

Raubitschek

THE UNIVERSITY AND SMALL BUSINESS PATENT
PROCEDURES ACT

HEARINGS
BEFORE THE
COMMITTEE ON THE JUDICIARY
UNITED STATES SENATE
NINETY-SIXTH CONGRESS

FIRST SESSION

ON

S. 414

TO AMEND TITLE 35 OF THE UNITED STATES CODE; TO ESTABLISH A UNIFORM FEDERAL PATENT PROCEDURE FOR SMALL BUSINESSES AND NONPROFIT ORGANIZATIONS; TO CREATE A CONSISTENT POLICY AND PROCEDURE CONCERNING PATENTABILITY OF INVENTIONS MADE WITH FEDERAL ASSISTANCE; AND FOR OTHER RELATED PURPOSES.

MAY 16, AND JUNE 6, 1979

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THE UNIVERSITY AND SMALL BUSINESS PATENT PROCEDURES ACT

WEDNESDAY, MAY 16, 1979

U.S. SENATE,
COMMITTEE ON THE JUDICIARY,
Washington, D.C.

The committee met pursuant to notice at 10:45 a.m., in room 2228, Dirksen Senate Office Building, Hon. Birch Bayh presiding.

Present: Senators Bayh and Dole.

Staff present: Subcommittee on the Constitution: Nels Ackerson, chief counsel and executive director; Mary K. Jolly, staff director; Linda Rogers-Kingsbury, chief clerk; Christie Johnson, assistant clerk; Joseph P. Allen, professional staff member; Brenda Levenson, counsel to Senator Dole; John Miner, counsel to Senator Kennedy; Jesse Sydnor, counsel to Senator Metzenbaum; Tom Parry, minority chief counsel; Kim Pearson, minority legislative assistant; Dennis Shedd, counsel to Senator Thurmond.

Senator BAYH. We will have our committee come to order.

OPENING STATEMENT OF HON. BIRCH BAYH, A U.S. SENATOR FROM THE STATE OF INDIANA

I might say to our witnesses, I apologize for the fact that the previous committee business took time away from all of us.

We appreciate the special effort that has been made by the Comptroller General, Mr. Staats, to be here this morning. I appreciate the fact that my colleague, Senator Dole, is able to attend this important hearing. Senator Dole and I are glad to be allies on this important piece of legislation.

This morning the Senate Judiciary Committee is holding its first day of hearings on S. 414, the University and Small Business Patent Procedures Act.

I have become very concerned that the United States is rapidly losing its preeminent position in the development and production of new technologies, which historically has been our strong suit. Some examples of this disturbing trend are the following facts:

Importation of foreign manufactured goods are second only to foreign imported oil as the biggest drain on U.S. dollars. In the first half of 1978 we suffered a \$14.9 billion deficit on this importation. Countries like Japan and West Germany with fewer natural resources than the United States are paying for their imported oil with money that they receive from exporting goods.

The number of patents issued each year has declined steadily since 1971;

The number of U.S. patents granted to foreigners has risen since 1973 and now accounts for 35 percent of all patents filed in the United States;

Investment in research and development over the past 10 years, in constant dollars, has failed to increase;

American productivity is growing at a much slower rate than that of our free world competitors;

Small businesses, which have compiled a very impressive record in technological innovation, are receiving a distressingly low percentage of Federal research and development money; and

The number of patentable inventions made under federally supported research has been in a steady decline.

There are a number of theories on the cause of this trend, but one area where progress could be made immediately is with inventions arising from federally supported university and small business research.

Presently, there are over 20 different statutes and regulations in existence which govern ownership of inventions that are reported to the Government each year from its research programs. The underlying philosophy of these policies is that the funding agency should retain title to these inventions even if the agency has provided only a small percentage of the funding. Unfortunately, the agencies have had very little success attracting private industry to develop and market these inventions because when the agencies retain the patent rights there is little incentive for any company to undertake the risk and expense of trying to develop a new product.

This problem is especially serious in the field of biomedical research programs where delays by the agencies in granting patent waivers for new drugs and processes have condemned many people to needless suffering. Unless universities and small businesses receive the right to retain the patent on these inventions, valuable discoveries wind up wasting away on the funding agency's shelves, benefiting no one.

The Departments of Energy and HEW frequently take months, and in some cases even years, to review these petitions for patent rights. Many inventions could make significant contributions to the health and welfare needs of our country if they were utilized. When the Government decides to retain patent rights on these inventions there is a very great chance that they will never be developed. Of the 30,000 patents that the Government presently holds, less than 4 percent are ever successfully licensed. This is very little return on the billions of dollars that we spend every year on research and development.

Another problem that this legislation addresses is the distressingly low percentage of Federal research money that goes to small businesses. The Office of Management and Budget released a study which said that firms with 1,000 employees or less are credited with almost half of the industrial innovations made between 1953 and 1973. Small businesses have been found to get more from each research and development dollar than larger contractors. In light of these facts it is very disturbing to learn that small business receives less than 4 percent of the Federal research and development expenditure. One major reason

that many of these innovative small companies have avoided Federal grants is the uncertainty over whether or not they will be allowed to retain patent rights on resulting inventions. The University and Small Business Patent Procedures Act will end this uncertainty.

The bill that we are considering today would allow universities, small businesses, and nonprofit organizations to retain patent rights to inventions that they make under federally supported research and development programs when they are willing to spend the needed money to develop and market these inventions. The bill also protects the legitimate rights of the funding agency to use the invention on behalf of the Government. A section of the bill would also require the patentholder to reimburse the Government whenever a subject invention achieves a certain level of success in the marketplace within 10 years. S. 414 would create for the first time a uniform patent policy for every agency and thus end the confusion caused by over 20 different, and sometimes even contradictory, policies.

The United States has built its prosperity on innovation. That tradition of unsurpassed innovation remains our heritage, but without continued effort it is not necessarily our destiny. There is no engraving in stone from on high that we shall remain No. 1 in international economic competition. In a number of industries we are no longer even No. 2. New incentives and policies are needed to reverse this trend. The University and Small Business Patent Procedures Act will be a step in the direction of encouraging innovation and productivity in the United States. I am pleased that 26 of my Senate Colleagues have joined me in support of this important bill.

