and other areas are going to continue to require very heavy employment.

I also believe that many of the efforts we have made to improve our economy indicate that the companies are beginning to—I'm referring to everyday civilian business companies—are beginning to increase employment. I don't underestimate the statistical problem of unemployment in an area such as science and engineering where people have worked so long and hard to get themselves prepared to do something.

I don't underestimate, either, the statistical problem nor the severe personal problems of these unemployed people, but I do think things are swinging back.

Mr. HANNA. Mr. Chairman, would you yield at this point?

Mr. SYMINGTON. Yes.

Mr. HANNA. I am sitting here having a hard time swallowing the pendulum theory. I am prepared to accept the fact that human performance is not steady. But when somebody grasps at the stupidity of the past to kiss off the stupidity of the present, I don't find comfort there. It seems to me conversion was required when funding was shifted. Since we didn't do it, I think we should not try to cop out, but rather admit that this was somewhat stupid. It wasn't for lack of activities requiring effort on our part. I think you would agree with that. You already have.

I just would hope that we won't go forward into the future with the idea that there is some awesome natural phenomenon which requires us to go through this kind of bath, because to the people in it, it is a pretty tragic experience. Having been in southern California where it hit human beings who were my neighbors, I find it pretty hard to just say, "Well, now, that is tough, buddy; it's just the swing of the pendulum."

The CHAIRMAN. Would the gentleman yield?

Mr. HANNA. Yes.

The CHAIRMAN. Whether he likes it or not, pendulums do swing, and they have been swinging a long time, and out of them we get a lot of things.

We are talking, for instance, about rapid transportation in many parts of the country.

If the gentleman's memory were as long as mine—

Mr. HANNA. It is almost that long, closer than I like.

The CHAIRMAN. In California and in the West generally, there was a great upsurge in railroad building. We built a transcontinental line.

If we are going to tie to things like the immediate problem, we will solve them. Then we will go into it again. This pendulum will come the other way.

There is a chance of preparing people to meet future conditions, but there is, to me, no great laying on of hands that is going to take the economy out of its present state.

Mr. HANNA. I agree with you, but when you build pendulums, you should try to control pendulums. Those were not brought to us from on high. We made them with our own hands.

Mr. SYMINGTON. I think I can reconcile the two views of the pendulum. There was a story by Edgar Allen Poe, "The Pit and the Pendulum." This pendulum had a blade on it, and I think what Mr. Hanna feels is that there are an awful lot of people in the pit waiting for it to come down.

Dr. STEVER. May I speak to Mr. Hanna?

I hope my remark doesn't give any indication that I don't feel strongly that as a society and as a country and as a government we have to tackle these civil science areas, and with force. Not only for society, but I also think it is the greatest problem for science, not only in the next year, but in the next decades. I am very enthusiastic about that, and my comments about the bill have been primarily with respect to the approach and proposed organization rather than the overall objective.

As I say, I think science has—science and our country together have an opportunity of unparalleled proportions.

Mr. SYMINGTON. Dr. Stever, in this connection, you responded, I think, in the affirmative to my question as to whether or not we don't need to assign tasks of the magnitude of the space program in order to absorb these talents properly and usefully.

Do you feel that we have assigned ourselves such tasks?

Dr. STEVER. Mr. Chairman, let me go a little more deeply into this. I think some of these problems, or some elements of these problems, possibly the transportation element, do have similar features to a space program in which a large organization with many, many talents, science, engineering, managerial, lots of funding, are pointed at the development of a device or a large interrelated group of devices and systems.

There are others of these national needs which have quite different features, really quite different. They really are best attacked on a local basis but with nationally-generated R. & D. information.

I think, for example, the environmental program has many aspects. I think if you are tackling the environmental problem of the automobile, you do it on a national basis.

If you are tackling the environmental problem of some particular streams and air, you have to take the local conditions, the environment can be affected by the building of a canal, the environment can be affected by a relationship between one little creek and a mine drainage.

There are millions of things, so I don't think we should always think of a NASA-like approach to a national need. A determined and directed approach with lots of good information going right to the problem is the important thing.

Mr. WYDLER. Mr. Chairman, would you yield? I would like to comment on that statement, because over the years, as a member of this committee, I have heard these programs come up from time to time. The impression is given, I think, rather lightly, that there is somehow a switch in a space company. You have a switch turned on for producing a LEM vehicle, and then somehow the Congress can pass a bill and switch it into neutral and they pull the other way and

off comes water pollution equipment or something of this nature. It is simple as pulling a switch.

I think that is very misleading to the country to give people that impression that that really can be done, or is really a very practical approach to trying to solve manpower problems.

If you just think about it for 5 minutes, the NASA approach to building a vehicle to go to the moon, a company in that program dealt with one customer. He dealt with the Federal Government. But when a company would try to go from that type of an organization setup into doing work, we will say, in the water pollution field, in the sewerage field, the whole nature of what they are doing is different. Their customer isn't the Federal Government any more. They are going to have to go out and sell their equipment to 1,000 municipalities spread out all over the United States who buy water pollution equipment. They are going to have to deal with city governments and localities and things of this nature.

It is a totally different type of business, and to try to make it sound like you stop the production line for the space equipment and start, you know, the production line going for the water pollution equipment, I think is a very misleading type of thought to get into the minds of the people in the country that that is the way it is going to work.

I don't think it works that way at all, and I think if you analyze exactly what is involved in these programs, the differences of the nature and the way of doing business is, just to try to sell your product, you have to have a national sales force, and it begins from scratch with that.

You realize then that that type of conversion is something that will take years and years for any company to undergo it successfully if they could undergo it at all. It really takes restructuring the company from the top to the bottom. It is not just changing the product. That is just a little part of the whole problem that they undergo.

Thank you.

MR. SYMINGTON. I want to thank the gentleman for his, I think, correct description of the distinction between the methodology involved in meeting one national need and another.

I would say to this gentleman and the rest of us that that was not what was implied in my question. My question was: Have we assigned as a national need to be met the task, let us say, of providing reliable, clean, rapid transit for our cities?

Now, if this is a task which is unworthy of the Federal Government or improper for it to undertake, then let's settle the matter, but I doubt anyone would take that position.

So we get back to the conclusion, don't we, that it is a worthy task, and if it is a worthy task and if it is met in some reliable fashion, it is going to absorb many people of this country whose talents are relevant to it. Many of them happen to be unemployed.

I would think that if it is the position of NSF and of anyone else in Government that the NASA approach isn't going to work, and I never suggested that it would, I should think it would be the responsibility of the same entity to suggest a system that would.

DR. STEVER. Mr. Chairman, may I respond to that?

In the RANN program, in our new R. & D. Incentives program, we are tackling exactly that problem.

For example, in California, with the Jet Propulsion Laboratory, in cooperation with NASA, we have a technology transfer program in which the NSF contributes some money as well as NASA and the companies, and we are getting aerospace engineers involved with the city managers within the cities. I think the cities are Anaheim, San Jose, and a couple of others—Pasadena—and we are having some success, and the different nature of the business that is mentioned here is coming out. We are beginning to develop the added information that we need to tackle these new tasks.

Mr. SYMINGTON. Thank you, Dr. Stever.

Mr. Bell?

Mr. BELL. If the Congress wishes to expand R. & D. in line with S. 32, what agency do you believe is better equipped to carry out the program than the National Science Foundation; or would you suggest we create another new agency?

Dr. STEVER. You are speaking now of R. & D., and not expanding support of the end objects of R. & D.—like the transportation system and so on.

You are thinking of the process of R. & D.

I think the National Science Foundation can contribute very strongly to the research side of that including the applied research side. When it comes to demonstration, to development of a large system, whether it is a transportation system, or a health care system; or a system in public safety; then this should generally be assigned to a mission agency that has its greater strength in development.

There really is a difference between research, applied research, development, testing, and so on.

I think that in some areas where there is an overlap of some—or some project falls between the chairs, NSF can step in.

But, we have an agency that is created for transportation and it has many fine scientists, and engineers involved with it. I think we ought to put the pressure on the support for that agency to be able to come through with the needed systems.

Now, the NSF can help in research and applied research in a very important way, and as the programs grow, I think our programs in the area should grow.

Mr. BELL. You testified before that there are a lot of cracks that these things are falling in between?

Dr. STEVER. Yes. In some cases like energy which this committee has highlighted and studied—

Mr. BELL. And certainly, a lot of things are not getting done?

Dr. STEVER. I think we ought to look at them a little more carefully.

Mr. BELL. It seems to me the features of S. 32 do try to fill in more than the cracks, perhaps, but they are certainly trying to get the NSF, or some organization, to take some kind of action to get these problems solved.

We have not done very much in this field. You have mentioned a few things, but we are only scratching the surface.

Dr. STEVER. It is the beginning, yes. But, I think we also need more than the resources of NSF. We need the managerial and scientific resources within OST and OMB, and NSF, and the mission agencies, all working on the problems.

We all have something to contribute.

Mr. BELL. Since its inception, Dr. Stever, the NSF has expended millions of dollars in training scientists and engineers. In fact, we have trained so many of them that we have a surplus.

Some of them in my district are driving taxicabs today. Would it not be consistent with the previous effort of the National Science Foundation not only to educate and train individuals, but would it not be consistent with utilizing their skills and directing their talents in attempting to solve our pressing domestic problems?

Dr. STEVER. On the education side, we have already begun to redirect part of the science education program so that we are trying to work on the education which is needed in the civil science areas.

This, I think, we can do. NSF is already involved in some programs on the retraining program, and we find that we think the best chance of success is where we have a job to marry to. For example, there is a program in California, the California State colleges, and Fullerton State College is the focal point, and that is to find jobs for veterans with science training, and aerospace workers out of work, and they are going back to school under NSF sponsorship, and the State is contributing, and others; and the veterans organizations are, too.

They will be converted to science teachers in the inner city, and there are jobs available for them. In fact, when they go into the program they are already assigned to a particular section, a job in the city schools in Los Angeles.

So this marriage of a job and retraining is very important to us. We are trying this in a number of areas where we know the jobs are available. We have one at Emory University, at Stanford, I have mentioned the Fullerton one, and so on.

Now, I think these efforts should be continued as long as we have this problem. We can do more. I think you have pinpointed a capability of NSF, and it is a capability that should be shifted over to try to work on the new problem we have.

The CHAIRMAN. Doctor, have you had any contact with the system of State colleges in California, the Peralta system?

Dr. STEVER. The what?

The CHAIRMAN. The Peralta system.

They have four college under them. At Oakland Airport, they have taken over a machine shop where these people who want to go into this are trained directly at the airport. They use some of the personnel out there where they fit right into the scheme of things as they come along.

Dr. STEVER. Well, the marrying of job and retraining, I think is very important, because that is how we are going to solve the problem fastest.

The CHAIRMAN. Right.

Mr. SYMINGTON. Mr. Hanna?

Mr. HANNA. Well, I made the point that I wish to make, I think there has been a great deal of broad-brush strokes used on both sides. As indicated in Mr. Wydler's comment, people automatically think you can shift technology and science.

There have been equally broad-brush statements by us, but, in my judgment, unanimous by those who are supposed to be directing themselves to the problem. I am just not very satisfied with the finger painting by either squad. There has to be specific action and specifi-

cally what we can and should do. We have to get the mechanisms of Government directed to accomplishing them and forget the finger painting.

That is one of the reasons I am an author on this bill, not because I think this is the only way to go, but you have to put the pressure on to get some specific programs rolling. I believe we have to be masters of our own fate. We built this world that we are now living in, and we have got to make it work for us and for those who are going to pick up where we leave off. This is pressing on us very, very seriously.

Dr. STEVER. I agree.

Mr. HANNA. Therefore, I am anxious to hear from you and the other witnesses, where are the specific replies that we can get something done, like tomorrow? Then move on and accomplish those things that we cannot do until the end of the decade.

I agree with Chairman Miller. We did not get to the moon overnight. We took 10 years building a program that could then get us to the moon. To the public now, it seems like we did it overnight, but we did not. We are not going to overcome our environmental problems overnight; but we do have to have programs that begin to get something done, today, that will help us project ourselves into the decade.

Thank you very much.

Mr. SYMINGTON. Dr. Stever, you were present a couple of years ago, I think when we had the science panel on the role of technology in solving the urban crisis, and I think we laid to rest then, did we not, the myth that a NASA-type approach would be appropriate?

Dr. STEVER. Yes.

Mr. SYMINGTON. But it is the position of all of us, I would hope, that the mere fact that we are not going to use the same machinery does not absolve us of the mission and the need.

Mr. Mosher?

Mr. MOSHER. Dr. Stever, I have heard it said that proposed legislation here, at least two titles of it, is really only an extension or an extension of the RANN principle, and program in NSF.

As I sense it, as I understand this legislation, it really would go well beyond the mere extension of RANN, and I judge that it is at that point that you raise some doubts and questions in your testimony.

I speak particularly of where you say that the development, testing and evaluation activities proposed are more appropriately done in mission agencies.

Dr. STEVER. I said in most cases, sir. I think that as we do it in the RANN program currently, NSF can step up into those areas which meet certain criteria in which the people that we normally deal with have the talent, in which another agency doesn't have the full responsibility.

But you are quite right. The titles I and II do go far beyond RANN.

Mr. MOSHER. They would tend to put NSF in the business of managing some major demonstration projects, at least.

Dr. STEVER. In my words, the title I makes up a supra agency, one which puts the priorities on the other agencies and in fact gives them report cards, because in the bill it says that we would rate performance.

Mr. MOSHER. That is the crux of the doubts you raise?

Dr. STEVER. That is one of them. Title II puts us in the role of a supra agency, and title II makes us a development agency in a very wide spectrum of activities, development, testing, evaluation.

Mr. MOSHER. I merely wanted to sharpen that point, because I think it is certainly one, if not the most important issue that this committee has to consider about this legislation, whether we want to put NSF in that supra agency category, and recognizing that all of us, I think, want to accomplish the goals of this legislation, is this the best way to do it?

Dr. STEVER. Mr. Mosher, I actually think that it is a very timely subject for Congress to be involved in. The science policy of the United States has evolved pretty steadily in my professional life, during World War I and since World War II. There has been a study operation of the administration and the Congress on our science structure in this country, addressing it to particular needs as they came up. I think we are now at another point where we have to work out very carefully how we go at tackling these new problems. Agency goals can be changed, as witness the changing of NACA to NASA, basically a research and information agency, to an operating agency in space; the formation of the Atomic Energy Commission, and others.

We have continually done things to our structure and support and so on as need dictated. I think that we had better look with considerable care and exercise great wisdom in taking the next steps.

Mr. MOSHER. I am glad that the committee has the opportunity to consider this next proposed step. My mind is not made up at all against NSF's assuming this role as proposed here, but I think it is a question of such major importance that we have to consider it very thoroughly.

Mr. BELL. Well, relative to the NSF position, the basic research function of the National Science Foundation, if it were preserved and maintained by this bill, what objection would the NSF have to the passage and implementation of the concepts of S. 32?

Dr. STEVER. Well, I think before that is done, I think you and all the other parts of the administration would have to work out how practically this can work. You note I have used the term "supra agency" and it would be a supra agency. We already have management agencies—the operating departments, mission agencies, the OMB, OST, and other units of the White House. But this S. 32 agency would cut across—the NSF—would then cut across the work of the mission agencies which in many cases—not all cases—have this responsibility assigned to them. They appear at Congress every year to get money to do their jobs, and here would be an overriding agency.

I think you would have to work out something that Chairman Miller mentioned. How would this agency deal with the Congress? The NSF at the present time deals with four committees of Congress; the committees understand science very well; and there are two in each of the houses. They understand science very well; they understand the NSF way of working; they understand the NSF constituency, the science community that does the NSF work.

If this bill were to go through, the NSF might then have its programs draw the attention and surveillance of many other committees of Congress.

I think you have a problem of working on this, whether it would be a revamped NSF or any other supra agency, how do you deal with it?

Mr. BELL. Don't you agree, though, Dr. Stever, that all of these things that supposedly need to be done and aren't being done by these

so-called, as you refer to them, the goal organizations, or mission oriented programs, that maybe it is time for some kind of a coordinated effort by one organization to coordinate and to try to solve these problems?

These cracks are getting awful big that you are talking about, and there are an awful lot of things falling into them.

Dr. STEVER. Like the man who was standing with one foot on the dock and one on the boat, maybe you are making the crack a little wider for me. A lot of these things aren't just falling between the cracks, there are some important things being done.

I think, for example, the Atomic Energy Commission is tackling better atomic power, and atomic power offers some of the hope of solving our energy crisis in the decades ahead of us. In fact, if we don't come along with it properly, we will be in a crisis. The Atomic Energy Commission is hard at work in that area.

Our transportation system, while I don't like certain features of it, the fact is that we are making progress there, too. I once studied in your State of California and you were talking about going to the harbor in Los Angeles. I used to go from Long Beach—to Long Beach from Cal. Tech to go swimming, and it took a longer and messier trip than it does today.

So we are making progress. If we get ourselves trapped in the idea that we are not doing anything, I think we are creating another kind of trap. So let's give ourselves credit for doing something.

Mr. BELL. Dr. Stever, I don't want to belabor this, but you also don't have the unfortunate position or opportunity to have to see and talk with some of these unemployed people that my friend here from California has, and I have.

The CHAIRMAN. Which gentleman from California do you refer to?

Mr. BELL. Mr. Hanna.

The CHAIRMAN. You southern Californians recognize your problem, and you think it doesn't exist in other parts of the State. I have it as much as you do.

Mr. BELL. I would put you in the same category.

The CHAIRMAN. All right.

Mr. BELL. In addition to that, and perhaps you are not in this category, you don't have the constant problems with the environment that day after day aren't solved, like we have in Los Angeles, such as the smog. These things aren't getting done. If you tell anybody down in Los Angeles that these things are being done, just wait, they are being done, you wouldn't stay in office very long, I am afraid. So that is the problem we have, Dr. Stever. I think now, as far as the cities are concerned, we are talking about a lot of things, but I think there comes a time in our national life where we need action, and we need action now, and we are not getting it, really.

These problems are only being scratched. Nobody is making a centralized effort to get on with them, to get the job done. That is what I am objecting to. I think the time has arrived for some kind of action and the people want it, and that is what I think Mr. Miller and Mr. Hanna and myself are really thinking about. We are from a State where these problems are hitting us every day.

Mr. MOSHER. Mr. Chairman, could I just ask a further question?

Since S. 32 came over the horizon, I am sure you have done a lot of discussing with many people in and out of the NSF.

Hasn't a proposal ever been made that another type of organization would be better?

It is not clear in my own mind.

Dr. STEVER. Yes, this proposal has been discussed. It has been discussed in the past in science councils, and I think probably your committees here have occasionally talked about it.

I think the concept of this type of organization would be to take those problems which someone else is working on and try to run as fast as one could until it became clear that there was another agency to take over.

For example, that is similar to the way the ARPA works in the Department of Defense. They do the early research and development and even to testing, and then it is turned over to one of the armed services branches.

Yes, I think this is a possibility.

Mr. MOSHER. There wouldn't be any real reason to go in that direction to create a new organization, unless it could be successfully argued that the direction that this bill takes us would seriously threaten the integrity of the NSF.

Dr. STEVER. I think we have to look very carefully at that particular point. You know, problems involving science are not ever going to disappear from the face of the earth, and NSF's biggest contribution in the past is in the basic science area.

A lot of the problems, for what would we do today and in the next few years, the solutions are coming out of the science that was done in the past, and the problems that face this country 20 years and 30 years from now will come out of the science that is done today, and NSF has that role.

That is our principal role, and we can't give up on it. It is the seed corn of ideas.

No matter what is done in reorganization of the Government, of NSF, or anything else, to do these kinds of jobs in civil science, we must not hurt our basic capability.

Mr. BELL. If the gentleman would yield again. Dr. Stever, do you think S. 32 requests that National Science Foundation give up its basic functions?

Dr. STEVER. No; but, Mr. Bell, I would point out that there are many in the pure science community, including in your own State, where, as you pointed out, there are a large number of them, they are concerned that NSF, if it spreads its aim to wider features, will take its eye off the ball.

I think we can show so far that the RANN program, the broadening of NSF, has not yet hurt our capability in that area, but there is constant concern about that.

Mr. BELL. I really don't see that that is going to affect your basic research. Are you trying to say, then, that you can't have basic research and applied research both, that you can't do both?

Dr. STEVER. There are some who say that. I personally think one has to be very careful to keep them going, but I think it can be done.

Mr. SYMINGTON. Mr. Wydler?

Mr. WYDLER. The chairman commented that you didn't seem to be embracing this bill, and its provisions, very warmly.

I think, if I understand the legislative situation, that probably these hearings are mainly informational in character, so that you may

have the information that I think is the situation in the House right now.

The rules committee, of course, which controls the flow of legislation to the floor of the House has promulgated its own rule that they aren't going to consider any new legislation that isn't already before them.

I think it was as of last night.

So this bill could never get a rule and come before the House for consideration in this session. Possibly it can in a future session.

I thought you would like to have that information for your own purposes in making whatever plans you want to make.

The point I was trying to make before about trying to turn on and off the production lines, I looked at it from a negative point of view, which is that I don't think that is a practical solution to manpower problems. Because the period between the transition is so great that, practically speaking, they have to do something else while waiting for the conversion that we always talk about to take place.

In the meantime, they are unemployed and out of work. Although there are plenty of them in California, there are plenty of them on Long Island as well.

But I can't help thinking along these lines, Doctor, and, again, probably mainly as a legislator who has some responsibility to the people involved in the programs as well as the programs themselves, that is, that I find a great many Members of Congress say, very, very lightly, that we have to reorder our priorities in this country. That may take many forms when it comes to the actual legislation and what we do about programs.

For example, in the space program, we found many Members of the House and Senate calling for enormous cuts in the space program and some of them proposing in effect that we do away with it as something that was wasteful of our national resources and funds.

What always gets me is that often these very same people are the ones that have a smaller cut than they are proposing. When people are laid off as an inevitable result, they are the ones who come running forward with "Here is a piece of legislation to put those fellows to work that have been thrown off the lines." They believe we are going to reconvert everything or change the lines, or help them by giving them a Government grant.

What we find is that we are spending the Federal Government's money not to build some space vehicle, which you could argue would have more or less value, but, in effect, WPA-type projects where we are really going out looking for anything to put these people to work. We are using the same Government funds if we kept them on the line working productively in the space program or other Government-related programs.

To me, this has been a thing that has bothered me the most, because I sit here and listen to it coming and going.

We hear now we must have this program to find jobs for men displaced from the space work. I don't want to comment on the programs themselves, because I don't think they are very successful in finding jobs for people.

But be that as it may, it seems to me the way to look at this thing from an order of priorities is that if you have a program that is fairly successful, the man is better off if that program goes

on rather than depending on the promised program that might be down the line for him in the future.

I would like to ask you one question, Doctor. You talk here a great deal about giving everything to the National Science Foundation. If that were to be done, how would that relate, for example, to the water pollution control bill, which I understand is about to come out of conference and about to be passed by the House and Senate in final form.

It is going to be, I understand, about a \$25 billion bill, much of that money is going to go for the purchase and installation of anti-pollution equipment all across the United States of America.

Would you see under this bill, this umbrella-type arrangement with NSF running that program? I don't understand where that fits in, in other words. How would that fit in with this whole scheme of things?

Dr. STEVER. With the amount of money that is in title II, I am quite sure that NSF, or any other agency, given that responsibility, which is again a coordinating and boss role—that agency would have to select very carefully the particular national needs which it tackled, and I would suspect if there is a large bill in water pollution control, that that might not be one of the areas tackled.

But I think you have pointed out that Congress and the administration, have many actions going in many of these national needs already, and somehow we have to make those actions more effective.

I think, as I say, that they are producing, and we want to continue to make these produce better, and I think NSF and other agencies should turn to make them more—make them produce better. That is the object of the RANN program.

Mr. SYMINGTON. We have another witness.

Thank you very much, Dr. Stever.

I think your legislative staff was informed concerning the legislative situation in the House, so you weren't learning anything new there.

Dr. STEVER. Yes, sir.

Mr. SYMINGTON. We are anxious to get your views on this, and will probably ask you back for more views and comments.

Thank you ever so much for your kindness.

Dr. STEVER. Thank you, Mr. Symington, thank you.

Mr. SYMINGTON. Our next witness is Dr. Edward Wenk, Jr., chairman, Committee on Public Engineering Policy, National Academy of Engineering. He is also the director of the program in social management of technology at the University of Washington. He is former executive secretary of the President's Council on Marine Resources and Engineering Development.

Dr. Wenk, we welcome you here, and we will be pleased to hear your testimony.

(A biographical sketch of Dr. Wenk follows:)

EDWARD WENK, JR.

Place of Birth: Baltimore, Maryland.

Date of Birth: January 24, 1920.

Education: Johns Hopkins, B.E., 1940, with honors; Harvard, M.Sc., 1947; Johns Hopkins, Dr. Eng., 1950.

Brief Career Summary: 1942-56—Head, Structures Division, David Taylor Model Basin, U.S.N., Washington, D.C.; Navy specialist on submarine strength; 1956-59—Chairman, Department of Engineering Mechanics, Southwest Research

Institute, San Antonio; 1959-61—Sr. Specialist, Science and Technology, Legislative Reference Service, Library of Congress, Washington, D.C. (First Congressional Science Advisor); 1961-64—Technical Assistant to President's Science Adviser, White House, Washington, D.C., and Exec. Secretary, Federal Council on Science and Technology; 1964-66—Chief, Science Policy Research Division, Legislative Reference Service, Library of Congress, Washington, D.C.; 1966-70—Executive Secretary, National Council on Marine Resources and Engineering Development, Executive Office of the President, Washington, D.C. (Appointed by President Lyndon B. Johnson and Richard M. Nixon); and 1970—Professor of Engineering and Public Affairs, University of Washington, Seattle; Programs in Social Management of Technology and Marine Affairs.

Additional Professional Activities: Visiting Scholar, Woodrow Wilson International Center for Scholars; Consultant to White House, National Science Foundation, Congressional Research Service, several Congressional Committees, and several industrial organizations; Board of Directors, URS Systems Corporation; Member, President's National Advisory Committee on Oceans and Atmosphere, 1971-72; Chairman, Committee on Public Engineering Policy; and Chairman, Study of Priorities for NSF, RANN; National Academy of Engineering.

Awards: Tau Beta Pi; Sigma Xi; Chi Epsilon; Sigma Xi, and Wm. M. Murray Lecturer; Univ. Rhode Island, Dr. Sc. (Hon.), 1968; National Academy of Engineering; Ford Foundation Fellow, 1970; Navy Meritorious Civilian Service Award.

Other Affiliations: National President, Society for Experimental Stress Analysis, 1957; American Society of Civil Engineers; American Society of Mechanical Engineers; National Society of Professional Engineers; Pressure Vessel Research Committee; National Oceanography Association; AAAS; Cosmos Club; Previously Reviewing Editor of journals *Engineering Mechanics* and *Experimental Mechanics*; Editorial Board, *Ocean Management*, Registered Professional Engineer.

Noteworthy Special Work: Numerous publications in fields of engineering mechanics; submarine analysis and design; science policy; government organization for science policy; roles of the engineering profession; marine affairs; environmental affairs and technology assessment. Author of criteria for design of submarines, of concepts of deep diving submarines and designer of ALUMINAUT, 1959. Presidential, Vice Presidential and Congressional adviser on national science policy, scientific manpower policy, federal organization for science, International Decade of Ocean Exploration, treaties on seabed legal regime and disarmament and coastal environment. Advisor to United Nations Secretariat, UN Conference on the Human Environment, held in Stockholm in 1972. Author of book, "The Politics of the Ocean," 1972.

#### STATEMENT OF DR. EDWARD WENK, JR., CHAIRMAN, COMMITTEE ON PUBLIC ENGINEERING POLICY, NATIONAL ACADEMY OF ENGINEERING

Dr. WENK. Thank you very much, Mr. Symington. Mr. Miller and members of the subcommittee, it is a great privilege to appear before this committee on an issue of such great portent to the future of our Nation and to countless individuals who seek to contribute more effectively the fruits of training and experience in science or engineering to the unmet needs of our society. It is also a special pleasure to renew a long and treasured acquaintanceship with members of this committee.

Through your continuous and intensive study of national science policy, you have received much learned testimony on the role technology has played in meeting the hopes and aspirations of our citizens and I do not believe I could add to that general perspective. In this brief statement, I shall try instead to focus on specific objectives and provisions of S. 32 that may require analysis and possible amendment.

I must confess that I do not completely—interpretation of S. 32 objectives—share Dr. Stever's views about the present state of the situa-

tion. He has given a most eloquent defense of ongoing activities, and I think he quite properly took a view that many of the goals recognized in S. 32 are the legislative missions of other agencies and, therefore, there is a problem of stepping on their toes. Some of us have come to recognize that Washington has wall-to-wall toes. If one begins with excessive caution about overlapping missions that have not been implemented, we will have great difficulty making any progress.

I should indicate that although the Committee on Public Engineering Policy of the National Academy of Engineering has been wrestling with these issues for the last 2 years, so that I have the benefit of their judgments, there has not been ample time to consult with my colleagues so as to develop any consensus as to explicit views on this bill. On one thing I am certain, however: that they are profoundly grateful that you have requested testimony from a representative of the Academy.

Mr. Chairman, if I may submit my full statement for the record and just provide extracts from it, that would provide more time for questions.

Mr. SYMINGTON. Yes.

Dr. WENK. In 1972, we are asking how the development of technology—rather than science—will generate corresponding increments of social satisfaction. And how—at a policy level—to face the challenge of matching technical prowess with political wisdom and social responsibility.

That is my interpretation as to what S. 32 is all about.

It would seek to focus the potency of scientific discovery and technological innovation on a compelling litany of grievances: urban decay, transport congestion, dehumanization of the individual, hazards from crime, pollution of the environment, and failure to meet needs for social justice of the politically unrepresented. Perhaps now realizing there is no utopia, neither is there validity to apocalyptic views that technology is a new social disease of such potency that our only salvation is to turn it off.

Indeed, I reject that notion. In the face of these concerns and confusion, it is essential to consider policies and mechanisms by which society cannot only cope with this shadow that technology appears to cast on our future, but to steer this resource to collective goals. The very essence of Western thought demands that man not lose control over his own destiny but subject the whole technological process to conscious human guidance, and that is what some of us have chosen to call the social management of technology.

First, regarding national technology policy, S. 32's declaration of policy, section 2. Your committee has mounted a continuing inquiry since 1964 on the goals and the structure of national science policy. At first, you mainly received testimony that dealt with science and with ways to sustain its health, but not with technology. In recent years, the focus of your inquiry broadened. In that context, I should note that the thrust of this bill is toward national technology policy. The distinction is of some importance in its focus relatively more on utilization of scientific knowledge than on its generation. This involves quite different ends as well as means, different interest groups, institutions, and institutional behavior.

Section 2(a)(2) focuses on policy for utilization of the manpower pool of scientists and engineers that constitute an invaluable national resource. Such a policy is long overdue. Previously the Federal Government did, as a matter of national policy, undertake education and training to enrich that pool in the aftermath of the Soviet space surprise. A wide range of subventions were instituted through many agencies, largely in relation to national security. But once the urgency subsided in the glow of long-sought international amity, the Government neglected to face up to a utilization counterpart of its education responsibilities. That indifference has been a cruel blow to many talented individuals and their families, as you gentlemen have brought this out this morning, who were innocent recipients of contraction. But such oversight is equally a burden on the citizens who made the original public investments. A serious inquiry is warranted as to other nonmilitary needs that could be better met with a farsighted manpower policy.

Two factors underpin any such policy planning for effectively utilizing manpower. The first concerns a balance in priorities on civilian as compared to national security innovations, for sponsoring research and creating employment opportunities. The second point is the need for stability in Federal investments and policy related to manpower because of the social as well as economic costs of the slot machine operation. We have had literally a slot machine approach where we have invested a certain amount of money for a certain product and then turned away. I believe that we had a clear policy in converting civilian capabilities to military, but we have neglected the obverse, and this bill makes a fresh start at opening that issue.

In this regard, it may be worth recalling that momentum of our Nation's technological enterprise is spurred by two concurrent forces. The first is a suction of need; the second is the pressure of new scientific discovery and invention. Our greatest challenge lies in finding the institutional vehicles by which we couple these two forces together. In the case of consumer goods, private entrepreneurship and incentives of the marketplace have worked reasonably well. But in the case of health care, housing, education, transportation, nutrition, urban safety and tranquility, and communications, the marketplace has not operated effectively. Technical solutions cannot be prescribed as simply; the market is often disaggregated; customer consensus is less assured; and the locus of decisionmaking is distributed to local and State governments. The transfer route for science and engineering between knowledge producer and knowledge consumer is ambiguous and organizationally undefined.

As again brought out this morning, NASA as a single agent of technological coupling in the space field simply does not exist in these other areas.

The Federal Government may thus have to foster a surrogate entrepreneur, market analyst, and information broker toward that end.

#### GOAL IDENTIFICATION

Title I thus properly focuses on policy and priority setting for civilian research and engineering to meet this dilemma. Section 103 hits directly at the need for problem definition; that is, what to do and what to do first. In many respects NSF's RANN program seems de-

signed to fulfill this function. I might add, incidentally, that the NSF director and RANN staff have called on the NAE Committee on Public Engineering Policy to indeed identify priority areas of civilian research and engineering likely to contribute to the resolution of national problems. This effort which already shows promise as a first attempt at priority setting across the board, due for completion in March, will lead to advisory reports to NSF that will be made public.

But whether NAE or other bodies undertake such inquiry, I subscribe enthusiastically to the spirit of the bill in section 106(3) that requires an annual report that would presumably synthesize recommendations from all sources including other Federal agencies, and provide the President and the Congress with an opportunity to express their explicit views as to priorities.

We have no such annual report today. The Office of Science and Technology has been encouraged for many years to prepare such reports. It was publicly announced 2 years ago that they were requested by President Nixon to prepare such a document. It has not been released.

These reports could be employed inside the Federal Government in preparing implementation plans. Outside, universities and industrial interests could then gain a far more accurate perspective of target areas for research proposals and cut down the vast effort in proposal preparation that in my view is a pathological condition of the entire research and development enterprise.

#### INVENTORY OF FEDERAL PROGRAMS

Section 106 calls for analysis of all Federal R. & D. expenditures. To implement that requirement, a far better inventory than is now available should be prepared on what is going on today, where, with whose funds and to what effect.

We do not have that information. There is no central catalog of all the research and development in the field of civilian activity going on in the Federal Government, much less outside, on the basis of which any analysis could possibly be made. There is one exception. The \$600 million marine science and technology area is one of the few where annual reckoning of ongoing efforts in all Federal agencies is required by legislation, thanks largely to congressional initiative.

#### DEMONSTRATION PROJECTS

Title II deals with "Civil Science Systems"—a charge to utilize the power of modern systems analysis through applied research and demonstration projects to design and develop improved services to our citizens. Again, the objective is not only commendable but urgent. There is overwhelming evidence that frustration is mounting in almost all areas of public services, with a wrenching paradox of unsolved problems residing side by side with underemployed scientists and engineers.

As a resident of Seattle, I have witnessed this challenge and have seen only scattered, uneven efforts at resolution. Most important, the theme of this title is to go beyond the idea stage to prototype testing and demonstration, partly to confirm validity of design and research, but also partly to persuade the potential customer of the attractiveness,

utility, and economy of the innovation. We long ago adopted this practice in military hardware development. We have been shortsighted in practicing an artificial thrift in being unwilling to experiment on the civilian side and risk failure.

#### ROLE OF STATE AND LOCAL GOVERNMENT

When we talk about demonstration, we need to recognize that most of the services to be examined and improved are delivered to the citizen by State and local governments. Title II may not adequately reflect their key role. Two studies released this spring highlighted not only the involvement by such governmental units but their limitations in dealing with sophisticated technology. The Committee on Intergovernmental Science Relations of the Federal Council for Science and Technology stated that:

This newer application of science and technology is being applied directly to problems which are basically the responsibility of state and local governments . . . The main thesis of this report is that state and local governments, to a large extent, are not prepared to handle this public technology role, and that the federal government is doing far too little to involve those units of government in the formulation of science and technology addressed to domestic needs.

A companion report by the Council on State Governments observed that:

Somehow the political system was not penetrated to any significant way by all of this new knowledge about how to solve problems and manage the future.

Said the Council:

State governments have a growing need for a new public technology—that is, technological innovation to increase productivity in delivering services to the citizens . . . The basic scientific knowledge for the solution of many problems facing state governments is already at hand. The unfinished business is that of applying it.

That the Federal Government has a key leadership role to energize the evolution of more productive delivery systems is widely agreed upon and seems to be the goal of section 202(a), but, where so much of the delivery is decentralized through the State and local governments, their involvement should be provided for. I do not believe the representation in section 6(d) by these individuals simply on an advisory committee is adequate. More needs to be done to recognize the role of State and local governments.

#### THE CONCEPT OF TECHNOLOGY SYSTEMS

To lend perspective to further discussion of the bill under title II, it is important to clarify certain definitions. First, we should not equate R. & D. to science and technology.

I should like to suggest that technology is the entire process of applying knowledge, a whole ensemble of physical, legal, economic, political, and social processes—and institutions. It then becomes easier to understand what we mean by the notion of a technology delivery system that has been implicit to discussion thus far.

I suggest we define the term explicitly: Each technology delivery system is specialized to provide TV sets, or frozen foods, or urban transportation, or health care. These are outputs. For each, we have inputs of knowledge, of capital, of trained manpower, of natural re-

sources. These are mobilized by an array of institutions: university research laboratories, private industrial corporations, interest groups of various kinds, but with involvement also of Federal agencies and regulatory bodies, congressional committees, State and local governments. All are interconnected by a series of complex relationships shaped by the marketplace and by public policy. Technology thus becomes an organizing principle, to focus this otherwise random set of players on one objective of a selected output.

This leads to a point about terminology of S. 32. The activity associated with title II extends so much beyond science that in the first instance I would suggest amending the phraseology to "Civil Technology Systems" rather than science systems. This is more than semantics because an entire concept is involved.

In this regard, while we deal with the technology delivery system in the context of intended outputs, we must pay attention to the unintended.

One of the most enigmatic qualities of our technologies is their capacity to produce unplanned effects, some transmitted geographically or sociologically remote from the focus of action, some in hibernation to produce effects much later in time. Some of these externalities may be unwanted, even dangerous. This Science and Astronautics Committee has distinguished itself by its understanding of this characteristic and by propositions for technology assessment that have found their way into national environmental policy. It is desirable to make, as a matter of national policy, the necessary assessment of social, economic, and institutional as well as environmental impact of initiatives developed under title II, as a concomitant feature of new and hopefully improved systems. Efficiency should not be the only criterion of superiority when comparing alternative systems.

Section 208 especially singles out applied social research, an emphasis I should like to endorse. We have all heard about some promising innovation that has been deterred from application by so-called cultural or institutional barriers. Updated building systems and automated ships represent examples whose solution may lie in such inquiries. More fundamentally, we have encountered difficulty in identifying what a pluralistic society considers as its value preferences; and yet we need such social indicators—like economic indicators—if we are to make urban transportation, by way of example, serve society.

#### FEDERAL AGENCY JURISDICTION

Title II would assign all these functions to the National Science Foundation. At the outset, it is self-evident that many of these civil functions already fall within the orbit of existing Federal agencies. Yet, for a variety of reasons, they have not been able to respond to the challenge of innovation. They have often lacked funds, internal research capabilities, and experience.

But you gentlemen know far better than I that they are often the captives of history and a long sequence of comfortable relationships with outside clientele who may be found inhibited by tradition or anxieties over disruption of the status quo. If the Congress uses the possibility of duplication as the reason for dropping title II, nothing new may happen and the paradox mentioned earlier will go unbroken. Breaking new ground in a different agency, especially to the point of

demonstration, could have a salubrious effect in the department whose primary mission is involved, and furnish the grist for their own initiative to follow through. The threat of competition may be the best road to refurbishing the outlook of old-line agencies.

#### A NATIONAL SCIENCE AND CIVIL TECHNOLOGY FOUNDATION

Whether the NSF is the appropriate body, or whether some other agency, or an entirely new one, is the appropriate host needs careful study. NSF's origins, its life style, its relationship largely with university clientele could be seriously upset, so that its present mission capability could be debilitated.

A major organizational clarification, for example, would be to create a National Science and Civil Technology Foundation, with two separate but symmetrical internal administrations. One would comprise most of NSF's current structure dedicated to strengthening science and engineering resources—that is, knowledge production. The second new administration could focus on knowledge consumption with necessary internal interconnections.

#### ADVISORY COUNCIL

The Advisory Council provided for in section 206 is extremely important and the integration of members from different disciplines and user groups is excellent. Such a body could help define what is needed from the point of view of the knowledge consumer, and how new policy might affect them. They could evaluate how well the function is being performed.

To combine representatives of Federal agencies having similar interests within this body bears examination. I believe that the combination of insiders and outsiders into one body confuses roles and would make it unlikely that either of the objectives could be successfully obtained. Federal agencies can't evaluate their own performance, and certainly they can't evaluate that of their sister agencies.

#### COORDINATION

The problem of coordination is important, and simply because these functions are carried out in other agencies makes this a major question to examine from a policy point of view. I do not believe the Advisory Council provided for has the horsepower to do the job.

The Federal Council for Science and Technology was created by Executive order—was created for this purpose, but it was not developed by legislation, and it has had a checkered career as to effectiveness. In the 10 years since the Office of Science and Technology was created by legislative act, the Federal Council continues by Executive order, and no committee of Congress has examined its capability to meet its responsibilities.

I would submit that the alternative of the Marine Council, created by Public Law 89-454 as a policy planning and coordinating body, deserves study as a possible model. In any event, the essentials of transagency activities should be thought of as far more than inter-agency coordination, important as that is. The opportunity exists here for a systems approach to public administration, but it will take

considerable thought to design the appropriate machinery perhaps, as I have proposed elsewhere, by the creation of a Council of Technology Advisors.

I would also suggest that the chairman of the advisory body be selected by the convening authority, not the body itself; either the agency head, or, considering the importance of the functions, the President of the United States. The Office of Science and Technology should be included as an observer in the group of Federal agencies designated by section 206 (c) as nonvoting members.

#### STRENGTHENING POLICY RESEARCH CAPABILITIES

Section 209 on research and design of technology delivery systems has obvious merit, but there is a presumption of availability of well-trained, research capabilities. There is considerable evidence as to the difficulty of conducting the necessary problem-oriented, multi-disciplinary research. Such capabilities are not widespread, and certainly do not match the demands that would be placed on them by S. 32.

Earlier, we noted that more than hardware is involved. More sophisticated approaches must recognize complex social systems, and ways they must be integrated and orchestrated to employ the fruits of scientific discovery to properly account for multivariable interactions and interdependencies. Social and behavioral scientists must join in partnership with engineers in this pursuit.

Such research capabilities should be encouraged as a matter of national policy. A necessary, albeit not sufficient, condition for their generation is stable financial support. The centrifugal forces that thwart building interdisciplinary teams cannot be countered if funds via project grants are short term, uncertain, and highly sensitive to whatever project priority is in vogue.

The National Science Foundation already has authority, structure, and programs to generate these capabilities. Your committee demonstrated an interest in NSF's activities during your 1973 authorization. I am not sure you developed information, however, on how meager and uncertain are NSF funds for this area.

Title II should thus address the generation and nourishment of such research capabilities that are critically essential to carry out its operating provisions.

#### NEEDS FOR EXAMINATION OF NATIONAL POLICY

These comments have necessarily been brief and not intended to be comprehensive. But if we are to focus the Nation's technical talent and resources on the Nation's priority problems, we need a policy bridge. S. 32 is a rough approximation of a needed blueprint.

The bill was generated from a commendable concern over conversion of technical capabilities to civilian problems. There was, however, no comprehensive examination of the roots of a national technology policy, with all of its ramifications as to governmental structure, goal setting, resource allocation, intergovernmental relations, interagency integration, et cetera.

I urge this committee to consider the objective sufficiently portentous to undertake the next steps of legislative refinement to produce a

broad and flexible policy framework that can then be filled in as experience develops from pilot projects.

I would also urge that the policy backdrop be suitable to strengthen programs in existing agencies as well as creation of any new entities.

I do not believe you should wait to try to do every possible thing in the legislation, but to get started.

Thank you very much.

(The prepared statement of Dr. Wenk follows:)

PREPARED STATEMENT OF DR. EDWARD WENK, JR., PROFESSOR OF ENGINEERING AND PUBLIC AFFAIRS, UNIVERSITY OF WASHINGTON, AND CHAIRMAN, COMMITTEE ON PUBLIC ENGINEERING, NATIONAL ACADEMY OF ENGINEERING

Mr. Chairman, Members of the Subcommittee on Science, Research, and Development: It is a very great privilege to appear before your Committee on an issue of such great portent to the future of our nation and to countless individuals who seek to contribute more effectively the fruits of training and experience in science or engineering to the unmet needs of our society. It is also a special pleasure to renew a long and treasured acquaintanceship with members of this Committee.

Through your continuous and intensive study of national science policy, you have received much learned testimony on the role technology has played in meeting the hopes and aspirations of our citizens and I do not believe I could add to that general perspective. In this brief statement, I shall try instead to focus on specific objectives and provisions of S. 32 that may require analysis and possible amendment. In so doing, I should indicate that although the Committee on Public Engineering Policy of the National Academy of Engineering has been wrestling with these issues for the last two years so that I have the benefit of their judgments, there has not been ample time to consult with my colleagues so as to develop any consensus as to explicit views on this bill. On one thing I am certain, however, that they are profoundly grateful that you have requested testimony from a representative of this Academy.

#### RATIONALE OF S. 32

First, a brief perspective. With heightened perception that the promise of technology in meeting human needs has not been fulfilled, it is usually assumed that the present dilemma is characteristic of a new age. Yet, there is a long history of policy level concern, if not effective action. One report has stated: "The most important general conclusion to be drawn from this study is the continuing growth of the already high and rapidly developing technology in the social structure of the nation. In view of the findings regarding the importance of technology and applied science (in relation to civilian needs) it is recommended that the Federal government develop appropriate agencies for the continuous study of them." Surprisingly perhaps, the date was 1937. The report "Technology Trends and National Policy" was prepared for the President's National Resources Commission.

That call for Federal initiatives, however, received modest response. Nevertheless, triggered by World War II, science and technology over the next 30 years did receive increasing and usually uncritical promotion as the hope for improvement of mankind. They were expected by our national leaders: "to end poverty and inaugurate prosperity," "provide universal equality of opportunity," "bring a radical increase in individual freedom," "replace work by leisure for most of mankind," "tap fresh water for desert dwellers." Most of all, we were assured after World War II that science and technology would bring us stable and durable world order.

Such unadulterated expectations were not without foundation. Agricultural technology spawned civilization. First freed from drudgery of hand labor, then favored with better nutrition, housing, health and education, countless millions found technological progress gave flower to their talents, dreams and ambitions.

Post World War II enthusiasts taught that science was an endless frontier of beneficence. Science and technology were amplifiers of man's muscle and man's mind. They provided amenities to protect man against the hostile conditions and caprice of nature. But they also vastly altered institutions, life styles and even basic values. The new scientific understandings and engineering wonders that

grew exponentially were now followed by a recognition that a better comprehension of the physical universe in no way guaranteed by itself any improvement in the human condition. On the contrary, science and technology have been found amplifiers of other human characteristics beyond mind and muscle. They were amplifiers of defects in our social institutions, of conflicts in values, and of social appetites. The magic of technology has enhanced aspirations and thus widened the disparity with fulfillment.

Now in 1972, we are asking how the development of technology—rather than science—will generate corresponding increments of social satisfaction, and how—at a policy level—to face the challenge of matching technical prowess with political wisdom and social responsibility.

That is my interpretation as to what S. 32 is all about.

It would seek to focus the potency of scientific discovery and technological innovation on the compelling litany of grievances: urban decay, transport congestion, dehumanization of the individual, hazards from crime, pollution of the environment and failure to meet needs for social justice of the politically unrepresented. Perhaps now realizing there is no utopia, neither is there validity to apocalyptic views that technology is a new social disease of such potency that our only salvation is to turn it off.

Indeed, I reject that notion. In the face of these concerns and confusion, it is essential to consider policies and mechanisms by which society cannot only cope with this shadow that technology appears to cast on our future, but to steer this resource to collective goals. The very essence of Western thought demands that man not lose control over his own destiny but subject the whole technological process to conscious human guidance. Such guidance could well be called the *social management of technology*.

S. 32 would seek to identify priority areas where science and engineering could contribute to national purposes. It would provide machinery to undertake necessary research and demonstration of systems that would provide improved public services, and it would foster transition of scientific and technical manpower from security related programs that have been terminated or reduced to other civilian-related activities.

All of these objectives are consistent with the broad desire to strengthen public management and responsibility. Ways and means provided for in the bill however, deserve very careful scrutiny as to alternatives.

#### DECLARATION OF POLICY

First, regarding the declaration of policy, Section 2. Your Committee has mounted a continuing inquiry since 1964 on the goals and the structure of national science policy. At first, you mainly received testimony that dealt with science and with ways to sustain its health, but not with technology. In recent years, that focus of your inquiry broadened. In that context, I should note that the thrust of this bill is toward national technology policy. The distinction is of some importance in its focus relatively more on *utilization* of scientific knowledge than on its *generation*. This involves quite different ends as well as means, different interest groups, institutions and institutional behavior. Especially, as brought out later, it involves a concept of technological systems.

Section 2(a) (2) focuses on policy for utilization of the manpower pool of scientists and engineers that constitute an "invaluable national resource." Such a policy is long overdue. Previously the Federal government did, as a matter of national policy, undertake education and training to enrich that pool in the aftermath of the Soviet space surprise. A wide range of subventions were instituted through many agencies, largely in relation to national security. But once the urgency subsided in the glow of long sought international amity, the government neglected to face up to a utilization counterpart to its education responsibilities. That indifference has been a cruel blow to many talented individuals and their families who were innocent recipients of contraction. But such oversight is equally a burden on the citizens who made the original public investments. A serious inquiry is warranted as to other non-military needs that could be better met with a farsighted manpower policy.

Two factors underpin any such policy planning for effectively utilizing manpower. The first concerns a balance in priorities on civilian as compared to national security innovations for sponsoring research and creating employment opportunities. The second point is the need for stability in Federal investments and policy related to manpower because of the social as well as economic costs of the slot machine approach. There is great flexibility in this knowledge producing

and knowledge transferring capability. This was proved in the fantastic acceleration of the Manhattan project and the space effort when, before either, specialists in nuclear or space science and technology were unknown. But then we had a policy to convert civilian capabilities to military. We have neglected the obverse. This bill makes a fresh start at opening the issue.

Section 2(b) treats the level of support as a matter of policy—a matter that may deserve detailed study. Parity between military and civilian programs may be arbitrary. The level to sustain a full employment economy may prove as illusory as other measures toward that end. More to the point is the need to couple science and engineering to human needs more effectively—and continuously. For the immediate future, levels should respond more to sharper perceptions, analysis, experimentation and management on the basis of rational justification than by formula.

In this regard, it may be worth recalling that momentum of our nation's technological enterprise is spurred by two concurrent forces: The first is a suction of need; the second is the pressure of new scientific discovery and invention. Our greatest challenge lies in finding the institutional vehicles by which we couple these two forces together. In the case of consumer goods, private entrepreneurship and incentives of the market place have worked reasonably well. But in the case of health care, housing, education, transportation, nutrition, urban safety and tranquility, and communications, the market place has not operated effectively. Technical solutions cannot be prescribed as simply; the market is often disaggregated; customer consensus is less assured; and the locus of decision making is distributed to local and state governments. The transfer route for science and engineering between knowledge producer and knowledge consumer is ambiguous and organizationally undefined. Contrast, for example, NASA as the single technological coupling agent in the space field.

The Federal government may thus have to foster a surrogate entrepreneur, market analyst and information broker toward that end.

#### SETTING OF RESEARCH PRIORITIES, TITLE I

Title I thus properly focuses on policy and priority setting for civilian research and engineering to meet this dilemma. Section 103 hits directly at the need for problem definition; i.e., what to do and what to do first. In many respects NSF's RANN program seems designed to fulfill this function. I might add, incidentally, that the NSF Director and RANN staff have called on the NAE Committee on Public Engineering Policy to indeed "identify priority areas of civilian research and engineering likely to contribute to the resolution of national problems." This effort which already shows promise as a first attempt at priority setting across the board, due for completion in March, will lead to advisory reports to NSF that will be made public. But whether NAE or other bodies undertake such inquiry, I subscribe enthusiastically to the spirit of the bill in Section 106(3) that requires an annual report that would presumably synthesize recommendations from all sources including other Federal agencies, and provide the President and the Congress with an opportunity to express their explicit views as to priorities. These could then be employed inside the Federal government in preparing implementation plans. Outside, universities and industrial interests could then gain a far more accurate perspective of target areas for research proposals and cut down the vast effort in proposal preparation that is a pathological condition of the entire research and development enterprise.

Section 106 calls for analysis of all federal R and D expenditures. To implement that requirement, a far better inventory than is now available should be prepared on what is going on today, where, with whose funds and to what effect. Information would need to be catalogued by objective rather than field of science that NSF already publishes. The \$600 million marine science and technology area is one of the few where annual reckoning of ongoing efforts in all Federal agencies is required by legislation, thanks largely to congressional initiative.

#### DESIGN AND DEMONSTRATION OF CIVIL TECHNOLOGY SYSTEMS, TITLE II

Title II deals with "Civil Science Systems"—a charge to utilize the power of modern systems analysis through applied research and demonstration projects to design and develop improved services to our citizens. Again, the objective is not only commendable but urgent. There is overwhelming evidence that frustration is mounting in almost all areas of public services, with a wrenching paradox of unsolved problems residing side by side with underemployed scientists and engineers. As a resident of Seattle, I have witnessed this challenge and have seen

only scattered uneven efforts at resolution. Most important, the theme of this title is to go beyond the idea stage to prototype testing and demonstration, partly to confirm validity of design, but also partly to persuade the potential customer of the attractiveness, utility and economy of the innovation. We long ago adopted this practice in military hardware development. We have been short-sighted in practicing an artificial thrift in being unwilling to experiment in the civilian side and risk failure.

#### THE ROLE OF STATE AND LOCAL GOVERNMENT

When we talk about demonstration, we need to recognize that most of the services to be examined and improved are delivered to the citizen by state and local governments. Title II may not reflect their key role. Two studies released this spring highlighted not only the involvement by such governmental units but their limitations in dealing with sophisticated technology. The Committee on Intergovernmental Science Relations of the Federal Council for Science and Technology stated that "this newer application of science and technology is being applied directly to problems which are basically the responsibility of state and local governments.—The main thesis of this report is that state and local governments, to a large extent, are not prepared to handle this public technology role, and that the Federal government is doing far too little to involve those units of government in the formulation of science and technology addressed to domestic needs." A companion report by the Council of State Governments observed that "somehow the political system was not penetrated to any significant way by all of this new knowledge about how to solve problems and manage the future." Said the Council: "State governments have a growing need for a new public technology—that is, technological innovation to increase productivity in delivery services to the citizens.—The basic scientific knowledge for the solution of many problems facing state governments is already at hand. The unfinished business is that of applying it." That the Federal government has a key leadership role to energize the evolution of more productive delivery systems is widely agreed upon and seems to be the goal of Section 202(a). However, where so much of the delivery of services is decentralized through state and local governments, their more intimate involvement should be provided for. Representatives on an advisory committee in section 6(d) seems inadequate.

#### THE CONCEPT OF A TECHNOLOGY DELIVERY SYSTEM

To lend perspective to further discussion of the bill under Title II, it is important to clarify certain definitions. First, we should not equate R and D to science and technology. Technology has a far richer meaning. In its most limited definition technology is a body of knowledge to accomplish a specific purpose, like growing food, building a people mover, carving rock. In ancient cultures, folk knowledge would have been a technology. The contemporary version of this definition is a machine to release physical limits of human muscle or even the human mind. In this sense, technology is primarily a technique, a general name for a way of doing things and artifacts to help. Jacques Ellul argues that social techniques such as management, should also be included if they are essential to achieve specific amenities or values.

I should like to suggest that technology is the entire process of applying knowledge, a whole ensemble of physical, legal, economic, political and social processes—and institutions. It then becomes easier to understand what we mean by the notion of a technology delivery system that has been implicit to discussion thus so far. I suggest we define the term explicitly: Each technology delivery system is specialized to provide TV sets or frozen foods or urban transportation or health care. These are outputs. For each, we have inputs of knowledge, of capital, of trained manpower, of natural resources. These are mobilized by an array of institutions: university research laboratories, private industrial corporations, interest groups of various kinds, but with involvement also of Federal agencies and regulatory bodies, congressional committees, state and local governments. All are interconnected by a series of complex relationships shaped by the market place and by public policy. Technology thus becomes an organizing principle, to focus this otherwise random set of players on one objective of a selected output. These various institutions thus interact for the special purpose intended.

While the starting point may be scientific discovery or invention, and hardware, it is clear that another significant component is software.

This leads to a point about terminology of S. 32. The activity associated with Title II extends so much beyond science that in the first instance I would

suggest amending the phraseology to Civil Technology Systems rather than science systems. This is more than semantics because an entire concept is involved.

#### TECHNOLOGY ASSESSMENT

While we deal with the technology delivery system in the context of intended outputs, we must pay attention to the unintended.

One of the most enigmatic qualities of our technologies is their capacity to produce unplanned effects, some transmitted geographically or sociologically remote from the focus of action, some in hibernation to produce effects much later in time. Some of these externalities may be unwanted, even dangerous. This Science and Astronautics Committee has distinguished itself by its understanding of this characteristic and by propositions for technology assessment that have found their way into national environmental policy. It is desirable to make as a matter of national policy the necessary assessment of social, economic and institutional as well as environmental impact of initiatives developed under Title II, as a concomitant feature of new and hopefully improved systems. Efficiency should not be the only criterion of superiority when comparing alternative systems.

#### APPLIED SOCIAL RESEARCH

Section 208 especially singles out applied social research, an emphasis I should like to endorse. We have all heard about some promising innovation that has been deterred from application by so-called cultural or institutional barriers. Updated building systems and automated ships represent examples whose solution may lie in such inquiries. More fundamentally, we have encountered difficulty in identifying what a pluralistic society considers as its value preferences and yet we need such social indicators—like economic indicators—if we are to make urban transportation, by way of example, serve society.

#### THE ROLE OF THE NATIONAL SCIENCE FOUNDATION

Title II would assign all these functions to the National Science Foundation. At the outset, it is self-evident that many of these civil functions already fall within the ambit of existing Federal agencies. Yet for a variety of reasons, they have not been able to respond to the challenge of innovation. For one thing, they have often lacked funds, internal research capabilities and experience. They are often the captives of history and a long sequence of comfortable relationships with outside clientele who may be bound by tradition or anxieties over disruption of the status quo. If the Congress uses the possibility of duplication as the reason for dropping Title II, nothing new may happen and the paradox mentioned earlier will go unbroken. Breaking new ground in a different agency, especially to the point of demonstration, could have a salubrious effect in the department concerned and furnish the grist for their own initiative to follow thru. The threat of competition may be the best goad to refurbishing the outlook of old line agencies.

Whether the NSF is the appropriate body, or whether some other agency or an entirely new one is the appropriate host needs careful study. NSF's origins, its life style, its relationship largely with university clientele could be seriously upset, so that its present mission capability could be debilitated. A major organizational clarification would be to create a National Science and Civil Technology Foundation, with two separate but symmetrical internal administrations, one comprising most of NSF's current structure dedicated to strengthening science and engineering resources, i.e., knowledge production. The second, new administration could focus on knowledge consumption, with necessary internal interconnections.

#### ADVISORY COUNCIL

The Advisory Council provided for in Section 206 is extremely important and the integration of members from different disciplines and user groups is excellent. Such a body could help define what is needed from the point of view of the knowledge consumer, and how new policy might affect them. They could evaluate how well the function is being performed. To combine representatives of Federal agencies having similar interests within this body bears examination. For one thing, insiders are not able to review their sister agencies any more than their own operations.

That coordination across the government is essential is reflected in Section 213, but referral to the Advisory Council for that purpose confuses roles. Coordination

could be executed separately through a committee of the existing Federal Council for Science and Technology. Unfortunately, this raises questions because the FCST was created by executive order, not legislation, and because it has a checkered career as to effectiveness. As an alternative, the Marine Council experience should prove useful. In any event, the essentials of transagency activity should be thought of as far more than interagency coordination, important as that is. The opportunity exists here for a systems approach to public administration, but it will take considerable thought to design the appropriate machinery, perhaps as I have proposed elsewhere the creation of a Council of Technology Advisors.

I would also suggest that the Chairman of the advisory body be selected by the convening authority not the body itself; either the agency head, or considering the importance of the functions, the President of the United States. The Office of Science and Technology should be included as an observer in the group of Federal agencies designated by Section 206 (c) as non-voting members.

Section 209 on research and design of technology delivery systems has obvious merit, but there is a presumption of availability of well trained, research capabilities. There is considerable evidence as to the difficulty of conducting the necessary problem-oriented multi-disciplinary research. Such capabilities are not widespread, and certainly do not match the demands that would be placed on them by S. 32.

Earlier, we noted that more than hardware is involved. More sophisticated approaches must recognize complex social systems, and ways they must be integrated and orchestrated to employ fruits of scientific discovery to properly account for multivariable interactions and interdependencies. Social and behavioral scientists must be in partnership with engineers in this pursuit.

Such research capabilities should be encouraged as a matter of national policy. A necessary albeit not sufficient condition for their generation is stable financial support. The centrifugal forces that thwart building interdisciplinary teams cannot be countered if funds via project grants are short term, uncertain and highly sensitive to whatever project priority is in vogue.

The National Science Foundation already has authority, structure and programs to generate these capabilities. Your Committee demonstrated an interest in NSF's activities during your 1973 authorization. I am not sure you developed information, however, on how meager and uncertain are funds for this area.

The National Science Board in its 1972 report had also much to say on this issue. Title II should thus address the generation and nourishment of such research capabilities that are critically essential to carry out its operating provisions.

#### MANPOWER CONVERSION TO CIVILIAN PROBLEMS, TITLE III

Essential underpinning to this manpower section is not just retraining in the abstract, but provision of employment opportunities. Unless there are jobs, what is the retraining for? Thus, its provisions that focus on incentives for creating new employment are of highest importance.

Sector 305 on assistance to state and local government is of special merit for reasons enunciated previously. To underscore this point, let me recall for this Committee that the highly technical content of Federal activities has required a very substantial employment of scientists, engineers and physicians. The 162,300 scientists and engineers in 1970 represent over 50% of the total professional cadre. Less than half of these are engaged in research and development, but all are involved in technology. At the state level, where the services often planned and funded at a Federal level are delivered, the availability of technical personnel is far less; and at local levels of government, the mix is even leaner. The technical personnel in state and local governments in all 50 states is roughly one third that in the Federal government, and level of training is lower. Integrating more technical skills into a highly complex, politically sensitive apparatus is essential. It is not simple, but a concerted start needs to be made.

Some time ago, I had occasion to list topics of interest to the government of the State of Washington where such capabilities could be employed:

- (1) Management of coastal resources.
- (2) Problems of jet aircraft noise.
- (3) Siting of nuclear power plants.
- (4) Disposal of solid waste.
- (5) State inspection of autos for pollution.
- (6) Auto safety.
- (7) Hazards of pollution in Puget Sound from supertankers.

- (8) Technique for handling hazardous cargo.
- (9) Environmental monitoring networks.
- (10) Hazards of oil drilling in Puget Sound.
- (11) Effects of urban concentration on transportation, and conversely.
- (12) Future of fish protein concentrate in relation to state fisheries.
- (13) Reduction of forest fire hazards.

I have also seen a team of former Boeing engineers develop an extensive analysis of risk to Puget Sound from oil transportation, as employees of a project team for the Washington State Oceanographic Commission. They proved the transferability of their skills.

May I lend support to the concept of Section 310 on career transition fellowships to enable scientists, engineers and technicians to acquire new knowledge and skills. Not every individual who worked in industries affected by contracting government funding is necessarily well qualified by talent or disposition to practice civilian technology. Some will be happier in other pursuits. Some have savings that have permitted self initiated retraining. But some who can make a contribution will be lost without transition assistance. By utilizing some form of competitive examination, the highest qualified and motivated can be equipped to meet the goals of this bill.

#### SUMMARY

These comments have necessarily been brief and not intended to be comprehensive. But if we are to focus the nation's technical talent and resources on the nation's priority problems, we need a policy bridge. S. 32 is a rough approximation of a needed blueprint.

The bill was generated from a commendable concern over conversion of technical capabilities to civilian problems. There was, however, no comprehensive examination of the roots of a national technology policy, with all of its ramifications as to governmental structure, goal setting, resource allocation, intergovernmental relations, interagency integration, etc.

I urge this Committee to consider the objective sufficiently portentous to undertake the next steps of legislative refinement to produce a broad and flexible policy framework that can then be filled in as experience develops from pilot projects.

I would also urge that the policy backdrop be suitable to strengthen programs in existing agencies as well as creation of any new entities.

Mr. SYMINGTON. Thank you very much, Dr. Wenk, for an extremely interesting and thought-provoking statement. I regret a brief absence for a vote on toxic substances in the Commerce Committee.

I would like to thank you particularly for your suggestion of broadening the expressed function of the National Science Foundation into—at least you partially suggested it—that it would go to a National Science and Civil Technology Foundation with parallel responsibilities. This is something that certainly deserves close consideration, I think, by the committee.

You heard Dr. Stever express his reservations concerning expanding the role of the National Science Foundation per se.

What is your answer to his suggestion that this is awkward, unworkable, and that a mission-oriented agency should have the funds to do their own jobs, and we shouldn't attempt to oversee this investment in science?

Dr. WENK. First, Mr. Chairman, let me say I very much respect his views and understand the basis for them. I think it is well understood in Government that the Congress sets the mission of agencies in order that there not be unnecessary duplication.

But I also think it is fair to say that these agencies dealing with transportation and housing, and communication and urban development, have had their missions for a long time that frequently have not been fulfilled.

The question is whether one uses the legislative intent as a reason for continuing to have high expectations from these agencies?

There are many reasons why they have not succeeded, and I suggested this morning that this is not all a matter of their oversight. It is a very complex question. Nevertheless, it seems to me that if the national need is sufficiently strong, that Congress should not let the administrative structure impede some innovation in Government, much less innovation in our services themselves.

Mr. SYMINGTON. You heard me address a question to him as to the need to establish national goals in the fields we discussed in order to really set the stage for this kind of development. If we did establish goals of that kind, let us say—for example, ground transportation—in 30 or so metropolitan areas, how do you see the division of labor between the National Science Foundation or the broadened version of it and the Department of Transportation, and the funding?

Dr. WENK. In the first instance, the intent, as I understand S. 32, and my own view of a partnership between a new function and an existing agency such as the Department of Transportation, would be that this new agency would have the opportunity of integrating scientific and technical information from a wide variety of sources, but focus on a new objective.

It would then be in a position to test new ideas, and particularly to carry their activity through the demonstration stage. But I absolutely would not expect them, then, to replicate that activity, as would then be deserved if it were successful, in community after community.

That, it seems to me, is the role of the Department of Transportation.

By no means does this deny that department the opportunity to undertake some research on its own. On the contrary, the great hope is that they would, and this is why I made reference to the fact that perhaps the threat of competition would be one way to get some of the old-line agencies to be swifter.

Mr. BELL. Well, as I get it, Dr. Wenk, you are thinking of this as a sort of coordinating body; in this case S. 32 thinks of the National Science Foundation as being that body, and a coordinating body.

There is, as I gather from your testimony, a very dire need for some type of a body to coordinate this effort. They are going in several different directions and there is no real body that coordinates this effort. To me, I think that is one of the main things that you have pointed out which in my questioning I tried to point out, too. That is one of the main things we need, and we are not going to get these things accomplished unless we have a body like that.

Dr. WENK. Mr. Bell, you have interpreted my remarks exactly. I would like to amplify them by saying there are two separate functions involved, but closely related. The first is this one of deciding where you are going to go and how to steer and coordinate all of the resources of the Federal Government toward that goal. In the second function, then, is to put more fuel in the tank as needed in order to carry through these innovative starts by demonstration projects.

This is a rocket analogy: the need for more and better steering in the Executive Office of the President but also the need for a stronger propulsion unit, in present or new operating agencies, but both for one purpose.

How these are matched organizationally deserves further study, but the fact is that both are needed.

Mr. HANNA. Mr. Chairman, I would like to amplify what Mr. Bell said, but with a little different kind of analysis, where you could be pointing out a problem.

It is my observation that mission agencies which have been in existence for a long period of time automatically develop a controlled approach to the activity which they are in charge of. They go by the book, not by the performance.

When you get into a transitional situation, you can no longer go by the book, because there is no capability of building up a reflection on a performance standard; that has to be introduced.

What we have suggested in the legislation, I hope, and what I think you point out as a very necessary requirement, is that there be available to each agency an assistance in partnership which will say:

We will now provide you all of the available capability, scientific and technological, from wherever they might be summoned. We also give you demonstrations to show you performances that reach goals you cannot reach, because you are tied in with a control activity approach which frustrates any possibility of breaking through and getting to a solution.

I do not know whether I get that through in what I have been saying. Does this make sense to you?

Dr. WENK. It does, Mr. Hanna. I think, though, I would have this small caveat, that I don't believe all of the innovation should be expected to be done in this new activity. Indeed, the hope is that there will be some going on in all the mission-oriented agencies. But if it is not, we should not use their mission statement as the reason for not doing anything else.

Mr. HANNA. I think if you get competition as you indicated, you are more likely to get parallel activity on their part.

Mr. SYMINGTON. Dr. Wenk, I would like to try to summarize at least one portion of the colloquy and your statement. That is that you do not deem S. 32, or legislation of this character, to be a substitute for a national policy with respect to the establishment of national goals. You think of it as a tool to use. Nor do you think of it as subsuming all of the developmental responsibilities, and funding, which would go into the achievement of a rational transportation system, ending pollution, and so forth.

Dr. WENK. Right.

Mr. SYMINGTON. As Mr. Hanna pointed out, I think the history of the bureaucracy is such that it tends to cause people to want to solve new problems with old methods and not to hire people who understand the new thing—they need to be stimulated into a kind of new thing.

You see this bill presenting the country with a structure for offering them this kind of assistance. In fact, it even would help the national administration—if they would let us know what some of the priorities are. We hear it directly from the mission agencies. They are busy doing what they are told, and rather than being solicited for their views. Is that a fair statement?

Dr. WENK. It is, indeed, Mr. Symington. I would like to underscore this last point, because we have been interested in the delivery of the services, or assistance through this agency, but this question of priority setting in the first instance is addressed by this bill, in title I, as I recall, and it strikes me as important for two reasons.

We will never have enough money to do all the things we think are needed, and therefore we are going to have to make very hard choices.

The way these questions are often presented either in the executive branch or in the legislative branch is not to provide a broad spectrum of alternatives.

Now, the RANN program is endeavoring to do this, and the National Academy of Engineering exercise I alluded to earlier where they asked us to look across-the-board at national needs, and to look across-the-board at opportunities in engineering, will result in identification of a substantial number of opportunities. This committee is going to climb out on a limb with its own suggested priorities and explain why, but obviously the judgment as to priorities is RANN's and the administration's and the Congress when you appropriate funds for that.

The point, however, is that a start is being made to do this for the first time. Title I makes this a matter of a legislative necessity, and I guess I am one of those who believes you are more sure of getting things done regularly if you do make it a matter of a legislative appointment.

So from that point of view, it would do what you suggest. The bill would also make sure there is an annual report to Congress on this picture, and I think that would help every committee in the Congress to see how their programs fitted together. That would be the congressional contribution to a systems approach.

Mr. SYMINGTON. We have passed out of the House a bill to establish an Office of Technology Assessment, which would be an attempt to provide the Congress with equivalent assistance to let us know what the second-generation effects on certain scientific initiatives might be.

Gentlemen, we have moved into a rollcall, and it is past the time. We thank you very much, Dr. Wenk, for this stimulating statement, and we will ask you back here, with your permission, for further comments.

Dr. WENK. Thank you. It is a privilege being here.

Mr. SYMINGTON. The committee will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 12:25 p.m., the hearing was adjourned, to reconvene at 10 a.m., on Wednesday, September 27, 1972.)

The way these questions are often presented within the executive branch or in the legislative branch is not to provide a broad spectrum of alternatives.

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Mr. Sturgeon: We have passed out of the House a bill to establish an Office of Technology Assessment, which would be an attempt to provide the Congress with equivalent assistance to let us know what the second-generation effects on certain scientific initiatives might be. Gentlemen, we have moved into a tollcall, and it is past the time. We thank you very much, Dr. H. for this stimulating statement, and we will ask you back here, with your permission, for further comments.

Dr. H. says: Thank you. It is a privilege being here.

Mr. Sturgeon: The committee will adjourn until tomorrow morning at 10 o'clock.

The hearing was adjourned, to reconvene at 10 a.m. on Wednesday, September 27, 1972.

NATIONAL SCIENCE POLICY AND PRIORITIES  
ACT OF 1972

WEDNESDAY, SEPTEMBER 27, 1972

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON SCIENCE AND ASTRONAUTICS,  
SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT,  
Washington, D.C.

The subcommittee met pursuant to notice, in room 2325, Rayburn House Office Building, Hon. James Symington presiding.

Mr. SYMINGTON. Good morning, everybody. This will be the second session of hearings on S. 32, the National Science Policy and Priorities Act of 1972, before the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics.

The committee is now in session and we are pleased to have all of you with us. We welcome both the witnesses and our guests. Our first witness is the very distinguished gentleman, Dr. Roger W. Heyns, member of the National Science Board since 1967, and its vice chairman since 1970. He has a doctorate in psychology from the University of Michigan in 1942, went to the University of California in 1949, became chancellor in 1965, and he is now president of the American Council on Education.

Clearly a gentleman whose views we welcome and certainly respect. Good morning, sir. We will be pleased to hear your testimony.

(A biographical sketch of Dr. Heyns follows:)

DR. ROGER WILLIAM HEYNS

Born: Grand Rapids, Michigan, January 27, 1918; son of Garrett and Rosa (Klooster) Heyns; married Esther Gezon, September 20, 1941; children—Michael, John, Dan.

Student, Hope College, 1936-37; A.B., Calvin College, 1940; M.A. in clinical psychology, University of Michigan, 1942, Ph. D., 1948.

Instructor in psychology, University of Michigan, 1947-48, assistant professor, 1948-55, associate professor, 1955-57, professor, 1957-65, vice president for academic affairs until 1965; chancellor, University of California at Berkeley, 1965-71; professor of psychology and education, University of Michigan, 1971; President, American Council on Education, 1972.

Director of Hunt Foods and Industries, Inc. Member, citizens recreation board, Ann Arbor. Member, Western Parole and Probation Association.

Served from private to captain, USAAF, 1942-46.

Recipient, outstanding teacher award, University of Michigan, 1952, faculty distinguished service award, 1958.

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**STATEMENT OF DR. ROGER W. HEYNS, VICE CHAIRMAN, NATIONAL SCIENCE BOARD, AND PRESIDENT, AMERICAN COUNCIL ON EDUCATION**

Dr. HEYNS. Thank you very much, Mr. Chairman. I appreciate, Mr. Chairman, and members of the subcommittee, the invitation to appear before you today to testify on S. 32, the National Science Policy and Priorities Act of 1972.

I want to express my regret that Dr. H. E. Carter, the chairman of the National Science Board, could not be here, but I am honored to represent the Board in his absence.

Before proceeding to my formal statement, I want to make two general remarks to put those later statements in context.

The Board clearly wants to express its basic support for the objectives of this legislation which is to strengthen the role of science and technology in the solution of national problems.

The Board recognizes that this legislation involves administrative and organizational questions that need further exploration. Many Federal agencies are involved in the development of science and technology policy in the conduct of research and development.

What I will try to do is report as accurately as I can the results of several hours of discussion of S. 32 by the National Science Board at its September meeting. It will be clear as I proceed that the discussion did not deal with all aspects of this complex legislation. The Board did, however, reach some conclusions on the principal provisions, and I pass them on in the hope that they may be useful to the committee.

Before I state them, however, it is only accurate to report that none of these conclusions I will be presenting was without its critics within the Board; and the Board will continue its discussions.

Now I will proceed to each of the titles.

The Board approved the intention of title I to strengthen the role of the National Science Foundation (NSF) in the development of national science policy.

The increase in responsibility proposed draws upon existing strengths of NSF. The Foundation has the ability to draw upon the scientific community for program design, analyses, and evaluation, all vital activities for sound policy decisions. The Board noted further that title I is the key to the successful operation of the programs referred to in title II.

Title II would assign new responsibilities to NSF for development, testing, and demonstration of civilian science systems. In addition, it would increase NSF responsibilities for studies and applied research leading to the design of such systems.

The Board recognizes that a greater effort must be made to try to utilize science to deal with civilian problems. Here I would note the strong steps already taken by the administration to increase R. & D. in civilian agencies and provide support for applied programs.

The Board concluded that the Foundation, while not necessarily uniquely capable, is a reasonable locus for this responsibility. It has effective relations with the scientific community, and it has demonstrated in the recently established research applied to national needs program, the RANN program, that it can develop support in that scientific community for research programs in which science is applied to civilian problems.

At the same time, however, the Board has a genuine concern about the impact of these new commitments on the basic science obligations of the Foundation. The Board recognizes that title II markedly changes the basic and applied research balance of the Foundation and that this new balance may jeopardize its ability to discharge its responsibilities for the health of basic science.

It is this concern with basic science and the effective integration of the basic science and applied science activities which led the Board to comment on the administrative provisions of title II. The Board recognizes that the adequate discharge of the responsibilities of this title may well require changes in its present administrative arrangements, perhaps along the lines suggested by the legislation. Since, however, the principal argument for NSF involvement in title II activities is the Foundation's unique ability to relate to the scientific community, we believe there should not be any language in the bill which appears to diminish the Board's responsibility for determining the policies under which the Civil Science Systems Administration would function.

Finally, if it were given the responsibilities under title II, the Board would reaffirm its commitment to certain well-established policies of the Board: It is committed to strengthen the research capabilities of existing agencies. It does not want to separate these agencies from their constituencies. It intends to continue its commitment to the principle of multiple sources of research funds within the Federal Government.

With respect to title III, the Board recognizes the manpower dislocations the Nation has been experiencing in the scientific and technical fields and recognizes that these have caused significant losses to the Nation as well as to the individuals affected.

However, the appropriate solution to this manpower problem must be found through public programs which utilize the skills of scientists and engineers for specific program ends rather than through programs where employment per se is the primary objective. Temporary employment and retraining programs with no permanent job opportunity in sight are palliative and do not allow either the Nation or the individual to achieve maximum potential.

It would appear to the Board that the task contemplated in this title can be performed by the Federal Government more effectively if continued to be coupled with the responsibilities of title II.

With respect to title III, the Board agreed that this is a problem that must be solved. It is an urgent one and one with which the Board must concern itself in some manner.

Turning to title IV, the Board supports the concept of portability of pensions but observes that scientists and engineers constitute only a small fraction of the millions who are affected by the loss of pension and retirement rights. The Board believes, therefore, that any solution for scientists and related professionals should be a part of the solution to the larger problem and that an effort to find that larger solution is more appropriately the task of another agency, such as the Department of Labor.

In conclusion, Mr. Chairman, I reemphasize that the National Science Board offers these views fully aware of the fact that the objectives of this legislation are of enormous significance. Undoubtedly, the Board in subsequent discussions will refine and expand its position.

The Board would want me to emphasize the significance it attaches to the basic science responsibilities of the Foundation, and its eagerness to preserve the Foundation's strength in that area.

The Board, as my report indicates, recognizes, however, that the problems the Nation faces call for added emphasis on the application of science—a position that this administration has taken, as already reflected in the President's science and technology message.

The National Science Board stands ready to work with the Congress and the administration in developing a balanced program of research and development and in playing an enlarged role in that program.

Thank you very much.

Mr. SYMINGTON. Thank you very much, Dr. Heyns.

Your testimony as a whole conveys to me a somewhat different impression than we heard yesterday from Dr. Stever. That is to say, it appears to me that you do not look with quite as much alarm on the idea of transferring to the National Science Foundation some of the responsibilities, if not really all of them, that are contained in the bill.

Is that a fair statement?

Dr. HEYNS. I am not in a position to contrast this position with that of Dr. Stever, but I think your summary that we are making a positive response is an accurate one. I also did state, however, that the Board was not without some qualms and a genuine concern about the impact on basic science, but I think the Board would want me to convey somewhat of a positive response.

Mr. SYMINGTON. It is a pity sometimes that we can't always be together when we conduct this dialog because that would help us focus on each other's point of view.

But we did get the impression yesterday from Dr. Stever, who is with us again this morning I see, that the bill presented some difficult bureaucratic problems, perhaps insurmountable from his point of view.

Those being the transfer to the NSF of such a tremendous applied research obligation, well in excess of its total authority for basic and applied research now. It also tended to raise the question of what the role of the mission agencies would be in conducting research in their respective areas. I take it, from the first glance at least, this did not pose similar problems for you?

Dr. HEYNS. We are really talking about nuances in the amount of anxiety, I think.

Mr. SYMINGTON. And could we say "hope"?

Dr. HEYNS. Yes; I do not detect major differences in objectives between the Director and the Board. I think it would be an adequate reflection of the process the Board went through to say that there was an acceptance of the problem, followed by a discussion of alternative solutions and possible risks, and then a final assessment that the Board could play a useful role and we are willing to assume the risks.

Mr. SYMINGTON. Just to emphasize one or two of your comments, you have concluded that this effort must be made and that it is not being successfully accomplished at this time.

I take it that you mean the effort of developing, testing, and demonstrating civil science systems. That effort must be made and it is not being sufficiently made at this time, and that the Board concludes that the Foundation, while not uniquely capable, is a reasonable locus of this responsibility.

Dr. HEYNS. That is right.

Mr. SYMINGTON. Further you state that there should not be any language in the bill which appears to diminish the Board's responsibility for determining the policies under which any civil science systems administration would function.

So in a sense you feel that the Board can take this on?

Dr. HEYNS. Yes, but with a good deal of trepidation. I cannot improve on that summary. May I suggest that it has been observed that the statement—that it has not been successfully accomplished—is a little strong. There are good examples of that effort in the Federal Government. This was my effort to say that the Congress, the administration, and the Board recognize that much more can be done.

Mr. SYMINGTON. You say it has been observed that this statement is strong? I did not hear anyone observe that.

Dr. HEYNS. Let me remind you that as the Vice Chairman of the Board I have to coordinate with the rest of the Board. Not everybody agrees with this wording.

Mr. SYMINGTON. Can we say this represents a consensus of the majority?

Dr. HEYNS. I think that the spirit in which that was written would be assented to, yes. That we have a national task still to be done, yes.

Mr. SYMINGTON. I don't think anyone would seriously argue there was no problem.

Dr. HEYNS. Nobody does; in fact, that is what that sentence is intended to convey.

Mr. SYMINGTON. OK. I wonder how you would react to Dr. Wenk's suggestion made yesterday that perhaps a structural compromise could involve the creation of a National Science and Civil Technology Foundation which would absorb NSF, allow it to pursue its basic research responsibility, and have a parallel but continuingly interacting authority and responsibility in pursuing civil technology?

Dr. HEYNS. I think that realistically the Board confronted the fact that the proposed legislation would change the nature of the Foundation; and it would, I think, begin to approximate what Dr. Wenk was talking about.

The task of trying to assimilate and handle the problems of interrelationships of basic and applied science would be easier if built on what we are currently doing.

Mr. SYMINGTON. I take it that you feel that the National Science Board ought to in any event have the power to approve grants or contracts for any sums that are made by the Civil Science Services Administration under title II?

Dr. HEYNS. The Board would want me very much to emphasize that, yes.

Mr. SYMINGTON. How often in the past has the Board exercised its review authority on grants totaling over \$2 million, or \$500,000 in 1 year to override the Director's recommendations?

Dr. HEYNS. I cannot give you a percentage figure, but may I describe our procedure and policies with respect to review on the Board? In the initial stages, for example, of the RANN program, the Board reviewed all proposals recommended for support by the Foundation staff. This was done as a result of its desire to observe the nature of the proposals being received and because there is an interaction be-

tween policy and decisions on funding. At that time we reviewed all recommended proposals regardless of amount. The Board now reviews all recommended proposals in the RANN program over \$150,000. That is one of the procedures that would be followed. After policies are established and we are all in agreement with respect to them, then there would be delegations up to various amounts depending on the nature of the program. That procedure is not limited to new programs; we intend to do that with programs that we have previously delegated substantial decisionmaking on. We might ask to have those reviewed again more intensively by the Board. But the Board always reviews grants involving \$500,000 or more in 1 year or \$2 million or more in total. Is that responsive?

Mr. SYMINGTON. I think one of the points I am trying to get at is how active the Board really is in overseeing the grants.

Dr. HEYNS. It is very active.

Mr. SYMINGTON. It is very active?

Dr. HEYNS. Right.

Mr. SYMINGTON. Now, how do you see this creature working?

How do you view the responsibilities and how do you project the activities of a Civil Science Services Administration, vis-a-vis what the mission agencies are doing? What is their relationship in terms of responsibilities, authority, and so forth?

Dr. HEYNS. Mr. Chairman, I wish to emphasize that what I am trying to do is to convey what the Board has discussed. Actually our discussion about these issues was relatively limited. But I think I can convey our general posture. We would certainly try to do some farming out, some contracting out, to existing agencies. We might develop ARPA-type projects and programs. These are some of the alternatives. I think there are a variety of ways in which that could be done. Some could be managed by the Foundation itself, some conducted by external contracts, and some performed by existing agencies.

Mr. SYMINGTON. But the—

Dr. HEYNS. This is about as far as our discussions went.

Mr. SYMINGTON. But the real question really is whether or not the Civil Service Science Administration undertakes to simply suggest or to develop ideas, and of course development would take a great deal more money, and you are not suggesting that they assign out tasks that they would normally pursue in order to make suggestions to—

Dr. HEYNS. No, no, not at all. The program definition in an early stage the Foundation itself must manage. The intent here is that there is a disposition not to be imperialistic about this but to utilize all existing resources and capabilities as we have done in the past.

Mr. SYMINGTON. I think what puzzles a lot of us on the committee is how we are going to avoid conflicting authorities, duplication of expenditures and research and so forth.

Dr. HEYNS. Right; we too recognize these problems.

Mr. SYMINGTON. We can perhaps particularize by asking you how you think the system would work with respect to mass transit, let's say?

Let's address ourselves to that one for a second. What would the mutual, joint, and separate responsibilities be between the Administration, Science Administration, and DOT, Department of Transportation?

Dr. HEYNS. Let me emphasize that there are some habits in the Foundation, being formed partly as a result of the RANN program, to work

with the existing apparatus in the Government in program definition. I can also imagine one of the clear implications of this legislation is that the Foundation would attempt to strengthen the capacity of a mission agency to conduct its own research for certain types of problems and would contract out to other instrumentalities in certain other areas. There would be other projects, as indeed in the RANN program, which would be handled by a combination of at least those two mechanisms. Coordination being sensitive to other agencies, and avoiding undue duplication—we are already in that business, and I think we have some procedures that are reassuring.

Certainly the Board is constantly asking whether we need to support a particular project or whether some other agency can do it, whether this is not more properly located in another agency. This is a constant type of preoccupation of the Board.

Mr. SYMINGTON. Thank you. Mr. Bell, do you have any questions?

Mr. BELL. Thank you, Mr. Chairman. Dr. Heyns, as a fellow Californian I welcome you, sir.

Dr. HEYNS. Nice to see you again.

Mr. BELL. Nice to see you before the committee. I would like to ask you the same question I asked Dr. Stever yesterday: If we make certain that the National Science Foundation basic research function is fully protected in this bill, what objections could you have to the implementation of the applied science function for the National Science Foundation?

Dr. HEYNS. I do not think the Board's discussion would indicate that there would be any objection. We recognize that there are formidable tasks and problems. This would be an enlarged area of responsibility and not easy to discharge.

We recognize the complexities and we want to emphasize that. But our belief was that we are in a position to make some useful contributions in that area and, if basic science were adequately protected, we would be disposed to go ahead.

Mr. BELL. Well, then, Dr. Heyns, do you basically think that it is possible to retain basic research with its efforts and concentrations as well as having applied research—both of them in the same organization?

Dr. HEYNS. The Board has anxieties about that problem and affirmative steps will have to be taken to assure that basic science will be protected. Just the stated intention of doing it is not enough.

And when I say we are disposed to do it, I mean that we think there is a reasonable possibility that the Board with the cooperation of the Congress and the executive branch can indeed protect basic research and take on new tasks. We believe that has to be done; and we are inclined to think we ought to try it if asked to do so.

Mr. BELL. It is fine to say that projects contemplated in S. 22 should be carried out by the various mission agencies. However, we agreed yesterday, it seems to me, that the mission agencies are not doing it. A coordinated body is needed.

Dr. HEYNS. Yes.

Mr. BELL. If the NSF is not the proper agency to administer this scientific program, what agencies would you suggest?

Dr. HEYNS. We ended up by not suggesting any and saying that we were probably a reasonable possibility.

Mr. BELL. The National Science Foundation is?

Dr. HEYNS. Yes, sir. All we were trying to say here is that we would intend, if given this responsibility, to cooperate with and to strengthen the capacity of other agencies; but we were not ignoring the responsibility that this title would give us.

Mr. BELL. I see. Thank you, Mr. Chairman.

Mr. SYMINGTON. Dr. Heyns, thank you for coming up and putting this very helpful statement to the committee.

Dr. HEYNS. Thank you.

Mr. SYMINGTON. Our next witness is Dr. Philip C. White, immediate past president of the Industrial Research Institute, now chairman of the institute's committee on Federal Science and Technology.

Mr. SYMINGTON. Dr. White has occupied a number of research management positions with Standard Oil of Indiana; he is now a general manager of research for that company.

We are glad to have you with us, Dr. White, and anxious to hear what you have to say.

(A biographical sketch of Dr. White follows:)

DR. PHILIP C. WHITE, GENERAL MANAGER OF RESEARCH, STANDARD OIL Co. (INDIANA)

Dr. White started with the Standard Oil Research Department in 1938. In 1947, he became chief chemist of the Whiting refinery and later directed research on fuels and special products.

In 1951, he was appointed manager of R&D for affiliated American Oil Company at Texas City, Texas.

With the corporate reorganization in 1960, he became general manager of research and development and a director of American Oil Company, and in 1966, vice president-research and development. He later returned to Standard Oil as general manager of research, responsible for research coordination and environmental conservation activities.

Dr. White is a member of many professional societies, such as the American Petroleum Institute, American Chemical Society, American Institute of Chemical Engineers, and Society of Automotive Engineers. He is past-president of the Industrial Research Institute, vice chairman of the Coordinating Research Council, and chairman of the U.S. National Committee for World Petroleum Congresses. He is also a member of the Illinois Science Advisory Council, the Research Directors' Association of Chicago, and the Directors of Industrial Research, New York.

Born in 1913, a native of Chicago, he received both his bachelor's degree (1935) and doctor's degree (chemistry—1938) from the University of Chicago. While there, he was a member of Alpha Delta Phi, Owl and Serpent, Sigma Xi, and Phi Beta Kappa. Dr. and Mrs. White make their home in Hinsdale, Illinois.

STATEMENT OF DR. PHILIP C. WHITE, CHAIRMAN, COMMITTEE ON FEDERAL SCIENCE AND TECHNOLOGY, INDUSTRIAL RESEARCH INSTITUTE, GENERAL MANAGER OF RESEARCH, STANDARD OIL CO. (INDIANA)

Dr. WHITE. Thank you, Mr. Chairman.

For those who may not be familiar with the Industrial Research Institute, I might explain that it is a nonprofit organization which was founded back in 1938 under the auspices of the National Research Council, with some 230 corporate members, including most of the large industrial companies of the country, and aggregately they account for about 85 percent of the privately funded research in the United States.

I very much appreciate the opportunity of presenting an industrial viewpoint regarding the provisions of S. 32 to the committee. I should explain that having received your invitation to do so only last Friday, my inputs from other members of the Industrial Research Institute who are familiar with the bill were necessarily somewhat limited. I talked to perhaps a dozen of them.

There is no question in my mind but that the problems to which S. 32 addresses itself are very real ones. We do need a coherent, long-range science policy and stability in the Federal funding levels for R. & D. I think everyone in industry recognizes and is hard at work, as appropriate, on the problems of energy, air and water pollution, mass transportation, urban housing, et cetera, and we, all of us, regret the waste represented by the unemployment and underemployment of highly trained scientific and engineering manpower.

While industry traditionally favors the role of the free market and wishes to see those Government activities which impinge on the civilian section be minimized, we also recognize that these particular problems are, by their nature, ones that will only yield to solution, on an acceptable time scale, through Government activity.

To the extent that current Government programs are inadequate to bring about a solution, we feel that further steps are clearly indicated. Thus, I would say that industry will look with favor on some form of new legislation directed at solving the problems of research stability, manpower utilization, and the broad national problems of social importance.

With that general endorsement of the broad objectives, I would now like to comment on some particular features of S. 32.

With respect to the basic policy of R. & D. funding, we believe that our country, just like any industrial company, should carry out the research it needs to achieve its objectives.

Quantitative formulas for the amount of research are poor guides in both cases. Stability in funding of R. & D., both direct and indirect, is most worth while. Any corrective trends should be gradual, but we would urge rejecting any tie between civilian R. & D. dollars and defense R. & D. dollars or GNP.

#### TITLE I, SCIENCE POLICY AND PRIORITIES

Now there is one point I would like to raise on title I. Industry is certainly in accord with the idea that national science policy be designed to foster the application of scientific and technical knowledge to solution of national problems.

We also feel the identification of priorities for civilian research among these many pressing areas merits very careful attention. We think the board that is responsible for overseeing these activities should include representatives from industry, and we would suggest specifically from industrial research.

It is not clear to us that the National Science Foundation is the best vehicle for this effort. As I will comment later, with respect to the activities proposed under title II, it seems to us that these latter activities need a different approach. If that approach is indeed modified, the provision for vesting this responsibility for civilian research priorities and application in NSF may become questionable.

## TITLE II, CIVIL SCIENCE SYSTEMS

Title II on civil science systems is clearly where the action is, with \$795 million channeled into projects for the design of civil science systems to improve our major social problems. The advance technique of "systems analysis" is referred to specifically in the bill.

It is apparent from the terms of title II, and more clearly from the testimony of Senator Kennedy, that the performance of NASA in the space program is serving as a model for the approach proposed in S. 32.

Before analyzing title II further, I would like to make a couple of points about the planning and management of research. Most of us in industry, and particularly those experienced in industrial research management, recognize two characteristics, among others, of good applied research:

1. The development of effective technology comes about only when those mounting the attack have a clear knowledge of what the problem is that they are attacking, including what has been done before and what the market is for the solution.

Our business and technical literature is sprinkled with reports of failures, where the willingness of the user to accept the product of technology was not established ahead of time or where an excellent technical answer was developed but it did not really answer the problem.

2. Second, the pace of applied developments and their completion should be properly geared to the ability of the market—in this case the entire society—to use them.

Even when the research is technically a complete success, if those results cannot be used due either to our inability to implement the solutions or to the slowness of the public to accept them, the benefits are unrealized and our research dollars have been wasted.

With these two criteria in mind, I would like to comment further on title II: Putting the man on the moon, or developing a new weapons system, is the responsibility of a single agency. The impact of such developments on the daily life of the average citizen was very small, and his concern was commensurate. Also, these projects have indeed been amenable to treatment by "systems analysis," since they comprise largely technical hardware and are one-shot developments.

However, in the case of these major national problems, I think it is recognized by most of those who have studied them closely that mass transportation, housing, pollution control, et cetera, are not primarily technical problems.

They do have technical components to varying degrees, but they are primarily social, economic, and political problems. In many cases we have a perfectly acceptable technical solution at hand, but the problem is still with us.

Several hundred million dollars in research projects may advance our technology somewhat, but we feel society may still be waiting for the solution to the problem. Also, responsibility for implementation will be vested in hundreds or thousands of agencies, and the man on the street will be affected in numerous ways.

All this means that these problems are complex. It is trite to say so, but they are complex—terribly so. We may know how some of them

might be solved, but the public is not ready to buy and accept the solution.

It is our view that passage of S. 32 as now written would violate both those precepts of a sound research program. We would very likely find ourselves attacking the wrong problem, or developing a solution that is unacceptable, and our pace of generating technology and "systems for its application" would be so far in advance of broad-scale implementation that we would lose the sort of feedback guidance that a slower pace might help us with in hitting our target.

In other words, we feel starting off with three-quarters of a billion dollars' worth of studies, projects, demonstrations, and selling efforts is a scattergun approach that is unworthy of the seriousness of the problems. And that is aside from the question of locating such a program in the NSF with the obvious duplications and overlapping of existing work in other agencies. The exhortations contained in the bill for interagency coordination do not allay our fears in this regard.

I do not mean to imply by these remarks that nothing should be done or that we think that current activities dealing with these national problems are adequate. They are not.

Admittedly it is appealing, with the demand for more effort clear cut, and the supply of technical manpower overflowing, to try to match up the two. But it simply is not a good match. Each—unemployment and a broader-scale attack on national problems—should be the subject of separate legislation, in our opinion.

How should we attack these important, complex problems more systematically and with better prospects for success and acceptance? We endorse the recommendation made by the National Science Board in its 1972 report to the President, and I quote :

There should be established, on a continuing basis, substantial groups of full-time professionals of outstanding competence to develop the capability (methodology and manpower) to explore specific large problems of national importance, and to explore alternatives for dealing with those problems. The groups would develop alternative exploratory approaches, lay out several possible trials, and devise appropriate experiments. So equipped the decision-making institutions of our country may better guide its future.

I was privileged to hear Prof. Jay W. Forrester of MIT, perhaps the country's foremost expert in systems analysis applied to social problems, make a similar recommendation the other day, when someone asked him, "What should we do, if we believe we are faced with 'limits to growth'?" He recommended top-quality study teams as a first step.

We do not need a single 31-man advisory board for this job. We need dozens of top-level boards, one on every aspect of each problem area. The best blueprint I have read for such an approach is the recent article in *Science* (August 25) entitled "Councils of Urgent Studies." It is so cogent and so pertinent to this need, for which title II is drafted, that I have taken the liberty to append a copy of the article to my written testimony.

We would urge the committee to reject title II, and proceed, with due deliberation, to develop legislation to establish these top-level, continuing study groups. They might appropriately be attached to NSF, although perhaps there is some better home for them.

## TITLE III, TECHNICAL MANPOWER TRANSITION

Now I would like to comment on the manpower transition question. Most industrial representatives deplore any approach that involves special Government support to undergrid the employment prospects of a small segment of the population.

Further, we seriously question whether contracts to study "social, economic, and managerial aspects of the transition," to quote the bill, are going to add much to the knowledge that already exists on this problem. Obviously, such funds as go directly to hiring unemployed scientists, engineers, and technicians will offer spot solutions, but I believe most members of the industrial community would prefer to see a make-work program, if Congress decides it is necessary to have one, so labeled and so drafted.

Specifically, also, we question the provisions for Community Conversion Corporations. These appear to be a rather uncontrolled proposal to make money available for various organizations to work in almost any activity vaguely related to those problems of recognized national importance.

The training and placement provisions of title III will perhaps be useful on a temporary basis, but these also would appear to be better handled by some of the existing programs now underway.

Perhaps more importantly, we would concur with the comments of Mr. Dominick, as reported in the Record, that this bill is 3 years too late and that the provisions it makes for dealing with unemployment problems duplicate many of those efforts already underway.

Certainly our own experience, as an employer of engineers and scientists, albeit primarily in the chemistry area, would convince us that this situation is slowly correcting itself and, given adequate Federal support for many of the current programs directed to those national problems, would likely be normalized as soon as it would be under the provisions of S. 32.

This is not to say that the Government should not do a better job of addressing itself to the manpower problem. Our uncoordinated policy of independently dealing with supply and demand has clearly produced a very severe lack of balance.

We need a better system, and I am confident most industrial companies which employ technical personnel would wholeheartedly endorse and cooperate with efforts to develop and operate such a system.

As stated earlier, we would urge Congress to consider dealing with this question in separate legislation, however, rather than with an omnibus bill such as S. 32.