Today the committee will hear from a number of witnesses who have had firsthand experiences in research and development and who should be able to shed much light on what would constitute an effective, efficient Government patent policy.

It is in everyone's interest to insure that the fruits of American inventive genius are delivered to the marketplace as quickly as possible, and are not simply left to rot because of indifference or bureaucratic delays.

[Text of S. 414 introduced by Senator Bayh follows:]

96TH CONGRESS
1ST SESSION

S. 414

To amend title 35 of the United States Code; to establish a uniform Federal patent procedure for small businesses and nonprofit organizations; to create a consistent policy and procedure concerning patentability of inventions made with Federal assistance; and for other related purposes.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 9 (legislative day, JANUARY 15), 1979

Mr. BAYH (for himself, and Mr. DOLE, Mr. BELLMON, Mr. DECONCINI, Mr. GARN, Mr. HATFIELD, Mr. HATCH, Mr. LUGAR, Mr. MATHIAS, Mr. MATSUNAGA, Mr. MCGOVERN, Mr. METZENBAUM, Mr. SCHMITT, and Mr. THURMOND) introduced the following bill; which was read twice and referred to the Committee on the Judiciary

A BILL

To amend title 35 of the United States Code; to establish a uniform Federal patent procedure for small businesses and nonprofit organizations; to create a consistent policy and procedure concerning patentability of inventions made with Federal assistance; and for other related purposes.

- 1 *Be it enacted by the Senate and House of Representa-*
- 2 *tives of the United States of America in Congress assembled,*
- 3 That this Act may be cited as the "University and Small
- 4 Business Patent Procedures Act".

1 **SEC. 2. AMENDMENT OF TITLE 35, UNITED STATES**
2 **CODE, PATENTS.**—Title 35 of the United States Code is
3 amended by adding after chapter 17, a new chapter as
4 follows:

5 **“CHAPTER 18.—PATENTABILITY OF INVENTIONS**
6 **MADE WITH FEDERAL ASSISTANCE**

- “Sec.
“200. Policy and objective.
“201. Definitions.
“202. Disposition of rights.
“203. March-in rights.
“204. Return of Government investment.
“205. Preference for United States industry.
“206. Confidentiality.
“207. Uniform clauses.
“208. Domestic and foreign protection of federally owned inventions.
“209. Regulations governing Federal licensing.
“210. Coordination of Federal licensing practices.
“211. Restrictions on licensing of federally owned inventions.
“212. Precedence of chapter.
“213. Relationship to antitrust laws.

7 **“SEC. 200. POLICY AND OBJECTIVE.**—It is the policy
8 and objective of the Congress to use the patent system to
9 promote the utilization of inventions arising from federally
10 supported research or development; to encourage maximum
11 participation of small business firms in federally supported
12 research and development efforts; to promote collaboration
13 between commercial concerns and nonprofit organizations,
14 including universities; to ensure that inventions made by non-
15 profit organizations and small business firms are used in a
16 manner to promote free competition and enterprise; to pro-
17 mote the commercialization and public availability of inven-
18 tions made in the United States by United States industry

1 and labor; to ensure that the Government obtains sufficient
2 rights in federally supported inventions to meet the needs of
3 the Government and protect the public against nonuse or un-
4 reasonable use of inventions; and to minimize the costs of
5 administering policies in this area.

6 "SEC. 201. DEFINITIONS.—As used in this chapter—

7 "(a) The term 'Federal agency' means any execu-
8 tive agency as defined in section 105 of title 5, United
9 States Code, and the military departments as defined
10 by section 102 of title 5, United States Code.

11 "(b) The term 'funding agreement' means any
12 contract, grant, or cooperative agreement entered into
13 between any Federal agency and any person for the
14 performance of experimental, developmental, or re-
15 search work funded in whole or in part by the Federal
16 Government. Such term includes any assignment, sub-
17 stitution of parties, or subcontract of any type entered
18 into for the performance of experimental, developmen-
19 tal, or research work under a funding agreement as
20 herein defined.

21 "(c) The term 'contractor' means any person that
22 is a party to funding agreement.

23 "(d) The term 'invention' means any invention or
24 discovery which is or may be patentable or otherwise
25 protectable under this title.

1 “(e) The term ‘subject invention’ means any in-
2 vention of the contractor conceived or first actually re-
3 duced to practice in the performance of work under a
4 funding agreement.

5 “(f) The term ‘practical application’ means to
6 manufacture in the case of a composition or product, to
7 practice in the case of a process or method, or to oper-
8 ate in the case of a machine or system; and, in each
9 case, under such conditions as to establish that the in-
10 vention is being utilized and that its benefits are to the
11 extent permitted by law or Government regulations
12 available to the public on reasonable terms.

13 “(g) The term ‘made’ when used in relation to
14 any invention means the conception or first actual re-
15 duction to practice of such invention.

16 “(h) The term ‘small business firm’ means a small
17 business concern as defined at section 2 of Public Law
18 85-536 (15 U.S.C. 632) and implementing regulations
19 of the Administrator of the Small Business
20 Administration.

21 “(i) The term ‘nonprofit organization’ means uni-
22 versities and other institutions of higher education or
23 an organization of the type described in section
24 501(c)(3) of the Internal Revenue Code of 1954 (26
25 U.S.C. 501(c)) and exempt from taxation under section

1 501(a) of the Internal Revenue Code (26 U.S.C.
2 501(a)).

3 "SEC. 202. DISPOSITION OF RIGHTS.—(a) Each non-
4 profit organization or small business firm may, within a rea-
5 sonable time after disclosure as required by paragraph (c)(1)
6 of this section, elect to retain title to any subject invention:
7 *Provided, however,* That a funding agreement may provide
8 otherwise (i) when the subject invention is made under a con-
9 tract for the operation of a Government-owned research or
10 production facility, or (ii) in exceptional circumstances when
11 it is determined by the agency that restriction or elimination
12 of the right to retain title to any subject invention will better
13 promote the policy and objectives of this chapter. The rights
14 of the nonprofit organization or small business firm shall be
15 subject to the provisions of paragraph (c) of this section and
16 the other provisions of this chapter.