Such legislation, in our view, would best be aimed at a long-term cure for the cyclic nature of the problem. We need good data on the future supply of technically trained people. These data are fairly readily obtained, considering the educational leadtime. Estimates of demand are obviously more difficult to come by.

We can perhaps improve our projections by segregating the demand that industry sees for in-house work to meet its own future needs from that which may be required and funded by the Government.

There is also the federally stimulated demand of the university graduate schools and of the national laboratories to be projected.

Much of the past variation in demand must be laid at the door of Congress itself. To achieve the objective of better manpower utiliza-

tion, it will be necessary that Congress recognize and some way offset the impact of starting and stopping massive programs which have a large technological component.

In this area, however, we need not only better predictions but some mechanism of guidance on both the demand and supply sides if we are to achieve a match.

*Business Week*, in its feature article, September 23 issue, describing the trained manpower problem emphasizes the need for coordination between our schools, which supply, and business, which employs.

Our challenge is a way to develop national guidelines and projections which can serve as a basis for voluntary coordinated action. It is certainly an area where none of us would want to see mandatory controls imposed. I can assure the committee that the Industrial Research Institute would be most interested in cooperating in such a national effort.

Finally, may I say that the patent policy provisions of the act appear to be flexible and aimed at protecting both the public interest and equities of the contracting organizations. They will certainly receive industry endorsement.

That concludes my remarks and I want to thank the committee for allowing me to testify on this matter.

Mr. SYMINGTON. Thank you, Dr. White.

How would you describe S. 32? As essentially a work, or make-work bill?

Dr. WHITE. Throughout its provisions I notice it makes reference to the maximum possible use of unemployed scientists, engineers, and technicians. I believe in the provisions of title I as well as title II, and certainly title III; of course it has direct provisions for funding local efforts, those of State and city governments, and directs that such individual be employed where possible.

Mr. SYMINGTON. Do you think there is inherent in it an effort to assist the Nation in making constructive and useful science policy?

If so, is that effort being made in order areas? Doesn't it need more focus than that?

Dr. WHITE. No. I think it needs more focus. I think the point Dr. Heyns made, that I tried to make, and certainly the article I have appended makes, these items are so complex that they need a broader attack than is now being mounted by the agencies.

However they are so complex, and the solutions have eluded us so far to such a degree, that it seems apparent to us that if we are to be successful we should proceed more slowly rather than simply funding a bunch of projects under contract. To study them in some coordinated way, to really try to define what the problems are, is needed.

It is this approach, through numerous high-level boards, that we think offers the best possibility here. The work of these boards might well lead to projects later that would offer employment to some of the unemployed scientists and engineers, but I think this will come along rather slowly, because I do not believe the deliberations of these boards will bring quick answers.

Professor Forrester saw these boards as functioning for 10 or 15 years before we really had some of these problems whipped.

Mr. SYMINGTON. I confess to being somewhat puzzled by this idea of proliferation of boards to study problems. I thought that we could

identify without another board the problem of say, energy research, the problem of urban blight, the problem of the mass transit situation, rapid and clean so people can get to work from their homes and back again. Those are problems which I do not think it would take a board to discern. But it would take some entity or combination of entities to deal with them.

Parenthetically, I do not know what discussions really they had in the Senate on this but this committee is not beguiled by the notion that a NASA-type approach is the one that we ought to take.

Dr. WHITE. I am glad to hear that.

Mr. SYMINGTON. So, I would like to relieve you of that illusion.

But I would also like to express the view that I have that your alternative suggestion seems almost to be a denial of the existence of the problem and the seriousness of the problem. This idea of setting up boards for study is such that we have reached the point where we have this huge national budget, and we have to get to some of these problems, clean up the environment, the air and water. We have the National Academies of Science and Engineering helping us in these areas.

But what are these boards? What would they do?

Dr. WHITE. If I may address myself to the point you made first: Why I think it is necessary to consider something more than we have today. We have certain mission agencies today, the DOT for example, or HUD on the housing question, to take two departments. They are obviously well funded, presumably competent to understand the problem and yet we still have the problems and I do not think any of us are very satisfied that we are moving to solve them with the pace we would like to see.

I think part of this is because they are so complex and the interactions are so involved—they obviously interact between inner-city problems and mass urban transportation and the acceptance of these—the energy costs are going to affect this as people find it more expensive to use their cars. These things all interact and they will be changing.

I think this is the type of thing envisioned by these proposals as you see in this article. We need something that cuts across agencies and, of course, this bill does have that broad approach but it is doing it with a rather different emphasis than we would like to see.

The article recommends boards which cut across agencies and recommend ways to solve the problems: Here are the alternatives and the costs. Then they would offer a recommendation out of a study group which has done a good deal to interact, through public hearings hopefully, with all people involved, recommending to Congress that, of possible alternatives, perhaps this is the best one.

I think this is the way people see this happening. I do not see this as being the result of the kind of projects proposed in S. 32 and title II. The latter simply funds specific projects in various institutions, nonprofit groups, universities, and so forth.

I would be afraid that out of these would come many reports done by small groups who obviously were well meaning and probably competent in certain areas, but that report would be filed away and that would be the end of it.

I would hope this could be set up in a better way than that.

Mr. SYMINGTON. What would you think of a national goals policy, let's say, as enunciated by the administration as of a certain time in

the future, perhaps 10 years or so, the Nation ought to have, say 20 or 30 cities equipped with mass transit. Would that be the sort of thing that would obviate, in your mind, the need for further study, simply get people to work doing it by stating the problem and the determination to solve it?

Dr. WHITE. In my view that says: Here is a problem, and here is a solution we have decided is the right one.

I think many people believe creation of new cities is not the answer. I happen to think it is. I have heard other people say that is the wrong way to go.

Mr. SYMINGTON. You do not mean creation of new cities; you mean rehabilitation of the old.

Dr. WHITE. Essentially rehabilitation is a better way to go than creation of a new one with a perfectly coordinated transit system and balance and so forth.

Mr. HANNA. Would you yield on that point?

Mr. SYMINGTON. Yes.

Mr. HANNA. It occurred to me when you were talking that to have a solution or a choice of solutions in any of these complex problems you have to have someone who has taken a deeper look into these interactions and sum up with it.

I have had the feeling that there is a tendency out of our past to have the problem of giving a name to a problem and to have identified and understood it. Naming problems does not necessarily indicate that you have an understanding of the problem.

Dr. WHITE. Yes.

Mr. HANNA. It is true as you have said that there are social, economic, and political aspects of solutions.

Dr. WHITE. Right.

Mr. HANNA. Which are not apparent until you have gotten into the depth of things and tried to solve them.

I have a certain amount of sympathy with your suggestions that you need these boards to be assigned to go into these problems to give us an understanding of a more technical content and the broader aspect of ramifications given a certain solution.

Dr. WHITE. Not only that; I think the economic and social implications, too.

Mr. HANNA. Yes; so you have that mixture in there.

Dr. WHITE. Right.

Mr. HANNA. But I cannot reconcile that with your idea that there should not be some pilot projects. I think part of this whole picture of what is involved comes out of trying something. You know if you have only what is on a drawing board, your tendency is to minimize problems that you are not quite that familiar with.

Mr. SYMINGTON. Isn't that what the Senate debate made explicit—that the bill envisages a small number of large-scale systems projects rather than a large number of scattered small ones?

Mr. HANNA. It seems to me that these two things we are talking about, Mr. Chairman, they are not mutually incompatible.

Dr. WHITE. No, I—excuse me.

Mr. HANNA. That is the point I try to make.

Dr. WHITE. I would buy your point that the small projects are worth while—maybe it is a matter of definition of what is small—it

seems to us that pouring a billion dollars into this was going too fast where we did not know the answer.

I would certainly agree with you that projects should come along as quickly as we can decide we have good ones designed and are able to assimilate the feedback from them, really to proceed on what they tell us. And how fast that pace is I certainly would not be prepared to judge myself, even as an opinion.

Mr. SYMINGTON. Aren't we really talking about who is to have the responsibility for being innovative, for testing, for design?

Mission agencies are by nature rarely of a mind to take chances with the taxpayer's dollars, and the oversight of Congress and so forth. You do not want to take chances, however, with a lot of money. You might take some with a little.

Dr. WHITE. The idea of experimentation in this field is fine but I think it should be preceded by a more careful analysis and on a broader scale of the problem than I see provided for in the single advisory board in title II.

Mr. SYMINGTON. Just as a last question, one of the subjects that was emphasized yesterday was the energy search. Take oil, for example; at what point in time do we expect known reserves to be exhausted at the current depletion rate, would you say?

Dr. WHITE. Of oil?

Mr. SYMINGTON. Yes, of oil.

Dr. WHITE. Based on the definition of proven reserves, as commonly used, as I understand it from the latest study, which I do not believe has yet been published, the time is under 10 years in the continental United States.

Mr. BELL. Would the gentleman yield?

Mr. SYMINGTON. I was wondering should that give us a sense of urgency with respect to either the further search for oil or even a slightly longer range search for alternatives?

Dr. WHITE. I feel very definitely so; certainly we in the oil business feel it is a terribly urgent problem.

Mr. BELL. Would the gentleman yield?

Mr. SYMINGTON. Yes.

Mr. BELL. On that point, when you speak of 10 years, are you speaking of the oil-production methods used today or are you including oil shale, coal—

Dr. WHITE. Just conventional reserves, and recovery methods. With shale and tar sands and coal there are hundreds of years of supply but the technology is not yet available.

Mr. BELL. Some of these are getting close to the economic level with oil.

Dr. WHITE. Tar sands is being produced competitively now. Shale is awaiting the enunciation of leasing policy.

Mr. BELL. Are you speaking of U.S. production?

Dr. WHITE. Tar sands are in Canada. I am including the North Slope.

Mr. BELL. You do not know the extent of that yet, though, do you?

Dr. WHITE. The figure that is usually listed for that, as proven reserves, is 10 billion barrels.

Mr. BELL. But there is a considerable amount of North Slope yet undiscovered.

Dr. White. That is right. There is also much offshore yet to be discovered.

Mr. SYMINGTON. What about the world reserves of oil? I take it that after 10 years, unless something magical happens, we would be greatly dependent on foreign sources. What about those sources?

Dr. WHITE. The estimates I believe imply 50-percent imports by 1985 involving \$30 billion a year. That implies a tremendous balance-of-payments problem. But the resources are there for probably another 50 to 100 years depending on how fast they are used up by developing parts of the world.

Mr. SYMINGTON. In our task force on energy we were told 40 years would be a rough estimate. But you go to 50 and on up to a hundred.

Dr. WHITE. I do not have the figures that well in hand. I would defer to the other authority.

Mr. SYMINGTON. In any event, that is the thing; we have to be thinking, don't we, about the consequences to our foreign policy, to our national security, things of that kind in respect to our own industry?

Dr. WHITE. That is right.

Mr. SYMINGTON. I feel that the committee is equally cognizant of the need to meet other national problems with the next generation in mind. I think that in substance is what is behind this bill, faulty as it may be, it was the identification of national needs and an attempt to prove to the American people and the governing authority that certain needs could be met in certain ways through testing of one kind or another. We are sort of in a drift at this point; we sort of think that, if things are allowed to take their course, somehow there will be an interaction of private and public authorities that will bring about solutions.

This bill is a denial of that supposition and I think that we should deny that assumption.

Dr. WHITE. I agree with you. I think we should, too.

Mr. BELL. Dr. White, I want to take a slightly different tack: Your concept seems to be toward following more or less the same pace that we have been doing and to identify by research and so forth which route to go before we move too hastily in some other approach.

Dr. White, I wish you could have been with me when 3 years ago I took this approach with some of my constituents and I cannot find today that any great progress has been made in this direction. That was 3 years ago.

I just wonder how much more we are going to say we are going to research and look into these things and study them, and set up committees to identify before we get some kind of action?

Sometimes you can get a little action and get something done where it is not precisely correct. Sometimes you get toward the accomplishment of it by starting out and doing something even though it is not precisely right but you move in a direction in which something can be accomplished.

I think that you—if you talked to my constituents, this is not soon enough. They are not happy with that approach. They want a solution.

The CHAIRMAN. Would the gentleman yield?

Mr. BELL. Yes.

The CHAIRMAN. Aren't there lots of things the public is not happy about? We are not a bit happy that we have not found a cure for the

common cold. Research is taking place in many of the diseases that plague mankind. We have confidence that sooner or later they will come to us but the fact that we are unhappy about these things is there. That is not the point of the solution, is it?

Mr. BELL. Mr. Chairman, I am talking to the witness basically. I do not want to get in a major discussion with you. I respect your judgment but I do want to point out one thing, that it seems to me that the drive to get scientists and engineers and get this education going for them, the idea of getting our scientific setup started, was sponsored largely by the Government—now we have a lot unemployed, so this is a Government-made problem to some extent. So it requires Government-made action to solve it.

That is the basic theory—the chairman helped me by pointing out what I think is basically the problem. So it thereby falls somewhat on us as a government to find a solution and not 10 years from now.

Dr. WHITE. Well, I would certainly respect your point that action is very welcome and I would feel that some effort to proceed in some direction would be very much in order.

I would hope, however, that with it, even if the committee and the Congress decides some steps should be taken immediately, that we simultaneously try to provide some broader analysis that brings in not only the technical but social and political dimension of these problems across the board, whether it is in NSF or elsewhere where these further alternatives are developed, and not just rely on this action to solve the problem.

I might point out that even title II is largely for developing single projects, as I read it, and for developing alternatives, and the only place these are brought together and analyzed is in one advisory board or perhaps by the staff of the Civil Science Systems Administration.

I submit that these are sufficiently complex and important that they deserve more attention just in top-level manpower than that.

Mr. BELL. Well, Dr. White, would not the top-level study group you propose to replace title II face the same problem of technological advances unimplemented and unaccepted by society which you describe for the existing bill? Wouldn't you have the same problem, in other words, by approaching it from the suggestion that you made of trying to—in other words, how do we get by the people problem? You are going to have the same problem with your method, it would seem to me.

Dr. WHITE. I think if you have both alternatives debated publicly in Congress and in hearings, and have experiments that are tried as part and parcel of this effort, that we will hopefully slowly get public consensus as to what is the best or perhaps the least painful solution to some of these problems.

Inevitably they are going to be somewhat painful.

Mr. BELL. I do not know; I get the kind of reaction from my people that, "I do not want to hear about any more papers and reports and statements. We want some kind of a solution to our problem. I am driving a taxicab, and I am a scientist who graduated from MIT. I want some kind of action." That is what they are saying. They have problems of unemployment compensation wearing out and, "Where am I?"

Dr. WHITE. That man basically is looking for a job and that is one problem, and I think it is a problem that needs a solution. We would not question this at all.

Several people, with whom I talked to in the IRI in comparable jobs to mine, feel we should spend tax dollars to correct this problem, which is, after all, of the Government's making. We developed these big programs and we hired these people and educated them—

Mr. BELL. I think S. 32 is a start in solving this problem.

Dr. WHITE. I would hope we could unhook it from these national social problems, and the thinking that putting these together necessarily solves both of them. That is not necessarily so. I think a better alternative is to deal with them separately.

Mr. SYMINGTON. Supposing you had, say under title II, planning studies which I think qualify for your definition of a study project under a board, suppose you had one that absorbed the talents of some unemployed scientists and they worked on a matter which proved to be of interest to municipal governments and the National Government, and they in fact resulted in larger appropriations to pursue in the development form what the study was after.

That would be a transition from ignorance on the one hand of a possibility, and unemployment of some people on the other, bringing the two together, generating some thought and suggestions resulting in the implementation of what could then be described as a national goal of some dimension and employing more technicians and perhaps scientists.

What is wrong with that?

Dr. WHITE. I do not think there is anything wrong with it, except the part that bothers me is where will this solution be developed? If it is going to be developed by the group brought together from fellows now driving taxis—I hate to be brutal about this—but the fellows out of work tend to be the least experienced and in some cases the least able. I know some very able people have been let go through no fault of their own, but, by and large, it is my feeling that I would be little concerned about trusting the solution of these very serious national problems, the broad solution, to that group.

Now, if the broad solution is developed by some of our best minds in the country and then results in projects that hire these fellows to work, I think that is great.

Mr. SYMINGTON. Do you think—

Dr. WHITE. I would hope somehow to get that top-level group, given the responsibility for development of projects to create work in these areas, whether it is energy, or others, and whether it is in the NSF or mission agency.

Mr. SYMINGTON. I wanted to ask, on that point, do you think it is possible to discern when the unemployment problem is so great when it is affecting capable people? Do you think some capable people are unemployed today?

Dr. WHITE. Of course.

Mr. SYMINGTON. Or, generally speaking, is it second raters?

Dr. WHITE. I would answer yes to both. I think there are capable people unemployed and, on the average, the people unemployed are somewhat less able than those that retain employment from what I

have seen of this layoff thing and I have lived through a few myself. I know how it works. It is human nature.

Mr. BELL. If the gentleman would yield; some of the things you say may be true relative to layoffs but you have pockets in large areas where the large plants have been virtually shut down. There you also destroy some incentives of some very brilliant, capable people. So those are the things you are being hit by. It is not just a general trend.

Maybe you are right in some respects but there are areas where you are really hurt badly.

You say in your statement:

We can perhaps improve our projections by segregating demands that industry sees for inhouse work to meet its own future needs from that which may be required and funded by the government.

Do you think that you are able to project by this method downturns and so forth over, say, a 3-year program?

Dr. WHITE. We could try. What I was trying to say there—frankly this is one that I wouldn't want to emphasize strongly because I am not really sure it is completely valid—but I feel generally that in most companies, we can project our own progress in our own line of business, even with swings in the economic cycle. We have a fairly good idea for the next 2 or 3 years what that progress is likely to be.

Further, I think most companies are willing to inject a little dampening in the research cycle; in other words, if there is a downturn, 10-percent drop in sales, they will not lay off 10 percent of the research staff. Those companies in the past that have done that have recognized that is a poor policy both for their reputation and their programs. On that side there can be some stability, I think. It may not be perfect but it would be a little better.

But these other swings can hit companies pretty severely both on the up and down.

Mr. BELL. Just one last comment, Dr. White: I think the point that we are getting at here is that you can go—as I said earlier—analyze, and study and not do anything too hastily because you might do it wrong. That might be a shortcut to getting nothing accomplished. Sometimes it is a little easier—we used to say in the Army kiddingly, of course, do something even if it is wrong—in other words by the impact of trying to do something, sometimes some of these complicated problems start falling into place and I think this is something to bear in mind when you have a serious problem facing the Nation.

I think you cannot always with deliberate speed approach a problem because sometimes you are a little better off by moving right toward it. Then things fall into place. You might make some mistakes, but in the long range you are a lot better off.

Dr. WHITE. I think I would like to bet on my horse as well as yours. If we are going to go ahead and try this and that, let's back it up with some top-level study and probe the problem, because if we just try this and that, we may end up with a bunch of mishmash.

Mr. SYMINGTON. Dr. White, thank you, and I want to say to the members we do have some other witnesses but I do not want to deprive you of major questions.

Mr. HANNA. That is all right. We should get on with the other witnesses.

Mr. SYMINGTON. Mr. Seiberling?

Mr. SEIBERLING. I would just like to bring into focus the points you are trying to make.

I read this article you appended to your testimony. Of course the proposal of S. 32 is that the National Science Foundation identify priority areas to foster research and engineering to solve problems in those areas.

Now, as I understand it, you do not quarrel with the idea of having somebody in this Government with that responsibility. Your only point is you do not think the NSF is the appropriate body?

Dr. WHITE. No, Mr. Seiberling, I do not quarrel there ought to be bodies and I would not really feel—I am not competent to judge whether it should be in NSF or elsewhere. But I think it needs the establishment of bodies that have responsibility for one of these, say top-priority areas who are a continuing body, who represent some of our best minds in technical, economic, and social areas that impact on that particular problem and are—as this article describes—protected in duration, to keep working on this problem and watch the experimental attempts to solve it over a period of years and if that were created by this act or some replacement of it and vested in NSF or related to NSF or the national academies, I think this would be fine.

But I do not see S. 32 accomplishing that.

Mr. SEIBERLING. Isn't that what title I does?

Dr. WHITE. It asks NSF to identify the areas, yes, but to set up and somehow protect either from variations in funding or administrative turnover of groups that were very competent, I do not see that in title I. Maybe I have not read it properly but I did not see it there.

I see the advisory board in title II and it has got broad coverage but it has one board to look over the whole program. I do not think that is enough.

Mr. SEIBERLING. You say this bill comes 3 years too late.

Dr. WHITE. On the manpower problem.

Mr. SEIBERLING. All right, but the problem of conversion is a continuing one as far as I can see and will continue to be with us for the foreseeable future.

As far as I can tell there is no agency in the Government that is really doing anything to tell industry what areas their trained manpower should be moving into to take the place of efforts that are being phased out.

We have this tremendous resource of all these technically trained people that is just going to waste. Mr. Bell is right, we cannot just sit by and study it when we know it is an academic problem.

Every day that goes by we are wasting an enormous resource that will not be producing anything. How do we address ourselves to that problem if title I doesn't do it?

We ought to have some suggestions as to how it ought to be changed so it will do it possibly. Just to say councils of urgent studies would do it does not tell us much. Isn't this a council of urgent study that would be set up?

Dr. WHITE. It certainly could be called that. One council studying everything that is urgent.

Mr. SEIBERLING. Your suggestion is that we break it down and have a group.

Dr. WHITE. Yes, that is basically what I mean. That is the point I want to make. Maybe subcouncils under the main one. I do not know how the mechanism could work.

Mr. SEIBERLING. In other words you do not feel a council of global responsibilities, covering all fields, is the right way to attack.

Dr. WHITE. It does not seem adequate to me.

Mr. SEIBERLING. Thank you.

Dr. WHITE. As far as the unemployment problem, but the current problem, I am afraid I do not have any answer to offer there.

Mr. SEIBERLING. But you do agree there is a relationship there because until you have identified the priorities you do not know what to do with the manpower?

Dr. WHITE. Yes, that is right. But I wouldn't entirely use this manpower to identify the priorities.

Mr. SEIBERLING. That is right. That is the problem we are faced with. We have this manpower problem and we are trying to put these people to work before we have really identified the areas where they ought to be working. I think that was the difficulty we ran into last year when we had our hearings on the bill we were then considering.

Dr. WHITE. Right.

Mr. SEIBERLING. We were sort of putting the cart before the horse. Yet we have this asset that we are wasting.

Dr. WHITE. Right.

Mr. SEIBERLING. Thank you.

Mr. SYMINGTON. Thank you, Dr. White, for what was obviously a stimulating statement and one we will be studying for some time.

Dr. WHITE. Thank you.

Mr. SYMINGTON. Our third witness this morning is Mr. Porter Homer, president of Public Technology, Inc., which was founded in 1970, based on the technology applications program of the International City Management Association.

Mr. Homer's experience has largely been in city management. He served in that capacity in Tucson and Rochester, N.Y., and before joining Public Technology he was county manager of Metropolitan Dade County in Florida for 5 years, ending in 1970.

We welcome you here this morning.

(A biographical sketch of Mr. Homer follows:)

PORTER W. HOMER, PRESIDENT, PUBLIC TECHNOLOGY, INC.

Experience: October 1970 to Present—President, Public Technology, Inc. (Formerly Technology Application Program of the International City Management Association).

May 1, 1965–October 1970—County Manager, Metropolitan Dade County, Florida.

March 1962–May 1965—City Manager, Rochester, New York.

October 1955–March 1962—City Manager, Tucson, Arizona.

July 1949–October 1955—Director of Research and Budget, Kansas City, Missouri (and various staff positions).

World War II Veteran—U.S. Infantry Officer (Postwar service with Connecticut National Guard).

Also taught basic Political Science at Syracuse University and the University of Kansas City. Has lectured at several colleges and universities and at professional conferences, and has authored several articles in professional journals.

Education: Bachelor of Arts, 1948, University of Connecticut; Graduate work in Public Administration of Maxwell School at Syracuse University.

Professional memberships: International City Management Association; National League of Cities; Municipal Finance Officers' Association; American

Society for Public Administration; National Municipal League; Systems and Procedures Association of America; American Legion; Veterans of Foreign Wars; National Association of Counties.

Offices held: Board of Directors, American Society of Planning Officials (Presently); Former President, Missouri-Kansas Chapter, American Society for Public Administration; Former President, Arizona City Managers' Association; Former Chairman, Personnel Policy Committee, National League of Cities; Member, Performance Budgeting Committee, Municipal Finance Officers' Association; Former Vice President of International City Managers' Association; Former Chairman, Goals Committee, ICMA.

#### STATEMENT OF PORTER W. HOMER, PRESIDENT, PUBLIC TECHNOLOGY, INC.

Mr. HOMER. Thank you.

Mr. Chairman, and members of the committee, it gives me a great deal of pleasure to be here to testify before you on S. 32.

In general, we in Public Technology agree with the policy findings and establishment of goals as set forth in this bill.

We agree with the necessity of Federal funding for science and technology to sustain national progress;

We agree that the manpower pool of scientists and engineers in this country should be utilized to the maximum extent possible;

We agree that our scientific resources can contribute to meeting America's human needs;

And we agree that Federal investment and obligations for science and technology, civilian research, and engineering activities must be increased.

Most of all we agree that these resources must be focused on meeting the human needs of the Nation.

Perhaps a few words of explanation concerning Public Technology, Inc., will explain our concern for this subject.

We are a new public interest group supported by the six public interest groups representing this Nation's cities, counties, and States.

Those public interest groups are:

- Council of State Governments,
- International City Management Association,
- National Association of Counties,
- National Governors' Conference,
- National League of Cities, and
- United States Conference of Mayors.

Our purposes are to facilitate and encourage the application of technology and science to public sector problems at the State and local levels of government and to communicate aggregated technology and scientific requirements for State and local governments to the private sector, academic institutions, and the research community.

It is believed that only in this way can the above resources be brought to bear on our problems. It is our belief that no one city, county, or state can afford the expense of a sufficiently broad research and development technology program to address all the problems existing in any one jurisdiction. Therefore, then, for cities, counties and States, we advocate a collectively financed program in which costs and benefits are shared.

However, even if we are successful beyond our wildest dreams in creating this kind of a shared program, we would still advocate a

drastically increased Federal investment in science and technology if we are to meet the human needs of this Nation in the priority problem areas listed in S. 32.

While we advocate an increase in total Federal investment and obligations for science and technology in civilian research, we are not prepared to advocate dollar parity with Federal obligations for defense research and engineering activities as section 2(b)(3) does.

It seems to us that the 3-year funding authorizations contained in S. 32 should make it possible to determine realistically the necessary future expenditure levels to carry out the purposes of this bill and the policies contained therein.

With respect to title I, Science Policy Act, we agree with the concepts in this title, the prioritization of national civilian problems, the funding for basic and applied research on those problems, and the expansion of qualifications for membership on the National Science Board.

We believe this to be necessary if the National Science Foundation is to carry out these new duties.

In our short experience, we have determined two requirements for a successful program of technology application that relate to this part of S. 32.

First is the establishment of a work agenda based upon a rigorous, systematic determination and description of problems susceptible to technological or scientific solutions. Without this disciplined approach any program is likely to find itself deluged with "solutions" looking for problems to solve.

The second requirement determined by our experience is a high degree of user involvement. To us at the State and local level that means elected and appointed officials in cities, counties, and States. Without such an input no program will be realistic, workable, or acceptable.

Therefore, it is respectfully suggested that a paragraph (4) be added to sec. 103(a) to read as follows:

consult with appropriate public interest groups such as the Council of State Governments, International City Management Association, National Association of Counties, National Governor's Conference, National League of Cities, and the U.S. Conference of Mayors.

For the same reasons it is respectfully suggested that the above list of public interest groups be added to the already included list of organizations and associations included in sec. 105.

Under title II, Civil Science Systems Act, here again we agree with the concepts in this title, the support of applied research and experimentation to provide improved services, the testing and evaluating of alternative systems, the dissemination and demonstration of results, and the utilization of the Nation's scientists, engineers, and technicians.

Indeed, we are doing this on a small scale ourselves. Our experience has shown us a number of important facts that are relevant to this title.

First, a rigorous, systematic definition of a problem into operating requirements by public officials makes it possible for scientists, engineers, and technicians to address that problem on a realistic design basis.

Second, a reiteration and refinement of the problem identification operation starts to create an aggregated market on the part of the

State or local government users. This, in turn, justifies a development expenditure by a private sector company or by the Federal Government. This, in turn, can help employment and the gross national product.

Therefore, we support the concept of Civil Science Systems. We believe it is workable and that it can be productive in terms of improved public services, reduced unemployment and underemployment, and an increased gross national product.

We are particularly supportive of section 211 calling for the establishment of Civil Science Systems Information Service. Without this service this whole program will bog down to simply another demonstration program. To be successful, there must be a widespread, organized, aggressive transfer program.

We are also highly supportive of sec. 206(c) and sec. 213, which call for participation by other Federal agencies or their representatives.

We believe this to be necessary to bring the full thrust of Federal knowhow and activity to bear on this important program.

Our experience has taught us that many Federal agencies have much to offer in the area of improving services. At the same time, our experience has taught us the desirability for some Federal point of coordination as is offered by S. 32 under the National Science Foundation.

We note the absence of any mention of the Department of Defense in sec. 206(c) and sec. 213. Our experience does indicate the desirability of including that agency.

We respectfully suggest that sec. 206(d) and sec. 213 be amended to include the six public interest groups previously mentioned in this testimony. This will provide user participation from the State and local government public sector—the jurisdictions most often responsible for dealing directly with the problems mentioned in S. 32.

Under title III, Technical Manpower Transition Act, we support most of the concepts embodied in this portion of S. 32, but with caution. We support the concept of assisting in the transition of scientific and technical personnel to civilian-oriented research and engineering activities.

We support the concept of research on this problem just as we support assistance to State and local governments and the training of governmental officials for this purpose.

We support the concept of job transition programs, of career transition fellowships, of placement assistance, and particularly of education programs "to prepare students for careers in civilian, socially oriented research and engineering activities \* \* \*."

We must caution, however, that this portion of S. 32 seems, by the impact of the wording, to rely too heavily on State and local governments to employ transitional technical manpower.

We believe, with the encouragement of S. 32 and with the growing interest in technology in cities, counties, and States, that public jurisdictions can and will employ such personnel.

However, it must be realized that State and local governments are essentially service delivery organizations rather than developers of new delivery systems. We believe that there are hard facts of economics and of practicality that require the development of new service delivery systems by the research community and the private sector with a high degree of user participation by representatives of State and local governments.

If this is true, then the private sector rather than the public sector will have much more demand for civilian-oriented scientific and engineering personnel if the proper incentives are offered.

The State and local government market is large, but it consists of a series of submarkets that are too often too fragmented to attract the investment of a development effort.

Public Technology, Inc., is proving that this fragmentation can be overcome by working through other public interest groups, with representatives of user governmental jurisdictions, and with interested, concerned private industry.

However, there are many complex, large cost needs that will not be met unless the Federal Government adopts a policy of involvement, of financial incentives, and of leadership.

The potential for improvement of quality of life and of public services is too great to be ignored.

We therefore urge your serious consideration of S. 32 in order that we may all get on with the business of solving these problems.

Thank you for this opportunity to appear before the committee.

I shall be happy to attempt to answer any questions you may have or to expand upon any points you may wish to have me do so.

Thank you.

Mr. SYMINGTON. Thank you, Mr. Homer, for a very thorough review of the bill as seen through your eyes as a city manager.

In fact, in your testimony I don't find any strong criticism of the bill, rather I discern a few helpful hints that you make or suggestions you would make to improve it.

Mr. HOMER. That is a kind way to put it.

Mr. SYMINGTON. But you feel, generally speaking, the bill has merit?

Mr. HOMER. Yes, sir.

Mr. SYMINGTON. Mr. Bell?

Mr. BELL. Thank you, Mr. Chairman.

Mr. Homer, in your statement, you mention that the State and local government market is large and consists of a series of submarkets, et cetera. Do you feel S. 32 really addresses itself to the problem of using and meeting the market of the subgovernments?

Mr. HOMER. I think, sir, that it can and it provides the mechanism to do just this and it would be my hope, particularly if there was active participation by State and local government officials, that they would move more rapidly in that direction.

Mr. BELL. Thank you, Mr. Chairman.

Mr. SYMINGTON. Mr. Chairman?

The CHAIRMAN. Hasn't there been a tendency of late, within the last year or two, for more cooperation between State and local governments and their agencies, particularly those that you mentioned, or to put it another way, for them to work in unison on problems of this kind?

Mr. HOMER. Yes, sir; there has.

The CHAIRMAN. I had the privilege of attending a conference called by the mayors in Harrisburg, Pa., some time ago. Also, I am conscious of the effort being put forth in parts of the country where three States, none of which have been at the top in this field, Mississippi, Louisiana, and Arkansas, are binding themselves into a compact to advance education, science, and the application of science relating to the problems of the people there.

Mr. HOMER. Yes, sir; and that is but one example of the type of thing that is going on.

It is going on at the city and county level. There is a rising interest. But again, when you get into the more complex problems in order to solve these on an acceptable basis, we think there is a need for a Federal investment and leadership.

The CHAIRMAN. I always felt that the local government has been a parochial sort of thing, you do your bit and I will do mine.

We come to an example, say, in the Rocky Mountain States, where six States are fairly well bound together, to solve their common problems under the direction of the former Governor of New Mexico.

I think they are doing a very good job.

Mr. HOMER. There are also four cities in California, working under a grant from the National Science Foundation and from NASA, utilizing space engineers from private companies, for example, to attack local government problems and they are meeting together constantly to exchange information and experience.

The CHAIRMAN. What cities are these?

Mr. HOMER. Well, if I can remember them, Anaheim, San Jose, Pasadena, and there is one other, I am sorry I can't recall it, but they by and large have felt that this has been a very profitable and useful experience and would like to be able to see that effort expended.

The CHAIRMAN. Thank you.

Mr. SYMINGTON. Thank you, Mr. Chairman.

Mr. Hanna?

Mr. HANNA. I just want to say that I think one of the major steps forward was the creation of your organization supported by these associations of local governments.

Looking back to the testimony of the previous witness, Mr. Homer, I was involved with a group of people who wanted to use a pilot project for the disposal of solid waste in the Long Beach area. They would have to coordinate the pickup systems of about 11 local little cities around the periphery of Long Beach and bring it to a central place where they hope to separate out those things that are recyclable and the glass for reclamation, et cetera. They would experiment for uses of residuals and then a utilization for those biodegradables which could be taken back to the soil.

One of the political problems was that in each of these little cities, you had five councilmen. At least three out of the five had a cozy arrangement through a section of town with a pickup operation which contributed to their campaigns. Being a politician, I can understand the practicality of these kinds of arrangements, but it made it very difficult to superimpose a collection system that would coordinate all of this.

Further, looking at the second area of economics, when you try to interface the projects of, for instance, the glass that would be picked up and the capability of the glass industry of that area to absorb the ground up glass, realizing that certain uses such as glassphalt, and so on, are just beginning to come on line, there was no indication that there could be a phasing in of the secondary glass with the primary sands in a way in which the operating glass factories could really absorb it.

The paper industry was already behind in trying to just coordinate with the paper that was being collected on a less concerted effort than this.

So we do have these problems, but it seems to me that by very definitely going at them tells you where those limitations are and gives you the challenge that this is where the effort has to be put in and even knowing what you can't do is helpful.

Mr. HOMER. It is very helpful, at least then you are not guessing.

Mr. HANNA. So when you put in an effort, you can put it where it could be as productive as possible. If you stand back and say you might find something that is impossible, therefore, you shouldn't do anything, this is an answer I am not ready to accept.

I am ready for us to move out and find out what we can't do and find out why can't we do it. Then where does the effort have to be placed to make it go is the question.

The CHAIRMAN. Speaking of glass, one of the big glass firms in Toledo, Ohio, which came into this by virtue of the fact that they are making the optical telescope that will go into Cerro Tololo, has actually paved a good many of their roads using glass.

Mr. SEIBERLING. Will the Chairman yield?

The CHAIRMAN. Yes.

Mr. SEIBERLING. The rubber companies in Akron have paved some of the streets with rubber, by coincidence.

The CHAIRMAN. I hope it would give off a little less sound than some of the things they have been using.

Mr. SYMINGTON. The committees of Congress can add paper possibly to the project.

Mr. HANNA. I just want to make the point—

The CHAIRMAN. You talk about recycling paper, 20 years ago every ship that left San Francisco for the Orient carried great amounts of paper that had been collected to be used throughout the Orient for wrapping paper. You go into a market in Hong Kong or Singapore—

Mr. HANNA. And get your fish in a San Francisco paper. A Hong Kong fish in a San Francisco paper. I saw some San Francisco papers for which that might have been the best use for them.

The CHAIRMAN. I won't say anything about that. The newspapers in Los Angeles—

Mr. BELL. Be careful, Dick.

Mr. SYMINGTON. Have you concluded, Mr. Hanna?

Mr. HANNA. Yes.

Mr. SYMINGTON. Mr. Seiberling?

Mr. SEIBERLING. I just take it that your company is the kind of company that perhaps might result from the act being passed?

In other words, we have a provision for formation of research corporations. Would you feel that you sort of fit in with this concept?

Mr. HOMER. No; I don't think that we would. We were put together by the six public interest groups that I previously mentioned to act as sort of a central point of activity in the general area of technology application on behalf of all these numbers of governments.

If we are able to help those kinds of things happen by the simple act of being here this morning, we have more than carried out our mission.

Mr. SEIBERLING. Do you feel that community conversion corporations is a fruitful way or would it be better to have the governments themselves initiate this type of thing as a result of your corporation being created?

Do you feel that is a fruitful way or would it be better to have the governments themselves initiate this type of thing as a result of your corporation being created?

Mr. HOMER. Well, I must confess I am a little ambivalent on the community conversion corporation concept. But I also take the attitude that the whole business of research and development involves some risks and some failures as well as some successes and that presumably in the first phases of this program, this is a concept that might be tried to see whether it works.

I basically think that it is time to do something about these problems. There is a great feeling, I think, in this country that we have a vast array of scientific and technological know-how but that it just isn't being applied to our civil sector problems.

Mr. SEIBERLING. Thank you very much.

Mr. SYMINGTON. Thank you, Mr. Homer.

You heard Dr. White's testimony concerning the need for boards to make decisions, to identify problem areas and study them.

Mr. HOMER. Yes.

Mr. SYMINGTON. You heard the reaction of some of the members to that.

Now, Public Technology, Inc., has a current research and development agenda, according to this document, which I think the members have before them, underground pipe and conduit locators, firehose pressure regulators, computer systems, integrated municipal information systems, solid waste technology, et cetera.

It seems that you, in an effort to rationalize city life and reconcile its problems have identified important things and you feel and your colleagues feel also that these problems need attention and development.

I take it you may not agree with Dr. White that we are insufficiently informed as to the precise problems we ought to be solving?

Mr. HOMER. Well, I would not agree with him. I think that actually, it would be fairly simple to put together an agenda that most mayors, Governors, city councilmen, county commissioners, et cetera, would feel needed study.

It then becomes a problem of using your systems analysis approach and what not to break that problem down into its parts and to start doing something about it.

That basically was my interpretation of the general language in the act which talks about the establishment of priorities.

I think that could be done fairly quickly, particularly if there is involvement from people who are, if I may use the word, on the firing line at State and local levels, as to what is bothering them and their constituents.

Then the hard work follows, that is where your technical personnel come into play.

I think the parameters have to be set by these people who are there on the firing line.

Mr. SYMINGTON. I thank you very much.

Mr. HOMER. Thank you.

Mr. SYMINGTON. We thank you for coming up and we appreciate your being with us today.

Mr. HOMER. Thank you.

Mr. SYMINGTON. Our fourth witness is Mr. Paul Robbins, executive director, National Society of Professional Engineers. He is accompanied by Mr. Robert Doyle, legislative counsel.

Mr. Robbins will speak in behalf of his own society and four other professional engineering societies representing a large segment of the engineering profession.

I might say that time is becoming of the essence. I am going to seek the permission of the House to continue the hearings in the afternoon, because we have other witnesses, but we should all bear in mind that we must try to conclude as quickly as we can.

We are very glad to have you here this morning, Mr. Robbins and very happy to hear what you have to say.

(A biographical sketch of Mr. Robbins follows:)

**PAUL H. ROBBINS, P.E., EXECUTIVE DIRECTOR, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS**

A registered professional engineer, Mr. Robbins has engineering degrees from Syracuse University, M.I.T., and Rose Polytechnic Institute. His early engineering experience was in highway design and layout and structural steel fabrication, after which he taught at Cooper Union, New York University, and the University of Maine. In 1941 he became a consultant on engineering training in the executive office of Mayor La Guardia of New York City and during World War II was with the Transportation Corps of the U.S. Army at the New York Port of Embarkation and in the Pentagon.

He has been executive director of NSPE since 1946. He has served as advisor and member of task forces of the President's Committee on Scientists and Engineers under Presidents Eisenhower and Kennedy and a member of the Committee on Specialized Personnel, advisory to the Secretary of Labor under President Johnson and is currently a member of the National Manpower Advisory Committee on Professional, Scientific and Technical Manpower. He is an officer of JETS, a member of several engineering societies, Tau Beta Pi, Rotary, and a Fellow of the American Association for Advancement of Science.

**STATEMENT OF PAUL H. ROBBINS, EXECUTIVE DIRECTOR, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS; ACCOMPANIED BY ROBERT H. DOYLE, LEGISLATIVE COUNSEL, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS**

Mr. ROBBINS. Thank you, Mr. Chairman.

The National Society of Professional Engineers, a nonprofit organization, with headquarters in Washington, D.C., and consisting of nearly 70,000 individual members who are engaged in every aspect of engineering practice, welcomes this opportunity to present its views on H.R. 15789—The National Science Policy and Priorities Act.

My name is Paul H. Robbins. I am executive director of the National Society of Professional Engineers. We speak on this measure today on our own behalf and also on behalf of the American Institute of Industrial Engineers, with about 20,000 members; the American Society of Mechanical Engineers, a 65,000 member group; the American Society for Metals, with 40,000 members; and the Institute of Electrical and Electronics Engineers, a 140,000 member organization.

All five of these engineering organizations, with a combined membership approaching 350,000 individual engineers, are firmly united in their judgment that this legislation is urgently needed and will materially benefit the public's interest. They vigorously support its enactment into law without further delay.

Earlier in this Congress, this committee heard detailed testimony during extensive hearings on H.R. 15789's predecessor—H.R. 34. The statements of considerable numbers of concerned individuals and groups established at that time the principle of need for this bill. The National Society of Professional Engineers was one of the organizations then supporting the measure. In the intervening months, as perfecting changes in the legislation have been made, our resolve in favor of this bill has continued.

During this intervening time, the Senate held hearings on its bill—S. 32. Deliberations in that body produced several amendments designed to satisfy concerns which were expressed both there and in the earlier House hearings.

The present bill before this committee, which was introduced after Senate committee action, reflects these improvements. And the overwhelming Senate vote of 70 to 8 in passing the bill identical to H.R. 15789 after unanimous committee action reporting it out, clearly mirrors the plea of the people for affirmative and prompt action by this committee and by the House of Representatives.

We appreciate the time limitation which impending conclusion of this Congress imposes. Our July 1971 testimony to this committee on H.R. 34 sets out the details of our reasoning in support of H.R. 15789. It contains a discussion of the problems and the potentials of the engineering community in the United States for which this legislation would provide a large measure of solution and opportunity.

A copy of that statement is attached to our statement of today and, by reference, reiterated in this presentation. Our further remarks will be confined to the salient points now in issue.

The list of domestic ailments plaguing all Americans continues day by day to grow in length and severity and the one national resource which can begin to provide solutions—our technical talent and energy—is being shamefully wasted through nonuse, misuse, and underuse.

Without the technological skills available for finding solutions to these problems, the country cannot hope to make significant headway against them. H.R. 15789, in our opinion, provides for the necessary national commitment to undertake this task. It is, therefore, in the context of genuine benefit to the entire country that we have continued to urge the kind of government leadership commitment contained in the bill's national policy provisions.

Creation in title II of the Civil Science Systems Administration with funding to research, design, test, and evaluate capacities for improving public services in areas such as pollution control, housing, transportation, public safety, health care, communications, and education is a basic and major step in reordering our technical skills for domestic benefit and in providing the support and resources so that the Nation's engineers and scientists can begin this job.

One of the objections which we expressed to this committee during hearings on H.R. 34 dealt with proposed expenditure of funds for retraining without firm reference to job market outlets.

We said then that creation of civilian markets should take first call on the treasury—that it is first and foremost necessary to create the demand for utilization of converted or convertible technical manpower—that retraining, where in fact it may become necessary, can then follow in the context of specific social needs once those needs have been refined to the point of marketable demands. It seems to us that title II of H.R. 15789 meets this previously voiced concern.

Title III then wisely provides for transition from research and engineering programs which have been terminated or significantly reduced to other civilian-oriented research and engineering activities through a variety of private and public associated techniques. This clearly puts the horse back before the cart, and remedies other points of past anxieties.

Finally, title IV addresses itself to pensions—a most urgent problem created by engineering mobility—one which rapid changes in national priorities and related government contracting imposes on the Nation's engineering community.

Seldom is it possible, engineers have discovered, to acquire a vested interest in a pension plan when it is necessary to change jobs several times during a working lifetime. Even where interests in fact become vested, the total accumulation of credits in such circumstances is rarely adequate.

For these engineers, this condition is a direct result of government action, and is, therefore, the justification for the remedy contained in title IV. The unpredictable expansions and contractions of government procurements, and the fact that engineers tend to follow the contract—having in many individual cases been urged by the Government to choose technical education in order to further government objectives in the first instance—requires governmental pension legislation over and above that contained in other proposals of general applicability in order that the pension expectations of engineers and scientists can be protected.

Title IV acknowledges this governmental responsibility by requiring development of recommendations for Federal procurement regulation modification in order that scientists, engineers, and others working in associated occupations employed under Federal procurement, construction, or research contracts or grants shall, to the extent feasible, be protected against forfeiture of pension or retirement rights.

So, in conclusion, it seems appropriate to observe that the conditions requiring enactment of H.R. 15789 were apparent as early as the midsixties. We could see the beginnings of change in national goals at that time, could reasonably anticipate reductions in aerospace and defense funding, could forecast the cruel unemployment and underemployment of our country's technological work force, and could expect a shameful waste of talent during times of demand for domestic problem solution.

We should have done something about it then, in our opinion, but didn't. H.R. 15789 seeks to do something about it now. It ought to be passed into law without further delay.

We thank you, Mr. Chairman.

Mr. SYMINGTON. Thank you, Mr. Robbins.

How would you estimate the number of unemployed or under-employed people in the field of engineering and technology, et cetera? Is there any way to answer that?

Mr. ROBBINS. Your question of how, you mean numbers probably?

Mr. SYMINGTON. Yes; what would your estimate be?

Mr. ROBBINS. Unfortunately this is a difficult thing without a definition of who we are talking about. As you have of course been aware there are various figures quoted from time to time. It is probably something over a hundred thousand qualified engineers either by way of registration or as educated in colleges, that have been involved. The numbers at any one time would probably include—and numbers quoted have included—scientists and in some cases technicians.

There has been a decrease in total number as of now but it is still very unhealthy.

Mr. SYMINGTON. To what would you ascribe the decrease?

Mr. ROBBINS. An improved economy. I hope we have bottomed out but we certainly have a lot—contrary to some of the other testimony here—I would say there are a lot of capable people out of work.

Mr. SYMINGTON. I was about to ask you if you had that opinion. You did hear Dr. White?

Mr. ROBBINS. Yes, I did.

Mr. SYMINGTON. Where he stated these people were the chaff, the wheat was still at work.

Mr. ROBBINS. There is some displacement, obviously the spectrum is larger here, but certainly the studies we have made and the people we contact know there are some very capable people who are not being used certainly at their capacity. There are some who are employed, the better ones find jobs, but in many cases they are not the jobs to which they are capable of contributing.

Mr. SYMINGTON. You have expressed the view that since the Government has induced them to make certain investments of their time and energy and perhaps geographic moves, that perhaps some responsibility devolves on the Government.

Mr. ROBBINS. Yes.

Mr. SYMINGTON. Not to avoid them.

Mr. ROBBINS. Yes.

Mr. SYMINGTON. You don't find incompatibility between Government efforts to employ them and also Government efforts to find useful work to do, that is to say that there are two problems which can be met within one piece of legislation.

Mr. ROBBINS. Obviously so. It seems to us that the technological—well, one of the comments earlier in the testimony this morning was to the effect that we need more study. We made a commitment in the space effort that we would do a thing in a certain period of time. The same kind of commitment seems to have to be made on social problems now. It is obvious we will have to apply the technical and applied scientific expertise of the Nation to achieve those objectives. Obviously we will employ them if we do that.

So the direction of the Government here will result in utilization of these people.

Mr. HANNA. May I make a point there?

Mr. SYMINGTON. Yes.

Mr. HANNA. An example of this was in housing. We made a statement that we were going to have so many houses built in the decade of the seventies. This commitment which was to 26 million, I guess, new homes in the decade. This meant that there would have to be 2.6 million built each year for 10 years.

As I recall, the figures were that we had never built more than 1.8 million in our best year. There was a statement that we never could reach that goal, but we made that as our goal. We are now turning out, I think, this year about 2.45 million or 2.5 million homes. So you see by setting the goal we are really achieving it.

On the other side of the coin, I would have to say, however, that in meeting goals you set in something like housing or like in transportation you have to think about the people that are involved; that is, the people equation.

We had a thing called breakthrough in which we put \$30 million and turned loose on it some of the large corporations including some of the space corporations who had production capabilities of the highest sort.

We found out that they really didn't deliver very much for us that was usable because they really had not been in the marketing aspects of housing.

Furthermore, we find that we have to prepare families for houses as well as prepare houses for families when you are talking about the low-income families. So that there are social problems as well as engineering and technological problems which if you don't get the interface you are never going to come out with the right kind of an arrangement.

So when you talk about how complex some of these problems are—I notice you mentioned that they are very complex and nearly every other witness has. That is true. They are complex. But I think we are getting a better understanding of how these complexities shape up as we go along, and I think that we can bring a mixture of disciplines into this.

Engineers have learned to work not alone now.

Mr. ROBBINS. That is right.

Mr. HANNA. You have others that work with you in these things, psychologists, et cetera.

Mr. SYMINGTON. Title II provides for major efforts at applied social research.

Mr. ROBBINS. I was going to comment that as difficult as putting a man on the moon was and it was recognized, it was a much more simple question in terms of the technological thrust than our social problems.

We didn't have nearly as much human factor as we have now. But title II and certainly the bills do recognize that we must have a mix of these disciplines to tackle the problem. We need to fund it and we need to put some sort of coordinating agency responsible for it.

Mr. HANNA. I think we need to put in the record at some point, Mr. Chairman, that we have some ancillary interests here as a nation that have not been emphasized. One is to get back into the school system a dynamics and an expectation of use of training for engineers and scientists.

Mr. ROBBINS. That is right.

Mr. HANNA. That is a very important thing for us to reacquire because we suffered a severe blow to that by the unemployment that occurred to those people who had gone through all of the rigors of training.

Mr. ROBBINS. Of course we are recognizing this in the decline in our engineering enrollments.

Mr. HANNA. That is right, and that is very bad for the country.

Mr. ROBBINS. Very much so.

Mr. HANNA. Especially considering the problems we are talking about having to solve.

Second, as a nation among nations and one requiring to maintain its balance of payments, technical people and technologies that they develop are one of our greatest potentials for maintaining our balance of payments. That is another reason why what we are trying to do in this bill, it seems to me, is exceedingly interesting to our total posture.

Mr. ROBBINS. That is right.

The CHAIRMAN. Mr. Chairman?

Mr. SYMINGTON. Yes, sir.

The CHAIRMAN. I am always interested when we talk about going to the moon in the sixties, and all of that. I remember very definitely that this was scoffed at in the beginning, that it couldn't be done. The thought of a man doing this was the thought of a man who didn't know what he was talking about. I remember one of the things that kicked that off which we don't have in this area was this thing called Sputnik.

Do you remember those days?

I was in Europe where in Vienna they could turn on the radio and get signals from Sputnik. We were on the sea when it took place but when we got to London the British papers were more or less filled with challenges of "Big shot, what are you going to do now? You have been talking a lot but the Russians have done it."

Mr. SYMINGTON. You were inspired by a technological model which we had to simply equal. Here there is no equivalent sort of socio-economic model. We are seeking something for the first time but actually it is something we need more than we needed to go to the moon.

The CHAIRMAN. I think there are things coming up now, Mr. Chairman, that indicates some interest in the American people in going to the moon when you begin to get television ads talking about "Why can't I get a cup of coffee that is good? We went to the moon?"

Mr. SYMINGTON. We were willing to spend roughly \$50 billion—correct me if I am wrong, Mr. Chairman—to assure ourselves that we were not outdistanced in space. Would that be an outlandish sum to invest over a 10-year period in the solution of problems we are addressing today?

The CHAIRMAN. No, because you are addressing problems today that mean the vitality of this country and democracy. It is cheap.

Mr. SYMINGTON. Amen.

The CHAIRMAN. Do you agree with me?

Mr. HANNA. I agree with you.

Mr. SEIBERLING. Amen.

The CHAIRMAN. It is not very often I get my colleague from California to agree with me.

Mr. BELL. I want to congratulate you, Mr. Robbins, for a very good statement, one with which I agree in most every respect.

Mr. ROBBINS. Thank you.

Mr. BELL. I like your point that the problems we are having began in the 1960s and we have to get some legislation to get moving in this direction. It is good to hear that.

Mr. ROBBINS. Thank you.

Mr. BELL. That is all, Mr. Chairman.

Mr. SYMINGTON. Thank you, Mr. Bell.

I believe, Mr. Robbins, that you have attached to your oral statement a longer statement which you made a year ago. Would you wish that to be included as part of the record?

Mr. ROBBINS. Yes, sir.

Mr. SYMINGTON. Without objection that will be inserted in the record.

(The statement referred to above by Mr. Symington follows:)

PREPARED STATEMENT OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS ON  
H.R. 34, JULY 13, 1971

The National Society of Professional Engineers appreciates the opportunity to appear before this Committee and to present its views on economic conversion legislation. We are a nonprofit, individual membership organization, headquartered in Washington, whose purpose is promotion of the professional, economic, and social well-being of professional engineers. Our membership consists of some 67,000 engineers who are engaged in virtually every aspect of engineering practice. We vigorously support legislation seeking to assist in the conversion of the nation's talents and resources to the solution of domestic problems. The engineering community has a crucial role to play in this program, a program which needs strong leadership from the Federal Government in order to succeed. In principle, the proposals being considered by this Committee seek to accomplish this end.

During the years of the late fifties and throughout the sixties, it was recognized that the time would come when the country's occupation with defense and defense-related production would decrease, and it was suggested at that time that advance planning begin so as to ease the transition from military to peacetime activities. For this purpose, creation of the National Economic Conversion Commission was proposed in legislation which we endorsed. But the time for this type of planning, unfortunately, has passed. The problem is now upon us, and the time for action becoming increasingly critical.

Unlike any prior conversion period in our history, today's difficulty is magnified many times over by additional aggravations. The cutback in military requirements is concurrently accompanied by a projected drop in the demand for strategic weaponry and other moderation in defense procurement. The current situation is also witness to reduced demands for space exploration techniques and hardware, elimination of advanced civilian types of aircraft as a national goal, and restrictive economic policies necessary to cool inflationary trends. These are just the more obvious coincidental factors which have combined to produce the present crisis.

The situation on a personal basis for the engineers is truly a major concern. By the end of this year, an alarmingly large number of technically trained persons in the United States will be unemployed. And throughout the entire economy, many times this number of additional jobs, jobs which are dependent on the existence of technical positions, are also disappearing. This situation results not only in human hardship and suffering, but also a serious loss to the nation. For because of the need to provide livelihoods throughout other occupations, the disenchantment of fluctuating career potentials, and other reasons, there exists the real possibility that many will never return to the technical world. The long-range implications inherent in further reduction of the American technological position in the world by reason of these types of developments is apparent and frightening.

But this valuable natural resource of talent and technical energy need not, indeed cannot, be wasted. The list of domestic ailments plaguing all Americans continues to grow both in length and severity. Without the engineering skills available for use in finding solutions to them, the country cannot hope to make significant headway against such evils as the rising tide of pollution, the critical demand for housing, the crying need for efficient mass transportation facilities, the war on crime, or the fight against poverty and unemployment.

It is in this context of genuine benefit to the entire country that we urge a commitment of government leadership. Through the establishment of a publicly funded priority guidance and development program, the talents and energies of engineers, scientists, and technicians can be redirected toward that wide range of public services our society so urgently needs and demands. Conversion as seen from this view, therefore, is more than a technical challenge, it is also a social and human challenge. Above all, it is a challenge to imaginative leadership coupled with a rare opportunity for the preservation of an important national resource and its use in the service of humanity.

H.R. 34 addresses itself to these issues. It would establish, in the form of a Congressional Declaration, the responsibility of the Federal Government to provide opportunities to engineers, scientists, and technicians for socially useful employment in positions commensurate with their capabilities; to raise total Federal investment in science and technology to an adequate annual expenditure level and keep it no less than proportionally equal to the growth in the gross national product; and to increase and maintain Federal obligations for civilian-oriented research and development activities to a parity level with similar obligations for defense research development. H.R. 34 recognizes that action must be undertaken to study and appraise the social, economic, and managerial aspects of conversion from defense-related research and development activities to civilian research and development activities, to identify priority areas of civilian research and development activity likely to contribute to the resolution of the nation's pressing domestic problems, and to advance the scientific and technical state of the art in priority areas thus identified.

We wholeheartedly support these objectives. There can be no question that implementation of these goals will result in broad, tangible benefit to the entire population, will promote the general social and economic health and well-being of us all, and will operate to insure the preservation of our technical talent resources while, at the same time, redirecting its utilization to the optimum domestic good.

There exist two vital areas, however, which, it seems to us, require particular attention in any overall consideration of long-range conversion efforts. These are the need for assuring the initial and continuing funding of socially responsive research and development programs, and the need for maintaining an ongoing appraisal of the country's technical manpower requirements in order to guarantee that the right kinds and right amounts of technical talent will be available when and where they are really needed.

A large part of the present technical unemployment problem in the United States stems from the fact that the markets for technical services which existed under conditions of large scale military requirements simply disappeared with reduction in such demands. Defense-oriented industry, as an institution, was unable to convert to the civilian market. And much of the reason for this inability is the innate nonreceptiveness of the civilian economy to the extensive use of technical resources. Substantial financing for research and development in areas of the nation's social problems must be assumed as a long-term Federal commitment. Only in this way can sufficient markets be created to absorb the energies, both human and technological, which become available from time to time as national priorities change. We recommend, therefore, that conversion legislation include provision for establishment of Federal funding for civilian research and development on a continuing basis.

The problem of technical unemployment, inextricably intertwined as it is with national interest considerations, is adversely complicated by the absence of a viable program for the effective planning of the nation's technical manpower needs. Frequently characterized by alternative high demand or low opportunity, this roller-coaster effect is productive of extremely adverse impacts on the national health, welfare, and defense as well as on the engineering community itself. Curtailments of educational scheduling in periods of low demand for technical skills inevitably lead to serious shortages in future years, and crash training during times of national emergencies can be counted on to guarantee a super-

fluity either in amount or kind in periods of relative peace or years of lowered technological goals. In terms of the broad spectrum of societal issues, moreover, a maldistribution of talents is almost pre-ordained under any technical supply situation without better forecasting. We therefore further recommend that conversion legislation also include a provision investing in a national agency the responsibility of conducting a continuing appraisal of and forecasting the future needs for technically trained manpower in the United States, and with the additional responsibility of planning, through publication of recommendations, for the most efficient utilization thereof on a comprehensive national basis.

Both of these recommendations are within the spirit of the Policy Declaration contained in Section 2 of H.R. 34. By adoption of them as operative provisions of the bill, implementation of Policy will become a fact.

Section 201 of H.R. 34 authorizes the National Science Foundation to arrange with public and private organizations for the conduct of study into the social, economic, and managerial aspects of conversion from defense to civilian-related R&D, and the identification of priority areas likely to contribute to resolution of the nation's pressing domestic problems. We feel that a more positive approach to both of these vital aspects of the conversion program is warranted and necessary. As in the case of responsibility for forecasting future technical manpower needs, our judgment is that the issues are so important and so far-reaching that a separate national agency should be charged with such duties. In tandem with authority for continuous funding of civilian R&D, this facet of the effort makes up conversion's heart. It is far too complex and much too critical to leave in the hands of a multi-purpose organization on a permissive basis, operating through grants to and contracts with others.

Resolution of the social issues requires vastly different techniques and technologies than does successful prosecution of military or space objectives. Considerably more than identification of the problems and priorities is involved. It is safe to say that in many areas of the social sciences, we don't even have the knowledge at present on how to begin proceeding, much less the established skill to apply. All of these things must be developed in an evolutionary manner as we start to fully utilize our technical resources for the first time on these issues. It is our judgment, therefore, that the Section 201 and 202 authority should be broadened to encompass the full magnitude of the problem. In addition, a separate national agency, we feel, should be given the responsibility and the duty to carry the program forward.

Section 203 provides for the planning, developing, strengthening, and carrying out of education programs designed to retrain scientists, engineers, and technicians in order that they can work effectively in areas other than those in which they have been working—presumably defense and aerospace; while Section 206 provides funds for award of fellowships to highly qualified scientists, engineers, and technicians to enable them to participate in the Section 203 programs. We are constrained to observe that all the retraining that can be provided to all the engineers in existence will solve nothing standing alone. Unless markets exist for the utilization of technical skills, trained and retrained alike will continue to stand idle. This is precisely why the Policy Declaration of H.R. 34 is so vital, and why its implementation through practical application is so critical to the whole conversion issue.

All of this is not to say that we oppose retraining with Federal funds. We do not. But we are firmly convinced that the proper conduct of a program of research and development in the broad area of social needs will develop the outlets for employment of our technically skilled citizens without which retraining is meaningless. We think therefore, that expenditure of funds and efforts in the civilian R&D field occupies the position of first call on the treasury. Retraining can then follow. Where retraining is in fact required, whether it consists of simple re-orientation sessions, on-the-job instruction, or lengthy academic programs, it will be more productive in the context of specific social needs once these needs have been refined to the point of marketable demands.

The same conclusion in principle attends Titles III and IV. The efficient utilization of technical resources in the civilian economy can only hope to approach a truly useful degree, in our judgment, when civilian R&D funding creates the market. Conversion of businesses, like retraining of human beings, in effect, puts the cart before the horse. And here also, we do not oppose the intent behind the Titles III and IV provisions. Conversion of business structure and personnel may, in fact, be highly desirable. But we are of the conviction that it is first and foremost necessary to create the demand for the utilization of converted

or convertible resources. To the extent that business operations then need specific conversion aid, it can then be provided.

Finally, we are convinced that conversion cannot take place within the framework of our present structures, that a Federal commitment to conversion leadership is requisite. In retrospect, it is plainly evident that the country should have pursued a course of action over the past decade to prepare for the situation in which we now find ourselves, and to have developed both knowledge and blueprints to carry out a conversion program at the time of need. But we can possibly make up for this lack of preparedness now by acting without further delay, not by concentrating solely on finding jobs for the unemployed, but by undertaking a real effort to generate marketable outlets in the civilian economy for the use of converted or convertible technical talents. Successfully meeting this challenge will serve to meet not only the economic demands so urgently requiring satisfaction, but also to open an entirely new era for the accomplishment of benefit to humanity. This is our challenge. This is our opportunity. We need only act.

Mr. SYMINGTON. Thank you, Mr. Robbins.

Mr. ROBBINS. Thank you.

The CHAIRMAN. Mr. Robbins, as a young engineer 40-odd years ago I came out of World War I and we were going through the same sort of thing then.

Mr. ROBBINS. I am very proud to have you sitting in that chair, sir. We claim you as one of ours.

Mr. SYMINGTON. I will call on Mr. Charles Stone, chairman of the board of the EDICT Foundation. EDICT stands for Ecology Development and Implementation Commitment Team.

(A biological sketch of Mr. Stone follows:)

CHARLES L. STONE, PRESIDENT, EDICT FOUNDATION

Born: January 1, 1936; married—3 children; secret clearance.

Qualifications: Eighteen years in industry.

Six years in management of various departments with up to 105 personnel involved in computing and management systems development and operation.

Four years of staff work including business system development and implementation activities.

Eight years as a designer/draftsman in missile launcher equipment, aircraft, truck engines and gas turbines.

Specialized training and experience: Advanced planning; management technology; computer applications; engineering data systems; performance management; configuration management; engineering; and cost reduction.

Successfully directed concept, development and implementation of specialized major division and program level business systems; and engineering data systems.

Awarded nine separate accommodations for outstanding and superior performance, the last of which was for "Sustained Superior Performance".

Received six separate "employee suggestion" awards.

Education: Technical Secondary School; San Diego Junior College; San Diego State College; U.S. Air Force and Industry Courses.

Special Studies: Math; Science; Drafting; Electronics; Management; Jet Engine Maintenance and Automotive Maintenance.

Current public service: President—EDICT Foundation; advisor—City of Huntington Beach, California State Legislature, United States Congress; guest lecturer—Golden West College, University of California at Irvine.

STATEMENT OF CHARLES L. STONE, CHAIRMAN OF THE BOARD,  
EDICT FOUNDATION, MANAGEMENT CONSULTANT, NORTH AMERICAN  
ROCKWELL CORP.

Mr. BELL. Mr. Chairman, may I welcome Mr. Stone who testified before our committee, I believe, in Los Angeles a year ago.

Mr. STONE. Right.

Mr. BELL. And also he is very close to my district in southern California. It is a pleasure to welcome you before the committee.

Mr. STONE. Thank you.

Mr. SYMINGTON. We in Missouri, particularly the St. Louis area which enjoys a small but active firm known as McDonnell Douglas, are well aware of North American Rockwell's ambitions and activities. And we are somewhat envious. I would point out that EDICT which was founded in Los Angeles has branches now in 14 States with about 5,000 members so it is clearly a voice to be reckoned with and we are glad to hear it today from you, Mr. Stone.

Mr. STONE. Thank you, Mr. Symington.

Mr. Chairman, members of the subcommittee, many thanks for inviting the EDICT foundation to share its views with you on S. 32, "The National Science Policy and Priorities Act of 1972."

After 2 long years of solid research, debate, and coordination, the 92d Congress has formulated a great piece of legislation in this act. The progress which has been made on this legislation is a great tribute to this subcommittee and the Senate Subcommittee on the National Science Foundation.

I remember well when Representative John V. Tunney was willing to take time out from his duties with the 91st Congress to chair ad hoc congressional hearings on the aerospace industry in Los Angeles, Calif. That was December 3, 1970.

The EDICT Foundation was there to testify how hard it was struggling to define what is now so well defined within this act. North American Rockwell Corp. president, Robert Anderson, testified regarding his commitment to many of the goals now embodied within this act. The EDICT Foundation would like to submit the text of that statement as exhibit A of my testimony here today. As an employee of North American Rockwell, I am very proud of Mr. Anderson's leadership on this issue. Labor leaders and unemployed individuals and groups testified on the hardships and trauma of mass unemployment and the need for jobs rather than retraining.

#### EXHIBIT A

STATEMENT OF ROBERT ANDERSON, PRESIDENT, NORTH AMERICAN ROCKWELL CORP., TO THE AD HOC HEARINGS ON THE CALIFORNIA AEROSPACE INDUSTRY, CONDUCTED BY CALIFORNIA CONGRESSIONAL DELEGATION, LOS ANGELES, CALIF., SENATOR-ELECT JOHN V. TUNNEY, CHAIRMAN, DECEMBER 3, 1970

As President and Chief Operating Officer of North American Rockwell Corporation, I have responsibility for an important segment of the California aerospace industry. My background prior to joining North American Rockwell in 1968 was principally in the automotive industry, and I am still closely involved in this facet of the nation's industrial complex since a significant part of our company's business involves automotive products. Because we are deeply involved in diversified commercial business as well as in space and defense work, I feel that I have a good opportunity to view aerospace problems in perspective.

I was pleased to accept your invitation to appear before this ad hoc group for two reasons. The first is my desire to cooperate in efforts to solve the problems the group is considering. The second is my wish to become better acquainted with our senator-elect from California and his California congressional colleagues present here, who must certainly play a key role in the future of aerospace and the future of California.

At the outset, I want to express my wholehearted agreement with the objectives of these hearings, which the Chairman summarized in his letter of invitation as "the revitalization of California's ailing aerospace industry." He referred to the "staggering unemployment, declining corporate profits, and wasted

technological potential." Significantly, three of the five points in his program relate the problems of our industry to the larger national problems of urban life and environmental pollution. I think we all agree that the two sets of problems can and should be worked together. Some steps have already been taken in this direction; more are being taken. As the calling of these hearings demonstrates, the nation—all of us—must continue the momentum which is being generated. We must counteract the natural tendency to do nothing because full solution of the problems is not immediately attainable.

But the principal idea I want to advance in this statement is that a substantial application of aerospace capability to the solving of the nation's domestic problems is unlikely to occur easily. It is probably not going to occur at all unless there is a dramatic focusing of our economy and our national purpose. I will return to that thesis presently. First, as a background, I would like to touch on some aspects of our company in relation to the complex crises with which you are concerned.

As an indicator of the dimensions of the industry unemployment problem, our aerospace operations in California, which employed 63,000 two years ago and 49,000 last year, are now down to an employment of 34,000. So we have reduced our California employment by 29,000 in the past two years. Many of these 29,000 men and women have been unable to find work of any kind, let alone work that would utilize their special skills and experience.

To counteract this trend, we have devoted very considerable effort in trying to bring new aerospace business into California. In this connection, I think it is significant that the first point in the five-point program relates to increased efforts to bring aerospace contracts into California. I am sure that if those people who have been laid off by aerospace companies were polled on the best way of revitalizing the ailing aerospace industry they would reply unanimously: more aerospace business.

I remind this Committee that the aerospace industry is characterized by intense competition on the one hand and declining government procurement budgets on the other hand. We were successful in winning the Air Force B-1 bomber competition. If this program continues to be funded as planned and proceeds into production, it will be a very large program indeed and have a very positive effect on aerospace employment in California. Before that we had participated in a very costly competition for the Air Force F-15 fighter program. There we were unsuccessful. Since that time we have entered into an agreement to perform major subcontract work on the supersonic transport program. That program, like the B-1 bomber program, is also very important to Southern California. If it continues to receive the necessary government support and eventually continues into production, it will also have a very positive effect on employment in this area. I should like to interpolate here, an invitation to the members of this Committee to visit our Los Angeles Division and review the work which is being performed on both of these programs.

We are continuing vigorous efforts for new aerospace business. One substantial opportunity of great importance to Southern California is the NASA Space Shuttle Program on which we are devoting substantial resources in the competition for both the space shuttle vehicle and the space shuttle engine. We need all the support that we can get on this program.

But I must emphasize that the overall outlook is bleak because of the few major programs which can be forecast in the light of the limited federal aerospace procurement budget. The size of that budget, of course, is not our province but that of the government and, ultimately, of the people of this country. Speaking as an individual citizen, I believe that the current and projected budget levels are dangerously low.

Apart from our efforts to increase our aerospace activities, we have had under way now for some time an organized effort to apply our technological capabilities to the domestic sector of our economy. I should like to put forward some examples of the kinds of things which we are doing. While by themselves they may not make a large impact on our non-aerospace economy, if they are multiplied by the efforts of other companies along the same lines they could indeed be significant.

Our basic corporate philosophy is that the advanced technology inherent in the aerospace industry can be successfully transferred, on a selective basis, to the commercial marketplace.

After three years of concerted effort, we have learned many lessons. We have recognized that commercialization of advanced technology does not occur overnight or without some re-education of both the technology-conscious engineer

and the market-oriented commercial product manager. Most important, however, we have learned that technology transfer will work.

We have developed considerable technology in the area of water and waste water pollution control, largely as a by-product of our aerospace program efforts. Much of the knowledge grew from a need to treat and remove chemical ingredients which built up in the cooling water utilized in large rocket engine tests. Since no commercial techniques were available to treat this water adequately prior to discharge, we were forced to learn how to monitor, measure and control the impurities. Our nuclear reactor work also taught us techniques for providing the controlled purity fluids required for reactor coolants. In addition, development of environmental systems for the Apollo spacecraft got us into sophisticated systems for disposal of liquid and solid wastes, and purification and recycling of gaseous wastes.

With this advanced and somewhat specialized technology in hand and with no practical internal outlet, we joined in the formation of a new company, Envirotech Corporation.

Envirotech, already a major firm in the pollution control industry, with perhaps the broadest line of special water and waste water treatment equipment, continues to grow in related pollution control areas and is developing an integrated waste management systems capability working with consulting engineers and industry. As an extension of our own technology transfer philosophy, we have established a continuing technology relationship with Envirotech.

For almost two decades, North American Rockwell has been intimately involved in the development of nuclear reactors for commercial application. More recently, we have been firmly committed to development of the fast breeder concept. The nuclear reactor plant by its very nature exhausts no undesirable combustion products to the atmosphere during operation and represents a major advance in reducing air pollution. Compared to first generation nuclear plants, the fast breeder concept, with its high thermal efficiency, provides a further advantage since it greatly reduces the thermal effects in effluent cooling water per unit of energy produced.

As a by-product of our work in the nuclear area, we have developed an advanced concept for the removal of  $\text{SO}_2$  and various other noxious gases from industrial and utility exhaust gases. This process, which has been advanced through company programs and through support from the National Air Pollution Control Administration, originated from molten salt technology associated with nuclear fuels reprocessing. We feel this molten carbonate  $\text{SO}_2$  removal process has great potential and we are planning a joint industrial/utility team approach to submit a proposal to the government for a pilot plant.

Additionally, we have identified even further derivatives of advanced molten salt technology. For instance, we are developing a diesel muffler which may greatly reduce the contaminants and odor inherent in truck and bus diesel engine exhaust. We are seeking to test and demonstrate this development with the Los Angeles Rapid Transit District, principally supported by a grant from the Urban Mass Transit Administration of the Department of Transportation. If the development work proceeds well, we can see meaningful commercial applications which can be marketed through our own automotive products operations.

In the field of integrated transportation systems, our Los Angeles Division was selected by the State of California in 1965 to perform a six-month study of the transportation requirements of the state through the year 2015. The resulting report suggested a further four-year program in which an operational simulation model of the California transportation system would be developed. The State of California did not, however, elect to fund this further work. Subsequently, in 1969, the Space Division, with company funds, performed a conceptual design study relating to an integrated transportation network for the Los Angeles region.

We are also working in the earth resources area. Here, through advanced sensor and information handling systems, we feel we can contribute significantly to the surveillance, monitoring, control, and enforcement in both resource management and pollution control areas.

From these examples, it is evident that even a single industrial firm can utilize a variety of approaches in organizing to employ its advanced technology in environmental control. As we have learned from our efforts, however, the common denominator in achieving successful translation of aerospace technology into the commercial sector is the need for a definite program with a definite objective and an interested sponsor or customer for the services or products to be produced.

The government, of course, is providing needed organizational thrust through the formation of the Environmental Protection Agency and the National Oceanic and Atmospheric Agency. We, as members of industry, look forward to a close working relationship with both the EPA and NOAA, and offer our assistance in helping to define the specific goals and long-range plans which will make a national effort successful. In addition, we offer our services in helping to formulate the policies and procedures which can optimize our contributions at a program level.

The recently formed National Industrial Pollution Control Council represents an excellent example of the cooperative government/industry approach toward defining and solving our environmental problems. This council, created by President Nixon in April of 1970, is specifically structured to bring the resources of the business community to bear in the pollution area. Made up of 63 chief executive officers of major U.S. corporations, the Council integrates the advice from industry representatives who fully recognize the problems of pollution. Mr. Willard F. Rockwell, Jr., Chairman and Chief Executive Officer of our company, serves as Vice Chairman of the Council.

A valuable and positive further thrust forward could well be achieved by the creation of the proposed National Environmental and Urban Laboratory in Southern California with the responsibility for determining the applicability of aerospace technology to solving domestic problems. We would assume that such an organization would work closely with the Environmental Protection Agency as well as with industry. In this connection, it may be that the Laboratory could serve as a program technical coordination office.

I should like to elaborate on this matter of defining specific goals, specific plans, and specific programs. Our urban and environmental problems are enormous and various. At the same time, we have at hand in Southern California alone, waiting to be used, a vast capability that can make a vital contribution in arriving at solutions to those problems. We have developed teams of people with unique ability to invent and implement new technical and managerial solutions to unusually difficult and complex problems. As long as a problem can be defined in terms of technical performance, we can almost invariably find a way to solve it. We cannot, with equal confidence, state that we have the ability to solve problems when performance must be measured in social or economic terms. But we can contribute to the solution of such problems by helping to define the problem itself and then by defining the systems and building the necessary hardware. Inevitably, the undertakings involved will be very large and, equally inevitably, will require a good deal of money.

The federal government has, I believe properly, recognized its responsibility in this area. As I have indicated, I believe the moves which have already been made are constructive. I would urge that further moves be made toward consolidating overall responsibility for identifying and attacking our domestic problems. By reducing the multiplicity of agencies involved, stimulus can be given to the development of the vitally necessary long-range objectives and programs for a broad but effectively integrated national approach. Equally important, and essential in our view, is the planning of identifiable programs with schedules and sufficient funding to maintain continuing well-focused efforts. It has been our experience in the aerospace industry that program fragmentation, excessive and too-small tasks, and lack of long-term focus result in gaps, redundancy, and general inefficiency.

Eventually, I would hope that specific plans and programs can be unified by the government by a positive policy with definite goals and definite time schedules.

President John F. Kennedy's goal of men on the moon within the decade of the sixties captured the imagination and support of the entire nation. The challenge of saving the earth and its resources for mankind—even more difficult than the exploration of space—must also be dramatically focused if it is to be met.

The very complexity of our civilization and the organizational patterns through which we govern ourselves dictates a unified national approach rather than a series of well-meaning but uncoordinated thrusts, however carefully thought out and constructive. I would not stop or discourage any of these efforts, but rather hope that they can become part of a bigger whole.

As an illustration of the complexities involved, I recall reading some time ago of efforts to solve the growing pollution problems in Lake Tahoe, one of the state's most beautiful recreational assets. As I recall, the article cited the fact that Lake Tahoe, which borders on five counties in two states, was receiving

the attention of more than 100 separate agencies and organizations, each of which presumably had a slightly different view of what should be done. The difficulty of accomplishing fast and meaningful action in such circumstances is readily apparent.

Accomplishment of President Kennedy's moon goal was possible because it generated a massive, fully funded effort under positive control of a single agency. The program had purpose, direction, and money. It also had intellectual and emotional support from the Congress and the people. I find it hard to believe that our nation could not generate the same support if we declared as a national goal the effective reversal of our presently unfavorable environmental trends by the end of the seventies; and established clear-cut technical program goals in support of such a national goal.

I submit that the coordinated program envisioned in this concept, which of course is not original with me, would go a long way toward solving the problems faced by the aerospace industry. The talents and skills of the aerospace industry would be absorbed into the national effort in support of program opportunities. Companies and individuals would be drawn into the competitive open market at appropriate points as their capabilities warranted. We believe that large retraining programs would not be needed to use these capabilities effectively. In the main, we would expect that existing skills could be applied to these programs of the future.

This approach, rather than a massive WPA, is in my opinion the most practical interrelated solution for the problem of the ailing aerospace industry and the problems of urban life and environmental pollution. It would utilize the normal patterns of American freedom and competitive enterprise, by companies and by individuals, to accomplish the stated goal efficiently.

Perhaps it is visionary to hope that this kind of unified national program can be established and funded and carried forward. I believe, however, that something very much like this is needed to get us from here to where we must go in the seventies and beyond. Meanwhile, I emphasize again that each step taken in the right direction now should be encouraged. We must not stop and wait for the great moment when everyone will be ready to move forward with a massive national program. Whatever we can do now will contribute to the ultimate objective, and our individual efforts will prepare us for the bigger jobs ahead.

In conclusion, I want to reiterate my main themes which are that a substantial application of aerospace capability to domestic problems will not occur until there are large programs with the corollary large funding. We must recognize realistically that it will take some time for these programs to come into being even if the nation should adopt a positive policy to do so tomorrow. Consequently, I think it is plain that in the nearer term the aerospace industry problems of staggering unemployment and unused technological potential can only be counteracted by the initiation of large aerospace programs.

As I have said, we are devoting a substantial part of our resources to win new business wherever possible. For example, we spent \$25 million in trying to win the F-15 contract on which we were unsuccessful, many millions of dollars on the B-1 bomber competition, and we are making a significant investment in our efforts to capture the Space Shuttle Program. Our employees are highly motivated and, in many cases, are making personal sacrifices to insure that the company is in the best possible posture to win those programs which may be initiated by the government. However, no matter how hard we work and no matter how many resources we apply, we cannot bring programs to Southern California unless there are programs initiated by the government for which we have an opportunity to compete.

Mr. STONE. Shortly thereafter the 92d Congress issued S. 32 and H.R. 34 as the Conversion Research and Education Act of 1971. That legislation began to move our thrust in the right direction. It defined a new tool called a Community Conversion Corp. to operate as a nonprofit regional project office. But it never really gave definition or funding for the projects to be performed.

Extensive hearings were held on H.R. 34 in June, July, and August by your committee. These hearings indicated that the urban crisis and the excess of technical manpower could become national opportunities, if civil system project definition funding were provided. Building upon the intelligence from this committee's hearings on H.R. 34 the

Senate subcommittee held hearings in October 1971, on S. 32. Those hearings cleared the way for amendment 469, which was then incorporated into S. 32. This brief history on S. 32 and H.R. 34 does not give adequate recognition to the extensive efforts of the subcommittees and their staff.

Perhaps the overwhelming vote of 70 to 8 by the U.S. Senate is the best indicator of the fact that this bill had reached a level of maturity and is now ready to implement. Another good indicator is the joint resolution from the California State Legislature enclosed as exhibit B.

## EXHIBIT B

## CALIFORNIA LEGISLATURE RESOLUTION

By the Honorable Larry Townsend, 67th Assembly District; the Honorable Bill Greene, 53rd Assembly District; the Honorable Walter Karabian, 45th Assembly District; the Honorable Paul Priolo, 60th Assembly District; the Honorable Ralph C. Dills, 32nd Senatorial District; and the Honorable Mervyn M. Dymally, 29th Senatorial District.

## RELATIVE TO FEDERAL LEGISLATION

Whereas, The issues of energy resources, transportation, health care, pollution, adequate housing, crime, and unemployment are increasingly important to our nation; and

Whereas, Many of our California technical and scientific work force remain unemployed, and are not being utilized in the search for solutions to these pressing problems; and

Whereas, There is an urgent need for the National Science Foundation to conduct research, education, and assistance programs through Community Conversion Corporations to prepare the nation for conversion from defense to civilian socially oriented research and development activities, and for other related purposes; and

Whereas, The United States Senate has now approved legislation which will bring federal funds and direction of our national skilled work force together for the first time in our history to cope with the problems outlined above; and

Whereas, This legislation was originally sponsored by the California based Edict Foundation, and is strongly supported by labor and service organizations and individuals throughout the country; and

Whereas, Legislation identical to the National Science Policy and Priorities Act of 1972 is now pending before the United States House of Representatives, and is expected to receive floor action this year; now, therefore, be it

*Resolved by the Joint Rules Committee of the Senate and the Assembly,* That all members of the California Congressional Delegation be urged to support this legislation and assist its passage in every possible way; and be it further

*Resolved,* That copies of this resolution be transmitted to each member of the California Congressional Delegation and to the Speaker of the House of Representatives.

*Resolution No. 100, Approved by the Joint Rules Committee.*

*Subscribed this 24th day of August, 1972.*

JAMES R. MILLS,  
*Chairman, Senate Rules Committee.*  
ED REINECKE,  
*President of the Senate.*  
JOHN L. BURTON,  
*Chairman, Assembly Rules Committee.*  
BOB MORETTI,  
*Speaker of the Assembly.*

Mr. STONE. As a member of the team of employees that built the Apollo and most recently helped North American Rockwell win the Space Shuttle Award, let me assure you that my colleagues in industry are very favorably impressed with S. 32 and the forward

thinking of this subcommittee, as well as your counterparts in the Senate.

As evidence of the enthusiasm for this act, I would like to enclose a copy of a resolution from the National Convention of the International Association of Machinists and Aerospace Workers as exhibit C.

EXHIBIT C

Proceedings of the 28th Grand Lodge Convention

INTERNATIONAL ASSOCIATION OF MACHINISTS AND AEROSPACE WORKERS,  
LOS ANGELES, CALIF., SEPTEMBER 5 TO 15, 1972

RESOLUTION No. 138

Subject: The National Science Policy and Priorities Act  
(Referred to Resolutions Committee)  
Submitted by Lodge 2024.

Whereas the problems of energy resources, transportation, health care, pollution, housing, crime and unemployment are increasing problems of our nation which must be solved, and

Whereas much of our nation's technical and production workforce is unemployed because of inadequate programs to meet our domestic needs, and build our society, and

Whereas the Senate has passed S. 32 and the House of Representatives is now considering H.R. 15789 (the National Science Policy and Priorities Act) and

Whereas the purpose of this legislation is to bring the nation's unused technological potential—such as that of the aerospace industry—to bear upon the nation's problems,

Now, therefore be it *Resolved*, That the Machinists and Aerospace Workers go on record as supporting the National Science Policy and Priorities Act,

And be it further *Resolved*, That the secretary of this conference be instructed to communicate to each member of the House of Representatives our organization's deep and direct interest in H.R. 15789 and to solicit their support for its speedy enactment.

TED NEIMA, Jr.,  
President, Lodge 2024.

The resolutions committee recommends concurrence and I move the adoption of the resolution.

(The motion was duly seconded.)

Vice President WINPISINGER. The committee moves for the adoption of the resolution. Any discussion? Hearing none, all those in favor please signify by saying "aye", opposed? The "ayes" have it and such will be the order.

Mr. STONE. The most pressing domestic challenge faced by this Nation in the remainder of the 20th century is its capability to organize scientific and technical resources to meet the problems of the cities, the environment, and the public services—in short, our 19th century civil systems. Carefully organized research thrusts into energy, regional environmental systems, and municipal service systems by the National Science Foundation's (NSF) RANN directorate has prepared this Nation to take the next step toward advanced interdisciplinary and systematic planning.

This step requires creative work of the highest order. Many examples are available; however, there is one which was printed in the Los Angeles Times just 30 days after the Senate voted on this act. I believe that the narrative and associated art work in this article gives a perspective of the future to which this act will contribute and an indication of public interest. The title is "California 2001—Better Life Follows Environmental Wars," by Al Martinez. This article is submitted as exhibit D for your information.

## EXHIBIT D

## CALIFORNIA 2001—BETTER LIFE FOLLOWS ENVIRONMENTAL WARS

(By Al Martinez)

Morning comes to California, gleaming off the amber dome of a transpoliner that streaks south out of San Francisco on a cushion of air.

The linear induction motors accelerate smoothly, pressing the multiunit commuter to its cruising speed of 300 m.p.h. just clear of the sprawling San Jose megalopolis.

The six-forty-fiver is nonstop to Los Angeles. The trip will take an hour and 20 minutes.

The day is Tuesday, Sept. 25, 2001.

Overhead, on its regular 18-day orbit, the manned station Skylab glides through space, its sensitive scanning equipment geared now to monitor the life of the Golden State in the golden autumn: the rush of rivers and traffic, the purity of air and ocean, the sum of resources and population, the health of crops and forests, the subtle movement of mountains and the barely perceptible erosion of granite.

All of this, translated in a flicker to analog-video-digital telemetry, is flashed to Sacramento as Skylab, its passover done, moves out of range, and as the transpoliner slips by Joaquin-1 on the western edge of the great Central Valley near Polonia Pass.

Joaquin-1 is the first of the cities conceived by a coalition of planners from government and the private sector to relieve the pressure of urbanization from California's overpopulated metropolitan centers, and it is aborning now at the confluence of a network of water and power and transportation, where need and nature destined it should be.

Here business and industry will flourish in a population complex designed to overcome the enigma of wasted space and congestion that still threaten the survival of the big cities. Here new knowledge utilizes land for capacity and privacy and creates an architecture at peace with nature.

The transpoliner, its computerized acceleration system ignorant of the dream coming true, is past Joaquin-1 in a twinkling and flies through the morning toward its final destination—by towns that appear with disturbing unplanned frequency in the distance, near low hills that mask the nuclear power plants of an energy-hungry state, through the far-flung outskirts of the L.A. suburbs that sprawl into Ventura County.

Finally, Los Angeles.

Its brakes hissing softly as the speed drops, the transpoliner dips through an underground opening to the mammoth subsurface downtown DOT (Department of Transportation) terminal and glides to a stop, settling gently through the cushion of air to its base.

The doors slide open automatically and the passengers leave their cars. They board electrically operated feeder pods, the so-called people movers, that transport them to key points throughout the big city.

The pods glide with a soft whir on fixed guideways 20 feet aboveground, over the elevated pedestrian walkways and the protected malls and the small clean cars that dart through a shimmery day in a world that has discovered the value of clear air after a choking haze.

The city comes to life. The business of the day is beginning.

Thirteen miles northwest of the downtown section, in a multi-use highrise building near the intersection of Mulholland Drive and the San Diego Freeway, morning has come with the clicking awake of an automated household.

A medium-impact Homemaster, the miniaturized and simplified version of a business computer, has been pre-programmed to bring the essentials of a new day to the six-room apartment.

Indirect lighting spreads automatically through each room, a microwave oven heats up, music plays, a coffee maker turns on and a video screen flashes a reminder of the day's commitments.

A family of three yawns and stretches into the routine of the morning in a scene that is repeated again and again in other high-activity centers and in the suburbs, the New Towns and the desert developments.

The Mulholland highrise is a relatively new application in urbanized cluster living, part of the movement to utilize space and distance that evolved into multiuse structures.

That family of three, out of the steamy showers now and around their instant breakfast, is but one segment of the building they occupy.

Not only are there other apartments in the same building—varying as much in price, style and size as homes in a suburban neighborhood—but the unit contains services as well.

School is three levels up, and the bread-winner in the family works in a spacious sub-surface center that assembles instrumentations for the space shuttlecraft at the Vandenberg launching facility.

Other buildings in the Mulholland Cluster are devoted to specific purposes. There is a health-care center that houses a hospital, an out-patient clinic, doctors' offices, laboratories, a rehabilitation unit, a nursing home and an ambulance company.

Another structure combines police and fire headquarters and government offices, and another a wide variety of entertainment facilities from an opera hall to a sports arena. Most of the rooftops are utilized for parks and swimming.

School is without grades and grading, and the six-million public school children of California have emerged as individuals in a system drastically regeared to provide for individual needs.

Sophisticated learning machines are utilized in open classrooms, and teachers have become managers of education.

But the human component has not been abandoned in the age of electronic gadgetry.

Senior citizens, a previously untapped reservoir of knowledge and experience, are volunteer teaching assistants. So are housewives and college students.

In the higher grades, the youngsters take a portion of their classes in the centers of communication, government, industry, law and commerce, taught by those involved in the function of society.

It has been a long-evolving dream to integrate learning with society, to realistically equate education with improvement of the culture, to utilize competitive technology for knowledge as well as profit.

The dream comes true not only in the skyscraper world of the high activity centers of Los Angeles, but in the far-flung suburbs as well, drenched now by the mid-morning sun on a blue-sky Tuesday of tomorrow.

The suburbs of California endure around the giant urban centers despite growing efforts to disperse and redistribute the population into the more sparsely inhabited sections of the State.

#### GROWTH REGULATED

An air-cushion rapid transit system, which also ties the high activity centers together, makes living in the suburbs and working in the cities easier, but suburban growth is regulated by law.

Building permits are frozen or only reluctantly granted in "down-zoning" programs around Los Angeles, San Francisco, Sacramento and San Diego.

For some areas it came too late, the residential clutter is the result along the high-speed transportation corridors of exurbia.

But in other suburban regions, streets have been closed off to provide for the kinds of parks and open spaces only grudgingly granted in the past.

Light industry and warehouse facilities which still exist beyond their specified areas are underground, and the land above them is utilized for public services.

Among the services are transportation terminals. Planners began to realize in the 1960s how instrumental the efficient movement of people would be to the survival of the cities.

They rejected as intolerable expedients the mass construction of additional freeways to meet travel needs.

Instead, state and federal money went into the study, design and creation of air-cushion and electric transit projects, and construction lead-time dissolved in the acid of necessity.

#### RAPID TRANSIT

They had to be built, and therefore they were built.

The long-distance transpoliners, flashing between the cities, evolved along with the interurban systems, the people movers and the smogless jitneys.

These same ground transportation systems have favored today's continued heavy reliance on jet travel by drastically lessening the time it takes to get from one's home to an airport.

A new generation of jet engines are pollution-free and quiet, and their short takeoff and landing capabilities have also minimized the environmental impact of airports by limiting their size.

It was the environmental movement generally, a revolution full-blown in the ecology-minded '60s, that has resulted in today's smogless cities.

The air snaps with a brilliance predating that era of pollution when the sun shone orange through a deadly haze, when the stars were blurred, when the outlines of the buildings were vague in the brownish density that settled over them.

Now the works of men stand sharply defined against the iridescent sky, and nowhere—not piled against the mountainsides nor stagnant in the land basins—is there even a hint of smog.

Water pollution is also only a distant battle—won in the war to preserve the environment.

The victory is evident as the sun at noon shimmers off the revitalized streams and the once dying lakes of California, the level of their purity monitored by instruments 1,000 times more sensitive than they once were.

Pollution is measured in parts per trillion, where yesterday such minutiae was not even detectable.

#### NATURAL COASTLINE

But environment involves some abstracts, too, and one of them is beauty. Toward esthetic considerations, mansions along with shanties have been removed by law as shoreline barriers to the blue Pacific.

And private vehicular traffic has been permanently barred from the mountain recreation areas in favor of public monorails to help preserve California's forest lands in perpetuity.

All these are triumphs of the environmental wars, a conglomerate name for the crusade to survive that finally unlocked the ecologists and the economists from what had become a private struggle and got them working together for the good of the future.

Their union spawned creation in the early 1980s of the California Committee, an independent, privately financed, quasi-official forum with Sacramento representation and approval.

#### ADVISORY BOARD

Initially a coalescence of environmental organizations, the California Committee assumed special status as an advisory body to the Legislature upon successful submission of a master plan for California.

The plan, until then only a long-standing dream, lays out state responsibility for orderly growth and assumes the function of an outline for the more substantive progress of today.

It begins to fade now as afternoon comes sliding down the western slope of the Cascade Range and flattens out over Mountain Country, the state's newest tourist mecca.

The mecca rises from the brushland southeast of Redding in the shadow of Mt. Lassen, Disneylandish recreation center half-history and half-carnival.

#### TO DRAW POPULATION

Essentially concerned with re-creating and animating early California Mountain Country embodies at least one element of a philosophy of population dispersion.

A private undertaking encouraged by tax incentives and a state transportation system, it will hopefully be the nucleus of a whole new population center in a wide-open region.

Until it becomes that nucleus, Mountain Country at least serves to shift a portion of the yearly tourist trade away from those areas barely able to handle the influx of visitors.

Masses of people have long been a critical consideration in California's concept of the future.

#### THREAT OF MEGALOPOLIS

Demographers were warning three decades ago that unchecked growth could result in one giant megalopolis covering 50,000 square miles from San Francisco to San Diego and jammed with 40 million people.

Those who feared its inevitability were already calling it San-San and were saying that a total state population as high as 50 million-plus by the year 2000 was not unrealistic.

The population of California today is 33 million.

Even at that, power needs have quadrupled over the last 30 years, urban water needs have doubled, solid waste has increased at five times the population growth, demands on the state park system have doubled.

The needs have so far been met, even to the closed-loop recycling of solid waste into new uses.

But they didn't know then, in the edgy days of the fading 20th century, that they would, or even could be met.

They called for strict migration control into California, for laws to remove all legal barriers to abortion, for tough marriage requirements among minors, for mandatory birth control classes.

But as the population boom ended (the birthrate dropped, in-migration eased), the emphasis shifted from control to guidance.

Today, to assure that growth remains at a moderate level, revised income tax deductions discourage large families, a national employment policy has opened new job opportunities in other states and the creation of a uniform welfare system throughout the nation has ended California's reign as one of the places to go for public assistance.

#### EFFORTS AT DISPERSION

New energy is being concentrated now in dispersing the population within the state.

One of the results is Joaquin-1 along the route of the San Francisco-Los Angeles transpolar and in close proximity to Interstate 5, the San Luis Reservoir, the California Aqueduct and a major power tie-in.

Joaquin-1 remains largely experimental to determine whether a so-called New Town, a prepackaged community of homes, services and industries, can survive—and to test how successful it might be in redirecting the state's population away from the cities.

Another effort at population redistribution is also being made in the Mojave east of Barstow where the Desert Campus of the University of California is in fall session.

#### COLLEGE IN DESERT

Desert Campus contributes to the birth of a new university town, its creation enhanced by piped-in water, a direct major highway connection out of Barstow, a new jet field for STOL aircraft and promise of air-cushion feeder service out of the Pasadena substation.

Here, around the 10th campus of the 150,000-student statewide UC system, tax incentives are again being offered residential and industrial development.

The state hopes that the new campus will have impact beyond education, and that simply by existing it will encourage the establishment of other desert cities—their outdoor activities domed, their transportation underground, their life geared to a blazing sun that hangs low even now over the Calico Mountains this Tuesday in September.

The day is fading over a California in transition.

Much has been done at this moment in time to make the Golden State a better place to live. Much remains to be done throughout the 21st century.

The sins of the past are the problems of the present. Economic ghettos exist even though low-cost housing in any residential development is a fact of law.

Mr. STONE. Thank you. How many times have we heard about how space-related developments permeate the economy? How the resulting new products, new jobs and high productivity stimulate national growth? How in the long run, this new wealth created in our economy, will pay the cost of the program and will provide solutions to many problems not evidently related to space? Now is the time to give the American people their due profit on investment.

Evaluations performed by the EDICT Foundation indicate a major communications gap between aerospace and most other elements of our society regarding relationship of space technologies to the environment on earth. Specific applications of space technologies are poorly documented and the potential future applications are ill defined. However, the relationships and potential for direct transfer of technology and management are very real.

In this troubled world beset by man-made problems in population, in transportation, in housing, in communications, pollution and in the general quality of our lives, there is need for exactly the type of innovative expertise demonstrated by the aerospace industry during the past decade in America.

The problems facing us are gigantic, nationwide, even worldwide in scope. Their solution will require technical skill and management of the highest order. The best management, in terms of inventiveness, is in the industry that has built the world's foremost supersonic, trisonic, and hypersonic aircraft; the industry that has developed "miracle" guidance systems; the industry that has ringed this Nation with defensive ICBM's and bridged the gap to the moon.

Recent pronouncements from Washington lack specific factors, such as funds, goals, and specific time frames for accomplishment.

Throughout the past decade, it has been the Committee on Science and Astronautics which brought this Nation to a new standard of greatness by taking us to the moon. It was your vision and foresight which dared change an ancient dream of man into a reality.

We believe this Nation should now make a total commitment to itself and the world as a whole toward utilization of science and industry for new innovative solutions to our manmade ecology problems. To accomplish this will require a commitment of national resources equal to the space commitment of the last decade.

The National Science Policy and Priorities Act will permit us to use the advantages of space technology as we convert this dream into a reality. It will give our Nation a better understanding of earth orbital missions and our real requirements for the space shuttle program. It will help focus our space program on our national needs.

The course will not be easy and the cost will be high, but there is no easier course at any cost.

The staff of the EDICT Foundation have studied this legislation thoroughly and believe that S. 32 has the policy, planning provisions, projects, and funding which H.R. 34 was attempting to provide.

Do you have any questions?

(Statement submitted by Mr. Stone for the record follows:)

PREPARED STATEMENT OF CHARLES L. STONE, CHAIRMAN OF THE BOARD, EDICT  
FOUNDATION

INTRODUCTION

Mr. Chairman, Members of the Subcommittee; many thanks for inviting the EDICT Foundation to share its views with you on S. 32, "The National Science Policy and Priorities Act of 1972."

After two long years of solid research, debate and coordination, the 92nd Congress has formulated a great piece of legislation in this Act. The progress which has been made on this legislation is a great tribute to this Subcommittee and the Senate Subcommittee on the National Science Foundation.