17 "(b)(1) Any determination under (ii) of paragraph (a) of
18 this section shall be in writing and accompanied by a written
19 statement of facts justifying the determination. A copy of
20 each such determination and justification shall be sent to the
21 Comptroller General of the United States within thirty days
22 after the award of the applicable funding agreement. In the
23 case of determinations applicable to funding agreements with
24 small business firms copies shall also be sent to the Chief
25 Counsel for Advocacy of the Small Business Administration.

**INTENTIONAL
BLANK**

1 “(2) If the Comptroller General believes that any pat-
2 tern of determinations by a Federal agency is contrary to the
3 policy and objectives of this chapter or that an agency’s poli-
4 cies or practices are otherwise not in conformance with this
5 chapter, the Comptroller General shall so advise the head of
6 the agency. The head of the agency shall advise the Comp-
7 troller General in writing within one hundred twenty days of
8 what action, if any, the agency has taken or plans to take
9 with respect to the matters raised by the Comptroller
10 General.

11 “(3) At least once each year, the Comptroller General
12 shall transmit a report to the Committees on Judiciary of the
13 Senate and House of Representatives on the manner in
14 which this chapter is being implemented by the agencies and
15 on such other aspects of Government patent policies and
16 practices with respect to federally funded inventions as the
17 Comptroller General believes appropriate.

18 “(c) Each funding agreement with a small business firm
19 or nonprofit organization shall contain appropriate provisions
20 to effectuate the following:

21 “(1) A requirement that the contractor disclose
22 each subject invention to the Federal agency within a
23 reasonable time after it is made and that the Federal
24 Government may receive title to any subject invention
25 not reported to it within such time.

1 “(2) A requirement that the contractor make an
2 election to retain title to any subject invention within a
3 reasonable time after disclosure and that the Federal
4 Government may receive title to any subject invention
5 in which the contractor does not elect to retain rights
6 or fails to elect rights within such time.

7 “(3) A requirement that a contractor electing
8 rights file patent applications within reasonable times
9 and that the Federal Government may receive title to
10 any subject inventions in the United States or other
11 countries in which the contractor has not filed patent
12 applications on the subject invention within such times.

13 “(4) With respect to any invention in which the
14 contractor elects rights, the Federal agency shall have
15 a nonexclusive, nontransferable, irrevocable, paid-up li-
16 cense to practice or have practiced for or one behalf of
17 the United States any subject invention throughout the
18 world, and may, if provided in the funding agreement,
19 have additional rights to sublicense any foreign govern-
20 ment pursuant to any existing or future treaty or
21 agreement.

22 “(5) The right of the Federal agency to require
23 periodic reporting on the utilization or efforts at obtain-
24 ing utilization that are being made by the contractor or
25 his licensees or assignees: *Provided*, That any such in-

1 formation may be treated by the Federal agency as
2 commercial and financial information obtained from a
3 person and privileged and confidential and not subject
4 to disclosure under the Freedom of Information Act.

5 "(6) An obligation on the part of the contractor,
6 in the event a United States patent application is filed
7 by or on its behalf or by any assignee of the contrac-
8 tor, to include within the specification of such applica-
9 tion and any patent issuing thereon, a statement speci-
10 fying that the invention was made with Government
11 support and that the Government has certain rights in
12 the invention.

13 "(7) In the case of a nonprofit organization, (a) a
14 prohibition upon the assignment of rights to a subject
15 invention in the United States without the approval of
16 the Federal agency, except where such assignment is
17 made to an organization which has as one of its pri-
18 mary functions the management of inventions and
19 which is not, itself, engaged in or does not have a sub-
20 stantial proprietary interest in the manufacture or sale
21 of products or the use of processes that might utilize
22 the invention or be in competition with embodiments of
23 the invention (provided that such assignee shall be sub-
24 ject to the same provisions as the contractor) (b) a pro-
25 hibition against the granting of exclusive licenses under

1 United States Patents or Patent Applications in a sub-
2 ject invention by the contractor for a period in excess
3 of the earlier of five years from first commercial sale or
4 use of the invention or eight years from the date of the
5 exclusive license excepting that time before regulatory
6 agencies necessary to obtain premarket clearance
7 unless, on a case-by-case basis, the Federal agency ap-
8 proves a longer exclusive license. If exclusive field of
9 use licenses are granted, commercial sale or use in one
10 field of use shall not be deemed commercial sale or use
11 as to other fields of use; (c) a requirement that the con-
12 tractor share royalties with the inventor; and (d) a re-
13 quirement that the balance of any royalties or income
14 earned by the contractor with respect to subject inven-
15 tions, after payment of expenses (including payments to
16 inventors) incidental to the administration of subject in-
17 ventions, be utilized for the support of scientific re-
18 search or education.

19 "(8) The requirements of sections 203, 204, and
20 205 of this chapter.

21 "(d) If a contractor does not elect to retain title to a
22 subject invention in cases subject to this section, the Federal
23 agency may consider and after consultation with the contrac-
24 tor grant requests for retention of rights by the inventor sub-

1 ject to the provisions of this Act and regulations promulgated
2 hereunder.

3 “(e) In any case when a Federal employee is a coinven-
4 tor of any invention made under a funding agreement with a
5 nonprofit organization or small business firm, the Federal
6 agency employing such coinventor is authorized to transfer or
7 assign whatever rights it may acquire in the subject invention
8 from its employee to the contractor subject to the conditions
9 set forth in this chapter.

10 “SEC. 203. MARCH-IN RIGHTS.—With respect to any
11 subject invention in which a small business firm or nonprofit
12 organization has acquired title under this chapter, the
13 Federal agency under whose funding agreement the subject
14 invention was made shall have the right, in accordance with
15 such procedures as are provided in regulations promulgated
16 hereunder to require the subject inventor, an assignee or ex-
17 clusive licensee of a subject invention to grant a nonexclu-
18 sive, partially exclusive, or exclusive license in any field of
19 use to a responsible applicant or applicants, upon terms that
20 are reasonable under the circumstances, and if the contractor,
21 assignee, or exclusive licensee refuses such request, to grant
22 such a license itself, if the Federal agency determines
23 either—

24 “(a) that such action is necessary because the
25 contractor or assignee has not taken, or is not ex-

1 pected to take within a reasonable time, effective steps
2 to achieve practical application of the subject invention
3 in such field of use; or

4 “(b) that such action is necessary to alleviate
5 health or safety needs which are not reasonably satis-
6 fied by the contractor, assignee, or their licensees; or

7 “(c) that such action is necessary to meet require-
8 ments for public use specified by Federal regulations
9 and such requirements are not reasonably satisfied by
10 the contractor, assignee, or licensees; or

11 “(d) that such action is necessary because the
12 agreement required by section 205 has not been ob-
13 tained or waived or because a licensee of the exclusive
14 right to use or sell any subject invention in the United
15 States is in breach of its agreement obtained pursuant
16 to section 205.

17 “SEC. 204. RETURN OF GOVERNMENT INVEST-
18 MENT.—(a) If a nonprofit organization or small business firm
19 receives \$250,000 in after tax profits from the licensing of
20 any subject invention within a period of ten years following
21 disclosure of the invention, the United States shall be entitled
22 to a share, to be negotiated, of up to 50 per centum of all net
23 income during said period from licensing received by the con-
24 tractor above \$250,000: *Provided, however,* That in no event
25 shall the United States be entitled to an amount greater than

1 that portion of the Federal funding under the funding agree-
2 ment under which the subject invention was made which was
3 expended on activities related to the making of the invention.

4 “(b) In addition if a nonprofit organization or small
5 business firm receives after tax profits in excess of
6 \$2,000,000 on sales of products embodying or manufactured
7 by a process employing a subject invention, during a period
8 of ten years commencing with commercial exploitation of the
9 subject invention, the Government shall be entitled to a
10 share, to be negotiated, of all additional income accruing
11 from such sales up to the amount of the portion of the Gov-
12 ernment funding under the funding agreement under which
13 the invention was made which was expended on activities
14 related to the making of the invention less any amounts re-
15 ceived by the Government in accordance with paragraph (a)
16 of this section 204.

17 “(c) The Director of the Office of Federal Procurement
18 Policy is authorized and directed to revise the figures of
19 \$250,000 and \$2,000,000 in paragraphs (a) and (b) of this
20 section at least every three years in light of changes to the
21 Consumer Price Index or other indices which he considers
22 reasonable to use.

23 “SEC. 205. PREFERENCE FOR UNITED STATES INDUS-
24 TRY.—Notwithstanding any other provision of this chapter,
25 no small business firm or nonprofit organization which re-

1 ceives title to any subject invention and no assignee of any
2 such nonprofit organization shall grant to any person the ex-
3 clusive right to use or sell any subject invention in the United
4 States unless such person agrees that any products embody-
5 ing the subject invention or produced through the use of the
6 subject invention will be manufactured substantially in the
7 United States. However, in individual cases, the requirement
8 for such an agreement may be waived by the Federal agency
9 under whose funding agreement the invention was made
10 upon a showing by the small business firm, nonprofit organi-
11 zation, or assignee that reasonable but unsuccessful efforts
12 have been made to grant licenses on similar terms to poten-
13 tial licensees that would be likely to manufacture substan-
14 tially in the United States.

15 "SEC. 206. CONFIDENTIALITY.—Federal agencies are
16 authorized to withhold from disclosure to the public informa-
17 tion disclosing any invention in which the Federal Govern-
18 ment owns or may own a right, title, or interest (including a
19 nonexclusive license) for a reasonable time in order for a
20 patent application to be filed. Furthermore, Federal agencies
21 shall not be required to release copies of any document which
22 is part of an application for patent filed with the United
23 States Patent and Trademark Office or with any foreign
24 patent office.

1 "SEC. 207. UNIFORM CLAUSES.—The Office of Feder-
2 al Procurement Policy, after receiving recommendations of
3 the Office of Science and Technology Policy, may issue regu-
4 lations which may be made applicable to Federal agencies
5 establishing standard funding agreement provisions required
6 under this chapter.

7 "SEC. 208. DOMESTIC AND FOREIGN PROTECTION OF
8 FEDERALLY OWNED INVENTIONS.—Each Federal agency is
9 authorized to—

10 “(1) apply for, obtain, and maintain patents or
11 other forms of protection in the United States and in
12 foreign countries on inventions in which the Federal
13 Government owns a right, title, or interest;

14 “(2) promote the licensing of inventions covered
15 by federally owned patent applications, patents, or
16 other forms of protection obtained with the objective of
17 maximizing utilization by the public of the inventions
18 covered thereby;

19 “(3) grant nonexclusive, exclusive, or partially ex-
20 clusive licenses under federally owned patent applica-
21 tions, patents, or other forms of protection obtained,
22 royalty-free or for royalties or other consideration, and
23 on such terms and conditions, including the grant to
24 the licensee of the right of enforcement pursuant to the

1 provisions of chapter 28 of this title as determined ap-
2 propriate in the public interest;

3 "(4) make market surveys and other investiga-
4 tions for determining the potential of federally owned
5 inventions for domestic and foreign licensing and other
6 forms of utilization, acquire technical information, and
7 engage in negotiations and other activities for promot-
8 ing the licensing and for the purpose of enhancing their
9 marketability and public utilization;

10 "(5) undertake all other suitable and necessary
11 steps to protect and administer rights to federally
12 owned inventions on behalf of the Federal Government
13 either directly or through contract;

14 "(6) transfer custody and administration, in whole
15 or in part, to the Department of Commerce or to an-
16 other Federal agency, of the right, title, or interest in
17 any federally owned invention for the purpose of carry-
18 ing out the provisions of paragraphs (1) through (4),
19 without regard to the provisions of the Federal Pro-
20 perty and Administrative Services Act of 1949 (40
21 U.S.C. 471); and

22 "(7) designate the Department of Commerce as
23 recipient of any or all funds received from fees, roy-
24 alties, or other management of federally owned inven-
25 tions authorized under this chapter.