I remember well when Representative John V. Tunney was willing to take time out from his duties with the 91st Congress to chair ad hoc Congressional hearings on the Aerospace Industry in Los Angeles, California. That was December 3, 1970.

The EDICT Foundation was there to testify how hard it was struggling to define what is now so well defined within this Act. North American Rockwell Corporation President, Robert Anderson, testified regarding his commitment to many of the goals now embodied within this Act. The EDICT Foundation would like to submit the text of that statement as Exhibit A of my testimony here today. (See oral testimony for Exhibit A.) As an employee of North American

Rockwell, I am very proud of Mr. Anderson's leadership on this issue. Labor leaders and unemployed individuals and groups testified on the hardships and trauma of mass unemployment and the need for jobs rather than retraining.

Shortly thereafter the 92nd Congress issued S. 32 and H.R. 34 as the Conversion Research and Education Act of 1971. That legislation began to move our thrust in the right direction. It defined a new tool called a Community Conversion Corporation to operate as a non-profit regional project office. But it never really gave definition or funding for the projects to be performed.

Extensive hearings were held on H.R. 34 in June, July and August by your Committee. These hearings indicated that the urban crisis and the excess of technical manpower could become national opportunities, if civil system project definition and funding were provided. Building upon the intelligence from this Committee's hearings on H.R. 34 the Senate Subcommittee held hearings in October, 1971 on S. 32. Those hearings cleared the way for Amendment 469, which was then incorporated into S. 32. This brief history on S. 32 and H.R. 34 does not give adequate recognition to the extensive efforts of the Subcommittees and their staff.

Perhaps the overwhelming vote of 70 to 8 by the U.S. Senate is the best indicator of the fact that this bill has reached a level of maturity and is now ready to implement. Another good indicator is the joint resolution from the California State Legislature enclosed as Exhibit B. (See oral testimony for Exhibit B)

As a member of the team of employees that built the Apollo and most recently helped North American Rockwell win the Space Shuttle award, let me assure you that my colleagues in industry are very favorably impressed with S. 32 and the forward thinking of this Subcommittee, as well as your counterparts in the Senate.

As evidence of the enthusiasm for this Act, I would like to enclose a copy of a resolution from the National Convention of the International Association of Machinists and Aerospace Workers as Exhibit C. (See oral testimony for Exhibit C)

#### THE NATIONAL SCIENCE POLICY AND PRIORITIES ACT OF 1972

The policy section of this Act says that the Congress finds a need for: meeting America's Human needs; creating more adequate civil science programs; better utilization of our unemployed; and, maintenance of our science and technology leadership.

It says the Congress declares it appropriate: to focus our R & D efforts on a priorities basis; to increase our funds for science and technology; to create opportunities for technical personnel in the civil systems area; and to develop a parity between defense and civilian R & D.

The EDICT Foundation strongly endorses these policies.

Title I provides for the national Science Board to govern the activities of NSF without restricting efficient performance by that agency. It gives the NSF an assignment to develop the nation's R & D priorities and then to grant contracts for new innovative solutions to our domestic ills. It provides for policy appraisal and reporting to both the Congress and the President.

The EDICT Foundation supports this title without exception, knowing that the bill provides for improving this legislation, as we progress through implementation and gain additional experience.

Title II contains all the necessary ingredients for development of prototype hardware and software in the civil sector. Program definition, planning, contracting to industry, test and evaluation, demonstration and the dissemination of information are all provided for.

The Civil Science Administration and the Civil Science Advisory Council will permit development of good coordination with other government agencies. Perhaps it is at this point in the Act that we can begin to envision the significance of this effort as a systems integration function.

Title III will prove essential to the conversion process. It provides various types of assistance to people, firms and government to aid each of them in development as components of the conversion process. And, it is here that the Act gives birth to the very heart of the process, the Community Conversion Corporation.

The most pressing domestic challenge faced by this nation in the remainder of the 20th century is its capability to organize scientific and technical resources to meet the problems of the cities, the environment, and the public services—

in sort, our 19th Century civil systems. Carefully organized research thrusts into energy, regional environmental systems, and municipal service systems by the National Science Foundation's (NSF) RANN Directorate has prepared this nation to take the next step toward advanced interdisciplinary and systematic planning.

This step requires creative work of the highest order. Many examples are available, however, there is one which was printed in the *Los Angeles Times* just 30 days after the Senate voted on this Act. I believe that the narrative and associated art work in this article gives a perspective of the future to which this Act will contribute and an indication of public interest. The title is "California 2001—Better Life Follows Environmental Wars", by Al Martinez. This article is submitted as Exhibit D for your information. (See oral testimony for Exhibit D.) The National Science Policy And Priorities Act recognizes the proliferation of political and economic interests represented by government and industry which must cooperate with community and scientific resources to achieve an advanced stage of domestic planning. For this reason, Section 308 of the Act will authorize creation of Community Conversion Corporations (CCC) to "stimulate the conduct of civilian-oriented research and development activities which focus on the particular problems, or draw on the particular resources, of the community within which the corporation is located." Since the goal of the Act is to initiate the design and demonstration of new and improved civil science systems, the task of developing an effective mechanism of institutional cooperation should be of major importance.

#### EXHIBIT E

#### RESOLUTION No. 3450—A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HUNTINGTON BEACH COMMENDING EDICT FOUNDATION FOR DEVELOPMENT OF CALIFORNIA COASTLINE STUDY PLAN

Whereas, the marine environment of the California coastline is a major factor affecting public health, the economy and other aspects of the quality of life in California and the city of Huntington Beach; and

The citizens of this "All American City" are virtually concerned about the maintenance of our local coastline as a natural resource for future generations; and

There have been numerous scientific warnings of a continuing reduction in the quality of marine life of our tidelines, beaches, and off-shore water; and

A growing percentage of our marine specimens have disappeared, or developed abnormal characteristics affecting their value as resources; and

There is a need for increased scientific knowledge of industrial and civic effluents released off the California coast and their relationship to deterioration of the environment; and

The EDICT Foundation based in Huntington Beach, California has developed plans for a California Coastline Study to systematically collect and organize scientific information utilizing the technical and managerial skills of the aerospace industry as a first step in reversing this undesirable trend; and

This study may also serve as national demonstration model of the social, economic and managerial aspects of conversion from defense related research and development activities to civilian research and development activities; and

President Nixon has called for increased federal funding of civilian research and development activities relative to urban and environmental ills in the cities of America;

Now, therefore, be it *Resolved*, That the City Council of the City of Huntington Beach does hereby:

1. Commend the EDICT Foundation for development of the California Coastline Study plan as a public service;
2. Offer to cooperate with the EDICT Foundation in implementation of this study through the office of the City Administrator;
3. Urge all concerned government and industrial interests throughout California to join in support of this important study; and
4. Instruct the City Administrator to send copies of this resolution to the President, California congressional delegation, Governor, appropriate members of the California legislature, and other potentially interested elements of government and industry.

Passed and adopted by the City Council of the City of Huntington Beach at a regular meeting thereof held on the 6th day of March 1972.

Original signed by Mayor, City Clerk, and City Attorney.

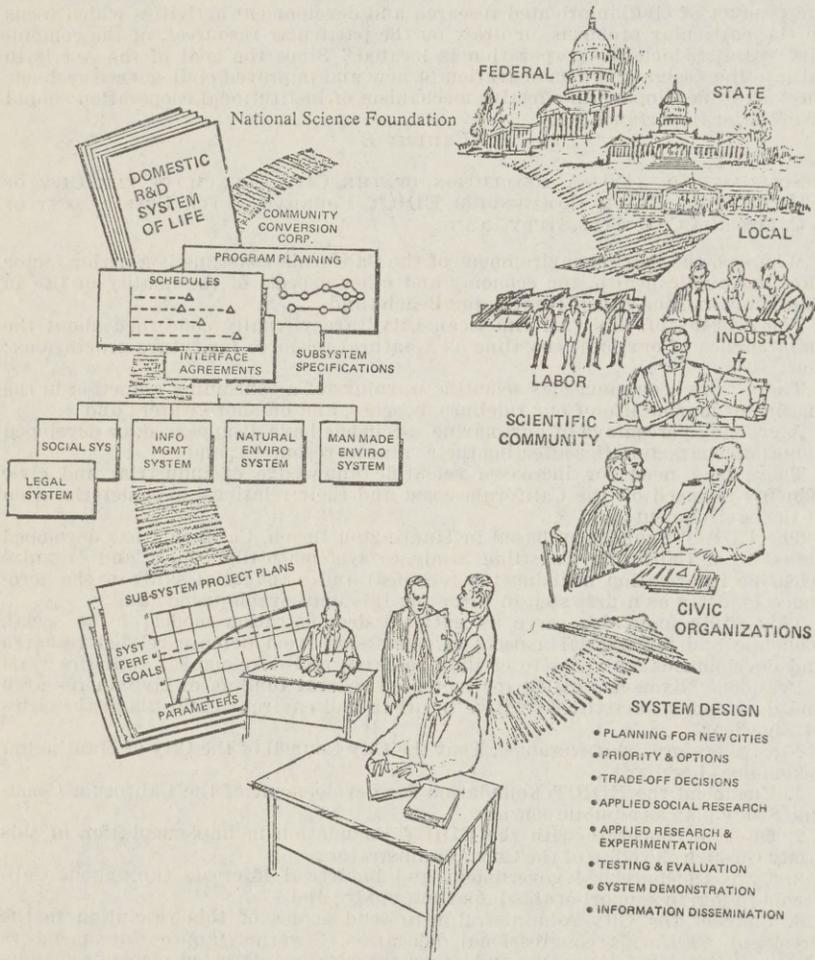
As an example of institutional cooperation initiated by a prototype CCC, I have as Exhibit E a resolution of the City Council of the City of Huntington Beach, California. This resolution has opened the door for the EDICT Foundation to develop a new innovative approach to the problems of our nation's deteriorating coastlines. The academic, industrial, civic and institutional elements will be working with the City of Huntington Beach as soon as we complete the financial arrangements.

The only major change the EDICT Foundation would urge you to make in the entire Act is reinstatement of a restriction on the Community Conversion Corporations to ban their involvement in defense research and engineering activities.

We do not recommend this change for any area of the bill, except the Community Conversion Corporations, because we do not see any serious conflicts in the other areas.

EXHIBIT F

HOW WILL IT REALLY WORK???



However, as shown in our Exhibit F, "How Will It Really Work?", the Community Conversion Corporation is intended to formulate conversion proposals at the regional level for NSF and as such must necessarily concentrate on the target civil system sector. As the drivers of the conversion process it is absolutely necessary to isolate them from direct involvement in defense and space activities.

Title IV provides for a new approach to the pension rights associated with government contracts. This section is essential to the personal welfare of individuals employed by industry involved in government contracting. This section is very popular with the employees and has long been the subject of debate between management and labor.

The Republican Senator from New York, the Honorable Jacob Javits is to be commended for his courage and foresight in sponsoring this amendment within the U.S. Senate. The EDICT Foundation supports this title as written.

The Staff of the EDICT Foundation have studied this legislation thoroughly and believe that S. 32 has the policy, planning provisions, projects and funding which H.R. 34 was attempting to provide.

At this point, I would like to relate with two key points raised by Senator John Tower of Texas and Senator Hubert H. Humphrey during Senate debate on this bill: (1) Let no one think for a moment that our support for this Act in any way indicates a position against space and defense research and development programs. (And that statement is backed up by the fact that many of us are the men and women who build the space and defense systems of this nation) and (2) what we are looking for now is responsible political leadership which can understand the value of this approach and deliver the necessary Federal legislation.

#### CONCLUSION

It was John F. Kennedy who stood before the Congress of the United States and electrified his audience and the world on May 25, 1961, with a ringing statement: "Now is the time to take longer strides, time for a great new American enterprise, time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on earth . . . I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth."

We have met this goal and that decade has passed. We have shown a great capacity for committing our national resources to accomplish the dreams of man.

We are now seeking to harvest the profits of our national investment in the programs of the first decade of the space age. Today, we use communication satellites to transmit color television and messages around the world. The dependability of the INTELSAT communications satellites are known. Unfortunately, no one can accurately predict the extent of the applications of earth research satellites. Mineral-producing industries are using earth photographs taken from Gemini and Apollo to guide the search for ore deposits. High altitude cameras and films have revolutionized mapping. Other benefits include new products, new manufacturing processes and testing techniques, new materials, new treatment of familiar materials, and a host of medical, health and safety devices, techniques and procedures.

How many times have we heard about how space-related development permeate the economy. How the resulting new products, new jobs and high productivity stimulate national growth. How in the long run, this new wealth created in our economy, will pay the cost of the program and will provide solutions to many problems not evidently related to space. Now is the time to give the American people their due profit on investment.

Evaluations performed by the EDICT Foundation indicate a major communications gap between aerospace and most other elements of our society regarding relationship of space technologies to the environment on earth. Specific applications of space technologies are poorly documented and the potential future applications are ill-defined. However, the relationships and potential for direct transfer of technology and management are very real.

A program for positive development of ecological solutions is logical and timely. Proposals for such a program have been discussed but never seem to have the necessary ingredients.

The EDICT Foundation dares dream of a new space goal—one which brings an end to rhetoric and excuse; and one which lets all life on earth breathe a little deeper and live a little longer.

We believe this nation should now make a total commitment to itself and the world as a whole toward utilization of science and industry for new innovative solutions to our manmade ecology problems. To accomplish this will require a commitment of national resources equal to the space commitment of the last decade.

The National Science Policy and Priorities Act will permit us to use the advantages of space technology as we convert this dream into a reality. It will give our nation a better understanding of earth orbital missions and our real requirements for the space shuttle program. It will help focus our space program on our national needs.

The course will not be easy and the cost will be high, but there is no easier course at any cost.

In this troubled world beset by man-made problems in population, in transportation, in housing, in communications, in pollution and in the general quality of our lives, there is need for exactly the type of innovative expertise demonstrated by the aerospace industry during the past decade in America.

The problems facing us are gigantic, nationwide, even worldwide in scope. Their solution will require technical skill and management of the highest order. The best management, in terms of inventiveness, is in the industry that has built the world's foremost supersonic, trisonic, and hypersonic aircraft; the industry that has developed "miracle" guidance systems; the industry that has ringed this nation with defensive ICBM's and bridged the gap to the moon.

Recent pronouncements from Washington lack specific factors, such as funds, goals, and specific time frames for accomplishment.

Throughout the past decade, it has been the Committee on Science and Astronautics which brought this nation to a new standard of greatness by taking us to the moon. It was your vision and foresight which dared change an ancient dream of man into a reality.

The real question before you here today is: (1) "Do you dare accept the challenge of this legislation, and move now to once again lift the greatness of our nation through science?" and (2) Is the Congress of the United States ready to support the next President of the United States when he rises to say:

"Now is the time to take even longer strides, it is the time for an even greater new American enterprise, the time for this nation to take a clearly leading role in achieving improved standards in the quality of all our lives, which may well hold the key to mankind's very existence here on earth . . . I believe this nation should commit itself to achieving the goal, before this decade is out, of reversing the negative trends of our domestic environment through science and technology."

Thank you for your kind attention to our views.

Mr. SYMINGTON. Thank you, Mr. Stone, very much. I think that you have made it very clear, the position of EDICT. That is one of support for the purpose and I take it the methods of bill S. 32.

Mr. STONE. Yes.

Mr. SYMINGTON. Mr. Bell?

Mr. BELL. In referring to your statement, has EDICT ever analyzed the employment problems? How many engineers and scientists the area can employ? I am not sure these areas offer the employment for the technical community. Has EDICT ever made a study of that?

Mr. STONE. I think we can safely say in our evaluation of the magnitude of the domestic problem, there is adequate employment opportunity there for all the people who are today unemployed in this Nation. Certainly, some people who are in certain types of skills, those specializing in liquid oxygen, perhaps, are going to have to find that liquid oxygen may not have a role in domestic problem solving. They may have to be assisted in realignment to some degree for reassignment.

But by and large, today's engineers will find that they will fit into this area. There are adequate job opportunities and certainly, we are going to find that as much commitment as this country is willing to make, that is, how much opportunity for employment there will be.

Mr. BELL. You have heard the two previous witnesses comment on the consent of the CCC's. Neither witness was particularly positive. I

know you are thinking about this, I wonder if you would like to comment?

Mr. STONE. That is a good question. We are very much convinced that the Community Conversion Corporation offers a real opportunity to develop a form of catalytic broker which can bring together the political and social sciences and the various forms of expertise which we have an excess of in this country today, and mold them into a community-oriented regional project office, capable of identifying new breakthroughs, in coping with the soft sciences as well as the hard ones.

Some of the work that we have done in the past 2 years in this area has been coordinated with the Stanford University people in Stanford, Calif. They have a very interested group of people working under the engineering-economics department.

The ideas of formulating some new concepts wherein the soft sciences are pulled up to the line somewhat to assist humanizing the physical engineers to the problems, to make humanized engineering approaches, is one which I think has a great deal of support in the technical community. I think it is gaining support among the social sciences.

We would envision probably 10 or 12 of these CCC's in the country, each assigned a project of some magnitude from the list of priorities set by the NSF to aid a regional area to test and demonstrate it along with the various agencies that already exist—a real breakthrough to prove up solutions to our domestic problems.

We would not anticipate the same project going to different areas. We would see different projects in the different community conversion corporations, and each one would be making these breakthroughs.

Mr. SYMINGTON. I think that we have a two-way street here, also, don't we? You have on the one hand the soft sciences systems turning to hard science disciplines in solution of its problems; but you also have as I recall, the reverse.

When I was in the Justice Department in the field of juvenile delinquency, working to coordinate Federal programs that impinged on that problem, we learned of the applications of aerospace talents in California to the solution of the delinquency problems—to improve the environment from much delinquency springs, and corrections, and law enforcement, the whole works.

So, you have opportunity for the hard sciences to assist the social sciences and the solution to their problems. I am wondering if you are familiar with that, and if you are aware of the other activities in California, the aerospace systems approach, to the solution of crime, transportation, and waste disposal, and that sort of thing?

Mr. STONE. We are very familiar, Mr. Chairman, with the four test programs that Governor Brown put together back in 1964, I believe it was.

Mr. SYMINGTON. Right.

Mr. STONE. Each funded for a hundred thousand dollars, and each attempting to start a pilot to do this type of good work.

Mr. SYMINGTON. What became of those?

Mr. STONE. In most cases, I think the programs were deemed successful in terms of the general experiment. I think they were a failure in terms of their gross contribution to society, predominantly because \$400,000 would never have gotten us to the moon.

In other words, the equipment wasn't there in the beginning, the Governor didn't have the resources, but I think there was a great deal of success that was brought forward out of those programs in terms of communications.

Mr. SYMINGTON. I think it would be helpful, I don't know whether it's in your province or capability to help us discover the fruits of that research, but it might be useful to the committee to receive it. Do you think you could lay your hands on any of the conclusions?

Mr. STONE. I am sure we can.

Mr. SYMINGTON. I think that every evidence that we can have in these various disciplines we can get is useful to the understanding of the Congress, so that we don't have blinders when we are looking at one science or another and assume that each one is a thing unto itself with no capacity to help its neighbor.

It goes to Mr. Hanna's earlier point that we have made often in this committee, and we have heard often from witnesses, that the schools should begin really at quite an early age to acquaint the youngster with the overall impact of the proficiency that he might acquire in some different skill or science, so that he is aware of the second generation effects of what he might be doing.

This is something that ought to be echoing throughout the school system, and through the secondary school to college, and on to the professions. So that by the time they are deciding to take on a profession, they know they are not simply mathematicians or physicists, but they are doing something to others. I want to be sure this is the sort of thing they want done unto them. Do you agree with that?

Mr. STONE. Certainly.

Mr. SYMINGTON. If we have proven this consciousness exists, we don't have to prove it again. We would appreciate it if you could get a hold of that information or any similar information from your vantage point now as head of EDICT.

Mr. STONE. We will do that.

Mr. SYMINGTON. Mr. Seiberling?

Mr. SEIBERLING. Mr. Stone, I think you made a very excellent statement whose brevity is very good and yet which really puts the finger on some of the problems. I read the statement by Robert Anderson, president of North American Rockwell, which is appended to your long form statement and I thought it was very impressive.

I noticed that one of the things that he suggested as a national goal was to declare as the goal the effective reversal of our present unfavorable environmental trends by the end of the 1970's. Of course, this statement was made 2 years ago. Since then, we have set up the Environmental Protection Agency and so forth, but I wonder whether any actions resulted from this? Did anything happen as a result of this very terrific statement that Mr. Anderson made before Mr. Tunney's hearing 2 years ago?

Mr. STONE. Well, Mr. Seiberling, I would hope that perhaps that statement contributed to our being here today, working on this problem in the Congress. The people who moved ahead with this legislation following the hearings at which that statement was formally presented in December of 1970, I believe probably forwarded part of that feeling on to this committee.

At least, I hope they did.

Mr. SEIBERLING. Perhaps the fact that Senator Tunney was sufficiently interested to appear before us yesterday to be the first witness, is some evidence of the force of this idea that really was put forth at the hearings he set up. Of course, the idea of making the reversing of the presently unfavorable environmental trend as a goal is really a goal that is as broad as all industry because everything in industry has a different environmental problem. Then we have the problems of solid waste disposal and water pollution and air pollution as separate fields.

I just wonder in view of subsequent thinking whether that is a single national goal and if it is still considered as feasible? Has any further thought been put on that?

Mr. STONE. Well, I think the difficult part of this whole question we have been hearing about the last 2 days here, is that there really is no one out there formulating a concept which can be brought to this committee with \$20, \$40, \$60, \$80 million worth of intelligence behind it.

There was no NASA front runner which had already plowed a lot of ground and there was no contribution from private industry towards concepts as we had for the space shuttle. I think that what we need to do is to move ahead with S. 32. It is a 3 year piece of legislation that provides for upgrading of the legislation at a later date.

I think that perhaps that gives us the seed money to begin moving and after a period of some 18 months, we can then present a story here which would then clarify what the real goals ought to be with concept statements, with diagrams, with drawings, with credentialed, technical staff.

I think we have to be a little bit careful that we don't tend to accept the shortage of natural resources which are going to be plaguing us in 10 years or 20 years or 40 years, and push that aside.

Science moves very slowly, no matter how much money you put to it, it has to have its time. I get very concerned when we see ourselves putting ourselves in a national defense posture which will require us all to defend the pipeline to Alaska during a time of national concern or support the import of gas from Indonesia, during a time when it is not safe to have our ships on the high seas.

I think the time to avoid those conflicts or concerns for national defense are now, by creating alternatives which don't force this Nation to turn to other nations for life support. That is a very far reaching statement, I suppose, from that which you probably are prepared to have me say here today.

Mr. SYMINGTON. That is not so bad because we had Dr. White here, who suggested that all of this is a little premature until we set up some boards and do some studying.

He works for the Standard Oil Co. They do a lot of studying, exploring, and depleting and it costs the American taxpayer about a billion and a half dollars to support the habit, you might say, through depletion, and so on. Yet he was rather cold on investing an equivalent sum to try and treat the whole panoply of problems that we face, one of which concerns the importation of this product from the Middle East, let's say, a rather sensitive area.

I think that looked at in that light, certainly the suggested appropriation for the implementation of S. 32 is rather modest, and quite reasonable.

Mr. STONE. That's right.

Mr. SYMINGTON. The main thing is that we have to see that it is properly spent. What you and previous witnesses have said is that there are problem areas that have been sufficiently identified to justify further research and development of the kind that would undoubtedly soak up some unused talent, as well as that much already exists.

EDICT, as I understand it, promotes an effort to bring together both employed and unemployed scientists, does it not, to work on these problems?

Mr. STONE. EDICT is a formally organized, nonprofit, science, and research foundation. But it is really an outgrowth of the feeling of frustration by people within the military-industrial complex who feel that their colleagues who have not been part of the chaff, but rather some of the real grain, have been put on the outside, to turn to other practices when their very talents are the ones we need so badly to put this Nation in a position of strength.

We started organizing in 1970 and we have about 500 members at the space division of North American Rockwell. There are about 200 at McDonnell Douglas. We have complementary numbers at other firms.

We would like to feel that we are socially motivated scientists, engineers, managers, et cetera, who say this thing is not as black and white as presented by many, but rather it is a complement to the strength of the Nation.

Mr. SYMINGTON. Parenthetically, would you say that your company and the other companies where EDICT is active are supportive of the idea and don't consider it a dubious extracurricular activity, but one which is quite compatible with the aims of the companies involved?

Mr. STONE. I think we can safely say that none of them feel that this is an offensive move on our part. They do not share our enthusiasm because their prime incentive is profit, that's why they are put in charge of the company, and if they can't turn a profit, they will not be in charge.

Mr. SYMINGTON. Are there any interactions with management which would cause the company to see a possible profit by investing in some of the items that EDICT has identified?

Mr. STONE. I think the statement from Bob Anderson clears up one company's position. I think there are other major aerospace firms who have gone on record who do support this legislation. I am not in a position to speak in their behalf. I would suggest maybe it wouldn't hurt to query those companies and ask them for a position.

Mr. SYMINGTON. That's right. It is important to get the position of industry. That is why we tried to hear a little bit from it. But I don't think we have heard nearly enough because without the active participation in the kind of psychological support of management and the private sector, I doubt that really much can be done.

Mr. STONE. I would like to address that last point if I may, Mr. Symington. I sat in front of the television set at home and watched the Lockheed loan debates before Congress and all the people with the titles who came before Congress and pleaded their case—backers, aerospace people, et cetera.

We saw this same performance on other issues from time to time, yet today when something is as basic as S. 32, which I think is really the beginning of a great new enterprise, a great new opportunity for

industry, they are not here. I think there is something that needs to be done to help these people understand. I wish I knew how to do it. I would hope maybe this committee would understand how to bridge that gap.

Mr. SYMINGTON. Well, these hearings are by no means definitive. It rather appears that we will be moving into another congressional session before we can really tie these ideas together and you can be sure that we will welcome the point of view of industry. But we would hope that it would be somewhat sanguine and that it would actually support these concepts rather than as we heard from Dr. White take such a dim view of them, almost the council of despair, certainly to those that are not working and who could and have the actual talent to do a useful job.

I think what you are doing is a very valuable job and I hope that it is infectious. I realize that it could be considered a departure from your normal activities. You will have to get a certain amount of approval from the top to do it.

Mr. STONE. Right.

Mr. SYMINGTON. You are getting that, are you not?

Mr. STONE. Let me say that we have somewhat of a negotiated agreement which makes it tolerable.

I am not sure that my management approves of my being here today. I have not asked for their approval. I don't expect that they are going to, on the other hand, fire me for being here.

I certainly expect they will welcome me back to the shuttle and say let's get on with the shuttle now.

Mr. SYMINGTON. Of course, the aerospace industry has not engaged in the same type of self-gratifying advertising, let's say, as the oil industry where it now appears from TV ads—that the best way to make sure all the sea birds live and that the ecology of a particular ocean area is to be preserved is to drill there.

I had not known that, you know, and we have not had that type of testimony before us in hearings, but the American people are being led to believe it.

But it does seem to me that most industrial men today, if asked, will say that what they are doing is in the best interests of the entire society. But if they claim that, they ought to encourage diversification of effort within the framework of their own industrial society.

Don't you agree?

Mr. STONE. I very definitely agree. I have read some studies on the damages caused by air pollution alone that have numbers going as high as \$30 billion a year damage from smog.

Now, this is a staggering figure to read about that someone else did a study on from some university. But if it were only \$10 billion annually, it would seem to me that those who produced the product which produces most of that air pollution would be doing a great deal more in terms of finding some alternatives to allow their product to serve society without throwing that burden on the taxpayers.

Mr. SYMINGTON. Additionally, I find myself defending projects like the space shuttle which we once had a glimmer of hope to build in our community, I defend it still even though it isn't, and I defend it partially on the basis of what it holds out for future work in search for energy. It could possibly lead to receiving solar energy, a nonpolluting and rather limitless source of energy.

We in the political world have to somehow communicate along those lines to the people in order to assure them that these vast expenditures are useful, that their money ought to be spent for these things, not simply to produce hardware to amaze ourselves and others but to do something with it.

Now, it is a little difficult for us, and I think we feel a little bit abandoned and cut off, that the very people making these things for profit don't take the same view, or don't press the same arguments, not only toward what they know they are doing, but what they could do if they made some effort.

Mr. STONE. I think that is all very true. I think we are going to see perhaps through the skylab program which McDonnell Douglas is playing a key role in—

Mr. SYMINGTON. Right.

Mr. STONE (continuing). The beginning of some understanding of the application of the space program to the environmental problems of the earth and perhaps the American public to understand the astronaut view of spaceship earth which has a limited set of resources; resources that require a great deal of proper management if it is going to sustain the size of the crew which seems to be growing perhaps faster than we would like, but, nevertheless, is a reality that the good Lord has passed on to us.

We are going to have to have the resources of the space world I think in order to protect our earth interests.

Mr. SYMINGTON. One example of this and I don't mean to continue this, especially after this bell, but we went to Philadelphia, as a member of the space applications subcommittee, to see General Electric's work there. They are doing a lot of work in environmental systems. They are happy to be doing it.

They have a contract with the State of Connecticut which has a rather forward-looking administration in terms of looking to the environmental problems there with the interaction of automobiles, industry, et cetera.

They have \$1 million planning project in Connecticut, the results of which could be a plan which if Connecticut wanted to make the second bite, they would set up I think perhaps the first statewide project of its kind in this country, an integrated departmental approach to the conduct of industry conservation in that State.

Now, that to me is an example of a company seeing economic profit in this in addition to broad social utility.

Mr. STONE. That is right.

Mr. SYMINGTON. I would hope that the aerospace industry wasn't simply tolerating this kind of happenstance in their community but encouraging it, you see what I mean?

Mr. STONE. Yes, sir.

Mr. SYMINGTON. Those of us who sit on committees like this who feel as I do would hope that they would take this view and you could take back to them a note to appear here today, to be away from school—and we will give you one—go back and say that we were glad you were here and we welcomed you.

Mr. STONE. I thank you.

Mr. SEIBERLING. Mr. Chairman, could I make one comment here. I am a little disturbed about the implications of one statement you made that one of the objectives of this kind of a program should be to assure

national self-sufficiency or autonomy if you use the economists' words, because of national defense considerations.

We must be aware of those considerations and as long as we have not developed a better world order system why we have to rely on our present system, of course.

But I certainly think that one of the great virtues of the idea behind S. 32 is to develop something that gives us an alternative to the military-industrial complex as a government-sponsored program. I hope to call it maybe the peace-industrial complex.

I wrote an article about the problem of economic conversion for an economic journal a few months ago. I used this terminology in it. One of the greatest things about this is that it builds a tremendous economic and political pressure to continue a program for solving the Nation's economic and social problems so that the only alternative we have to throwing people out of work by the thousands and millions is not just the curtailment of the defense program. It is not the continuance of the defense program.

I wonder if you agree with that assessment, that this is one of the important things that we should be doing to give us an alternative to the military-industrial complex whether we are talking about where we are going to employ scientists, engineers, and technicians, and a lot of ordinary workers?

Mr. STONE. I couldn't disagree with what you said. I think to clarify the point I was trying to make—I don't think any nation which is attempting to be a peaceful nation and avoid war should expose itself to an involvement in some other part of the world which would cause them to get all wrapped around the axle of another nation's political interests just because we need resources they happen to have and we are totally dependent upon it.

Total dependency for a resource is a bad move by this Nation or any nation that wants to remain a sovereign state. That was the point I wanted to make. I think we are building causes for tomorrow's war. I think we should avoid that.

Mr. SEIBERLING. I think you have a very excellent point. I don't think at the same time that if we accept that point that we don't also have to recognize that we are going to be increasingly interdependent and so perhaps by the year 2000 any idea that any country can be self-sufficient is going to be unrealistic.

Mr. STONE. That is a very interesting way of putting it. I couldn't disagree with you.

Mr. SEIBERLING. We don't want to get ourselves out on a limb unnecessarily and I agree with that certainly.

Mr. SYMINGTON. For society to make this difficult ponderous turn from its current course obviously requires more than the magical intuition and insight on the part of industrial management.

I remember appearing before industrial groups in the aerospace field suggesting that they take a crack at rapid transit and environmental systems, and I remember a high degree of apathy for that idea. They were waiting to know what I felt about the military systems requirements and their part in meeting them.

So, it is clear that we can't simply expect them to do this on their own.

By the same token, we would be sad to hear as we did earlier this morning from a spokesman of industry that it was not the duty of

the society through government to attempt to encourage people who work for a living to work on other projects.

Mr. SEIBERLING. Would the Chairman yield?

Mr. SYMINGTON. Yes.

Mr. SEIBERLING. It was particularly ironic coming from the oil industry that have gotten the biggest subsidy from the Government over the years than any industry in the country.

Mr. SYMINGTON. I agree with the gentleman. I hope that the view that he expressed is not the dominant view.

As I said before, we need industry and its representatives and its philosophers and its spokesmen to at least support the idea of meeting the problems of America to which their particular companies are not immediately structured to meet.

If there is a better way of doing it than that expressed in S. 32, naturally the committee would like to hear it and we would like to hear it from anyone who is qualified to speak. Certainly industry is.

But, before they are qualified to speak they have to at least evince an interest in the problem.

I might say as I mentioned before, many do. I am not saying they don't. We have got to increase the level of understanding of America's needs throughout the industrial community I think. That is our job. We hope you don't get hurt trying to do it where you are.

Mr. STONE. Well, I am not too worried about it.

Mr. SYMINGTON. Thank you for being with us.

This committee will adjourn until 1:30 when we will hear our final witness.

(The committee is in recess, to reconvene on this same day at 1:30 p.m.)

#### AFTERNOON SESSION

Mr. SYMINGTON. The subcommittee will come to order. With great pleasure we welcome the witnesses this afternoon who have very distinguished escorts who will, perhaps, present them.

We have had one Senator before us testifying on S. 32, Senator Tunney, and it is our pleasure now to have before us to introduce these guests, along with his colleague, Congressman Bob Jones, my good friend in the House, Senator Sparkman, distinguished Member of the Senate, and who is also interested in the problems before us.

We are very glad to have you with us here, sir. Thank you for bringing your friends with you, and would you let the committee know who you have with you, sir.

#### STATEMENT OF HON. ROBERT E. JONES, CONGRESSMAN FROM THE STATE OF ALABAMA

Mr. JONES. Mr. Chairman, I certainly want to thank you for extending the hearings in order that we may make this presentation on the legislation that is pending before your subcommittee. You have my commendation for your great interest in the work to provide the proper investment in the future progress of our Nation.

Legislation, such as you are sponsoring under the National Science Policy and Priorities Act of 1972, is urgently needed to bring into full and proper engagement the professional and technical capabilities of

the scientists, engineers, and technicians who are unemployed or underemployed as space and defense programs are reduced and curtailed.

I would like, Mr. Chairman, to file a statement immediately after I introduce the witnesses who are present here today.

Mr. SYMINGTON. Without objection, the statement will be received.

Mr. JONES. It is my great pleasure to introduce to this distinguished committee the mayor of Huntsville, Ala., my friend, the Honorable Joe Davis.

Mayor Davis has just won reelection to another term as chief executive of the largest city of the district I represent. He is alert to the views of the people and he is anxious to solve the problems his community faces.

He has firsthand knowledge of the problems which you are considering before your committee. His associates in attendance today will be Dr. Julian Kobler, Mr. Edward B. Dobbins, Jr., Mr. Earl S. Schmidt, and Mr. David Ludwig.

Now, Mr. Chairman, we have a gentleman who is well known to you, the senior Senator from Alabama. He is going to have to catch a plane at 2:30. He is going to Alabama to do some missionary work.

So I would like to yield to my fine and distinguished friend, Senator Sparkman.

Mr. SYMINGTON. It is hard to believe that the conversions haven't been completed, but if there is work to do, we certainly understand.

Senator SPARKMAN. It's got about 6 weeks yet to go.

#### STATEMENT OF HON. JOHN J. SPARKMAN, SENATOR FROM THE STATE OF ALABAMA

Senator SPARKMAN. Thank you very much, Mr. Chairman. Thank you, my Congressman. Congressman Bob Jones is my Congressman.

When the chairman walked in, I recalled the first time I ever met him. I think this is correct. I knew his father. I served with his father, but I think it was at a political rally at Moberly, Mo., and I believe—was it a guitar you had?

Mr. SYMINGTON. It could have been, Senator.

Senator SPARKMAN. I am glad to be here.

Mr. JONES. Incidentally, Senator, I served and you served with his grandfather.

Senator SPARKMAN. Oh; yes, I certainly did. His grandfather served in both Houses, and I served with him in the House of Representatives.

I simply want to say this, Mr. Chairman. As I mentioned to you a minute ago, briefly, I was down in Huntsville last week and these gentlemen had a get-together there to let the people, those that were interested, know just what they were doing, what they had done.

And I was invited to come by. I did, and I was very glad that I was there. I was amazed at the work that they have done in connection with the presentation that you will have today.

I presume they will give you the same presentation that they gave there.

But they have been working for a long time. They worked long before S. 32 passed the Senate. They were working with this in mind about 2 or 3 years ago when we started to lose scientists and experts in the field of space and aeronautics. And they have been working ever since that.

So this bill that passed the Senate just comes right in and fits their pattern quite well.

I wish I could stay but I do have to catch a 2:30 plane, and I have got to get back to my office and get my things together first.

But I commend them all to you. Bob Jones said that our mayor won a week or so ago; he didn't say that he won like all of us like to win—2 to 1.

Mr. SYMINGTON. That is the kind of mayor we like to have before this committee, Senator.

Senator SPARKMAN. That is the way we like it in Alabama, and I guess you do in Missouri, too.

Mr. SYMINGTON. We have enjoyed that in the past. It is less likely to be the case this year, perhaps, but we are working on it.

I want to thank you, Senator, very much for taking your time to come, and I know that it is an expression of your interest and your faith in the witness and his colleagues and what they have to say here.

Senator SPARKMAN. I will just say this additional word, that is, it is only natural that our area should be deeply interested in this, because, as you know, one of the largest installations, as a matter of fact, I believe it is NASA's largest installation, is at Huntsville, where these gentlemen come from.

We have had this problem of the upper stratum losing their jobs. So we are concerned with something along the same line.

If you will excuse me, I will go. Thank you very much.

Mr. SYMINGTON. Thank you very much, Senator. It is good to see you and good hunting.

Senator SPARKMAN. Thank you.

Mr. SYMINGTON. Mayor, I understand you are accompanied not only by my colleagues, Mr. Jones, but by Mr. Earl Schmidt, director of the Manpower Area Planning Council, Dr. Julian Kobler, and Mr. Edward Dibbins. And is there a fourth gentleman?

Mayor DAVIS. Mr. David Ludwig.

Mr. SYMINGTON. Happy to have you here, sir. We are aware, on the committee, that Huntsville is the headquarters of the Marshall Space Flight Center, where Dr. von Braun worked for so many valuable and constructive years. Also, in Huntsville we have the Army Missile Command and a number of high technical and industrial firms. Huntsville is an area that has been hard stricken by the cutback in expenditures along these lines. So we are particularly interested to hear, Mayor Davis, what you propose and what your views are concerning the bill before us.

Mayor DAVIS. Well; Mr. Chairman, and members of the committee, may I sit down and read this brief statement?

Mr. SYMINGTON. Certainly.

(A biographical sketch of Mr. Davis follows:)

JOE W. DAVIS, MAYOR OF HUNTSVILLE, ALABAMA

Mr. Joe W. Davis was born in New Market, Alabama, and was graduated from elementary and high school in New Market.

Mr. Davis received his B. S. Degree from East Tennessee State College, Johnson City, Tennessee, and received his Masters Degree from George Peabody College in Nashville, Tennessee.

During World War II, he served as a non-commissioned officer in the Navy aboard a LST and participated in the invasion of Okinawa and the Philippine Islands. He was honorably discharged in February of 1946.

From 1946 until 1955, Mr. Davis taught in the City Public School System, teaching biology and social studies at Huntsville High School; and he was principal of the Huntsville Junior High School and also Fifth Avenue Elementary School.

In 1955 Mr. Davis went to work for U.S. Industrial Chemical Corporation as Personnel Manager of the Huntsville Plant and in 1959 was transferred to their \$150,000,000 Petrol Chemical Plant at Tuscola, Illinois. From 1959 until 1963, he served as Assistant Manager of Industrial Relations and as Safety and Security Administrator for that company. In 1963 Mr. Davis moved back to Huntsville and went into the real estate business; and in October of 1964 he was appointed Administrative Assistant to Mayor Glenn Hearn. Mr. Davis was elected Mayor on September 24, 1968 and took office on October 7, 1968, and is now serving as Mayor of the City of Huntsville. Mayor Davis was reelected Mayor on September 5, 1972, for another four year term.

Mr. Davis is a member and deacon of the Central Presbyterian Church and has served as President of his Sunday School Class. He is a member of the Elks Club, American Legion, Huntsville Lions Club, has served as a member of the Admissions and Budget Committee of the United Givers Fund, and is also a member of the Board of Directors of the United Givers Fund. Additionally, Mr. Davis is a member of the Veterans of Foreign Wars and has served as Commander of the local V.F.W.—Post 2702. He has also served as Junior Vice Commander and Senior Vice Commander of the Veterans of Foreign Wars—Department of Alabama. As Mayor, he presently serves as a member of the Executive Committee of the Alabama Space Science Exhibit Commission.

Mr. Davis is married to the former Dorothy Allen of Huntsville, Alabama, and they have three children—ages 19, 16 and 9.

**STATEMENT OF HON. JOE DAVIS, MAYOR, CITY OF HUNTSVILLE, ALA., AND CHAIRMAN, MANPOWER AREA PLANNING COUNCIL; ACCOMPANIED BY EARL SCHMIDT, DIRECTOR, MANPOWER AREA PLANNING COUNCIL; DR. JULIAN KOBLER AND EDWARD DOBBINS**

Mayor DAVIS. I am indeed honored to have the opportunity to appear before this distinguished committee, and may I say we certainly appreciate you holding forth this afternoon to hear us.

I am the mayor of Huntsville, Ala., which is a medium-sized, technical city with a metropolitan population of some 200,000 people. Approximately 21,000 of these are aerospace, scientific, and technical employees who work for either three major Federal Government aerospace agencies, or some 73 aerospace industries. The city is now undergoing impact from aerospace layoffs that is likely to reach some 3,000 by the summer of June 1973. As a result of these layoffs, there are at least 9,000 community support individuals who will be affected. This is only one of the reasons I am willing and glad to testify in support of H.R. 15789.

I am also here today to confirm the existence of a most pressing need of this Nation: That need is a decision by our national leadership to direct the energy and knowledge of our scientific, engineering, and technological community to the Nation's most serious problem areas, namely, systems solutions to such civil problems as—but not limited to—pollution, housing, transportation, and power.

Although a multitude of civil agencies have been created in recent years and funds appropriated, something more is needed. That additional need is systems effort devoted exclusively to developing applied advanced technology to the solution of problems in the civil sector.

I can assure you that we mayors share a high degree of frustration. The city of Huntsville, along with many others, does not have the dollar resources, even with revenue sharing, necessary to match the costs of meaningful civil projects. With a \$14 million annual city operating budget, and with \$3 million estimated from revenue sharing,

the city of Huntsville would still be hard pressed to provide \$1 million for any kind of a matching program as required under existing legislation.

A further problem is the fact that the solutions to one problem may now readily cause new problems. The solution to housing problems now results in increased law enforcement costs, increased waste disposal and increased social problems caused by disruption of neighborhoods.

Another example is the fact that a solution to the mass transit problem may very well cause side problems in pollution and constrain the location of low rent housing. The existing programs under management of independent agencies do not provide for a balanced systems approach that would minimize these problems. Let the job be done by those most qualified, with the central direction and control demanded by a program of such complexity and difficulty.

As a mayor, I am fully aware of the inadequacy of our existing approaches and the urgent need for upgrading the state of the art in housing, transportation, health care, and other functional areas. At the same time, I am aware of the potential of our Nation to find more complete solutions to our Nation's most pressing problems by the application of system approaches.

In Huntsville, we have had a taste of the exciting promise of this concept. Working with our hospital, local engineers are designing equipment that will allow a totally paralyzed person to dial a telephone, to turn the pages of a book, to turn on the lights, all by a puff of breath or blink of the eye.

These are minor examples of the promise that House bill 15789 holds for our Nation.

Yet the existing programs offer few new opportunities for R. & D. scientists and technical personnel. These programs are generally concerned with that which has already been developed technically and need only implementation or construction.

Also of considerable importance is the fact that existing programs are fragmented and our city cannot efficiently transact business directly and individually with such Federal agencies as the Departments of Justice, Labor, Transportation, HEW, Commerce, HUD, and Interior, as well as the EPA and VA. Apparently what is lacking is a dedicated national civil science systems program.

I ask that you support House bill 15789, not only as a mayor who faces his share of problems in housing, transportation, pollution control, and education, but also as a representative of the voices of America, which are calling upon the Congress to make the significant decision to set as a national priority the systematic research and development solutions to our urban problems.

The bill under discussion provides this Nation with both the policy determination to search for the solutions and a workable mechanism to begin finding the solutions.

There must be a national commitment for civil sciences systems in order that we can find useful jobs for scientists and engineers. Centralizing the civil sciences systems program under the National Science Foundation will also reduce the number of direct contacts that the city of Huntsville or any other city is required to make. Because of the systems approach that this bill affords, we will be able to tech-

nologically assess the large socially oriented civil sciences programs. Huntsville is anxiously looking forward to passage of this bill, and my staff is currently developing methods to maximize the benefits that will accrue as one of a number of technical cities throughout the United States.

I am submitting my plan for a civil science systems administration, national technology systems research and development center. This plan primarily responds to titles I and II of the proposed bill. The requirement is here now; the manpower is available this year.

Thank you, sir.

(The entire proposal follows:)

PROGRAM FOR THE CIVIL SCIENCE SYSTEMS ADMINISTRATION, NATIONAL  
TECHNOLOGY SYSTEMS RESEARCH AND DEVELOPMENT CENTER

The purpose of this document is to describe the proposed National Technology Systems R & D Center and its functions and to further describe the positive thrust actions to initiate and implement the national program in north Alabama.

First, there would be two "branches" nationally under the Civil Science Systems Administration: the technology R & D center, which is proposed for Huntsville, and the national behavioral systems R & D center.

Program goals fall into three categories: 1. Management of civil sciences R & D programs, including program planning, technical management and financial contract management.

2. Transition of required technical manpower to planned programs, which includes acquainting the person with problems and teaching of applied skills, probably in Huntsville universities.

3. Implementation of the national civil sciences systems, including planning, research and design, and test and evaluation and demonstrations, such as the mass transit system already mentioned.

THREE AREAS

The three elements of program thrusts are the management agency, area universities and area industry. The management agency would organize, plan, and be responsible for contract and technical management.

Universities would be charged with acquainting displaced professional persons with new fields, applying new technical skills and forming new disciplines.

Industries have a major role in the program thrust. Planning and model studies would be role in the program thrust. Planning and model studies would be done first on short, intermediate and long-range bases. Next come project designs, prototype fabrication and testing, and system demonstrations (such as construction and operation of low-rent housing).

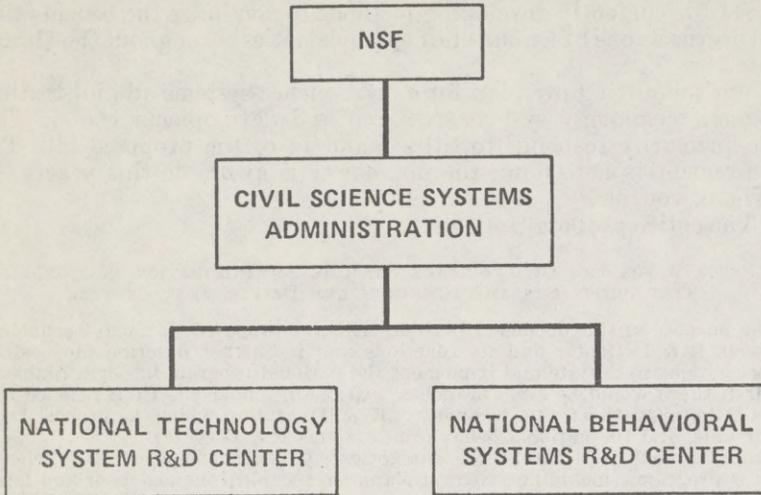
An initial 1,000 persons would be hired for the management agency and a non-profit agency, civil science planning corp., which would be formed.

PROGRAM FOR THE CIVIL SCIENCE SYSTEMS ADMINISTRATION, NATIONAL  
TECHNOLOGY SYSTEMS RESEARCH AND DEVELOPMENT CENTER

PURPOSE OF PRESENTATION

Present program to perform the national technology R & D center function.  
Describe positive thrust actions to initiate and implement.  
Explain why north Alabama is the preferred center site.

## ORGANIZATION



## ORDER OF PRESENTATION

Program goals.  
Areas of need.  
Problem environment and solution.  
Program thrusts.

Approaches.  
Why North Alabama.  
Required actions.

## PROGRAMS GOALS

Management of Civil Sciences R. & D. Programs: Program planning, technical management, and financial contract management.

Transition of required technical manpower to planned programs, acquaint with problems, and teaching applied skills.

Implement national civil sciences systems: planning; research and design, test and evaluation, and demonstration.

## NATIONAL CIVIL SCIENCES SYSTEMS AREAS OF NEED

Health care, public safety, public sanitation, pollution control, housing, transportation, public utilities, communications, and education.

## THE NORTH ALABAMA PROBLEM ENVIRONMENT

National policy, area development need, available skills, local institutional base, and motivational focusing.

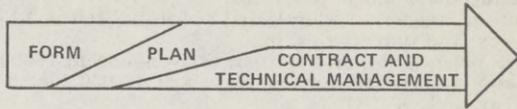
## SOLUTION

Requires coordinated action by government, educational institutions, and industry.