1 "SEC. 209. REGULATIONS GOVERNING FEDERAL LI-
2 CENSING.—The Administrator of General Services is author-
3 ized to promulgate regulations specifying the terms and con-
4 ditions upon which any federally owned invention may be
5 licensed on a nonexclusive, partially exclusive, or exclusive
6 basis.

7 "SEC. 210. COORDINATION OF FEDERAL LICENSING
8 PRACTICES.—The Secretary of Commerce is authorized in
9 cooperation with other Federal agencies to—

10 “(1) coordinate a program for assisting all Federal
11 agencies in carrying out the authority set forth in sec-
12 tion 208;

13 “(2) publish notification of all federally owned in-
14 ventions that are available for licensing;

15 “(3) evaluate inventions referred by Federal agen-
16 cies, and patent applications filed thereon, in order to
17 identify those inventions with the greatest commercial
18 potential and to insure promotion and utilization by the
19 public of inventions so identified;

20 “(4) assist the Federal agencies in seeking and
21 maintaining protection on inventions in the United
22 States and in foreign countries, including the payment
23 of fees and costs connected therewith;

24 “(5) accept custody and administration, in whole
25 or in part, of the right, title, and interest in any inven-

1 tion for the purposes set forth in paragraphs (1)
2 through (4) of section 208, with the approval of the
3 Federal agency concerned and without regard to the
4 provisions of the Federal Property and Administrative
5 Service Act of 1949 (40 U.S.C. 471);

6 “(6) receive funds from fees, royalties, or other
7 management of federally owned inventions authorized
8 under this chapter, but such fund shall be used only for
9 the purposes of this chapter; and

10 “(7) undertake such other functions directly or
11 through such contracts as are necessary and appropri-
12 ate to accomplish the purposes of this title.

13 “SEC. 211. RESTRICTIONS ON LICENSING OF FEDER-
14 ALLY OWNED INVENTIONS.—(a) No Federal agency shall
15 grant any license under a patent or patent application on a
16 federally owned invention unless the person requesting the
17 license has supplied the agency with a plan for development
18 and/or marketing of the invention.

19 “(b) A Federal agency shall normally grant the right to
20 use or sell any federally owned invention in the United States
21 only to a licensee that agrees that any products embodying
22 the invention or produced through the use of the invention
23 will be manufactured substantially in the United States.

24 “(c)(1) Each Federal agency may grant exclusive or
25 partially exclusive licenses in any invention covered by a fed-

1 erally owned domestic patent or patent application only if,
2 after public notice and opportunity for filing written objec-
3 tions, it is determined that—

4 “(A) the interests of the Federal Government and
5 the public will best be served by the proposed license,
6 in view of the applicant's intentions, plans, and ability
7 to bring the invention to practical application or other-
8 wise promote the invention's utilization by the public;

9 “(B) the desired practical application has not been
10 achieved, or is not likely expeditiously to be achieved,
11 under any nonexclusive license which has been grant-
12 ed, or which may be granted, on the invention;

13 “(C) exclusive or partially exclusive licensing is a
14 reasonable and necessary incentive to call forth the in-
15 vestment of risk capital and expenditures to bring the
16 invention to practical application or otherwise promote
17 the invention's utilization by the public; and

18 “(D) the proposed terms and scope of exclusivity
19 are not greater than reasonably necessary to provide
20 the incentive for bringing the invention to practical ap-
21 plication or otherwise promote the invention's utiliza-
22 tion by the public.

23 “(2) A Federal agency shall not grant such exclusive or
24 partially exclusive license under paragraph (1) of this subsec-
25 tion if it determines that the grant of such license will tend

1 substantially to lessen competition or result in undue concen-
2 tration in any section of the country in any line of commerce
3 to which the technology to be licensed relates, or to create or
4 maintain other situations inconsistent with the antitrust
5 laws.

6 “(3) First preference in the exclusive or partially exclu-
7 sive licensing of federally owned inventions shall go to small
8 business firms submitting plans that are determined by the
9 agency to be within the capabilities of the firms and as likely,
10 if executed, to bring the invention to practical application as
11 any plans submitted by applicants that are not small business
12 firms.

13 “(d) After consideration of whether the interests of the
14 Federal Government or United States industry in foreign
15 commerce will be enhanced, any Federal agency may grant
16 exclusive or partially exclusive licenses in any invention cov-
17 ered by a foreign patent application or patent, after public
18 notice and opportunity for filing written objections, except
19 that a Federal agency shall not grant such exclusive or par-
20 tially exclusive license if it determines that the grant of such
21 license will tend substantially to lessen competition or result
22 in undue concentration in any section of the country in any
23 line of commerce to which the technology to be licensed re-
24 lates, or to create or maintain other situations inconsistent
25 with the antitrust laws.

1 “(c) The Federal agency shall maintain a record of de-
2 terminations to grant exclusive or partially exclusive licenses.

3 “(f) Any grant of a license shall contain such terms and
4 conditions as the Federal agency determines appropriate for
5 the protection of the interests of the Federal Government and
6 the public, including provisions for the following:

7 “(1) periodic reporting on the utilization or efforts
8 at obtaining utilization that are being made by the li-
9 censee with particular reference to the plan submitted:
10 *Provided*, That any such information may be treated
11 by the Federal agency as commercial and financial in-
12 formation obtained from a person and privileged and
13 confidential and not subject to disclosure under the
14 Freedom of Information Act;

15 “(2) the right of the Federal agency to terminate
16 such license in whole or in part if it determines that
17 the licensee is not executing the plan submitted with
18 its request for a license and the licensee cannot other-
19 wise demonstrate to the satisfaction of the Federal
20 Agency that it has taken or can be expected to take
21 within a reasonable time, effective steps to achieve
22 practical application of the invention;

23 “(3) the right of the Federal agency to terminate
24 such license in whole or in part if the licensee is in

1 breach of an agreement obtained pursuant to paragraph
2 (b) of this section; and

3 "(4) the right of the Federal agency to terminate
4 the license in whole or in part if the agency determines
5 that such action is necessary to meet requirements for
6 public use specified by Federal regulations issued after
7 the date of the license and such requirements are not
8 reasonably satisfied by the licensee.