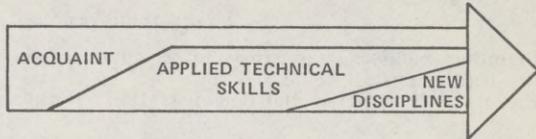
PROGRAM THRUSTS

ELEMENTS

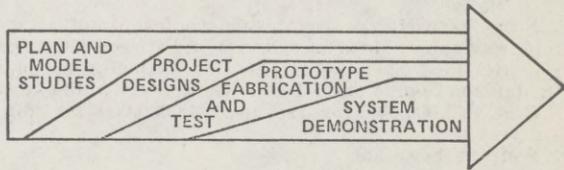
MANAGEMENT  
AGENCY



AREA  
UNIVERSITIES



AREA  
INDUSTRY



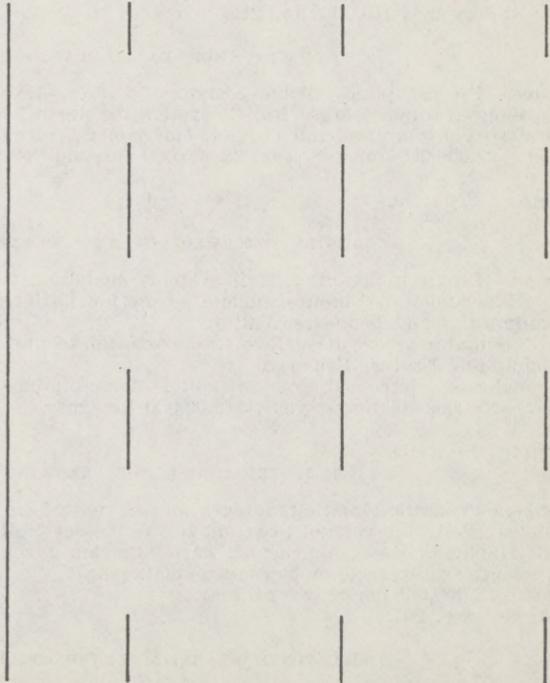
ACTION SCHEDULE

NOW

JAN 73

JAN 74

JAN 75



## MANAGEMENT AGENCY

Perform program planning.  
 Technically manage R. & D. contracts.  
 Financially manage programs.  
 State of agency—Federal civil servants (100 in 12 months) from government, industry, and universities.  
 Civil Science Planning Corporation—nonprofit (900 in 12 months).  
*Costs.*—\$25,000,000 for 1st year; \$29,200,000 for 2nd year; and \$33,000,000 for 3rd year.  
*Sources:* Sec's 103, 104, 207, 209, 210, 211, 212, and 308.

## AREA INDUSTRY

Planning studies: Long range, intermediate range, and short range.  
 Project designs: Specific.  
 Prototype fabrication and demonstration: Build and use new solutions.

## INDUSTRY PROJECT DESIGNS

*Scope.*—Specific project design studies, prototype R. & D. programs, and project topic examples: Mass transit system between Huntsville and Scottsboro, Decatur, Fayetteville, Athens, Guntersville; no pollution solid waste consumption plant in Madison County; and Tennessee River cleaning system.  
*Cost.*—\$5,000,000 for 1st year, \$8,000,000 for 2nd year, and \$12,000,000 for 3rd year.  
*Source:* Sec. 209.

## INDUSTRY PROTOTYPE FABRICATION AND DEMONSTRATION

*Scope (continued).*—Real time computer support for crime control, regional health computer history and diagnostics, automatic education progress evaluation and multi-regional automated utility supply network control system.  
*Cost.*—\$60,000,000 for 1st year, \$100,000,000 for 2nd year, and \$180,000,000 for 3rd year.  
*Sources:* Secs. 209, 210, 211, and 212.

## INDUSTRY SHORT-RANGE PLANNING

*Scope.*—Project plans, techno-economic studies, design concept studies, and study topic examples: Mass transit system for north Alabama, Madison County solid waste consumption, and Tornado emergency health care plan.  
*Cost.*—\$2,000,000 for 1st year, \$3,000,000 for 2nd year, and \$4,000,000 for 3rd year.  
*Source:* Sec. 209.

## INDUSTRY INTERMEDIATE-RANGE PLANNING

*Scope.*—Program planning, civil systems modeling, for example:  
 Experimental/computer model of major national regions—Appalachian Mountains and Tennessee Valley.  
 Computer model of surface transportation of national regions—north Alabama and Eastern Seaboard.  
 Selected distressed area modeling—Washington, D.C. and Seattle.  
*Cost.*—\$8,000,000 for 1st year, \$12,000,000 for 2nd year, and \$18,000,000 for 3rd year.  
*Source:* Sec. 209.

## INDUSTRY LONG-RANGE PLANNING

*Scope.*—Program planning, integration of related programs, and study topic examples: Pollution control program for Tennessee Valley, housing program for north Alabama, emergency health care program for north Alabama, national civil science system technology requirements plan.  
*Cost.*—\$2,000,000 per year for 3 years.  
*Source:* Sec. 207.

## WHY NORTH ALABAMA CENTER LOCATION

Available fundamental technical skills, available systems design and project management, available dynamic educational institutes, available local and na-

tional industry, several similar Federal agencies in area, strong local interest in high technology, citizens conditioned to accept changes due to high technology, minority and unemployable help programs need placements, and national network of automated information systems.

#### REQUIRED ACTIONS

Support passage of S32 and HR 15789.

Prepare and submit proposals: management plan, educational segments, and industry segments—expand those in this program and new approaches.

Maintain highly coordinated thrust actions.

#### AREA UNIVERSITIES

Short courses to acquaint government and industry personnel with fields of public science and technology.

Applied science and engineering courses to develop applied skills.

Formal programs to teach needed disciplines to qualified personnel in transition.

Specialized courses for personnel not fully qualified.

#### ACQUAINTANCE COURSES

*Scope.*—Orientation to terminology, update on technology area state-of-art, identify participating organizations, and update on laws and regulations.

*Cost.*—2500 students per year, \$200 per 40 class-hour course, total cost \$500,000 for 1st year, \$550,000 for 2nd year, and \$600,000 for 3rd year.

Sources: Sec's 306 and 309.

#### APPLICATIONS COURSES

*Scope.*—Application specific courses, longer term training, and application areas: chemistry of air and water pollution, engineering and biology of solid waste disposal, and law enforcement projects.

*Cost.*—1000 students per year, \$450 per 9 quarter hours of courses, total cost \$450,000 for 1st year, \$500,000 for 2nd year, and \$550,000 for 3rd year.

Sources: Sec's 306 and 309.

#### FORMAL AND SPECIALIZED TRAINING COURSES

*Formal.*—Teaches needed basic disciplines to qualified transition personnel: biology to engineers, and medical basis to engineers, and law enforcement fundamental policies.

*Specialized training.*—Teaches personnel not yet fully qualified: job transition program.

*Costs.*—Total \$700,000 for 1st year, \$800,000 for 2nd year, and \$860,000 for 3rd year.

Sources: Sec. 309.

#### UNIVERSITIES

Universities would provide short courses to acquaint government and industry personnel with fields of public science and technology; apply science and engineering courses to develop applied skills; develop formal programs to teach needed disciplines to qualified personnel in transition and develop specialized courses for personnel not fully qualified.

An average of 2,500 students are envisioned each year costing some \$500,000 per year based on \$200 per 40 class-hour courses.

In application courses, about 1,000 students would be enrolled costing \$450,000 a year based on \$450 per nine quarter hours of courses. Persons in the application courses in universities would have longer term training.

#### INDUSTRY

Under the city committee's long-range plan for industry projected to cost \$2 million the first year, here are the high points: Planning, integration of related programs, study of topic examples and development of a pollution control program for the Tennessee Valley; housing program for north Alabama; emergency health care program for north Alabama; national civil science system technology requirements plan.

The intermediate range plan for industry calls for planning and civil systems modeling such as: experimental-computer model of major national regions such as Appalachian Mountains and Tennessee Valley; computer model of surface transportation of national regions such as north Alabama and the eastern seaboard; selected distressed area modeling for Washington, D.C., and Seattle. Estimated cost is \$8 million, 1st year.

Short-range planning for industry calls for planning, technological-economic studies, design concept studies and a mass transit system for north Alabama; Madison County solid waste consumption plan and tornado emergency health care plan. Estimated cost is \$2 million a year.

Five million dollars, 1st year is estimated for industry project designs, including a cleaning system for the Tennessee River.

Sixty million dollars, 1st year, will be requested for prototype fabrication and demonstration by industry calling specifically for:

1. Mass transit prototype system for north Alabama.
2. No-pollution Madison County solid waste consumption facility.
3. Equipped operation of emergency health care system.
4. Low-cost new technique prototype construction and operation for low-rent housing, suburban private projects.
5. Real-time computer support for crime control.
6. Regional health computer history and diagnostics.
7. Automatic education progress evaluation.
8. Multi-regional automated utility supply network control system (for entire Tennessee Valley).

The area has enough people with fundamental technical skills; available systems design and project management; available dynamic educational institutes; available local and national industry; several similar Federal agencies in the area; strong local interest in high technology; citizens who are conditioned to accept changes due to high technology ("nobody around here gets excited when a Saturn 5 is tested"); minority and unemployable help programs; national network of automated information systems.

It will take a combined, coordinated effort of industry, government and educational facilities to support the bill in the House and implement this program.

#### TYPICAL PROBLEM AREAS WITHOUT UTILIZATION OF A SYSTEMS APPROACH TO PLANNING

The public concept of planning for large scale programs such as we are discussing today is considerably less than the typical text book examples. On the surface planning functions appear to be relative simple and straight forward, unless consideration is given to all side-effects that may be created in the planning jungle of the public environment. In preparing a comprehensive program plan, systematical investigation of all elements must be considered, including side-effects of each element.

The lack of comprehensive planning can be observed in all areas of the country today. Examples of the omissions in planning efforts are obvious in most of our slum clearance programs. The planning assumed that to provide adequate housing and improved physical environment would be adequate motivation for the residents to maintain a new way of life. The planning did not include the side-effects of creating a better living environment for a local group would:

(A) Act as a "vacuum" and draw in new residents with equivalent culture and economic backgrounds, from other areas who did not appreciate the improvements, thereby, creating human relation problems.

(B) Increased law enforcement costs.

(C) Increased City maintenance services such as waste control, pest control, building maintenance, etc.

(D) Increased human abuse such as rape, murder, drugs.

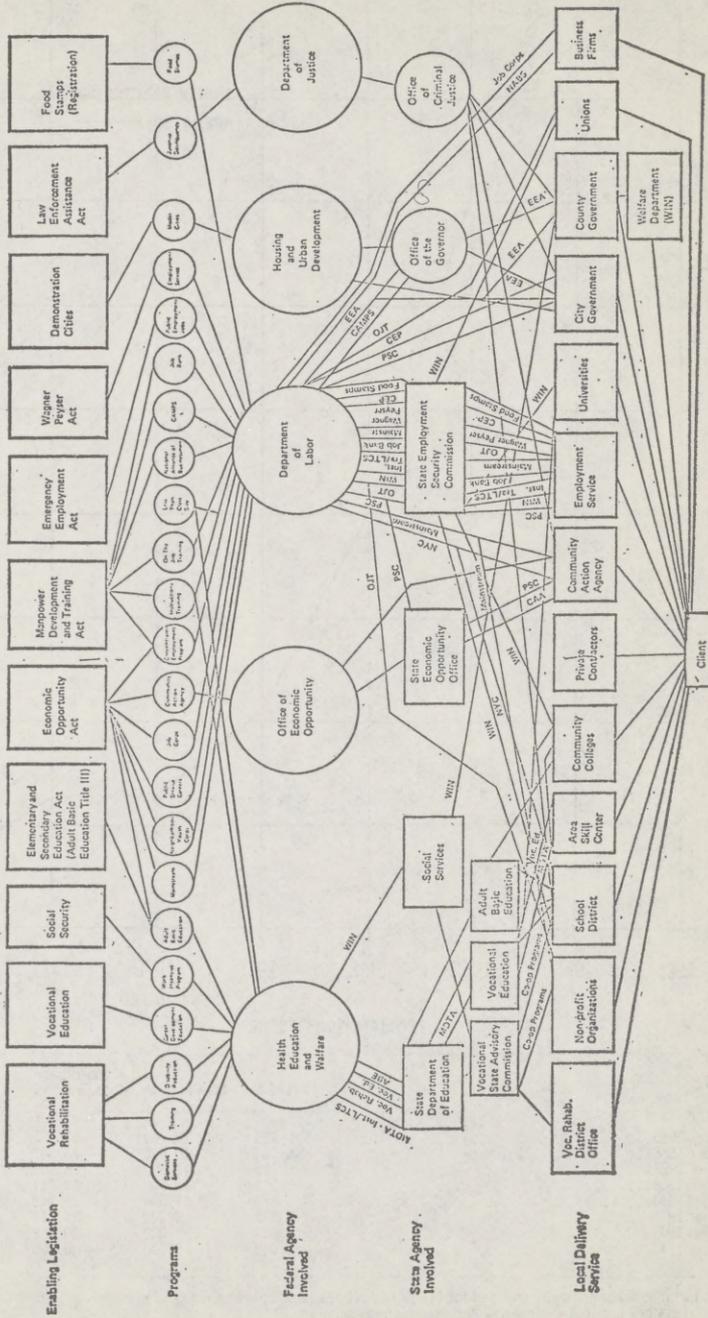
(E) ETC.

In short, most of the slum clearance programs resulted in creating new slums and perpetuation of old problems for the lack of comprehensive planning.

In the case of Human Resources Programs very little planning was performed and so-called manpower programs grew at such a rate during the sixties that the intended recipients' benefits were almost nil in most cases. All these programs are highly specialized, categorized and encapsulated in legal constraints that prevented comprehensive planning at the local level. Now the government is developing new methods to assist cities and states in developing comprehensive Human Resources Development plans to provide the proper assistance to the clients requiring services.

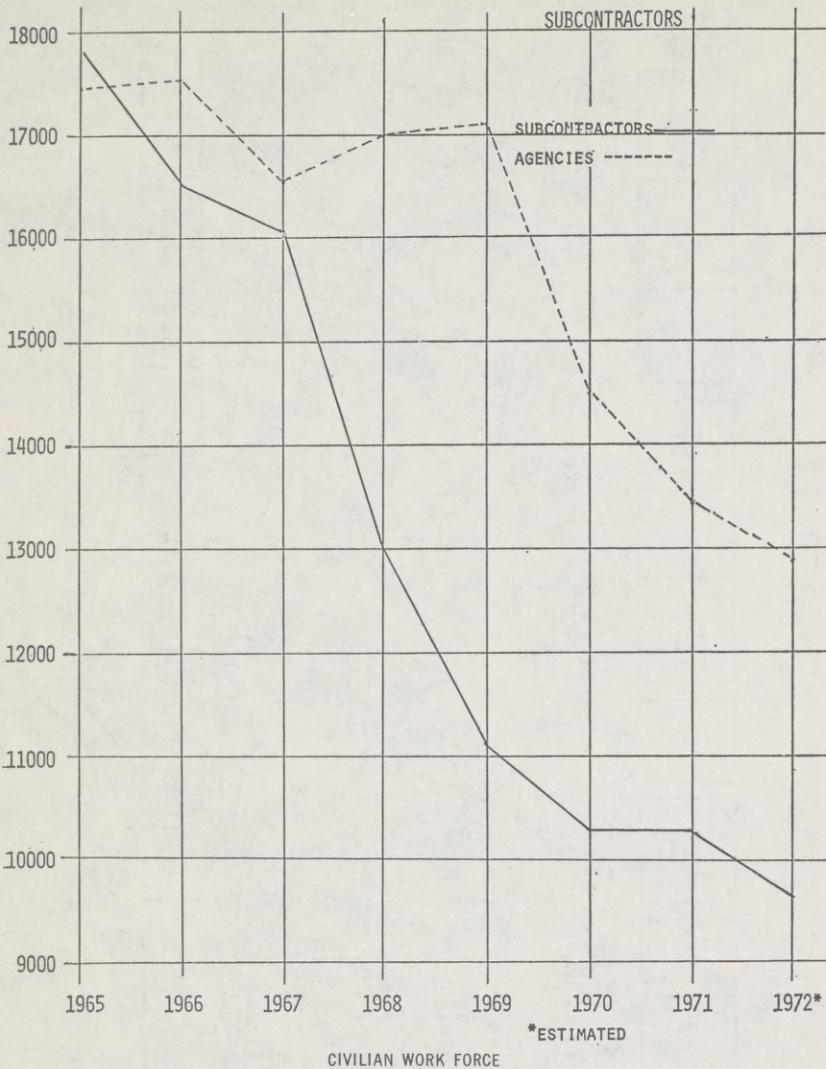
The above side-effects are not only typical of Huntsville but all cities where the lacks of systems planning at the local level has been imposed.

CURRENT PROGRAMS AND FUNDING PATTERNS



Client  
The target population,  
Huntsville, Alabama

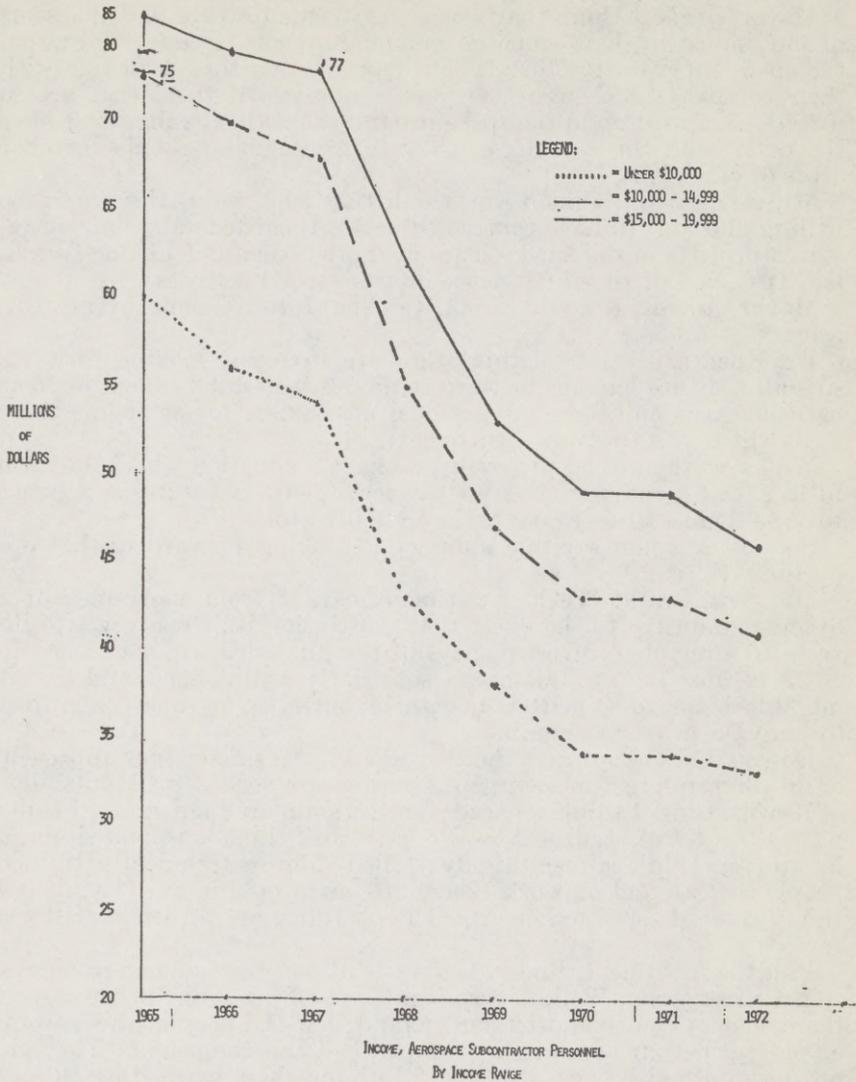
## TOTAL EMPLOYMENT - AEROSPACE &amp; DEFENSE AGENCIES &amp;



Year	NASA	USAMICOM	Aerospace subcontractors	Total labor force <sup>1</sup>
December 1965	6,705	10,700	17,755	35,160
December 1966	6,594	10,900	16,547	34,041
December 1967	6,495	11,000	16,103	33,598
December 1968	5,918	11,000	13,011	29,929
December 1969	5,671	11,500	11,218	28,389
December 1970	5,578	9,000	10,252	24,830
December 1971	5,454	8,000	10,266	23,720
December 1972	5,098	7,700	9,700	22,498

<sup>1</sup> This includes firms primarily engaged in: (1) guided missiles and space vehicles, (2) commercial research and development laboratories, or (3) engineering and architectural services.

Safeguard (current) ----- 1500  
Safelog ----- 500



Mr. SYMINGTON. Thank you, Mr. Mayor, for a very succinct and yet full statement of the problem, as you see it from the vantage point as the executive leader of a great city which has suffered directly from cutbacks in the relevant scientific investments. And this is extremely important to us.

One of the matters which we have been exploring in the past couple of days is the degree to which industry itself, the affected industries, are seeking other outlets for their skills rather than simply laying off fellows that were doing the old work.

Do you find a high degree of motivation in the industries of Huntsville to keep people on, and search for other socially useful things for them to do? Or are they pretty much tied to patterns of the past in their employment practices?

Mayor DAVIS. I think that would vary some to the point that some of our industries have done an outstanding job in converting from the space program to other types of production that is in line with their company. Although there are a number of them that are so directly wrapped up in the space program that they really don't have the outlet and the resources to try to locate these people in other areas or other jobs.

Mr. SYMINGTON. Would you think that such industries would be willing and able to have contracted out to them federally funded research projects in the hard science field other than defense, or even in perhaps some of the soft science efforts—social sciences?

Mayor DAVIS. I would think so. And I think some of my colleagues—

Dr. KOBLER. Yes, sir; I think they are anxiously looking forward, sir—all they are looking forward to now is the establishment of some national goals and some institutional mechanism for achieving these goals which we do not now seem to have.

We have fragmented programs, we have a situation where the ratio in R. & D. expenditures today is 4.2 for defense and state, as opposed to one—that is, 4.1-to-1 ratio to the civilian sector.

So, yes, I would say our industry is looking forward to that opportunity.

Mr. SYMINGTON. We had testimony earlier from spokesmen of a different industry to the effect that the Nation isn't ready yet to invest—to attempt to invest moneys of the kind that are mentioned in S. 32, because the projects aren't sufficiently well defined, and that it might be better to let matters take their course, set up some committees to study the problems some more.

Do you find in your area that this would be a satisfactory approach, or do you think that more urgent solutions are needed for Huntsville?

Mayor DAVIS. I think we need some action more than study. I think we made a lot of studies. Now we have, as I think we pointed out, a lot of very high-caliber, highly skilled, highly technically trained people that are out of work. These are our people in our city. And I think we need some action. And I don't think we can let it drift too far.

Plus the fact that I think it is a waste of our great human resources.

Mr. SYMINGTON. Well, in that regard, and I am sure you are correct there, should the committee understand that the people who are unemployed in your area are highly qualified and competent? They are not unemployed because of some failure on their part either to seek work or to be able to handle it if they had it?

Mayor DAVIS. No, sir; I don't—I think all of them that have been able to secure jobs have made great efforts to do it, and those that have, have done it. It is really the ones that are unemployed in that category that are unable to find employment. It is just that simple.

Mr. SYMINGTON. Do you think that any retraining is indicated for the unemployed engineering community, the technical community? Perhaps colleagues who are with you could respond to that.

Mr. DOBBINS. In the program we are recommending, which is in the handout, we are saying that there are three types of training that might be necessary for those people essential to new programs.

One would be a very minor reacquaintanceship with terminology. Many of these men have to learn the language of the new trade.

Second is some courses to teach them certain applied skills. Take a propulsion chemist and teach him the chemistry of air pollution. These are relatively simple, single courses.

And even in a few cases for a longer period, there is specialized re-teaching in new disciplines, teaching in the field of biology to an engineer working in waste disposal.

But most of the work is at a much lesser level. A lot of it is just in terminology and learning the state of the art of what is going on in new fields, learning the regulations currently dealing in pollution. If they are going to do applied engineering, they must know the rules now.

Mr. SYMINGTON. Has the city been in touch with organizations with intellectual resources and some of the capabilities like Public Technology, Inc., which appeared before us this morning? A group which contracts out its services to metropolitan communities to help them identify problems and solve them? Or is Huntsville really turned in on itself, trying to deal with matters without any outside assistance at all?

Dr. KOBLER. Well, we in the city, of course, have a Manpower Area Planning Council. The mayor is chairman, Mr. Schmidt is executive director, and I happen to be chairman of a committee called the Human Resources Program Development Committee.

We are aware of all of the efforts that are going on. We are in touch with all of these sources. I think the name of the game is systems analysis.

In other words, in effect, we have done a good job in defense. When we had a goal, we did a good job in space. We went to the moon.

And if we want to do a good job in civil science, we are going to essentially take the same approach, have alternatives, choices, parallel approaches, make decisions.

So that, yes, we have been in touch with the sources, but without the market. And only the Government in effect can develop that market ultimately by establishing goals.

Mr. SYMINGTON. I take it the resources of the city are not sufficient to let you, say, contract with the aerospace industry that is there to ask it to provide systems or suggested systems approaches like this?

Dr. KOBLER. That is correct.

Mr. SYMINGTON. But they would have the manpower to do it if the money were found to help them?

Mayor DAVIS. This is correct.

Mr. SYMINGTON. And the money would come from other sources than the taxpayers of Huntsville, and you would deem S. 32 might—that is, in the implementation of that, Huntsville might be identified as an intense problem area worthy of experimentation under the act?

Dr. KOBLER. We are proposing, as you note, under separate cover, a Civil Sciences Administration, which of course the bill presents, but a National Technology Systems Research and Development Center, as part of the Civil Sciences Administration.

Mr. SYMINGTON. Right. I saw someone else about to respond.

Mr. DOBBINS. I was going to point out that you were saying what can be done now.

On a small percent paid and a large percent voluntary basis, many people are supporting MAPC, and MAPC committees, in helping in

this planning and helping define better the problems and approaches that Huntsville can take.

If we get down to the hard solution problems that they are in need of money and specific programs that are defined and approved.

Mr. SYMINGTON. Is there a need to increase the engineering staff of the city itself in order to cope with the problem?

Mayor DAVIS. I would say yes, sir; we could use increased talents in several areas. And we have increased some of our talents through the EEA funds, by bringing these people aboard.

Of course, it is our intent, and has been our intent in the city government, that once the EEA funds are exhausted, we will keep them on the payroll. It is not our intent to bring them there, exhaust the funds, and let them go, because we are picking up some talent and we are having to train the people.

As a matter of fact, we have a system engineer in public works that is on in one of these capacities and we have used other personnel in keeping with EEA funds.

Mr. SYMINGTON. Mr. Mayor, you have identified on the second page of your paper a problem I think that needs consideration both in the formulation of this statute and the work of any administration like a civil science services administration would be, which is that you don't want to solve one problem at the cost of making another worse, and that is why systems approach is necessary.

Mayor DAVIS. That is right.

Mr. SYMINGTON. And I doubt that the same system will work for every city because there are different factors involved.

So that the input of the city management itself into any such evaluation is extremely important to the success of the project.

And perhaps my next question would be: Do you think you have an understanding of the city's overall social and economic problems to be able to work effectively to make a constructive contribution to a systems approach that would be offered from the outside?

Dr. KOBLER. Yes, sir. I think this can be done quite readily, and the bill provides for it by having an adequate information dissemination program so you can effect the technology transfer from any of the prototype programs that may be carried on, may be systemized ultimately, and you have enough of the capability and competency in a medium-sized city such as Huntsville, and many other cities across the Nation to take advantage of that technology, hopefully, that will be disseminated from this national program.

Mr. SYMINGTON. I remember a visit of Secretary Romney to the St. Louis area, and I think he left with the feeling that unless the local leadership, both in the public and private sector, put their heads together and met on some regular basis and adopted certain well-recognized and jointly understood attitudes, that it was pretty tough for the authorities in Washington to be of a great deal of help to them.

Now what I am wondering is, as mayor of Huntsville, is there an interest on the part of industrial management there, the people who are either at the top or near the top levels of management in the affected industries? Do they ever get together to do more than simply complain about the loss of contracts, but to think about what they could do in concert with the bankers and insurance men and municipal authorities about how to save their town and make it work?

Mayor DAVIS. Yes, sir; I think a great—probably a greater effort has been made in the city of Huntsville in that respect than any other city I know of, because the aerospace industry itself has banded together to work among themselves in a crisis such as this.

Production-type industries, certainly, have gone as far as they possibly could in trying to place the people.

Mr. SYMINGTON. In fact, they would welcome the actions that would be taken under this bill? They wouldn't number among those members of the industry to say, "We need no bill of this kind because supply and demand generally work themselves out over a period of time?"

Mayor DAVIS. I don't think we are quite that conservative in Huntsville.

Mr. SYMINGTON. Because my impression sometimes is, on the one hand, industrial leaders some of them, will say:

Enough of this social experimentation. Let the country run on a profit-and-loss statement, because people generally do what is best for them if they are left alone.

And above all, don't make some demands on us, on industry, change our ways and think anew.

If something has to be done it is left to the Government to do it. Then when they see the Government doing it, frequently they come to us and say, "We could do that better than those fellows, those ivory-towered guys. Why don't you contract out to us the problem-solving requirements and we will do it."

I say to myself when I hear that cycle repeatedly, why don't they just take it to begin with and not go through that catharsis of rejection and then acceptance of the responsibility?

I take it from what you are saying that your folks would be happy to be given some direction, some leadership, and some ideas?

Mayor DAVIS. Yes, sir.

Mr. SYMINGTON. As well as, naturally, some help. Because they do have to answer to their stockholders and they are not in the business of conducting these programs on air. They have to have some lateral assistance.

From your point, from what you can see, your people are ready for that? You have already had local meetings to discuss the problem of the community and the reason you are here today really is that there is a consensus that some kind of Federal input is necessary?

Mayor DAVIS. We very definitely feel that way, and I think my colleagues here with me agree on that.

Dr. KOBLER. We have had a number of meetings and have had unanimity expressed by our leadership in the industry, in the local area, and on a national basis. But they in turn are looking to the Federal Government for leadership in this program. They admit that there have been certain failures in the civilian sector.

For instance, if you take the overall highway program, roadbuilding program, you know the Government spent \$50 billion in roadbuilding, and we still have many, many problems.

If you take transportation in general, there has been an imbalance of emphasis, perhaps, that is, the emphasis going into roads, roadbuilding, and automobile transportation, with a lack of emphasis on rail and air and other types of transportation.

So that with the absence, as we see it, of some kind of an institutional mechanism, you might get the same type of fragmented approach.

In energy, we will continue to worry about oil, and that will be the only thing we are concerned with.

In health care, we will continue to worry about the classic hospital problems and stop there.

And that is exactly what we are doing today.

In sewage, waste disposal, we will continue to worry about the Roman sewers, and that type of technique and technology.

What we have prepared here in effect, under separate cover, was the establishment of a national technology R. & D. center to develop systems, test them out, prototype them, and then selectively disseminate that information out as rapidly as possible to cities, counties, States, throughout the Nation.

Mr. SYMINGTON. I see that you have this attachment. It looks as if you were really almost getting ahead of us here by proposing how this might be structured and how it might work.

That is farsighted, and we will make this a part of the record.

Mr. DOBBINS. May I add—a very fortuitous accident, but in last night's mail Dr. Kobler received Science Magazine, in which there is an article by the vice president of the Xerox Corp.—vice president for R. & D. What was his name?

Dr. KOBLER. John Goldman. A very interesting article.

Mr. DOBBINS. It is almost exactly the trend through policy and approach that we are recommending with very, very equivalent recommendations. And I will guarantee you it was totally independent of our approach in origination.

Mr. SYMINGTON. I am just looking under the heading "Industry Projects Design."

Mr. DOBBINS. The program we have is primarily pointed at industry, primarily pointed at having jobs for people if they require retraining or if they require rehiring, not just that training be the end. Training is merely a step toward that end in this program.

Mr. SYMINGTON. Speaking of that, are the universities in the area receptive to participation?

Mayor DAVIS. Very much so.

Mr. LUDWIG. We have had extensive meetings with the university about the problem when it first started, when we first heard of the bill, and we have a three-point plan already through their system to handle the impact of this, and now we are searching for money to be able to take care of it, of the total training program as we had outlined it in three different types.

It is the University of Alabama, Huntsville campus.

Mr. SYMINGTON. A community like yours seems to have within it the competence and expertise that somehow a spark can ignite them together. Your feeling is that this legislation could provide that spark?

Mayor DAVIS. We are hoping.

Mr. LUDWIG. It is the glue.

Mr. DOBBINS. In its present format it provides the media and the policy for which that entire proposal could be implemented.

Mr. SYMINGTON. In the bill itself there is reference to an idea of a community conversion corporation. How do you react to that?

Mr. DOBBINS. Our management agency is structured on a philosophy of a small—less than a 100-man—government group to let contracts and a large community corporation to manage and to do the technical planning and such to manage the efforts.

The whole management of that program with industry is primarily through a large community corporation. I think we call it a civil sciences planning corporation in that format.

Dr. KOBLER. That community conversion corporation can also have in-house capability as well—a think-tank type of approach.

Mr. SYMINGTON. I notice that in your project study you were thinking of a rapid transit from Scottsboro and a number of other communities. That implied that there is, of course, cooperation and participation of the authorities of those communities. Have they been brought in on this?

Mayor DAVIS. Not in final details, to my knowledge. But we have what is known as a North Alabama Mayors Association, and we are a very close-knit group of people in this district, with Congressman Jones, and I think he would vouch for the fact that this would not create any problem.

Mr. SYMINGTON. I am sure they would welcome it.

Well, Mayor, we are very glad to have heard you and grateful to Congressman Jones and Senator Sparkman for bringing you here.

Mr. JONES. Thank you.

Mr. SYMINGTON. This has been particularly valuable because we have had testimony along the lines of the needs of the urban areas we haven't really heard from, such as you. Now we have.

I might add that the record of these hearings will remain open through next Wednesday, should any further statements be desired to be submitted by you or your colleagues.

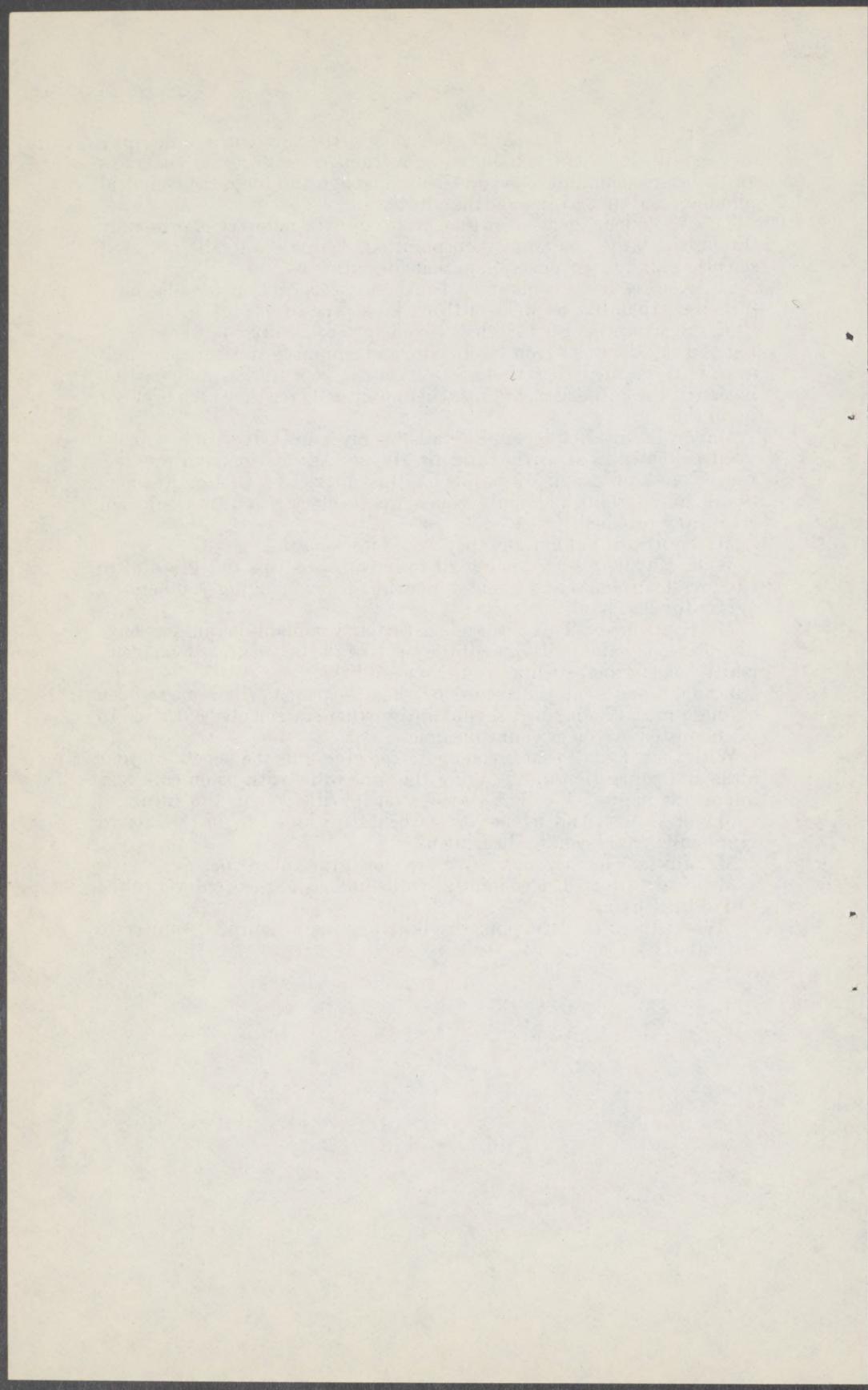
With that, I shall thank you again for giving us the benefit of your ideas and suggestions, and taking the time to be with us on this very important matter. We will stay in touch with you in the future.

Mayor DAVIS. And let me say in behalf of all of us in the city of Huntsville, thank you for hearing us.

Mr. JONES. Thank you, sir. We are most grateful to you.

Mr. SYMINGTON. The committee will stand adjourned, subject to the call of the Chair.

(Whereupon, at 2:20 p.m. the hearing was adjourned, subject to the call of the Chair.)



## APPENDIX I

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### STATEMENTS FOR THE RECORD RELATING TO THE ENTIRE BILL

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#### STATEMENT BY JOHN P. EBERHARD, AIA, MEMBER, RESEARCH ADVISORY PANEL, THE AMERICAN INSTITUTE OF ARCHITECTS

##### THE NATIONAL SCIENCE POLICY AND PRIORITIES ACT OF 1972

Mr. Chairman, I am John P. Eberhard, Dean of the School of Architecture and Environmental Design at the State University of New York at Buffalo and a member of the Research Advisory Panel of The American Institute of Architects.

On behalf of The American Institute of Architects, the national society for the architectural profession representing 24,000 licensed architects, I am pleased to have this opportunity to state our support for the goals expressed in S. 32, the National Science Policy and Priorities Act of 1972.

Lewis Mumford, noted architectural critic and historian, once wrote:

"Behind all the great material inventions of the last century and a half was not merely a long internal development of technics; there was also a change of mind. Before the new industrial processes could take hold on a great scale, a reorientation of wishes, habits, ideas, goals were necessary . . . Technics . . . exists as an element in human culture and it promises well or ill as the social groups that exploit it promises well or ill. The machine itself makes no demands and holds out no promises: it is the human spirit that makes demands and keeps promises."

It is the belief of The American Institute of Architects that such a "change of mind" has occurred in the United States. Among our country's concerns are the conditions of our cities and the quality of life available in such urban concentrations. The unemployment which has seriously affected many of our highly trained scientists and engineers is a symptom of this change of mind and the subsequent shift in priorities for the nation. Our national concern with the quality of public services now being provided in such areas as health care delivery, public safety, public sanitation, pollution control, housing, transportation, public utilities, communications, and education (what S. 32 defines as "civil science systems") reflects the new targets of opportunity to which we must address ourselves.

The American Institute of Architects adopted a statement on National Growth Policy goals at its 1972 national convention and will address itself to these issues over the next few years. The goals focus on the urban context and its need for improved hardware and software systems. The Institute has presented a concept of neighborhood growth units as central to its scheme for addressing our deteriorating urban conditions. The civil science systems marked for design and demonstration in the proposed legislation would have a major impact on such neighborhood growth units and are, therefore, included in the sphere of our concerns. A copy of the Institute's National Policy Task Force report is enclosed.

The size and scope of the program proposed in S. 32 could have an enormous impact on the quality of life of future urban dwellers. Since most of us will live in urban areas in the future, this means the impact will be felt by almost everyone. As architects, we would welcome an opportunity to work with scientists and engineers who would begin to turn their attention to such civil systems, and we would expect to be active members of research and development teams addressing themselves to such opportunities. We are particularly pleased that the Advisory Council proposed in this legislation includes "design professionals" as members.

Section 208, which calls for programs of social research into the economic, sociological, political, legal, administrative, and psychological aspects of the de-

sign, development, and implementation of civil science systems seems to us particularly important. As a profession concerned with the quality of the man-made environment, we too often have seen the results of an emphasis on quantity production alone and the support of engineering solutions which neglected human requirements. We hope that Section 208 would be given even higher priority in terms of program support.

We also are much impressed with the provision of Section 210 which will seek to evaluate proposed new systems in terms of their conformance to performance objectives, impact on the environment, impact on esthetic values, and responsiveness to public needs and desires. We see the links between Section 208 and Section 210 as important determinants of the contributions which this program could make to the quality of our urban areas.

The American Institute of Architects seeks approval of this legislation and urges the Committee to act favorably on it.

Thank you.

**A Plan for  
Urban Growth:  
Report of the  
National Policy  
Task Force**  
The American  
Institute of  
Architects

The plan for national urban growth offered in the following report was formally adopted by The American Institute of Architects at its 1972 convention. Recommendations contained in the report are summarized below.

## SUMMARY OF TASK FORCE RECOMMENDATIONS

**A. Scale and Form:** The building and rebuilding of American communities should be planned and carried out at neighborhood scale (ca. 500-3,000 residential units along with a full range of essential facilities and services) and in a form appropriately called a "Growth Unit."

**B. Priorities:** The value most to be respected is free choice. First concern should be given the condition of those trapped in the poverty and deterioration of older neighborhoods, especially of the central cities.

**C. Changes in the Ground Rules of Community Development:**

Free choice should be expanded:

(1) by ensuring open occupancy throughout the entire housing market affected by governmental subsidies and insurance.

(2) by directing needed housing subsidies to people rather than to structures.

(3) by providing locational options, especially by linking development in central and peripheral areas of the metropolis.

(4) by providing for diverse living styles, through Growth Units of varying densities, housing types, and service patterns; also, less restrictive building and zoning codes.

(5) by expanding the possibilities and scope of citizen participation in the design and governance of neighborhoods.

Financing patterns should be revised:

(1) Less reliance should be placed on the local property tax.

(2) State and federal governments should assume a greater share of:

a. infrastructure costs, and  
b. costs of social services, especially health, education, and welfare.

(3) The appreciating value of land benefited by public investment should be recaptured and recycled into community facilities and services.

(4) Categorical aids should be broadened—especially the Highway Trust Fund which should be expanded into a more general fund in support of community development.

Government structures should be reshaped and adapted:

(1) Private-public ventures should be encouraged.

(2) Development corporations should be created by federal, state, and local governments.

(3) Metropolitan planning and development agencies should be encouraged.

(4) State governments should participate more directly in planning and regulating the use of land, especially in areas defined as "critical" (e.g., flood plains, coastal regions, areas of acute housing shortages, and areas in the path of rapid development).

Capacity to build at neighborhood scale—both public and private—should be strengthened:

(1) Financial, legal, and other constraints should be reviewed and eased.

a. A steady flow of mortgage money at low and stable rates should be ensured.

b. "Front money" for Growth Unit development should be made available.

c. Public investments in infrastructure should be properly phased and coordinated.

(2) State governments and metropolitan agencies should take a more assertive role in acquiring and preparing land for development—and in building a network of utility corridors to accommodate and give shape to Growth Units.

(3) Tax and other incentives and disincentives should be revised to encourage high quality urban development.

(4) Environmental controls and design standards should be strengthened.

(5) New patterns for the delivery of critical services should be encouraged.

(6) Industrialized building processes should be encouraged.

**D. Special Program for Areas Impacted by Rapid Growth and Deterioration:**

Priority should be given to the 65 metropolitan areas over 500,000 population.

Within these areas, the public should acquire and prepare one million acres for Growth Unit development.

This development should be explicitly designed to benefit, not detract from, the improvement of the quality of life of those now residing in the older and deteriorating sections.

At average densities of 25 per acre, this special program should accommodate one-third of the expected growth of the U.S. population between 1970-2000.

# MEMO

Newsletter of The American Institute of Architects January 1972/Special Issue

## THE FIRST REPORT OF THE NATIONAL POLICY TASK FORCE

### CREATING A NEW NATIONAL POLICY

A Statement by Max O. Urbahn, FAIA  
President

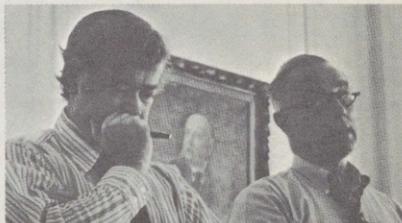
The American Institute of Architects has taken a major step into the future. It is an historic step for our professional society and, to the extent that we persuade our political leaders and fellow citizens to join with us, it will have a major impact on the quality of life in urban America.

I refer to the report of the AIA National Policy Task Force, whose findings and recommendations are set forth in the following pages. The report follows a year's intensive study by a group of distinguished architects with the help of expert consultants. The policies proposed in the report have been unanimously approved by the AIA Board of Directors, including representatives from all geographic regions of the country. They were formally accepted by AIA's Executive Committee on January 3, 1972, and are subject to revision and elaboration at the Annual Convention of the Institute in May.

In brief, the new policies recommended in this report would change the "ground rules" that now shape, and distort the shape, of American communities; create a new and useful scale for planning and building in urban areas; and commit the nation to a major land acquisition policy to guide development in and around key urban centers. These are new policies, but, in the best tradition of American progress, they are built upon the values and precedents of the past.

I am proud to be the president of your Institute at the moment when this new program—the natural culmination of many years of grappling with public policy—comes to fruition. The formal study was begun in the administration of President Robert F. Hastings, FAIA. Yet elements of it have been discussed by AIA boards and presidents over a period of many years.

I urge you to read this report, to communicate with me and with other officers of the Institute, to express your opinions—and, we hope, your dedication to its goals—at the Houston convention. I ask you also to join me in thanking the National Policy Task Force Chairman, Archibald C. Rogers, FAIA; members Ieoh Ming Pei, FAIA, and Jaquelin Robertson, AIA, and the body's two distinguished non-architects, William L. Slayton, Hon. AIA, executive vice president of the Institute, and Paul Yivisaker, professor of public affairs and urban planning, Princeton University. We are grateful for their far-sighted leadership.



Task Force Chairman Archibald C. Rogers, FAIA, right, and Paul N. Yivisaker, professional adviser.

### AMERICA AT THE GROWING EDGE: A STRATEGY FOR BUILDING A BETTER AMERICA

This report is about America at its growing edge. It outlines a set of policies that can enable this nation—as a responsible member of a threatened world of nations—to shape its growth and improve the quality of its community life.

The strategic objective of these policies is a national mosaic of community architecture designed to be in equilibrium with its natural setting and in sympathetic relationship with its using society.

In brief, the report urges:

A. That changes be made in a number of the "ground rules" (e.g., tax policy, governmental organization, etc.) which presently shape the development of American communities;

B. that the nation develop the capacity to build and rebuild at neighborhood scale (the "Growth Unit") ensuring open occupancy, environmental integrity, and a full range of essential facilities and services;

C. that federal, state, and local governments—in partnership—set the pace and standards for growth policy through a special impact program affecting 60 of the nation's urban regions and a third of the nation's expected growth between 1970-2000.



Task Force members  
I. M. Pei, FAIA, left;  
William L. Slayton, Hon. AIA,  
center, and Rogers.

## THE CIRCUMSTANCES WE ARE DEALING WITH

The nation's population has grown and urbanized dramatically over the last generation. By conventional measures, most of us have prospered. Personal and family incomes have generally increased. Housing conditions have improved. National opinion polls consistently find that most of us feel the quality of our personal lives is better. And amid the flurry of sudden growth, we have staked out a substantial range of free choice.

But a lot of things have us worried and dissatisfied—and properly so.

Millions of Americans have not had this range of free choice. Machines have pushed men off the land and into deteriorating cities where they have been imprisoned by rising prejudice and dwindling opportunity. Others have been left behind, trapped in the forgotten hamlets and hollows of rural America.

The nation has been polarizing into richer and poorer, black and white, growing suburbs and declining cities, neighborhoods of higher and lower status and some with no status at all.

Giant urban regions have sprawled into being without the armature of public utilities and services that make the difference between raw development and livable communities.

Jobs have been separated from housing, forcing families to spend more money on highway transportation than on homes and more time on the road than with each other.

Land, money, and building costs have priced more and more Americans out of the conventional housing market, not just the poor, but middle class as well. Construction has lagged for the lower income groups and larger families. Abandonment of existing stock in the older cities has picked up at a threatening rate. Mobile homes have "saved the day" for growing numbers of Americans (though not the minorities), but they have scattered their residents out past the range of regular community life and services.

The techniques of our growth have broken loose from the regenerating cycle of nature. The accumulating wastes of this growth—phosphates, plastics, pesticides, heat, hydrocarbons—contaminate our soil, our air, and our water, and cast a growing cloud over our nation and future.

Land has become a negotiable commodity and tossed carelessly into the game of speculation for profit. Once in the market, not only its use but its very existence is subordinated to the highest bidder and shortest-term gain.

The comforts and the hardships, the benefits and the costs of national growth have not been equitably shared. Our tax structure has frequently dumped some of the highest costs on those least able to pay. The education of the nation's children and the general level of community services have been left to the happenstance of local tax ratables and the small politics that exploit them. They breed fiscal zoning, and fiscal zoning has put a damper on the social and economic mobility of the poor and working class.

The social distortions in the development of our communities are reflected in our built environment. For much of what we have built, largely since World War II, is inhuman and potentially lethal. We have created a community architecture which, in its lack of efficiency, its inattention to human scale and values, and its contribution to chaos, adds up to a physical arena adverse to that "pursuit of happiness" which is one of the fundamental rights that stirred us to create a nation. Surely it is as important to bring our physical fabric into conformity with this goal as it is to do so with our social fabric. We cannot long endure an environment which pollutes air, water, food, and our senses and sensibilities.