9 "SEC. 212. PRECEDENCE OF ACT.—(a) This chapter
10 shall take precedence over any other Act which would re-
11 quire a disposition of rights in subject inventions of small
12 business firms or nonprofit organizations contractors in a
13 manner that is inconsistent with this chapter, including but
14 not necessarily limited to the following:

15 "(1) section 10(a) of the Act of June 29, 1935, as
16 added by title 1 of the Act of August 14, 1946 (7
17 U.S.C. 427i(a); 60 Stat. 1085);

18 "(2) section 205(a) of the Act of August 14, 1946
19 (7 U.S.C. 1624(a); 60 Stat. 1090);

20 "(3) section 501(c) of the Federal Coal Mine
21 Health and Safety Act of 1969 (30 U.S.C. 951(c); 83
22 Stat. 742);

23 "(4) section 106(c) of the National Traffic and
24 Motor Vehicle Safety Act of 1966 (15 U.S.C. 1935(c);
25 80 Stat. 721);

1 “(5) section 12 of the National Science Founda-
2 tion Act of 1950 (42 U.S.C. 1871(a); 82 Stat. 360);

3 “(6) section 152 of the Atomic Energy Act of
4 1954 (42 U.S.C. 2182; 68 Stat. 943);

5 “(7) section 305 of the National Aeronautics and
6 Space Act of 1958 (42 U.S.C. 2457);

7 “(8) section 6 of the Coal Research Development
8 Act of 1960 (30 U.S.C. 666; 74 Stat. 337);

9 “(9) section 4 of the Helium Act Amendments of
10 1960 (50 U.S.C. 167b; 74 Stat. 920);

11 “(10) section 32 of the Arms Control and Disar-
12 mament Act of 1961 (22 U.S.C. 2572; 75 Stat. 634);

13 “(11) subsection (c) of section 302 of the
14 Appalachian Regional Development Act of 1965 (40
15 U.S.C. App. 302(e); 79 Stat. 5);

16 “(12) subsection (a)(2) of section 216 of title 38,
17 United States Code;

18 “(13) section 9 of the Federal Nonnuclear Energy
19 Research and Development Act of 1974 (42 U.S.C.
20 5901; 88 Stat. 1878);

21 “(14) section 3 of the Act of June 22, 1976 (42
22 U.S.C. 1959d, note; 90 Stat. 694);

23 “(15) subsection (d) of section 6 of the Saline
24 Water Conversion Act of 1971 (42 U.S.C. 1959(d); 85
25 Stat. 161);

1 “(16) section 303 of the Water Resources Re-
2 search Act of 1964 (42 U.S.C. 1961c-3; 78 Stat.
3 332);

4 “(17) section 5(d) of the Consumer Product Safety
5 Act (15 U.S.C. 2054(d); 88 Stat. 1211);

6 “(18) section 3 of the Act of April 5, 1944 (30
7 U.S.C. 323; 58 Stat. 191); and

8 “(19) section 8001 of the Solid Waste Disposal
9 Act (42 U.S.C. 6981; 90 Stat. 2829).

10 The Act creating this chapter shall be construed to take prece-
11 dence over any future Act unless that Act specifically cites
12 this Act and provides that it shall take precedence over this
13 Act.

14 “(b) Nothing in this chapter is intended to alter the
15 effect of the laws cited in paragraph (a) of this section or any
16 other laws with respect to the disposition of rights in inven-
17 tions made in the performance of funding agreements with
18 persons other than nonprofit organizations or small business
19 firms.

20 “(c) Nothing in this chapter is intended to limit the au-
21 thority of agencies to agree to the distribution of rights in
22 inventions made in the performance of work under funding
23 agreements with persons other than nonprofit organizations
24 or small business firms in accordance with the Statement of
25 Government Patent Policy issued by the President on August

1 23, 1971 (36 Fed. Reg. 16887), agency regulations, or other
2 applicable regulations or to otherwise limit the authority of
3 agencies to agree to allow such persons to retain ownership
4 of such inventions.

5 "SEC. 213. RELATIONSHIP TO ANTITRUST LAWS.—

6 Nothing in this chapter shall be deemed to convey to any
7 person immunity from civil or criminal liability, or to create
8 any defenses to actions, under any antitrust law."

9 SEC. 3. AMENDMENTS TO OTHER ACTS.—The follow-
10 ing Acts are amended as follows:

11 (a) Section 156 of the Atomic Energy Act of 1954 (42
12 U.S.C. 2186; 68 Stat. 947) is amended by deleting the words
13 "held by the Commission or".

14 (b) The National Aeronautics and Space Act of 1958 is
15 amended by repealing paragraph (g) of section 305 (42
16 U.S.C. 2457(g); 72 Stat. 436).

17 (c) The Federal Nonnuclear Energy Research and De-
18 velopment Act of 1974 is amended by repealing paragraphs
19 (g), (h), and (i) of section 9 (42 U.S.C. 5908 (g), (h), and (i);
20 88 Stat. 1889-1891).

21 SEC. 4. EFFECTIVE DATE.—This Act shall take effect
22 one hundred and eighty days after the date of its enactment,
23 except that the regulations referred to in section 2, or other
24 implementing regulations, may be issued prior to that time.

Senator BAYH. I yield to my colleague from Kansas.

Senator DOLE. Mr. Chairman, I appreciate your calling the hearings. I think we can make a very good record.

I would ask that my statement be made a part of the record. I will not read it because I know that some of the witnesses are under some time constraints. I know that I have to leave fairly soon as well.

**OPENING STATEMENT OF SENATOR BOB DOLE, A U.S. SENATOR
FROM THE STATE OF KANSAS**

Mr. DOLE. Mr. Chairman, the present patent policy generally encourages retention by the Government of rights to inventions it sponsored. This policy has resulted in a reluctance by universities and industry to invest the necessary funds for the development and marketing of inventions emanating from federally funded research. This is understandable in view of the fact that the development process is not only risky but expensive, and estimated to cost 10 times the cost of the initial research.

By obstructing patent rights and innovations, the Government increases the factor of uncertainty in an already uncertain area, that of technology end result. By denying the modicum of protection that the granting of patent rights for a limited period of time would afford, the Government removes the incentive that would stimulate the private sector to develop and market inventions.

IMPACT OF FEDERAL POLICY

The effect of this policy is twofold, bearing on the consumer as well as on the economy in general. In both cases, the public is the victim. When large amounts of taxpayers' money are directed to the research field, the public expects and deserves to reap the benefit of its investment in the form of products available for its consumption. When this fails to materialize, it is obvious that the Government has reneged on its promise. This is evidenced by the fact that, of the 28,000 inventions funded by the Government, only about 5 percent have been used.

The damaging impact of the Federal patent policy on the economy is dramatic. That we have lost our leadership role to Japan in the fields of electronics and shipbuilding is no accident. Without short-term exclusive rights, small firms cannot take the risk of bringing innovations to the commercial market, but large foreign firms can and are doing so, with ideas gleaned from U.S.-funded research. That the richest Nation on Earth has a trade deficit with Japan amounting to \$13 billion leaves room for reflection, when one considers the fact that Japan has no natural resources on her mainland. Our annual growth is 3 percent as opposed to 8 percent in Japan. Our newly established ties with China make the People's Republic a candidate for emulation of the Japanese example. With a population of 900 million people, through the potential use of U.S. technology to which its access is now guaranteed, China could become a most formidable competitor.

The development of technological innovation by government and industry in countries such as Japan and Germany, is a contributing factor in their dominance of world trade.

WHAT IS THE ANSWER?

Protectionism is not what I am advocating. Such a theory would be counterproductive and one I do not adhere to on general principles. What I am rather suggesting is that the answer to foreign competition lies neither in an increase of export subsidies, nor in an increase of tariffs, but in an increase in productivity. I believe that the protection that patent rights for a limited amount of time would guarantee to American Business would be a giant step toward providing incentives for greater productivity.

Our economy is one which has always run on America's innovative genius. This resource must not be allowed to waste away on account of unnecessary delays and redtape. Complex rules and regulations devised by Federal agencies are detrimental to stimulating productivity and enterprise. They are particularly harmful to small business from which, traditionally, innovative and creative programs have emanated. In the field of medical innovation, the obstruction of patent rights by Federal agencies is an extremely serious problem. Indeed, when medical inventions offering potential cures for diseases are withheld, it is the very lives of Americans which are affected.

The almost adversarial relationship that now exists between business and Government must be replaced by a true and genuine partnership, a partnership in which the Government will act as impresario in bringing industry and universities together with new fields of knowledge, and their practical implementation.

GOAL OF LEGISLATION

The University and Small Business Patent Procedures Act that Senator Bayh and I have introduced would establish a uniform policy, guaranteeing rights for a limited period to inventions made under federally sponsored research. Such a policy would help promote the utilization of inventions and would encourage the participation of contractors in Government-sponsored R. & D. by doing this, the public investment in R. & D. would be protected, and the public interest would be served, according to the direction given by the Constitution in article 1, section 8.

Before concluding, I should like to ask that the text of an article published in the Washington Post on April 8, 1979, titled "Patent Bill Seeks Shift to Bolster Innovation," be inserted for the record, following the text of my statement.

[The article referred to follows:]

[From the Washington Post, Apr. 8, 1979]

PATENT BILL SEEKS SHIFT TO BOLSTER INNOVATION

(By Bradley Graham)

The U.S. government deals about \$26 billion each year to businesses and universities for research and development, and thus provides seed money for several thousand inventions.

Just who these inventions ought to belong to has been a matter of contentious debate over the years.

On one side are the "titlists"—mostly consumer advocates and trust busters—who believe what the government pays for belongs to the people and no one producer should be granted a patent monopoly.

Opposing them are the "licensors"—mostly business people, university researchers and patent attorneys—who claim that if the titlists have their way, the inventing process will suffer. They say inventors must be allowed to profit through executive licenses on their inventions. Their motto: That which is available to everyone is of little value to anyone.

Neither Congress nor the president has been able to decide which bunch to side with, though not for lack of trying. Back in 1943, President Roosevelt proclaimed the need for a uniform government patent policy. This was followed by a decade or two of congressional discussions, then a couple of middle-course and elastic presidential orders, and finally more congressional discussion. But no uniform policy.

Left to themselves, federal agencies have improvised. You can guess the result. Today 22 different funding agencies dispose of patent rights on government financed research in 22 different ways.

For government contractors, this potpourri of agency policies has led to confusion and discouragement. Federal officials, too, don't much like the arbitrariness of the current system. They'd prefer to operate under the instruction and legal protection of a congressional order.

Beginning this week, Democratic Sen. Birch Bayh of Indiana and Republican Sen. Robert Dole of Kansas will hold hearings on legislation that would tilt toward the licensors. The senators are promoting a bill to give universities, other nonprofit groups and small businesses the rights to inventions made under federal research and development contracts.

Noticeably missing from the proposal is any provision for large corporations. The bill's sponsors say that to include them would invite automatic defeat, which is what happened a couple of years ago when a similar patent licensing bill was introduced. Consumer advocates and antitrust lawyers at the time cried give-away, monopoly and profiteering and that was the end of that.

But it's not only the exclusion of big business this time that has the Bayh-Dole forces feeling optimistic so soon after the legislative embers from the last fight have cooled. They feel the mood of the country has swung in their favor. A heightened national concern over the wanting of American innovation has prompted review of all policies which touch on the inventive process.