At the same time that our growth has created an environmental crisis, the governmental process for dealing with growth has been scissored into bits and pieces. Whatever energies and resolves Americans can muster to shape their growth and salvage their environment are dissipated in an almost infinite chain of separate and conflicting consents which have to be negotiated in order to do the public's business. Just when the nation most needs its enterprise, creativity, and an overriding sense of community, stymie and cynicism become the order of the day.

Now another generation of dramatic growth is about to begin. The numbers of Americans in the 25 to 44 age group—traditionally those who create new households—are increasing at a rate nearly nine times that of the past decade. These new households will not likely beget children at the bulging rate of postwar, but they inevitably will touch off a new burst of community formation and urban growth. It is doubtful that these new householders will fit easily into old patterns; many of them will not want to. Families will be smaller; wives will be working; their tolerance of environmental pollution and bureaucratic incompetence will be lower; they will be demanding more for their money and especially the money they are asked to pay in taxes.

And young adults are not the only Americans pressing for places to live—to live better and in many respects to live differently. More and more Americans are living longer; during the seventies an ever growing proportion of our population will have raised their families, retired from their jobs, and started looking for communities that will serve their changing needs. There will be another round of kids with mothers asking for day care, new waves of migrants and immigrants searching for something better than ghettos to live in, and alumni of the ghetto—increasing millions of them—who have learned from tragic experience not to let even poverty trap them in bad neighborhoods forever and again.

## TOWARD A NATIONAL GROWTH STRATEGY: THE POLITICS AND PROMISE OF DIVERSITY

Sharpening awareness of the flaws in the way we've grown accounts for the rising demand for a national growth policy. Our

nation's search for such a policy is a welcome sign of a maturing society, a more civilized and humane America. But just because so many seem to be asking for a national growth policy, doesn't mean that they all want the same policy. And just toting up everybody's unhappinesses about how we've grown—and maybe goofed—doesn't necessarily add up to a policy that's better or more consistent or more salable to the American public.

Not until these differences in need and life style are admitted and understood will we really be on our way toward more productive policies for national growth. These diversities are the facts of life that politicians—especially the President and the Congress—have to deal with if the nation is to have governing policy and not just years of fruitless debate.

**In fact, it will may be that a diversified nation which values free choice above all may have to live with a national growth policy which is less than coherent, which contains more inconsistencies than it resolves, which turns the power of conflicting forces into creative energy—and which succeeds because it strives toward unity but does not mutilate its freedoms in an all-out effort to achieve it.**

We submit this report in that spirit. We are a single profession with our own creative diversities. We have spoken assertively, but only to enrich the national debate, not dominate it. We have tried to convert what we think are legitimate discontents into constructive ideas of how to make America better. And we have taken the risk of translating generalities (this is easy) into specifics (which is tough).

## THE BELIEFS AND PREMISES WE START WITH

**A. A national growth policy is first of all an expression of national values.**

**B. The values we most cherish are the worth of the individual and his freedom of choice.** These values have been constantly stated in national legislation but not so regularly honored.

**C. We believe, therefore, that national growth policy should actually commit the nation to these values, not merely restate them.** What has been missing is the public competence that makes both our values and our policies credible: laws with teeth; programs with money behind them; public officials with the power to act, and a willingness to fulfill a leadership role. Private freedom and public competence are not incompatible; one needs the other.

**D. The goals of national growth policy and the problems it should be concerned with have more to do with quality of life than with numbers.** We do not share two of the usual fears: (1) that the American population is too large; and (2) that not enough houses will be built to meet our growing demand. During the past decade, Americans have spontaneously and freely limited reproduction—the birth rate is now at an all-time low. Earlier estimates of how much America will grow in the next 30 years now seem too high—the total may well be as low as 60 million, a

number we can certainly care and provide for. Meanwhile, housing starts have picked up; the prospects are that the nation's stated housing goals (2.6 million annually during the 1970s) may be met, and these goals actually may turn out to be too high.

It is not the numbers we should be concerned about but the quality of living and the choice of life style that are opened to Americans wherever they are and however many there may be. This is what we believe Americans mean when public opinion polls regularly report that a majority of them say they would prefer to live in smaller communities. Not that they won't abide living in large metropolitan areas—(despite what they say, most of them have chosen to move and stay there). But they are searching for communities that are more livable. Neighborhoods that are safe, mix of community life and services, neighborhoods small enough to have some identity of their own, where no one need be anonymous while attaining the privacy Americans always have yearned for.

**E. It follows, we think, that the measuring rod of national growth should be the quality of our neighborhoods, and the assurance that neighborhoods—even when they change—will not deteriorate. The neighborhood should be America's Growth Unit. We have made it the theme of this report.**

**F. By concentrating on the neighborhood as a Growth Unit, national policy can relate to growth and regrowth wherever it may occur—in rural areas, in smaller towns and outlying growth centers, in metropolitan areas and their central cities, in free-standing new communities.** No national policy would be politically salable that did not speak to every condition of America; no national policy would be comprehensive if it did not.

**G. Our own guess is that most of America's expected growth from now until the end of the century will occur within existing metropolitan areas—whether all of us would like that to happen or not. The economics and the politics of radically changing that pattern are too difficult; they well may be impossible. Marginal changes, yes; and since we, too, have a general prejudice in favor of "more balanced growth" and against overloading the environment (as we have done, possibly, in some of the Great Lakes and coastal regions) we should be of a mind to encourage these changes.**

**But realities force us to be realistic. We therefore conclude that American growth policy should concentrate on improving the present and future conditions of our existing metropolitan areas.**

**H. Within these areas, we believe the first priority should go toward improving the condition of the older core cities, more especially the condition of those trapped in poverty and the squalor of declining neighborhoods.** Until we deal with the deep-seated factors in American life that give rise to such conditions, all growth in America is vulnerable, no matter how much concern and money are lavished on it, no matter how carefully it may be segregated from those neighborhoods where the contagion of decline is more evident.

**I. Growth and regrowth—building new communities and restoring old ones—must go together.** We think it folly to try urban



renewal in the older, denser neighborhoods before moving and relocation room is made ready elsewhere. That means, we think, a deliberate policy of building new neighborhoods on vacant land before renewal of older neighborhoods is begun.

**J. We believe that no national growth policy will work unless there is a broader base for financing the facilities and services that are necessary for more livable communities.** The local property tax is no longer enough. We have exhausted it, and now it is crippling us.

There are many possible ways of achieving this broader base of financing. Our own preference is for the federal government to assume far more of the costs of social services such as health and welfare, and more of the costs of utilities. We believe the states also should assume a greater share of local costs, especially of schools, and should do so through a combination of broad-based taxes whose impact is less regressive and its yield more responsive to changes in the general level of the economy.

**K. Similarly, we are convinced that an effective national growth policy will require broader perspectives and, in many cases, larger governmental jurisdictions.** We welcome signs that the states are readying themselves to participate more actively in community development—even when, as in the case of zoning, taxation, and other matters, they have to be prodded into action by the courts. The states are essential to the development of a national growth policy precisely because their jurisdictions (and hopefully their views) are broader, and because they constitutionally control the ground rules of local government and community development.

We also welcome the signs of new life at the metropolitan level. A promising example is the emergence of regional planning, development, and financing in the Minneapolis-St. Paul area. If indeed most of America's growth is to occur in these areas, some form of regional control must evolve—and soon.

**L. And while these broader capacities are developing, we also see the need for more citizen control and participation at the neighborhood level.** Neighborhoods have been swallowed up in the growth and urbanizing America. The exact forms and functions of neighborhood government can vary, but national growth policy cannot do without the sturdiness and savvy of grassroots support. We see no contradiction in simultaneous transfer of power upward to broader-based levels of government and downward to the neighborhoods. It is not power which is being subtracted—it is capability which is being added.

**M. It also follows from our concern with the neighborhood Growth Unit that the architects who design it, the developers who package and build it, the doctors and teachers and lawyers and merchants who serve it, should be given every honorable encouragement to work at this scale.** Urban America may be massive, but it has accumulated in a formless way from a myriad of actions and designs that were of less than neighborhood scale. Thought and habit patterns will have to change if we are to build more livable neighborhoods—neighborhoods that fit as building blocks into metropolitan, regional, and national societies.

**N. We wonder whether the time has come to consider less affluent standards of housing in favor of higher standards of neighborhood environment, facilities, and services—if indeed the choice must be made.** "Less affluent," at least, than is explicit in the spiraling requirements of floor space and lot sizes and building codes that are being written defensively into suburban and other exclusionary legislation. The rising cost of exclusion is even higher than the rising cost of building. The product may well be more luxurious houses but less desirable, certainly less open communities.

**O. Finally, we are convinced that an effective national growth policy requires that land development increasingly be brought under public control.** This is true particularly of land which lies in the path of growth or that otherwise is crucial to the community's well-being—open space, flood plains, coasts and shores, etc.

**We favor public acquisition and preparation of land in advance of development.** We believe that the appreciating value of urbanizing land should be recycled into the costs of developing, serving, and maintaining it. We believe that, in many cases, leasing rather than outright sale would be desirable for land acquired and assembled by public action.

## BUILDING AT NEIGHBORHOOD COMMUNITY SCALE: THE "GROWTH UNIT"

The Growth Unit is first of all a concept—a general way of saying that America's growth and renewal should be designed and executed not as individual buildings and projects, but as human communities with the full range of physical facilities and human services that ensure an urban life of quality.

The Growth Unit does not have fixed dimensions. Its size in residential terms normally would range from 500 to 3,000 units—enough in any case to require an elementary school, day care, community center, convenience shopping, open space, and recreation. Enough, too, to aggregate a market for housing that will encourage the use of new technology and building systems. Also enough to stimulate innovations in building maintenance, health care, cable TV, data processing, security systems, and new methods of waste collection and disposal. Large enough, finally, to realize the economies of unified planning, land purchase and preparation, and the coordinated design of public spaces, facilities, and transportation.

This general scale is consistent with likely trends during the 1970s which will encourage the filling in of open land and the renewal of older neighborhoods within existing metropolitan areas—as well as the expansion of outlying communities (Growth Centers) within the population range of 25,000 to 250,000. It also coincides with the trend toward "miniaturization" which seems to



Archibald C. Rogers, FAIA, discusses the report before the December 1971 Board of Directors meeting in Washington, D.C.

characterize emerging patterns of consumer behavior and demand and which is producing a new range of facilities such as community health centers, neighborhood city halls, and convenience shopping centers.

Life styles, housing types, and residential densities could vary according to local markets and circumstances.

Larger communities—up to and including free-standing new towns—should be built as multiples of these Growth Units—allowing, of course, for an emerging hierarchy of additional services and facilities such as high schools, community colleges, hospitals, regional shopping centers, mass transit, and utility systems.

The neighborhood Growth Unit relates just as much to the rebuilding of America's older cities as it does to new growth on open land. We have learned the hard way that urban renewal and the rehabilitation of older neighborhoods cannot succeed when done piecemeal, house by house, problem by problem. The job is much bigger than that, and the Growth Unit is a more appropriate scale and way of doing it.

The Growth Unit is based firmly on the principle of open occupancy and equal access to facilities and services. Moreover, by linking growth and regrowth both outside the central cities and within them, the nation can find an orderly way out of its segregated living patterns and the haunting tragedy of its older cities.

Finally, the Growth Unit offers a valid measuring point for environmental performance. It can be planned and judged as a "package" rather than a disjointed accumulation of activities, some of which do and some of which do not meet going standards of ecological innocence.

## USING THE GROWTH UNIT IN A NATIONAL GROWTH STRATEGY

Concentrating on the Growth Unit is a practical and incremental way of approaching a national growth policy. But it is not a retreat from major and even radical changes—as those who recently have ventured into large scale development painfully can attest. Architect after architect, developer after developer, large company after large company have tried their hands at building new communities at larger scale. Only a few have survived—and even for them the experience has been bloody. Listed below are some of the constraints and hazards and some of the changes and reforms we think are necessary if this nation is to achieve the capacity to produce livable neighborhoods without all the traumas (and mischief) that presently are involved.

**A. Housing and Land Use Policy:** Growth Units of the sort we propose will not be built at the rate and scale we propose unless:

- 1) there is an assured flow of credit at stabilized rates of interest over a sustained period of time;
- 2) low- and moderate-income families are directly subsidized (through income supplements, housing allowances, "235" and

"236" type interest reductions, etc.) at levels equivalent to the housing subsidies now provided higher income homeowners in the form of tax deductions of mortgage interest and local property tax payments (plus what economists call "imputed rents");

3) state governments retrieve sufficient control over local building, zoning, and health regulations to insure an adequate supply of land for large site development—and also land permanently reserved for open space, ecological balance, and communal use.

**B. Front Loading:** Building at neighborhood scale requires front money equal at least to 40 per cent of the total investment, with no appreciable return on that early investment coming until the fifth to the 15th year. Few are in a position to advance that kind of money and wait so long for a return. Public money and guarantees are still scanty and hard to come by. Except for New York State, they are available only through one limited program of the federal government. These public supports will have to be expanded greatly, both at federal and at state levels.

**C. Aggregating Sites:** The assemblage of large sites is a problem, but probably less so than obtaining the many consents necessary to develop them—zoning, building codes, etc. For the private developer, time is money; one major developer is reported to have incurred interest costs of \$5,000 per day over a year while awaiting the necessary consents. Too many developers have been led into dubious practices in an effort to offset these costs and find ways around these constraints.

The passage of legislation which authorizes planned community development promises some relief. Probably more important will be an arrangement that allows for someone other than the developer to hold the land until the consents have been negotiated and the developer can move immediately to build.

**D. The Public Infrastructure:** Another barrier is the shortage of public funds for the necessary infrastructure and community services. We propose that the federal and state governments plan and construct networks of utility corridors, including transit, water, sewage, electricity. These would constitute the skeleton of utilities on which Growth Units could be fastened.

At the level of a single project, the scale of development that we propose requires a long-term and disciplined schedule of public spending geared closely to the efforts of the builder.

**E. Removing Tax Disincentives:** Both federal and state tax systems are replete with impediments and disincentives to building and rebuilding at neighborhood scale. The Internal Revenue Code encourages a quick-build-and-sell posture for the developer; it discourages his staying around to make certain that the costs and concerns of management and upkeep are given equal attention as the cost of construction.

**F. Tax Incentives:** Building communities is far more complex than the single missions which become manageable profit centers for a business enterprise. Congress might declare the building of Growth Units to be in the national interest, and make special tax and other provisions to enable American enterprise—under tight performance standards—to make the long and broad commitments that the job requires.

**G. Property Tax:** America's dependence on the local property tax is especially hurtful. By tying practically all costs of community development to local ratables, it causes undue hardships to the builder and the citizen alike. The apparent answer is to move toward broad-based taxation at state and federal levels. It also suggests moving certain costs from local to state and federal governments.

**H. Revenue Sharing:** Any sharing of revenue by the federal government with the states should be conditioned on certain reforms, including a restructuring of the property tax system, zoning and building codes, and reallocation of infrastructure costs.

**I. Governmental Structures and Process:** Governments in America—federal, state, and local—are not organized to facilitate the kind and scale of development we propose. Major changes and innovations are in order:

1) at the federal level, some analog of a national development corporation capable of negotiating the necessary bundle of federal grants and consents; dealing with counterpart state, local, and private development agencies; and tapping national money markets;

2) at the state level, development corporations emulating and going beyond the pioneering example of New York State;

3) at the metropolitan level, public and public/private corporations subject to regionwide planning and participation, and oriented both to redevelopment of the inner city and to new development on open land.

**J. Categorical Grant Programs:** The tradition of categorical funding that long has been followed in American government needs to be modified. Above all, the Highway Trust Fund, we think, must be converted into a general fund for community development and greatly expanded. If this self-regenerating fund is not refashioned to serve our highest priority needs, the nation will place itself in bondage to the automobile and superhighway.

## USING THE GROWTH UNIT IN COMMUNITY DESIGN

A national strategy based on the Growth Unit requires the use of tactical stepping stones in the design of communities which will be in harmony with human needs and the natural environment. Such a strategy must be a long-term commitment. Its integrity must be maintained consistently although it may require continuous updating to accommodate changes we cannot foresee. Commitment to a long-term strategy based on such fundamental principles as freedom of choice and the worth of the individual demands tactics that emphasize flexibility and diversity.

Community design based on the Growth Unit should embrace the following principles:

**A. Equilibrium:** The design should be economical in its consumption of natural resources. It should minimize the emission of harmful effluents and encourage emissions that tend to replenish natural resources. The need for transportation should be reduced

by intermingling of residential and other uses. Community services (health care, education, security, etc.) should be consciously designed as systems and subsystems.

**B. Symbiosis:** The design should provide a beneficent and nourishing relationship between the physical environment and its using society. The surest means of attaining this relationship is to encourage community participation in the design process.

**C. Satisfaction of Spiritual Needs:** The design must satisfy the individual user's need for reassuring symbols that speak to him from the natural setting and from architecture within this setting. It must satisfy his need for symbols of place and personality which distinguish one person and one community from another—his need for an environmental order that denotes purpose in life.

**D. Expansion of Locational Options:** Just as the national strategy emphasizes freedom of choice of location, design of Growth Units should reduce barriers based on economics or race or age. This means that transportation, industry, and commerce must be placed with attention to their social consequences.

**E. Expansion of Qualitative Options:** The design mosaic must provide a rich variety of living environment matching the variety of life styles within our society.

**F. Open Space Preservation:** Community design must preserve open space at all geographic scales from the national to the local. Certain areas should be precluded from development either because of natural features that are hazardous to residents or where development would threaten ecological balance or recreational values.

**G. Historic Preservation:** Our historic heritage must be preserved from destruction or erosion if a sense of individual and community identity is to survive. Preservation of historic buildings and communities will require the discovery of new uses as original uses become obsolete. Some historic structures may have to be altered and modernized to accommodate contemporary functions. We also must look to the values in contemporary architecture that may in time have historic significance.

**H. Public Investment as a Key to Development:** Public utilities and facilities can be used to determine settlement patterns, both nationally and at the level of the single Growth Unit. The network of transportation and communications corridors should be the essential basis for comprehensive planning within the proposed communities and for their external connection with the existing community fabric. It should be designed and put in place incrementally in accordance with the largely private development of housing, commerce, and industry. Since this infrastructure is relatively permanent, it should be generous in its dimensions in order to permit accommodation of future technological developments. It should be seen as the opportunity for expression of great civic art and architecture.

**I. Amendable Architecture:** The design should provide a physical fabric that is amendable by its occupants to accommodate changes in life styles, technology, and economic circumstance.

**J. Reduced Cost of Shelter:** Design should seek to reduce the cost of housing. Off-site manufacture is one method of pursuing this goal, but care must be taken to produce a kit of parts that



Member Jaquelin Robertson (right) raises a key point at Task Force meeting in Princeton.

can be assembled in many differing ways to provide environmental variety. The design should take maximum advantage of the reduction in governmental constraints which must be a part of a national growth strategy. Better quality and workmanship can be attained once such constraints are removed. The unearned increment in the value of the land should be recaptured by the public, instead of becoming part of the inflated cost of shelter, as it does now.

**K. Experiment with Change:** We must deliberately experiment with change. This, in turn, will require that public funds be available to finance experimentation. Each Growth Unit can be a laboratory for new applications of technology and design. Procedural experimentation could involve the using community and public/private and multidisciplinary development teams in an open "Dialogue." The behavioral sciences can be involved in the development of a more sophisticated basis for establishing user needs. New ways of determining costs and benefits could take into greater account intangible factors and qualitative benefits.

## THE GROWTH UNIT AND THE URBAN CRISIS\*

The neighborhood Growth Unit applies to all America. But some parts of the nation's society and landscape have been, and will continue to be, especially impacted by growth. We believe a more specific and concentrated response should be made to the problems of the nation's declining central cities and their fast-growing metropolitan areas.

There are approximately 65 metropolitan areas in this country with 1970 populations of 500,000 or more. These 65 urban regions accounted for half the nation's total population, over half of the nation's black population, and 60 per cent of the nation's total growth during the decade 1960-70.

Currently, 80 per cent of America's growth is taking place within existing metropolitan areas. In all probability, the metropolitan areas cited above will continue to absorb the lion's share of national growth and the problems that go with it.

Without foreclosing (actually it could be planned as part of) a national strategy that might attempt to shift growth from these urban regions, we propose that the federal government join immediately with the affected state and local governments in developing growth plans for these critical areas.

These plans should include the following elements:

A. Governments involved immediately should assemble one million acres of land for community development within the core cities and in the metropolitan periphery. (We would estimate the cost of acquiring this at \$5 billion.) The appreciating value of this land—realized by lease and sale over the next 30 years—would be

\* This builds upon a forthcoming paper by Bernard Weissbourd.

enough to cover its original cost plus a large proportion of the costs of preparing the land for development.

B. A third of the nation's growth (20 million) during the next 30 years could be accommodated on these one million acres at average densities of 25 persons per acre—far under the present densities of troubled core cities, and within range of current consumer choice and economic feasibility.

C. The building block of this development would be the neighborhood Growth Unit—500 to 3,000 dwellings, 2,000 to 10,000 persons—built either singly or in multiples which over time would be fitted together into larger satellite communities.

D. The development of these Growth Units should be staged to provide relocation and elbow room for the restoration of older neighborhoods in the core area. Open occupancy would be ensured—with the end result that no one sector of the metropolitan area would be—or feel—overwhelmed.

E. The social mix of these neighborhoods would be further ensured by housing subsidies and allowances covering housing rental costs exceeding 25 per cent of family income. These subsidies also would be available to families filtering into existing housing throughout the metropolitan area.

F. The federal, state, and local governments would join in planning and paying for the necessary infrastructure—particularly transportation and utility corridors which would weave these Growth Units into the existing fabric of metropolitan life: jobs, education, health care, etc.

G. The economics (and for that matter, the politics) of these selected metropolitan areas should be pooled—benefits (such as new ratables) as well as costs. As a matter of first principle, new growth should not be allowed to occur as an escape from, or at the cost of, the revitalization of older neighborhoods.

H. Zoning and building codes for these Growth Units should be developed jointly by the three levels of government, with the states taking a strong initiative.

## NATIONAL GROWTH STRATEGY AS AN INVITATION TO CREATIVITY

Community building of the sort we propose is a many-sided challenge.

A. A challenge to developers, planners, and architects to anticipate and give creative expression to the emerging life styles of a richly diversified American people. The trends clearly are moving in the direction of smaller families with working mothers. The trends seem also to be moving toward residential densities lighter than those of the central city but heavier than those of existing suburbs. They also are moving toward the requirements, certainly an expectation, of a rich array of critical services, such as day care,

health, and continuing education. They also are pointing toward a greater degree of privacy and security. The art will be to put all these together into a working and livable community: the Growth Unit invites that art.

B. A challenge to those committed to the integrity of the environment; to produce increments of growth that are less hostile to man and nature, which continuously reduce the pollution of land, air, and water; and maintain open spaces and green belts for recreation and tranquility.

C. A challenge to all of us who must exact more and more resources which—at least relatively—are dwindling. Multiple purpose space and reusable resources will be the order of the day and will require all the inventiveness and ingenuity we can command.

D. A challenge to restructure the financing and delivery of critical services, especially health, education, and security in the face of escalating costs and consumer dissatisfaction. We believe strongly, for instance, that electronic information systems should be incorporated routinely as part of the community's infrastructure. There is also the prospect that imaginative use of cable television can reshape public education.

E. A challenge to each of the special skills, disciplines, and professions which historically have worked in isolation and are now being forced by the logic of complexity to meld their activities.

F. A challenge to develop new forms of joint enterprise, both within the private sector and between business and government.

G. A challenge to find new ways of resolving the dilemma of dividing trends, on the one hand, toward more distant government of greater resources and scope and, on the other, toward neighborhood control.

It is not easy to develop governing policy for a diverse nation in the full cry of its existence. It would be much easier to let the cup pass and continue to build the world's first throw-away civilization.

But if we are to achieve some coherence and not let freedom vanish into chaos, we have no alternative but to deal with all the tumbling forces and facts of the here and now, and then find levers that have the power not only to move but to win majority consent.

We have chosen the neighborhood Growth Unit as one such lever. It is within the grasp and values of every American. What we urge that the nation see and grasp it as part of a national strategy—to make of this country what it can and must be—a society confident and united enough to enjoy the richness of its diversity. Livability of that kind does not come by accident; even free choice requires design.



## TASK FORCE MEMBERS

Members of the Task Force on National Policy are:

—Archibald C. Rogers, FAIA, chairman; Chairman of the Board of RTKL, Inc., Baltimore. He developed planning guidelines for a team approach to highway planning, which led to establishment of the Urban Design Concept Team assembled to plan Baltimore's expressway system.

—Ieoh Ming Pei, FAIA; principal, I.M. Pei and Partners, New York. His firm was responsible for planning and design of Philadelphia's Society Hill redevelopment; a renewal plan for Oklahoma City's central business district; Montreal's Place Ville Marie, and a master plan for redevelopment of downtown Boston.

—Jaquelin Robertson, AIA; currently director of the Office of Midtown Planning for New York City; formerly head of the urban design group within the city's planning commission.

—William L. Slayton, Hon. AIA; executive vice president of the Institute; formerly Commissioner of the Urban Renewal Administration, Housing and Home Finance Agency; later president of Urban America.

—Paul N. Yivisaker, professional adviser, Dean of the School of Education, Harvard University; formerly commissioner of community affairs for the state of New Jersey, and later professor of public affairs and urban planning, Princeton University.

## AIA IMPLEMENTATION

A major task of AIA is to see that the recommendations of the report are actually put into effect. This will take considerable effort, but the report serves no purpose if AIA is not committed to, and geared up for, the report's implementation. This will take several forms.

The first effort is in the field of legislation. AIA, with technical assistance, will draft proposed federal legislation, establishing incentives and process for seeing that the Growth Unit becomes the concept whereby rebuilding and new growth are given form and direction. AIA will testify before Congress on its proposals as embodied in the Task Force report, and it will lobby for adoption of the legislation it proposes. It will work through its Minute-man Program for lobbying of individual members of Congress by individual members of AIA.

AIA will also work closely with those federal agencies involved in programs of urban development to persuade them to react favorably to AIA's proposals.

**At the state level,** AIA, again with technical assistance, will draft several pieces of alternative state legislation to enable the state to put the urban growth concept into practice. AIA will work closely with its state organizations to assist them in lobbying for, and advocacy of, the proposed model state legislation. AIA will also work with the Council of State Governments to have its proposed model legislation included in their model legislation publication.

**At the political level,** AIA will appear before the Republican and Democratic platform committees to urge inclusion in party platforms of the AIA proposal. AIA will ask its chapters to quiz Senatorial and Congressional candidates on their position on the AIA Growth Unit proposal.

AIA is requesting appearances at the conventions of other organizations and groups so that it can present the Growth Unit concept and encourage these other organizations and groups to adopt the AIA proposal.

AIA will be adding to the substance of the Growth Unit concept by undertaking additional studies that will go into the technical aspects of its recommendations. For example, AIA will hold

a small seminar of people eminent in the field to discuss the subject of constraints, and to see how such constraints can be removed to make the building process simpler and more economical, and assist the building of growth units.

Similarly, AIA will be preparing a national housing policy outlining the specifics of a national housing program aimed at providing subsidies to the user rather than to the housing unit. AIA, with technical assistance, will examine the question of tax incentives and disincentives to see how they might be modified to encourage the development of Growth Units as outlined in the Task Force Report.

AIA hopes, with foundation or governmental support, to encourage a local government or state to establish a program as soon as possible to make the building of Growth Units possible to "test" the recommendations of the report, including the building of Growth Units.

**On the public relations side,** AIA will provide information to newspapers and magazines about the urban growth report and will publicize additional material as it is produced. AIA may place ads in newspapers or magazines urging citizen approval and support of the Growth Unit concept. AIA hopes to prepare a packet for its components, including visual aids, so that the components may make presentations to local governmental officials and local civic leaders explaining the report and urging its support. AIA will work to obtain time on national television for presentation of the concepts embodied in the report, and would like to prepare TV and radio spots so that the message can reach the widest possible audience.

In all of this, the aim of AIA is to encourage the greatest debate possible on the basic question of giving direction to, and controlling the character of, urban growth and urban rebuilding. AIA will be espousing its own particular and specific recommendations, but AIA's major objective is to see that this question receives widespread discussion and that legislation and mechanisms to permit America to control its urban growth future are established. This will never be done unless the debate gets under way: AIA intends to see that the debate does get under way.



## MECHANISMS

Execution of the Growth Unit concept requires governmental mechanisms or institutions. Their creation requires federal-incentive legislation and state-enabling or institution-creating legislation. These mechanisms can be in several forms. Those discussed below are examples.

At the metropolitan scale, one needs a metropolitan planning and development agency to deal with the rebuilding of the worn-out portions of the metropolitan area, with control over the direction and form of peripheral growth, and with building of the interstices, in-filling those areas leapfrogged by development.

The metropolitan planning and development agency should be responsive, in an electoral way, to the residents of the metropolitan area. Methods of election and representation would be determined by the interests of the individual state.

Although such a metropolitan planning and development agency should exercise the metropolitan planning function, it must also have authority, with teeth, to see that its development plan is actually carried out. Development follows urban umbilical cords—transportation, communications, and utilities. To direct growth, one must control the infrastructure. Thus, this agency must have authority over the location and timing of major infrastructure development—major roads, mass transit, major water and sewer lines, airports, open space, state and federal office buildings, publicly owned or financed hospitals, and any other public investment that influences economic development and determines the pattern and character of future urbanization.

The metropolitan planning and development agency must also have the authority of eminent domain to do the following:

- (1) acquire vacant, or quasi-vacant, land in the urbanized portion of the metropolitan area to encourage the building of growth units in these areas. This is the in-filling process.
- (2) acquire land in the deteriorated portions of the metropolitan area at a scale to enable the building of Growth Units redevelopment.
- (3) acquire land in the path of development to at least diminish speculation in land and to establish the character of future development.
- (4) acquire raw land on the somewhat removed periphery of the urbanized area in order to build Growth Units or multiples of Growth Units.

Once such land is acquired, the planning and development agency should prepare broad-based plans for its development, install the necessary utilities and public facilities, and then lease or sell the land to those developers who agree to build in accordance with the prescribed plan and who also agree to provide housing for a specified spectrum of economic groups. The rate of land disposition should be geared to the rate of urban growth for the metropolitan area; and the metropolitan planning and development agency would, by this method of land acquisition

and disposition, determine the pattern and character of future growth.

A metropolitan planning and development agency should be able through this process to acquire sufficient land so that the prices of its offerings keep in line the speculative land values of private holdings in other portions of the metropolitan area.

The metropolitan planning and development agency should also be given the authority over the location of housing for low- and moderate-income families. Real freedom of choice requires not only that there be housing for all races and income groups throughout the metropolitan area, but that it be in sufficient quantity to assure the actual availability of housing units.

Within the inner city, the metropolitan planning and development agency should concentrate on relatively long-range (15-20 years) Growth Unit development plans, recognizing that the transformation of inner-city areas takes time and that housing must be available prior to displacement if large-scale land acquisition and development are to take place. Emphasis should be on early installation of good public facilities, particularly schools, to improve the area's public investment character. When rebuilding takes place, it must be for all income groups and all races. Replication of the socio-economic character of the area before clearance is not the objective. Although Fort Lincoln in Washington, D.C., is not a clearance area, it is a good example of this approach. Such areas must be rebuilt to attract middle- and upper-middle-income families as well as low- white as well as minority families.

In order to maintain control over development, the metropolitan planning and development agency should have control over all major (relatively large and large-scale) zoning decisions in the metropolitan area. There should also be a uniform building code for the metropolitan area.

Such a metropolitan planning and development agency would not serve as a municipal government, carrying out normal municipal services such as police, fire, street repair, library services, etc. Existing political jurisdictions would continue their municipal, governmental functions, but they would be relieved of the functions previously itemized. In fact, one would hope for the establishment of some form of neighborhood, quasi-governmental institutions, within the central city, to deal with neighborhood municipal functions on a neighborhood (Growth Unit) scale.

And finally, but still most important, is the necessity of equalizing the property tax throughout the metropolitan area so as to remove locational bias for economic development.

At the state level, it might well be desirable to create a state urban development corporation, much like the New York State Urban Development Corporation, with the authority to acquire raw land for the construction of new towns, but not within the jurisdiction of metropolitan planning and development agencies

where such agencies exist.

Also, it is important that the state, with federal assistance, assume the cost of financing public education so as to relieve the cities of this considerable burden. Each state will determine its means of financing.

The states also ought to adopt enabling legislation encouraging the creation of PUDs (Planned Unit Developments) to assist private holders of substantial acreages to develop such areas along the guidelines of the Growth Unit.

The state should also adopt statewide performance-oriented building and other codes relating to the construction, maintenance, and safety of structures.

**At the federal level,** the government should take over the costs of welfare, thus relieving the state and many local governments of the welfare burden. Here again, there is no prescription as to the means of financing.

In order to encourage the states and localities (metropolitan areas) to undertake these kinds of development programs, the federal government should provide incentive grant legislation. Assistance in the financing of major infrastructure should be given to those metropolitan areas where an adequate governmental mechanism has been established to carry out a development plan.

In addition, as a means of encouraging metropolitan areas to proceed with such action as quickly as possible, the federal government should provide financing for the acquisition of one million acres in the 65 metropolitan areas where the population is in excess of a quarter of a million. The location of this acreage should be determined by the metropolitan area agency (or the state, in the absence of such an agency) and some of it, of course, will consist of present federal holdings.

**In the field of housing,** the federal government should intensify its experiments with the subsidy of the family, rather than the housing unit, and try to transform housing subsidy programs so as to remove the stigma of housing built specifically for the poor or lower-middle-income groups.

The federal government should also provide incentives, similar to the Title VII incentives for new towns, to encourage metropolitan planning and development agencies and statewide urban development corporations to acquire land by eminent domain or direct purchase to provide for the building of Growth Units and new communities. These incentives could provide assistance in financing land acquisition and in subsidizing the installation of the necessary public utilities and facilities.

**Title VII of the present Housing and Urban Development** legislation leaves location and timing of new town developments to the happenstance of private developer land holdings rather than to public decision. Federal legislation should emphasize, in fact require, that the incentives be granted to only those developments that are in accord with the metropolitan development plan—a development plan created by an agency with the authority to see that the plan is actually carried out.

A possible additional mechanism at the federal level is a national urban development corporation, working with a national

development bank, to undertake the building of several experimental Growth Units or new towns to learn first-hand the difficulties and potentials of various kinds of development. The Minnesota Experimental City is a good example of this possibility.

**These mechanisms must also be geared** to making the process of private development a simpler operation than it frequently is with the constraints now established by local government. The role of the planning and development agency will provide the private developer with the assurance of being able to acquire land at nonspeculative prices. He will also have the assurance that he will be building in a planned development; he need not fear the impact of uncontrolled adjacent development. But in addition, the private developer should be free, within the constraints of the Growth Unit's overall plan, to build as he sees fit. An aim of the metropolitan planning and development agency should be to establish the simplest process possible for the processing of the necessary plans and building permits.

Within this mechanism, some special financial incentives should be included to encourage experimental Growth Unit developments. Such incentives might be in the form of governmental assumption of some of the financial risks plus adequate funds for substantial research in this area.

In some instances, states may feel it more desirable to retain for themselves greater authority over urban development in the urbanized areas within the state and may wish to establish centralized authority over zoning, land development, review of plans, etc.

**There is no one specific mechanism** for controlling and directing urban growth and rebuilding, but the principle of public determination of where such development takes place is essential. It is also essential that there be public control over the distribution of housing for a spectrum of economic groups throughout the metropolitan area, for otherwise there would be no assurance that actual freedom of choice as to housing location and style would be provided.

Mechanisms should also be established to deal with the expansion of smaller communities. Here it is probably necessary to use a state urban development corporation and the state's planning capacity to create development plans for smaller communities, and then actually undertake the acquisition of land and the development of Growth Units.

And finally, there needs to be a more careful examination of the existing mechanisms of rebuilding inner-city areas. We have reached the point where the constraints for rebuilding are so great that it is virtually impossible to rebuild inner-city areas at a scale sufficiently adequate to change their character. We have seen examples of relatively small-scale redevelopment in inner-city areas fail because the character of the entire neighborhood was not changed. The principle of citizen participation is very important, but citizen participation should not be translated into veto power by the local citizens. The same principle applies, of course, to those suburban communities which, through the zoning ordinance, have vetoed housing for minorities and the poor in their communities.

There should be a mechanism that provides technical assistance to an area's residents to aid them in evaluating and proposing plans for the development and redevelopment of their area. But, such plans must also be reviewed in light of the development program for the entire metropolitan area. Adequate consultation and consideration of the views of the residents of any area that is to be redeveloped, or where development is to take place, must be given. The process should be one of full consideration and review, but the governmental agency must have the clear authority to carry out the development program. This

probably will be the most difficult mechanism to establish, and yet our cities will continue to disintegrate unless we find a mechanism that permits their rebuilding at a scale that creates entire new neighborhoods (Growth Units) that are open and attractive to all races and all income groups.

This sketches out the mechanisms needed for implementation of the concept of the growth unit. The details will vary among the states, but these are the essential principles. If America is to be effective in controlling the character and direction of its urban growth and rebuilding, then it must have such mechanisms.



### METROPOLITAN AREAS

- |                          |                          |
|--------------------------|--------------------------|
| ● 500,000 TO 1,000,000   | ● 2,000,000 TO 5,000,000 |
| ● 1,000,000 TO 2,000,000 | ● 5,000,000 AND OVER     |

## DOCUMENTATION

Page 2, column 2: "The numbers of Americans in the 25-44 age group . . . are increasing at a rate nearly nine times that of the past decade."

Source: U.S. Census Bureau

1960 Data: 1960 Detailed Characteristics  
Vol. 1, Part D, Table 161

1970-80 Data: Current Population Reports, Estimates and Projections Series p. 25, No. 470, Nov. 1971

Age	1960 Actual (In Thousands)	% Change	1970 Actual	% Change	1980 Projection
25-34	22,822	10.8	25,278	45.9	36,900
35-44	24,076	-3.9	23,126	10.1	25,457
Total	46,898	3.2	48,404	28.8	62,357

Page 3, column 1: ". . . The birth rate is at an all-time low . . ."

Source: National Center for Health Statistics, Provisional Report for 1971 (reported in the *N.Y. Times*, March 2, 1972). The 1971 crude birth rate of 17.3 is the lowest *corrected* birth rate on record.

Page 3, columns 1 and 2: ". . . the total (Growth in Population by the Year 2000) may well be as low as 60 million . . ."

The following estimates of population growth show a range of 61.5 to 83.5 million additional people by the year 2000, depending upon fertility levels and timing patterns. Immigration (currently about 400,000 per year) and mortality rates are assumed to remain constant in these projections. The *fertility level* is the average number of children per woman upon completion of child bearing. The *timing pattern* of fertility relates to the median age of the mother.

Assumptions	Fertility Level	Fertility Timing Pattern	Projected Population by 2000 (In Millions)	Increase over 1970
1. Census Bureau Series E rate*	2.110	Old	266.3	61.5
(* "Replacement" rate leading over time to zero population growth)		Young	271.1	66.3
2. Approximate fertility rate for 1971**	2.284	Old	273.3	68.5
		Young	279.4	74.6
3. Census Bureau Series D rate	2.45	Old	280.7	75.9
		Young	288.3	83.5

\* Census Bureau, *Current Population Reports*, p. 25, No. 470, Nov. 1971

\*\* National Center for Health Statistics, *Provisional Report for 1971*

Page 3, column 2: "Meanwhile, housing starts have picked up . . ."

Source: 92nd Congress, 1st session: *Third Annual Report on National Housing Goals*, June 1971, p. 4

Housing Goals and Production  
(Thousands of Units)

Year	Goal	Actual
1969	2,001.0	1,997.2
1970	1,850.0	1,791.9
1971	2,040.0	ca. 2,100.0*
1972	2,330.0	Est. 2,295.0-2,765.0

\*(*President's Report on National Growth*, 1972; p. 60)

Page 7, column 1: There are 65 metropolitan areas in the United States with populations of 500,000 or more. These 65 metropolitan areas accounted for 50.4% of the nation's population, 58.9% of the nation's black population, and 60.4% of the nation's total growth from 1960-1970.

Source: U.S. Census

STATEMENT BY HON. ROBERT N. GIAIMO, U.S. REPRESENTATIVE,  
THIRD DISTRICT, CONNECTICUT

Mr. Chairman, I wish to thank you and the distinguished members of this subcommittee for affording me the opportunity of discussing and supporting S. 32, the National Science Policy and Priorities Act of 1972.

I had the privilege of introducing the first legislation into the House of Representatives (H.R. 34) that specifically dealt with converting our economy from a defense to a peacetime orientation. Cutbacks in defense and space spending have created a serious problem in this highly skilled scientific and technological community. Exorbitant numbers of scientists, engineers and technicians have lost their jobs. Thousands of small business firms once active in defense or space-oriented work are now facing financial liquidation. The blame for this terrible condition lies in the failure of this nation and its federal government to convert systematically its economy and resources to peacetime priorities.

It is inconceivable that the most technologically advanced nation on earth should tolerate this deplorable waste of talent. The scientists, engineers and technicians who are now losing their jobs could be developing new techniques for housing construction. They could be discovering cures for diseases, devising new systems of mass transportation and creating new methods for preserving our environment. Small businesses now facing fiscal chaos could be providing us with new goods and services to help meet our domestic needs.

If this nation is ever to enjoy both peace and prosperity, we must plan for it. This is our responsibility as representatives of the American people, and we should not, and cannot, ignore it any longer.

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STATEMENT BY JACK GOLODNER, EXECUTIVE SECRETARY, COUNCIL OF AFL-CIO UNIONS FOR SCIENTIFIC, PROFESSIONAL, AND CULTURAL EMPLOYEES

Hon. JOHN W. DAVIS,

*Chairman, Subcommittee on Science, Research, and Development, House of Representatives, Washington, D.C.*

DEAR CONGRESSMAN DAVIS: The Council of AFL-CIO Unions for Scientific, Professional and Cultural Employees enthusiastically endorses HR 15789, the National Science Policy and Priorities Act and its companion Senate bill, S. 32.

The Council, comprised of 16 national and international unions representing nearly five million Americans, believes this legislation to be of the utmost importance for the health of our economy and society. We believe this for two reasons:

First, the program provided for in this legislation will focus the nation's scientific, engineering and technical talent on civilian priority problems. These problems, such as air pollution control, mass transit, health care services, and many others, are seriously affecting the quality of life. We should be improving the environment in which Americans live. We have the technical ability and resources—both human and material—to do this. What is lacking today, is a commitment and the governmental machinery to marshal our efforts. The National Science Policy and Priorities Act provides both.

Secondly, we believe that implementation of the programs called for in this legislation will provide approximately 400,000 new jobs. The importance of this cannot be underestimated. It is difficult to imagine how anyone can remain impassive in the face of mounting unemployment among some of the most professional and skilled workers in our nation. These people have been highly educated and finely trained—often at government expense. While so much remains to be done to improve our society, it is inexcusable that our government has permitted a situation to develop whereby these people and their many talents are unemployed and underutilized. The National Science Policy and Priorities Act would be a major step in putting this manpower resource to work tackling our contemporary problems.

The Council and several of our affiliates have testified many times on very similar legislation. We appeared before your Committee and testified on HR 34, the Conversion Research and Education Act, in July 1971. HR 34, as you know, was the forerunner of the bill now before you. At that time, we noted that the

AFL-CIO Executive Council, in 1966, advised the Congress that we must have plans and programs to convert our economy from one dangerously dependent on defense-related enterprises, to one that is diversified and capable of responding to the growing need for expanded and improved public services. In our appearance before your committee, we deplored the fact that little was done in this regard.

When H.R. 34 was introduced, we had hopes that this Congress would exercise leadership in this area and override the inaction of an administration that kept telling us the mounting unemployment and dislocation of our professionals and other workers, was only temporary and that HR 34 and similar measures were unnecessary. We are dismayed that Congress, once again, has listened to those who counsel "do nothing". We wonder how many "recessions", how much suffering and waste of human energy must we experience before preventative action is taken.

We have little to add to our previous testimony. We suggest that the Congress and the administration have had ample time to study the matter and we ask only for passage of the measure before you.

Sincerely,

JACK GOLODNER,  
*Executive Secretary.*

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STATEMENT BY BENJAMIN B. GRAVES, PRESIDENT, THE UNIVERSITY  
OF ALABAMA IN HUNTSVILLE

HON. JOHN W. DAVIS,  
*Chairman, Science, Science, Research, and Development Subcommittee, House of Representatives, Washington, D.C.*

SIR: The University of Alabama in Huntsville wishes to fully endorse the testimony given by Mayor Joe Davis of Huntsville to your Subcommittee last week concerning the National Science Policy and Priorities Act of 1972. It is our desire that this letter be entered into the record supporting House Bill H.R. 15789.

We at UAH have an empathetic concern in two major problem areas facing America: human needs in civil areas and proper utilization of human resources. Our current activities and plans include a Center for Environmental Studies and a Center for Human Resources Conservation, modest contributions by UAH to solving problems in these two areas. However, it is very clear that significant accomplishments in relief of these problems can be made only through priority actions at the Federal level. In our opinion, the proposed National Science Policy and Priorities Act of 1972 represents a major step in simultaneously relieving these two problem areas.

Although the Huntsville technical community has become identified with the rather esoteric area of rocket engines and their applications, in actuality the scientific and technological capabilities of this community are highly diversified, encompassing a multitude of subdisciplines in engineering, physics, chemistry, mathematics, and management sciences. It is of considerable significance that these diverse disciplines make their contributions to the local aerospace programs through system science and analysis, for this is also a common denominator in modern approaches to solving problems in human needs and would be of great value in the efficient transfer of capabilities to new priority areas.

Similarly, the existing educational programs at UAH are highly diversified and also emphasize the systems approach. These programs have been developed primarily in response to local needs. Our institution has its foundations in the Redstone Graduate Program, established in the 1950's to improve the capabilities of scientists and engineers in the missile field. As a large segment of the Huntsville technical community made the transition to space programs during the early 1960's, our institution played a significant role by providing appropriate courses and curricula to support this new activity. We now stand willing and able to support the new transition to activities in civil science systems.

In summary, I would reiterate our support for the National Science Policy and Priorities Act of 1972 and, specifically, our willingness to be a participant in a local civil science systems effort.

Very truly yours,

BENJAMIN B. GRAVES,  
*President.*

STATEMENT BY U.S. SENATOR EDWARD M. KENNEDY OF  
MASSACHUSETTS

U.S. SENATE,  
COMMITTEE ON LABOR AND PUBLIC WELFARE,  
Washington, D.C., September 28, 1972.

Hon. JOHN W. DAVIS,  
*Chairman, Subcommittee on Science, Research, and Development, Committee on  
Science and Astronautics, House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: I am sorry that my schedule prevented me from testi-  
fying at the Science Subcommittee's hearings on S. 32, the National Science  
Policy and Priorities Act.

I know you and the other members of the Subcommittee are well aware of my  
strong support for this most important measure; but I thought you might find  
it helpful to have the enclosed materials for use in the Subcommittee's delibera-  
tions on the bill. Accordingly, I am enclosing copies of the Committee Report on  
the bill, the Congressional Record of the Senate debate on the bill, and a fact  
sheet on the bill as it passed the Senate. It might be useful to have these docu-  
ments included in the hearing record on the bill.

With best wishes,  
Sincerely,

EDWARD M. KENNEDY,  
*Chairman, Special Subcommittee on the National Science Foundation.*

[From the Office of Senator Edward M. Kennedy of Massachusetts]

S. 32, THE NATIONAL SCIENCE POLICY AND PRIORITIES ACT FACT SHEET

This bill was introduced by Senator Edward M. Kennedy on January 25, 1971  
and passed by the Senate by an overwhelming vote of 70 to 8 on August 17, 1972.  
The bill was then sent to the House of Representatives where it was referred to  
the Committee on Science and Astronautics.

Upon passage of the bill, Senator Kennedy stated:

"This Act puts over \$1 billion into scientific research and development directed  
at meeting human needs. It establishes a new NASA-like agency, the Civil Science  
Systems Administration which would function like the National Aeronautics and  
Space Administration. But instead of moving men to the moon, it would focus on  
our communities here at home.

"This agency would contract with industry and universities for the design of  
innovative public services, in health care, transportation, housing, nutrition,  
public safety, fire fighting, education, communications, energy supplies, etc. The  
resulting systems would be publicly demonstrated to stimulate their use in new  
and existing communities.

"I believe the Civil Science Systems Program can become the dramatic focus for  
science in the decade of the seventies, in much the same way as the Space Pro-  
gram did in the sixties. But the results will be of direct benefit to all our citizens  
here and now—not at some future date."

The following is a summary of the bill's provisions:

GENERAL

This bill establishes national science policy and programs to focus the Na-  
tion's scientific talent and resources on its civilian priority problems. It author-  
izes \$1 billion over a three-year period—\$30 million to advance the state-of-the-  
art in priority research areas; \$795 million to design and demonstrate civil sci-  
ence systems which can provide improved public services; and \$200 million to  
aid States, communities, companies, and individual scientists, engineers, and  
technicians in making the transition to civilian research and engineering  
programs.

NATIONAL POLICY PROVISIONS

Congress declares as national policy that: (1) Federal funds for science will  
grow with the GNP; (2) technical manpower must have continuing employ-  
ment opportunities at their professional skill levels; (3) Federal funds for  
civilian R & D must be raised to parity with military R & D; and (4) Federal  
programs for civilian R & D must be focused on meeting national needs in priority  
areas.

## TITLE I—SCIENCE POLICY

This title gives explicit authority to the National Science Foundation to develop national policies for applying science to social problems. It also broadens the composition of the National Science Board to include more technical-industrial representation. NSF is also authorized to identify priority areas of civilian R & D and to use \$30 million to advance state-of-art in those areas.

## TITLE II—CIVIL SCIENCE SYSTEMS ADMINISTRATION

This title establishes the Civil Science Systems Administration and authorizes \$795 million to do research, design, testing and evaluation, and demonstration of civil science systems capable of providing improved public services in areas such as: health care, public safety, public sanitation, pollution control, housing, transportation, public utilities, communications, and education. Programs would be carried out through contract with industry, universities, nonprofit organizations and public agencies, and would include provision for transfer of funds to other government agencies. Specific programs include: applied social research; design of civil science systems; testing and evaluation of such systems; dissemination of technical information on such systems; and public demonstration of civil science systems.

## TITLE III—TECHNICAL MANPOWER TRANSITION

This title authorizes NSP to plan and assist in transition of scientific and technical manpower from research and engineering programs which have been terminated or significantly reduced, to other civilian-oriented research and engineering activities. The \$200 million is authorized to aid States, communities, companies, and individual scientists, engineers, and technicians make the transition. Programs include: research on economic conversion; aid to State, regional and local governments for training of government officials, operating conversion programs, and for hiring unemployed technical personnel to work in government positions; Community Conversion Corporations to channel research and engineering programs in hard-hit communities; Job Transition Programs to enable companies to hire technical personnel to work on civilian projects for which they are not yet fully qualified (on-the-job training); Career Transition Fellowships to unemployed or underemployed technical personnel to acquire skills in other fields; placement assistance to technical personnel who are unemployed or underemployed; and the development of university courses and curricula oriented toward civilian engineering projects.

## TITLE IV—PORTABLE PENSIONS

This title authorizes the National Science Foundation to develop recommendations for the establishment of portable pensions for scientists and engineers to protect their pension rights as they shift from one organization to another.

NOTE: Senate Report 92-1028 from the Committee on Labor and Public Welfare, entitled "National Science Policy and Priorities Act of 1972" and dated August 9, 1972 as well as the pages of the Congressional Record covering the Senate debate of S. 32 (No. 133, Thursday, August 17, 1972, pp. S. 13868-S. 13922) are incorporated by reference and are available in the committee files.

STATEMENT BY MALCOLM R. LOVELL, JR., ASSISTANT SECRETARY  
FOR MANPOWER, DEPARTMENT OF LABOR

I welcome this opportunity to insert in the record the Department of Labor's views on S. 32, the "National Science Policy and Priorities Act of 1972." Since Titles III and IV of the bill are of most direct concern to the Department of Labor, I will limit my remarks accordingly.

Title III—Transition of Technical Manpower to Civilian Programs—authorizes the National Science Foundation to plan and assist in the transition of scientific and technical manpower from research and engineering programs which

have been terminated or significantly reduced, to other civilian-oriented research and engineering activities. Funds are authorized over three years to aid States, communities, companies, and individual scientists, engineers, and technicians in making the transition.

The Department of Labor is deeply concerned over the unemployment of engineers, scientists and other technically trained manpower. However, we do not think Title III of S. 32 is necessary since it duplicates programs already undertaken by the National Science Foundation and the Department of Labor.

For example, the Department of Labor and affiliated State employment security agencies have taken various steps administratively to respond to the current unemployment situation among engineers, scientists and other technically trained manpower. The Technology, Mobilization and Reemployment Program (TMRP) was launched in April of 1971. In this program, jobless engineers, scientists, and technicians are eligible for grants for travel to job interviews and for additional training and education. About 45% of 43,595 registered in TMRP were hired as of August 31, 1972. The 19,657 jobless engineers, scientists, and technicians were hired directly through the Technology Mobilization and Reemployment Program or through assistance from other manpower programs.

In addition to the counseling, interviewing, basic job development, matching and administrative services provided by special units established for TMRP within the State employment services throughout the United States, several additional activities have been conducted to further augment such reemployment services. These include comprehensive programs to broaden local and national job development activities, specialized training on résumé preparation and interview techniques, mass dissemination of information to employers and unemployed, and research and demonstration studies to develop information concerning means to convert the technical skills of aerospace and defense workers to use in other fields. The details of these special programs were presented to your Subcommittee on Science, Research and Development July 14, 1971, by Paul J. Fasser, Jr., Deputy Assistant Secretary for Manpower and Manpower Administrator. The attached chart will bring you up to date as to the progress of these programs.

I am pleased to report that the early months of 1972 have brought a generally improved employment situation for scientists and engineers. At the close of the first quarter of 1971, the unemployment rate for scientists, comprising those engaged in mathematics and the physical and life sciences, was 2.6 percent, and the rate for engineers was 3.0 percent. For the first half of 1972, the unemployment rate for scientists declined to 2.3 percent. For engineers the rate for the first quarter of 1972 dropped to 2.8 percent, and the second quarter showed a further decrease to 1.9 percent unemployed. The range in numbers of unemployed scientists and engineers during the first half of 1972 stood at 40,000 to 50,000, or 10,000 below the range limits during 1971. I believe the economy is now established on an upward path and an accelerated recovery can be expected to generate a steadily growing number of jobs with much better prospects for long-term stability than can be provided by temporary, stop-gap programs.

Although I am very concerned over the continued unemployment of some scientists and technicians, I cannot support the categorical grant approach taken in the bill before you. In my view, the Manpower Revenue Sharing approach provides a more flexible program, permitting State and local governments to adopt programs that will meet their own employment and retraining needs. I prefer this approach to the one taken in Title III of S. 32. Even without such new manpower reform legislation, the President has presented to the Congress, in his State of the Union message, his budget for fiscal year 1973 and through individual agency presentations, an overall strategic approach to the allocation of Federal scientific and technological resources. His March 16, 1972 message to Congress detailed this comprehensive strategy.

Title IV—Protection of Pension Rights of Scientists and Engineers—authorizes the Director of the National Science Foundation to develop changes in the Federal procurement regulations to protect scientists, engineers, and others working in associated occupations against pension forfeitures due to job transfers or loss of employment resulting from terminations or modifications of Federal contracts or procurement policies.

The problem of pension forfeiture, and other problems in the pension field, are major concerns of the President. These concerns, and the experiences of this Department in its administration of the Welfare and Pension Plans Disclosure Act,

led the President to propose major pension reform legislation to the 92nd Congress, including a vesting requirement which goes directly to the problem of forfeiture of retirement benefit rights due to job transfer or loss of employment. The Administration proposals are embodied in two bills, the "Individual Retirement Benefits Act" (H.R. 12272) and the "Employee Benefits Protection Act" (H.R. 12337).

Unlike Title IV of S. 32, which is limited to scientists, engineers and those in related occupations, the vesting provisions of the Administration proposal would benefit all employees participating in private pension plans. Just as Title III of S. 32 is objectionable because of its categorical approach, so Title IV is unsound in its limited application. And here, too, piecemeal legislation is neither wise nor equitable, because the need for pension reform, including protection against forfeiture, transcends any particular profession or occupation.

The provisions of Title IV would mandate administrative action by the National Science Foundation's Director to protect employees against pension forfeitures. Such forfeitures may involve many different circumstances, which are currently under review in the Departments of Labor and Treasury. In the near future these Departments will be completing a study of the losses of benefits under retirement plans due to plan terminations, job transfers and bankruptcies. We believe this study can provide a better basis for determining the best approach to treat pension forfeitures.

I urge that this Committee support the various elements of the President's manpower programs and pension reform proposals rather than the categorical and limited approaches of Titles III and IV of S. 32.

Thank you for this opportunity to present the Department of Labor's views on Titles III and IV of S. 32. With respect to the other titles of this bill, I defer to the National Science Foundation and other agencies more directly involved.

#### SUMMARY OF ASSISTANCE TO UNEMPLOYED ENGINEERS, SCIENTISTS AND TECHNICIANS

##### TECHNOLOGY MOBILIZATION AND REEMPLOYMENT PROGRAM (TMRP)

Administered by special EST units in employment service offices in approximately 23 major cities and by state specialists and job development consultants in 38 states.

Cumulative registrants .....	43, 595
Current active file.....	18, 263
Total reemployed .....	19, 657
Use of grants:	
Job search.....	3, 234
Relocation .....	1, 269
Training .....	3, 172

##### SPECIAL PROGRAMS SUPPORTING TMRP

National Registry for Engineers:	
Cumulative registrants (approximate).....	20, 000
Current active registrants.....	10, 255
Current job orders.....	1, 385
Total job openings (approximate).....	2, 500
Cumulative referrals to employers.....	29, 246
VEST (Volunteer Engineers, Scientists and Technicians):	
Members enrolled (cumulative).....	11, 260
Jobs developed (August only).....	2, 700
Active job openings.....	4, 333
Members returned to employment.....	4, 477

AIAA Workshops (American Institute of Aeronautics and Astronautics): Special counseling and job search training provided in approximately 250 workshops to about 20,000 applicants.

##### NSPE SKILLS CONVERSION STUDY (COMPLETED APRIL 1972)

In 12 of the 23 new areas of opportunity examined, 6,000 to 7,000 near term job opportunities and 25,000 to 40,000 additional opportunities in the next 3 years were identified.

## NSPE TECHNOLOGY UTILIZATION PROJECT

Job development program launched April 1972 to implement results on NSPE Skills Conversion Study. Twelve specialized training programs are being conducted in fields such as medical engineering, construction, forestry, industrial safety, electrical power and traffic engineering. Over 200 participants have been placed in jobs in new fields.

## NATIONAL COUNCIL OF TECHNICAL SERVICE INDUSTRIES

Special contract to encourage private enterprise cooperation with the employment service in reemployment of engineers, scientists and technicians. The initial effort was aimed at Cape Kennedy, Florida. Nine companies have participated. 525 applicants were actually interviewed but over 539 resumes were reviewed. One hundred and three applicants were hired and 37 applicants are still being considered. Plans are being made to expand the effort to two additional areas of high EST unemployment.

## PRESIDENTIAL INTERNSHIP PROGRAM

In this special program established in a cooperative effort with the Office of Science and Technology and the National Science Foundation, approximately 560 young, unemployed, advanced degrees scientists and engineers have been reemployed within Federal laboratories. They are conducting experiments to determine areas in which advanced technology can be applied to civilian social problems.

## STATEMENT BY SAMUEL J. TAYLOR, PRESIDENT, NPACSE, INC.

NATIONAL POLITICAL ACTION COMMITTEE FOR SCIENTISTS AND ENGINEERS, INC.

HON. JOHN W. DAVIS,

*Chairman, Subcommittee on Science, Research, and Development, Committee on Science and Astronautics, U.S. House of Representatives, Washington, D.C.*

DEAR CHAIRMAN DAVIS: I am pleased to submit the statement of our organization on S. 32, the National Science Policy and Priorities Act of 1972. In addition to the National Political Action Committee for Scientists and Engineers (based in Washington), the statement is also in behalf of the American Engineering Association (based in New Orleans) which has recently voted to merge with us. This statement emphasizes two main points:

- *Declaration by Congress of the general science and technology policy for the United States*—NPACSE believes the thrust of the declared policy is dangerously weighted in behalf of civil technology applications engineering to the detriment of America's high technology efforts. NPACSE stresses the need for a "balanced science and technology policy."
- *A Civil Science Systems Administration within the National Science Foundation*.—NPACSE believes that the emphasis for the proposed administration should be on the utilization of technology, not science. NPACSE also believes the proposed administration, with its emphasis on the design, development, testing, and evaluation of civil "science" systems should be located outside the National Science Foundation, either under the Department of Commerce or as an independent agency.

Comments on other aspects of the bill are covered in less detail. These comments are included in a third section.

## DECLARATION OF POLICY (SECTION 2)

The National Political Action Committee for Scientists and Engineers (NPACSE) believes the thrust of the declared policy is dangerously weighted in behalf of civil technology applications engineering to the detriment of America's high technology efforts. NPACSE supports a "balanced science and technology policy." On one hand, America must create the mechanisms to apply the new technologies to her pressing social needs. Such a mechanism may be the proposed

"Civil Science Systems Administration." On the other hand, America must continue to support high technology programs to maintain her economic and military strength, and to provide the parallel technologies as "tools" with which to solve her social ills. NPACSE fears that some sponsors of S. 32 may seek to use a "Civil Science Systems Administration" as a substitute for high technology programs (such as the space program) instead of as a necessary part of a "balanced science and technology program." Further, we question the term "misapplied" [Section 2(a) (4)] in light of the original bill where defense related research and development included not only the Department of Defense but also NASA and AEC. NPACSE would appreciate a clarification of the term. Further, in section 2(b) (3) DOD is covered, AEC is vaguely covered via section 2(b) (4) "energy resources," but what about the space program? NPACSE recommends that the Declaration of Policy be amended to include the following statement [after Section 2(b) (3)]: "In addition to Federal obligations for civilian research and engineering activities and Federal obligations for defense research and engineering activities, Federal obligations must be maintained for the vigorous exploration of space, both manned and unmanned."

Such a statement is altogether appropriate for one of Congress' more significant general policy statements of science and technology policy.

During the early Sixties, Space was an object of conversion. Everyone was excited about converting our technology resources from Defense to Space. Such a concept is still valid, however, it is now also appropriate to consider social engineering as a source of technical resources.

It is unfortunate that not only has social engineering been grievously neglected, but so has space and other high technology R & D areas likewise suffered. This unfortunate state is further complicated by the lack of science and engineering policy leadership in both parties. Eighty to one hundred thousand engineers are out of work or seriously underemployed. The administration is making some attempts at social engineering (5.4 billion) and is providing a moderate to meager space program (3.2 billion). On the other hand, the loyal opposition is suggesting a strong social engineering program (which is not research intensive) and a very meager unmanned space program (2 billion) with an outlook for far greater engineering unemployment. What is the solution of this bleak predicament? The solution lies in a "balanced science and technology policy" with adequate dollars for both the social engineering programs and the high technology programs.

#### CONVERSION TO SPACE, A VALID CONCEPT

The hope of the early Sixties to convert our technical resources from Defense to Space is still a valid concept. The wisdom of a vigorous Space Program as part of a balanced science and technology policy is realized when one recognizes the dependence of America on the accelerated advancement of high technology. The Space Program was a program that *accelerated* the advancement of the technological state-of-the-art over a broad spectrum of disciplines at a very efficient dollar per engineer ratio. It has been said that technology advanced during the decade of Apollo by four decades. A civilian-oriented research and development agency, however necessary, can not produce a similar advancement of the state-of-the-art. Engineering advancement depends both on economics and on the "level of adequacy" to which one designs. To design a "civil science system", as complex as it might be from a socio-political standpoint, has a much lower "level of adequacy" than a Moon or Mars mission might. In other words, a good engineer will design a system to a point which will meet the performance and economic constraints and no further. On the whole, though sociologically more complex, "civil science systems" offer many design short cuts that the Moon mission did not offer. Thus the effect of applying technology to human needs, though absolutely necessary, would not in itself result in the advancement of high technology over a broad spectrum of disciplines at an adequate rate of acceleration. Again, the answer is a "balanced science and technology policy". We must convert to both civilian-oriented research and engineering and to a more vigorous space program.

We must have a "civil technology applications engineering administration" to apply technology to our priority human needs on one hand. On the other hand, we need to maintain our priority high technology efforts to provide our country with the technological foundation upon which our economic and our military posture depends and we must maintain our high technology efforts to produce the parallel technologies as "tools" with which to solve our social ills.

One final comment, in building a house, one does not eliminate the house's foundation as a non-priority use of funds and devote all funds to building rooms just because rooms *seem* more relevant to immediate human needs than do foundations.

#### CIVIL SCIENCE SYSTEMS ADMINISTRATION (TITLE II)

The National Political Action Committee for Scientists and Engineers (NPACSE) is opposed to the establishment of a "Civil Science Systems Administration" within the National Science Foundation. NPACSE believes that a major agency to focus technology on human needs is necessary at this time. Such an administration should be considered in the context of the utilization of technology (refer to the statement before these hearings of Dr. Edward Wenk, Jr. of the National Academy of Engineering). The difference between science and technology deserves recognition here. The significance is greater than just semantics. The emphasis of the proposed administration is engineering, not science.

Tough engineering management, the type that put America on the moon, is what is needed to tackle America's social ills. There is a difference between overseeing a university research project and managing a massive (civil "science" system) technology applications engineering program.

Pure scientific research on civilian-oriented projects must continue and be expanded upon. This can be done through increases in the existing RANN program provided the National Science Foundation can prove capable of adequate performance. However, as far as the design, development, testing, and evaluation of "civil science systems", NPACSE suggests the creation of an independent agency. An alternative would be the creation of an eventually independent agency with an interim location within the Department of Commerce. As is widely known, the most difficult stage in the successful application of technology to various public sector problems is the commercialization of resulting new products. The barriers to technology utilization are currently being investigated under the NSF's Experimental Research and Development Incentives Program and the NBS's Experimental Technology Incentives Program. Such barriers to technology utilization (which are in turn barriers to commercialization) are urban market aggregation, patent rights, urban market research, and others. Possibly close association of the technology applications engineering program (civil science systems) with the Department of Commerce may create an atmosphere conducive to commercialization of public technology. Possibly an independent agency might be in a better position to coordinate the transfer and utilization of technology developed in the high technology agencies to the "user agencies" and to state and local governments. Regardless of whichever route may be taken, either would be preferable to the National Science Foundation. NPACSE has prepared a detailed concept for an alternative structure to that proposed in Title II after extensive consultation with leading experts in technology utilization. NPACSE will discuss this alternative upon request.

#### OTHER COMMENTS ON THE BILL

The final points on the bill are areas, in the view on NPACSE, which might require modification.

Section 2(b) (3)—There is some confusion as to the term "level of parity". How does this phrase come into play with the major areas of R & D? As you may know, there is some sentiment to create a major agency to deal with the "energy crisis", the result of which may be an expanded AEC type agency. Also there is NASA. What is the "level of parity" with respect to the Department of Defense and the three major civilian research agencies; the new "Civil Science Systems Administration"; NASA; and a possible expanded "AEC".

Section 103—NPACSE suggests adding the following clause to the first sentence after the word resources: "... and thereafter such areas as may be found, from time to time, relevant to national needs".

Section 206(a)—NPACSE questions the choice for selection of members of the Advisory Council. Should greater representation be given engineers and design professionals?

Section 206(c)—NPACSE believes that the Department of Defense should be represented on the Advisory Council.

Section 206(d)—NPACSE agrees with the comments of Public Technology, Inc. as to the inclusion of the other organizations which comprise the "big six" (Council of State Governments, International City Management Association, National Association of Counties, National Governors' Conference, National

League of Cities, U.S. Conference of Mayors). Further, since Public Technology, Inc. is itself the technology representative of state and local governments (its Board of Directors includes the Executive Directors of the "big six" organizations representing state and local governments), Public Technology, Inc. should be included in this section.

Section 206(e)—Adequate safeguards should be afforded for the presentation of opposing views in all reports and findings of the Advisory Council. This should especially include those non-voting members listed in Section 206(c).

Section 210(a)(2)—The list of analytical techniques should include "Reliability and Quality Assurance Engineering".

Title III—NPACSE supports this section but believes it does not go far enough. The problem of "technical obsolescence" should be addressed in this section. Provisions should be made for continuing education for all scientists and engineers employed on government contract and should include all basic disciplines as well as specialized social engineering courses. Basic engineering disciplines got us to the Moon; basic engineering disciplines will help us solve the social engineering problems.

Title IV—NPACSE strongly supports the concept of protecting scientific and engineering employee rights through the Federal procurement process. Following recommendations for pension right protection, recommendations for other scientific and engineering employee rights might be considered. NPACSE recommends that consideration be given to creating provisions for attacking other abuses of technical professionals through the Federal procurement process. Such abuses should include professional overtime, employee patent rights (refer to HR 1483), technical obsolescence, and other areas.

If there are any questions or any way in which we may be of help, please do not hesitate to contact us.

Sincerely,

SAMUEL J. TAYLOR,  
*President, NPACSE.*

STATEMENT BY DR. MAX TISHLER, PRESIDENT, AMERICAN  
CHEMICAL SOCIETY, ON BEHALF OF THE AMERICAN CHEMICAL  
SOCIETY

NATIONAL SCIENCE POLICY AND PRIORITIES ACT OF 1972  
H.R. 15789

We appreciate being given this opportunity to comment on the features of the National Science Policy and Priorities Act, H.R. 15789. The issues addressed by this legislation are both fundamental to the formulation of national science policy, and of vital significance with respect to the ability of our society to resolve many of the problems which confront it. These issues have been under discussion for some time now by the Committee on Chemistry and Public Affairs of the Board of Directors and Council of the American Chemical Society, and a general consensus on them has been under development. The viewpoint which we attempt to express is that of the chemical scientific community, as represented by the American Chemical Society.

The American Chemical Society was founded in 1876 and chartered by Congress in 1937 as a nonprofit, scientific and educational organization. Our current membership numbers approximately 110,000 individual chemists and chemical engineers. This membership reflects a broad spectrum involvement in academic, governmental, and industrial professional pursuits. Under its National Charter the Society is charged with the responsibility to work for the advancement, in the broadest manner, of chemistry, "thereby fostering the public welfare and education, aiding the development of our country's industries, and adding to the material prosperity and happiness of our people." The National Science Policy and Priorities Act would seem, in principle, to be directed toward similar ends.

The National Science Policy and Priorities Act is commendable both for outlining a mechanism for the evolution of national science policy and for focusing funds and manpower on the application of science and technology to national social problems. Given the resources that this legislation would provide, chemists and chemical engineers will have much to contribute to the solution of national problems, particularly in areas of public health, the environment, energy resources, nutrition, housing, communications, and transportation.

Support for civilian-related research and development would come at an especially opportune time for the thousands of scientists and engineers who are currently unemployed or working in positions that do not use their full abilities. The employment situation this year has continued to deteriorate. A survey of the American Chemical Society members has found that 3.0% of them were unemployed as of March 1972, compared to 2.7% in 1971. An additional 4.2% were employed in temporary or part-time jobs, or in what might be termed "subprofessional" positions, which do not fully use a person's education or training. Society members of age 25 or under were 23.7% unemployed, triple the 7.0% unemployment last year for this group. This indicates that new graduates are having a particularly difficult time finding employment.

Although the American Chemical Society supports H.R. 15789 on the basis of its emphasis on the direction of science and technology toward the solution of high-priority national problems, we have reservations about the administration of the Act. We believe that establishment of a Civil Science Systems Administration within the National Science Foundation is not the most desirable course to follow, and we would like to suggest an alternative arrangement, whereby existing executive agencies would be responsible for overseeing the smooth flow of scientific knowledge from research, through stages of development and demonstration, to practical application.

It may be helpful to the members of this subcommittee if we comment on individual sections of this bill in turn. We endorse Section 2, the Declaration of Policy, for its clear statement of the need to nurture this nation's scientific resources—resources which comprise both scientific knowledge and scientific manpower. We concur that the total Federal investment in science and technology should be raised to a level which is adequate to the nation's needs, and then should continue to increase at a rate which would support the annual growth in the gross national product needed to sustain a full-employment economy. An adequate rate of increase in science and technology funding would have to be at least as great as the annual increase in the gross national product, and we would like to see this principle clearly stated, as it is in H.R. 15789.

We endorse Title I, the "Science Policy Act", for establishing a framework for the continuing evolution and evaluation of national science policy. We support the expansion of eligibility for appointment to the National Science Board and welcome the opportunity to recommend persons for nomination to Board membership. We hope that the analysis of scientific, engineering, and technical manpower authorized in Section 106 will provide a strong replacement for the discontinued National Register of Scientific and Technical Personnel.

We regret, however, the omission from Section 102 of authority for National Science Foundation activity in the area of technology assessment. Although evaluation of the social and economic effects of civil science systems is included in Sections 208 and 210 of the "Civil Science Systems Act", a broader authority to assess the consequences of all advances in science and technology is a necessary adjunct to the formulation of national science policies. For this reason, the National Science Foundation should be able to initiate technology assessment studies relative to problems of national interest, quite apart from technology assessment activities of any other agency that might be established in the executive or legislative branches of the Federal Government.

In Title II, the "Civil Science Systems Act", the central authority and responsibility for the design, development, and demonstration of civil science systems is placed within the National Science Foundation, through establishment of a Civil Science Systems Administration. The Federal departments and agencies which are formally responsible for the problem areas that are the objects of the civil science systems would maintain consultation and coordination with the National Science Foundation through a Civil Science Systems Advisory Council. In addition, the National Science Foundation would be authorized to transfer funds to other Federal departments and agencies for planning, design, development, demonstration, and evaluation of civil science systems.

We have two reasons for suggesting that several alternatives in the Federal executive organization be given consideration relative to the central administrative authority under the Act. First, whereas various Federal departments and agencies are charged with developing solutions to national problems in their respective areas of responsibility, the National Science Foundation has been given a unique responsibility for supporting basic research and education in the sciences. Congress extended that responsibility in 1968 to include applied research, but the emphasis is still on research as opposed to development. We are thus concerned that addition of a large developmental component would strain the

National Science Foundation's ability to discharge its present responsibilities for research and education. Furthermore, the emphasis of the developmental work on national social problems might put pressures on the Foundation to divert some of its resources from basic research to projects of a more visible and popular nature.

We would like to make clear, however, that we do support involvement by the National Science Foundation in several of the activities of Title II. The Foundation should be responsible for support of basic and applied research relevant to civil science systems. As we said earlier, we feel that much research still needs to be done before civil science systems can be developed to solve many of our national problems on a long-term basis. In addition, it would be entirely appropriate for the National Science Foundation to support the applied social research and technology assessments proposed in Sections 208 and 210.

Second, we believe that consideration of several reinforcing administrative arrangements will result in the kind of structure that will provide the best possible coordination of the Civil Science Systems Administration with other Federal departments and agencies. These other departments will be responsible for the large-scale application of any civil science systems that are developed and thus should be involved more directly in the development of such systems. In particular, contracts for design, development, and demonstration with academic institutions, nonprofit organizations, private business firms, and state and local governmental agencies should be the responsibility of the Federal agency which will ultimately put the civil science system into application. We also believe that the proposed Civil Science Systems Advisory Council, with its majority of members representing business, labor, engineers, scientists, environmental groups, and consumers, would not be able to function as the prime interdepartmental coordinating body.

As one alternative arrangement for consideration by this subcommittee, we would like to suggest that the President's Office of Science and Technology and the Office of Management and Budget should provide some independent coordination and oversight, along with the agencies charged with the specific responsibilities, for the successful flow of research and development into demonstration and finally application. In the light of the legislation's emphasis on better coordinating the involvement of private industry, and to emphasize that civil science systems should be commercially as well as technically viable, there may be an important coordinating role here for the Department of Commerce, as well.

The proposed Civil Science Systems Administration has been described by some as being another National Aeronautics and Space Administration. There was a need for NASA in the late 1950's because no organization then existing had the capability to support space research or design a system to carry men to the moon and return them to earth. That is hardly the case with respect to health care, pollution control, transportation, or the other national problems with which our society must deal. The National Science Foundation has been established to support the necessary basic research, and existing Federal departments and agencies are responsible for applying research results to develop solutions to problems in their respective areas. This legislation, as revised, should provide a national science policy and a coordinating mechanism whereby existing organizations can work cooperatively toward national goals.

We endorse the comprehensive set of programs and financial assistance in Title III, the "Technical Manpower Transition Act". We have already mentioned the continuing need for assistance to unemployed and underemployed scientists, engineers, and technicians. The programs of this legislation should also assist the conversion of employed professionals from their present positions to the new positions that would be created for the development of civil science systems. The participation of industrial firms in the job transition programs proposed in Section 309 should be particularly helpful in enabling scientists, engineers, and technicians to acquire additional skills.

There is a clear need for assistance for retraining, whether by formal education or by on-the-job experience. Scientists and engineers are adept in the discipline of acquiring the knowledge needed to work in new fields, but this conversion process requires a period of time during which the person is unproductive and thus must be supported as an investment in his future. The need for retraining is particularly great at the present time, when national priorities are shifting from defense-related research and development to civilian problems such as health care and pollution control. This situation may be unprecedented, in that earlier priorities such as the space program were added to existing and continuing programs.

Consequently, scientists and engineers were in short supply and were recruited chiefly from among college and university students.

We also support Title IV, "Protection of the Pension Rights of Scientists and Engineers", as being necessary to permit professionals to switch to work on civil science systems without loss of pension rights and benefits. The thousands of scientists and engineers who regularly provide their services to contractors retained by the Federal Government have become acutely aware of the pension risks associated with this type of employment, particularly as related to vesting. Repeatedly, these workers have had their jobs terminated, frequently on short notice, before they achieved a stake in their pension plans. Hence, the concept of modifying Federal procurement regulations to insure the protection of the pension and retirement rights of those scientists, engineers, and others working in associated occupations, employed under Federal procurement, construction, or research contracts or grants, reflects the American Chemical Society's position accurately in this area, as expressed on June 23, 1972, in testimony before the Subcommittee on Labor of the Senate Committee on Labor and Public Welfare.

We do feel, however, that Title IV would be significantly strengthened if Section 404 was modified by deleting all the language after "... sixty days thereafter". It is our opinion that the provisions of Title IV are consistent with the primary objectives of all federal departments and procurement agencies and certainly in the national interest. In connection with Section 402, the American Chemical Society would be prepared to cooperate with the National Science Foundation in modifying existing procurement regulations to effectuate the purpose of Title IV.

Taken in its entirety, the National Science Policy and Priorities Act of 1972 is commendable for the steps it takes to involve industrial firms and other private organizations in the formulation of science policy and the conduct of research and development activities related to problems of national interest. We thus urge the support of H.R. 15789, with some revision, by this subcommittee.

## APPENDIX II

### STATEMENTS FOR THE RECORD RELATING TO TITLE IV PROTECTION OF PENSION RIGHTS OF SCIENTISTS AND ENGINEERS

#### STATEMENT BY HILTON DAVIS, GENERAL MANAGER, LEGISLATIVE ACTION, CHAMBER OF COMMERCE OF THE UNITED STATES

HON. JOHN W. DAVIS,

*Chairman, Subcommittee on Science, Research, and Development, Committee on  
Science and Astronautics, House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: The Chamber of Commerce of the United States requests that your subcommittee delete Title IV, on "Protection of Pension Rights of Scientists and Engineers," from H.R. 15789, "National Science Policy and Priorities Act of 1972."

Title IV requires the Director of the National Science Foundation to develop amendments to the procurement regulations of government agencies to protect the pension rights of scientists and engineers. It should be deleted for the following reasons:

1. The issue of vesting or portability of pension rights is not germane to the main purposes of the bill.

2. As written, it would be an unwarranted delegation of legislative authority to the Director of the National Science Foundation.

3. There are committee jurisdictional problems. First of all, both the tax-writing and labor committees of Congress are currently studying and holding hearings on legislation affecting the vesting and portability of private pension benefits. Moreover, the Joint Economic Committee and the Senate Special Committee on Aging have held hearings on private pensions. Secondly, amendments to regulations affecting procurement procedures for every Federal department and procurement agency are of interest and concern to other committees of the House, such as the Armed Services Committee. We do not believe that the National Science Foundation would claim any expertise in the exceedingly complex problems of private pension vesting or portability.

4. The proposal contemplates class legislation applicable only to certain individuals engaged in specified activities.

5. Any "feasible" action taken by the Director could conflict with Internal Revenue Code prohibitions. It is virtually impossible for an employer to provide a pension plan for employees unless he can qualify that plan so that contributions may be deducted for tax purposes. One of the conditions for such a qualified trust is spelled out in Section 401(a)(4) of the Internal Revenue Code of 1954, as follows:

"... if the contributions or benefits provided under the plan do not discriminate in favor of employees who are officers, shareholders, persons whose principal duties consist in supervising the work of other employees, or highly compensated employees."

Engineers and scientists are highly compensated employees. If an employer were to afford them special treatment, his plan could violate this prohibition, and tax qualification of the plan might be lost.

6. Administration of special provisions for vesting pensions for engineers and scientists would pose complex problems that are probably impossible to surmount. It would present special problems in trying to negotiate pension plan provisions in collective bargaining. It would even create discrimination among engineers and scientists working for the same company, differentiating among those who may be working full or part time on government contracts and those who are not. It would create special problems in operating and financing private plans.

7. The language of the bill and the procedure to be used by the Director is vague, indefinite and lacks standards. In addition, he is directed to consult only with professional societies.

8. The Title could materially increase government procurement costs.

Employers are deeply concerned with the need for retirement income from private pensions and the necessity for reasonable minimum standards or regulations governing the vesting of private pensions. We support legislation of this nature, but it should be accomplished through amendment of the Internal Revenue Code as a condition for qualifying a plan.

We urge you, therefore, to delete Title IV from H.R. 15789. It is the wrong approach, through the wrong committee, and would impose an unsolvable problem on the wrong government agency.

I respectfully request that this letter be made a part of the hearing record on this legislation.

Cordially,

HILTON DAVIS,  
*General Manager, Legislative Action.*

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STATEMENT BY JOHN W. KESNER, CHAIRMAN, COMMITTEE ON  
PENSION AND PROFIT-SHARING TRUSTS

CALIFORNIA BANKERS ASSOCIATION,  
*San Francisco, Calif.*

HON. GEORGE P. MILLER,  
*Chairman, Committee on Science and Astronautics,  
Rayburn House Office Building,  
Washington, D.C.*

DEAR CONGRESSMAN MILLER: This communication is being directed to you by the California Bankers Association Committee on Pension and Profit-Sharing Trusts to express opposition to proposed legislation that we believe will fragment the effort currently under way to improve the private pension system. To provide you with some background information, the California Bankers Association represents every bank and trust company in our state. The association is committed to promotion of the general welfare of banking and trust business and to improvement of services to the public. It also recognizes its responsibility to voice an opinion on matters that affect the public within the framework of the banking and trust industries. It is in the latter context that we want to share with you our concern about Senator Javits' amendment (Title IV) to Senate Bill S. 32.

Senate Bill S. 32, which proposes to amend the National Science Foundation Act of 1950, as passed by the Senate includes a provision (Title IV) calling for the development of a program designed to protect scientists, engineers, and others, employed under federal procurement construction, research contracts or grants, against loss of pension benefits as a consequence of job transfers or loss of employment resulting from termination or modifications of federal contracts or procurement policies.

Notwithstanding the possible merit of the principal provisions of S. 32, the Title IV amendment proposed by Senator Javits should definitely be deleted. It is objectionable for the following reasons:

1. It is class legislation applicable only to certain individuals engaged in a specific activity.
2. The class of individuals that will benefit by the proposal will include employees who will undoubtedly be in the highly paid group referred to in the pension provisions of the Internal Revenue Code. Since the Code prohibits a plan from discriminating in favor of such a group, more favorable treatment of scientists and technical personnel would be in conflict with existing laws.
3. The amendment raises issues of vesting, funding, insurance, and portability, each of which is very complex in its own right and is being addressed in other bills pending in Congress.
4. An increase in pension costs for workers engaged in government procurement contracts will result in increased cost to the federal government as the additional cost would be an allowable item under government procurement contracts.
5. The amendment does not contain any standards by which modification of the procurement regulations is to be developed.

Additionally, the language of the amendment and the standards to be used by the Director of the National Science Foundation in promulgating the modified procurement regulations are at best vague. He is directed to consult with professional societies which would most likely represent the class of employees in question and undoubtedly produce a biased viewpoint. The amendment would present extremely difficult problems in administering, operating, and financing private pension plans. It would necessitate special treatment for a limited group of employees and would raise special problems in negotiating pension plan changes.

Finally, Senator Javits' amendment to S. 32 is certainly inconsistent with similar provisions of S. 3598 which he co-sponsors with Senator Williams. If enacted, it would lead to other class groups seeking the same type of treatment, and it successful, would result in a hodge-podge of legislation that would be extremely arduous and expensive to administer and govern. It is interesting to note that the Senate Finance Committee in its consideration of S. 3598 eliminated the vesting, funding, reinsurance, and portability provisions of that bill.

In consideration of the ill-conceived and totally inappropriate nature of this legislation, I sincerely urge you to do everything in your power to defeat enactment of Title IV amendment to Senate Bill S. 32.

Sincerely,

JOHN W. KESNER,

*Chairman, Committee on Pension and Profit-Sharing Trusts.*

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STATEMENT BY STANLEY L. KING, JR., ASSISTANT VICE PRESIDENT,  
HUMAN RESOURCES DEVELOPMENT, AMERICAN TELEPHONE &  
TELEGRAPH CO.

Mr. Chairman; Members of the Subcommittee; this statement is submitted in my capacity as Assistant Vice President, Human Resources Development of the American Telephone and Telegraph Company on behalf of the 22 Bell System companies, the names of which are attached to this statement.

I appreciate being afforded the privilege of submitting this statement to this Subcommittee on S. 32, the proposed "National Science Policy and Priorities Act of 1972." My statement is not directed to the entire bill, but only to "Title IV—Protection of Pension Rights of Scientists and Engineers."

Title IV would seemingly require that all federal contractors provide immediate vesting of pension rights for "Scientists, engineers, and others working in associated occupations employed under Federal procurement, construction, or research contracts or grants," at least in the event of job transfers or loss of employment resulting from federal contract cutbacks. The provisions of this Title raise issues of vesting, funding, insurance and portability of private pension plans, already before the Congress in other bills. Extensive hearings have been held on these subjects by the House Ways and Means Committee and the Senate Subcommittee on Labor of the Committee on Labor and Public Welfare.

The Bell System is opposed to Title IV for the reasons which will be set forth in this statement.

BELL SYSTEM PENSION PLANS

Each of the companies I speak for has a pension plan identical in essentials with the others. Each plan is funded independently of the others and the trusts are administered by trustees selected by the respective companies. At present there are some 140,000 pensioners who are receiving pensions at an aggregate annual rate of almost \$500,000,000. Annual contributions by the companies to pension funds are now running at an aggregate rate of \$1,100,000,000.

No pension funds can ever revert to the contributing companies. Moreover, the companies are committed to payment of all vested benefits in the event of discontinuance of the plans, whether or not amounts in the pension funds are sufficient.

The Bell System plans include provision for early retirement if age and service requirements are met, and provide for full vesting of pension rights for those who are 40 or more years of age and have 15 or more years of service.

The Bell System presently employs more than a million workers, many thousands of whom are engineers and scientists. All of our employees, without exception, presently participate in our pension plans on an equal basis.

THE IMPACT OF TITLE IV OF S. 32 WOULD BE A SEVERE ECONOMIC BURDEN ON PRIVATE PENSION PLANS

The tremendous cost of the Bell System's present pension benefits is equivalent to 12 percent of our employees' pay. This is a heavy burden even without the immediate vesting of pension benefits implied by Title IV (instead of the service and age related vesting mentioned above). Preliminary estimates suggest immediate vesting of these benefits to all of our employees would double our pension payments.

Total Bell System revenues from federal business approximated \$1.3 billion in 1971. This is about 5 percent of our total business. Amounts paid to our pension funds are now running more than \$1 billion annually (in relation to total business, not just federal). Title IV requirements relating to this small portion of our business would have the severe impact of doubling our pension accruals.

If companies were permitted to apply the Title IV requirements only to employees actually engaged in government work, separate preferential pension plans would seem indicated. But such preferential pension plans obviously would create morale and administrative problems of such magnitude as to make separate plans not feasible.

As stated earlier, in the Bell System all employees without exception participate on an equal basis in our pension plans. The effect of S. 32 would apparently be to require by law that we accord preferential treatment to the small percentage of our engineers and scientists engaged in government work. If an engineer working on a government contract transfers or loses his job because of termination or modification of a government contract after one year of service, or less, he would have vested pension rights, whereas, if an engineer doing similar non-government work resigned after, say, five years' service, he would receive no pension benefits.

Obviously, this would produce an inequitable situation that would be intolerable from an employee morale viewpoint.

Under such circumstances, it would be an administrative "nightmare" to operate separate plans. Employers would be required to shift employees from one plan to another as their assignments shift to or from government work. Plans would have to keep track of short service employees who worked on government projects that had terminated. Where engineers or scientists were working on government and nongovernment projects at the same time employers would possibly have to keep track of the percentage of time spent on each assignment and prorate the time.

MORE RATIONAL APPROACHES ARE BEING MADE TO THE SAME ESSENTIAL PROBLEM

"Scientists, engineers, and others working in associated occupations" suffer no more than accountants, secretaries, and security guards in the event of a plant shutdown. The problems of pension security for all workers, and the benefits and drawbacks of federal intervention in the terms and security of private pensions, are being pursued in both the labor and tax writing committees of both Houses of Congress. It would be premature and ill-advised to add a make-shift and class-preferential patchwork measure, engrafted onto a bill serving essentially other objectives, when the culmination of years of efforts in the field of pension legislation is pending before or has been reported by no less than four Congressional Committees more directly charged with that responsibility. (S. 32, reported by Senate Labor and Finance Committees; H.R. 12272, House Ways and Means Committee; H.R. 1269 or successor legislation, House General Labor Subcommittee.) Further, this subject is so interwoven with the present tax law as to "indicate the impossibility of developing a bill without reference to the tax laws" (to quote the words of Senate Report No. 92-1224, with which the Finance Committee reported back, on September 25, 1972, S. 3598, Retirement Income Security for Employees Act, which had been referred to it after prior action by the Committee on Labor and Public Welfare).

In addition, the class of employees which would benefit under Title IV is a relatively highly paid group. Under § 401 of the Internal Revenue Code, a plan is prohibited from discriminating in favor of highly paid employees. This principle is well established and has been accepted as a salutary objective. The proposed bill would do violence to this principle by giving a specific statutory preference to a limited group of relatively highly paid employees.

For these reasons, I respectfully recommend on behalf of the Bell System that Title IV of S. 32 not be enacted.

STANLEY L. KING, JR.

## BELL SYSTEM COMPANIES

American Telephone & Telegraph Co.  
 The Bell Telephone Company of Pennsylvania  
 Bell Telephone Laboratories, Inc.  
 The Chesapeake and Potomac Telephone Co.  
 Cincinnati Bell Inc.  
 Illinois Bell Telephone Co.  
 Indiana Bell Telephone Co., Inc.  
 Michigan Bell Telephone Co.  
 The Mountain States Telephone & Telegraph Co.  
 New England Telephone & Telegraph Co.  
 New Jersey Bell Telephone Co.  
 New York Telephone Co.  
 Northwestern Bell Telephone Co.  
 The Ohio Bell Telephone Co.  
 Pacific Northwest Bell Telephone Co.  
 The Pacific Telephone & Telegraph Co.  
 South Central Bell Telephone Co.  
 Southern Bell Telephone & Telegraph Co.  
 The Southern New England Telephone Co.  
 Southwestern Bell Telephone Co.  
 Western Electric Co., Inc.  
 Wisconsin Telephone Co.

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STATEMENT BY CHARLES R. McNEILL, EXECUTIVE DIRECTOR, THE  
 AMERICAN BANKERS ASSOCIATION

HON. GEORGE P. MILLER,  
*Chairman, Committee on Science and Astronautics, U.S. House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: The American Bankers Association is deeply interested in all pension legislation because its member banks hold as trustees approximately \$100 billion of assets in connection with more than 120,000 employee benefits accounts. Consequently the Association is concerned over Title IV of S. 32 which would require the Director of the National Science Foundation to develop recommendations for modification of Federal procurement regulations to ensure that scientists, engineers, and others working in associated occupations employed under Federal procurement, construction, or research contracts or grants shall be protected against forfeitures of pension or retirement rights as a consequence of job transfers or loss of employment resulting from terminations or modifications of Federal contracts or procurement policies.

The Association for a number of years has urged the Congress to amend the Internal Revenue Code to require vesting of normal retirement benefits, to the extent they have been funded, for employees who lose their jobs in anticipation of, or as the result of, the sale or closing of a plant or operating division of a company. Thus we agree with the basic objective of Title IV. However, the pension field is quite technical and complex, and we seriously question whether the Director of the National Science Foundation is the appropriate office to develop the required recommendations for changes in procurement regulations.

We recently pointed out to the Senate Labor Subcommittee that regulation of pension plans involves many diverse considerations. Involved is the ability of industries and companies to bear the cost of plan requirements that are imposed; the effect of the requirements on tax structure; the interrelationship with bank, insurance, and other governmental supervisory agencies; and the effect of contributions and their investment on the economy of the country. While Title IV is somewhat narrow in scope, the development of safeguards against forfeitures might well require consideration of all these issues depending upon the approach followed. The Association does not believe that the Director of the National Science Foundation is the person best qualified to carry out the responsibility that Title IV would assign to him.

Therefore The American Bankers Association respectfully requests the Committee to delete Title IV from S. 32. Further, we respectfully request that this letter be made a part of the record of the hearings held on this measure.

Sincerely yours,

CHARLES R. McNEILL.

## STATEMENT BY THE NATIONAL ASSOCIATION OF MANUFACTURERS

## TITLE IV OF S. 32 AND H.R. 15789 "PROTECTION OF PENSION RIGHTS OF SCIENTISTS AND ENGINEERS"

The National Association of Manufacturers, speaking for American industry, is pleased for this opportunity to submit our views on Title IV of S. 32 and H.R. 15789, "Protection of Pension Rights of Scientists and Engineers." A significant number of NAM member companies and their employees would be affected by the provisions of this bill should it be enacted into law.

The National Association of Manufacturers seeks to encourage the expansion and improvement of private pension plans, which now have tremendous flexibility to adapt to the varied requirements of employers and employees. Private pension plans are making a significant contribution to the retirement security of more than 30 million Americans, and they will continue to make an increasingly greater contribution unless unduly hampered by inappropriate legislation.

Title IV of S. 32 and H.R. 15789 singles out scientists, engineers, and others working in associated occupations for favored treatment with respect to pension benefits of a contractor's private pension plan. While the intent appears to be commendable, i.e., to protect a particularly mobile group, the amendment, in our opinion, constitutes class legislation and is highly discriminatory. In addition, the language is vague and indefinite and vests enormous power in an office of the National Science Foundation having little or no prior expertise in this area. If enacted, this amendment would create antagonism among employees and present almost irreconcilable problems at the bargaining table. Further, it would establish a precedent for a piecemeal approach in spite of the fact that legislation dealing with the broad area of private pension plan reform is now under consideration by the Congress.

NAM has testified in support of S. 3012, "Individual Retirement Benefits Act of 1971," which would, among other things, establish vesting in private pension plan benefits under a formula known as the Rule of Fifty. During our testimony we supported that concept and suggested that equivalent forms of vesting might be equally acceptable. We believe that this feature would be more advantageous to scientists and engineers, particularly the older ones where the need is greatest, than would special privilege legislation as represented by Title IV of S. 32 and H.R. 15789. Under this Title, it is conceivable that two employees working for the same company and in close proximity to one another could have totally different entitlements insofar as the company's pension plan is concerned simply because one was working on government contract work and the other was not. Enactment would create a most difficult situation for all concerned and particularly for companies and their employees where such companies are engaged in both government contract work as well as nongovernmental work.

During your consideration of S. 32 and H.R. 15789, we urge the Committee on Science and Astronautics to reject Title IV, which NAM believes is discriminatory, vague, and unworkable.

## STATEMENT BY C. R. VOLK, PRESIDENT, COUNCIL ON EMPLOYEE BENEFITS

## Re Pension Plan Provision of Proposed National Science Policy and Priorities Act—(Title IV of H.R. 15789—Davis).

The purpose of this letter is to bring to your attention a bill now pending before the House subcommittee on Science, Research and Development of the Committee on Science and Aeronautics, one provision of which is causing considerable concern among the members of the Council On Employee Benefits and others interested in a sound private pension system and in the development of consistent, orderly and workable legislation relating to it.

Title IV relating to pensions of the bill seeks "to protect scientists and engineers from pension forfeitures by making protection against forfeiture of pension credit, otherwise provided, a condition of compliance with Federal procurement regulations." The Director of the National Science Foundation is directed to develop modifications of Federal procurement regulations—to be published in the Federal Register—to insure that "scientists, engineers and others working in associated occupations [are] protected against forfeitures of pension or retirement rights or benefits . . ." (there is no definition of what constitutes a "forfeiture" in the bill). This provision could be translated into a requirement that

all Federal contractors must provide immediate vesting of pension rights for scientists and engineers.

Regardless of the merits or demerits of the principle provisions of the bill, Title IV of the bill would be unsound and undesirable and unworkable for the following reasons:

1. The issue of vesting of pension plan rights is not germane to the main purposes of the bill which relate to problems of pollution control, mass transit, public safety, etc. No hearings have been held on this important private pension plan provision.

2. The provision would be an unwarranted delegation of legislative authority to the Director of National Science Foundation—an agency having no expertise or past interest in private pension plans.

3. The proposal represents unsound and undesirable class legislation setting up special benefits under government contracts for a limited grade or class of employee.

4. The enactment of Title IV could increase materially government procurement costs.

5. Congress and other legislative committees in both the Senate and the House are now currently studying the merits of requiring the vesting of pension plan credits for all pension plans applying to all covered employees. Legislation has been introduced by the Administration (H.R. 12272) to require the mandatory vesting of pension credits under a "Rule of 50"—when age plus service equal 50. The House Ways and Means Committee and a Senate Labor Subcommittee has held extensive hearings this year on this and other related pension legislation. The House Labor Subcommittee has held extensive hearings on pension plan legislation and recently issued an Interim Staff Report on their activities. The Senate Labor Subcommittee recently concluded hearings on this subject and on a bill (S. 3598—Williams-Javits, et al.) which calls for mandatory vesting of pension credits beginning with 30% vesting after 8 years of service. It would apply to all covered plans.

To require special vesting under government contracts as contemplated in H.R. 15789 would be in basic conflict with all of this other current pending legislation. It would be entirely inconsistent with such legislation since it would apply an entirely different standard and entirely different method of implementation to a select group of employees. A small minority of employees would be covered by H.R. 15789, whereas the vast majority would be covered by the type of legislation proposed in H.R. 12272 and S. 3598.

6. The provision would pose most difficult and complex problem in trying to administer, operate and finance private pension plans. It would call for special treatment in each of these areas for a limited class of employee. It would pose special handicaps in trying to negotiate pension plan provisions in collective bargaining—further restricting the present flexibilities in such processes.

7. The language of the bill and the procedure to be used by the Director in promulgating the procurement regulations are vague, indefinite and most impractical. The sole test or criteria in the proposal is that regulations be "feasible". This skimpy criteria is far too ambiguous, is a most indefinite, unclear delegation of legislative authority to an administrative agency. It would in effect, by-pass full Congressional review by granting too broad legislative powers to the administrator.

In sum, the proposed Title IV should be eliminated from the bill H.R. 15789. In view of other pending legislation on pension regulation, any proposal of this nature should at the minimum be referred for hearing and consideration to the Congressional subcommittees having jurisdiction over and knowledge of private pension legislation. In its present form, Title IV should be rejected as inconsistent, inappropriate and in conflict with the more universal approach being considered in other pending legislation before the other Congressional Committees who have devoted more time and attention to the subject matter. As written, the proposal seems unworkable, costly, at best difficult to administer and would clearly cause irreconcilable differences in treatment among employee groups.

We respectfully urge you to reject Title IV relating to pensions of H.R. 15789.

Sincerely,

C. R. VOLK, *President.*





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