"I think the climate is better now than it has been in years," said Arthur Obermayer, president of Moleculon Research Corp. in Cambridge and an official of the Small Business Research Association.

A White House advisory panel made up of private patent experts and headed by Robert Benson, an Allis-Chalmers Corp. lawyer, recommended to President Carter several months ago establishing a more relaxed and uniform government patent policy.

One critical problem now is that lots of inventions simply are not getting out to market. The government holds a portfolio estimated at between 25,000 and 30,000 patents. Uncle Sam's predominance in R&D since World War II has generated in the government's hands the largest number of patents in the nation.

Federal officials are quick to cite examples of government inventions that have been developed for commercial use. The list includes granular fertilizer, the aerosol dispenser, dehydrated potato flakes and frozen orange juice concentrate. But studies show that all of their examples add up to less than 4 percent of the government's whole portfolio.

"Experience has shown that the government is not in a position to take advantage of its ownership of patents to promote enterprise," the advisory panel reported to Carter. "Private companies, on the other hand, who are in a position to use the patent grant are ordinarily unwilling to take a nonexclusive license under a government-owned patent and commit the necessary funds to develop the invention, since it has not protection from competition."

The Bayh-Dole bill is a sort of testimonial to Norman Latker, a hero among university researchers and licensing proponents. Latker was patent counsel at the Department of Health, Education and Welfare until his unceremonious firing in December for what officials say was conduct and judgment not up to the department's professional standards. Latker's fans say he was let go for doing his job too well.

Latker, now in private law practice, is not your usual firebrand. He spent 22 of his 48 years in government service and from that acquired an appreciation

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for authority and a strong sense of working within the system. But even stronger was his zealotry for spurring innovation.

He is credited with developing an elaborate arrangement at HEW, called an Institutional Patent Agreement, which easily transferred patents out of the government. That was fine with the Republicans in the Nixon and Ford years. But to the Carter people it appeared Latker was giving away the store.

Senior officials at HEW ordered an extra step to review all Latker's decisions. As a result, the decisions on pending patent requests were delayed. The universities were miffed. They started complaining to Congress. Latker complained, too.

That's when Bayh and Dole stepped in. Dole charged HEW with "pulling the plug" on biomedical research by holding up action on important new drugs and medical devices. HEW responded quickly. It released some patents—and it also let go of Latker.

The upcoming debate over the bill Bayh and Dole subsequently introduced promises to raise questions of importance to the structure and inventive strength of the U.S. economy. Some key issues will be:

Between the titlists and licensors, which approach encourages the greatest dissemination of new information? The government's record of commercialization is certainly poor, but the contractors' isn't much better. Several studies have shown that no more than 13 percent of patents obtained by contractors ended up in commercial use.

Would giving away patents to government contractors result in the build-up of undue monopoly powers? There is little sure evidence either way.

Won't contractors who get patents enjoy windfall profits? The licensors answer no, but if not, then why are they so insistent the government give away its patents as an incentive to investors? The licensors say it is to build a protective moat around their inventions, to make sure competitors don't take advantage of them. Their attitude on this might best be summed up as "what have we got to lose" or "better safe than sorry."

But just in case excessive profits do result from a patent giveaway, Dole-Bayh includes a pay-back provision requiring inventors who make large profits to reimburse federal agencies for the support they received in creating the innovation.

Will companies really stop taking government work if there's no change in patent policy? They haven't yet, at least not in great hordes. And it isn't simple patriotism that keeps them bidding on contracts. Money, ideas, skills and training still flow with government sponsorship. On the other hand, it is generally agreed that the current system tends to favor large corporations with the time and legal staff to wade through the agencies.

Whether government officials even have the right to give away patents for federally financed inventions is subject to dispute. Nader's Public Interest Inc. challenged the practice several years ago, claiming Congress never has granted legislative authority. But the challenge was dismissed on the grounds that Nader's group lacked standing, and the merits of the case never were decided.

White House officials have taken no formal position yet on the patent question. And critics of the Bayh-Dole proposal are sure to make themselves heard before the administration takes sides.

But a sign that the times indeed have changed is suggested by the muted response so far from traditionally staunch titlists. An aide to Sen. Russell Long (D-La.), a veteran apostle of government-held patents, has told Bayh's staff that the senator won't "actively oppose" the licensing bill. (Another Long aide, however, said publicly that Long hasn't made up his mind. The Justice Department's anti-trust lawyers, normally hostile to anything smacking of monopoly, say they're reassessing their position on government patents.)

Trouble still may come from such licensing opponents as consumer advocate Ralph Nader, Admiral Hyman Rickover, and Sens. Edward Kennedy (D-Mass.) and Gaylord Nelson (D-Wis.). In this regard, it may not help that big business, though excluded, has thrown its support behind the bill. General Electric, which next to the Government files the most patents each year, calls the measure a step in the right direction.

Senator DOLE. I think the chairman has pretty well summarized the problem. We have a patent policy that generally encourages retention by the Government of rights to inventions it sponsored. In trying to

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find ways to resolve the situation that has resulted from such a policy, we feel that S. 414 is a significant step in the right direction.

There have been a number of good suggestions. We believe that we can accommodate the objections of some and perhaps compromise on others.

I also ask permission, Mr. Chairman, that certain questions might be submitted to Mr. Staats by Senator Thurmond and maybe we can have a response in writing to the questions he has, as he couldn't be here this morning. I would make the same request for myself as I am regretfully not able to stay.

Senator BAYH. Without objection, so ordered.

Senator DOLE. Thank you, Mr. Chairman.

I would also like to make a part of the record the statement of Senator Strom Thurmond, the ranking Republican on the Senate Judiciary Committee, who supports the measure; and also a copy of the statement of Senator Hatch in support of the measure, an outstanding statement.

[The statements follow:]

**OPENING STATEMENT OF SENATOR ORRIN G. HATCH, A U.S.
SENATOR FROM THE STATE OF UTAH**

The launching of Sputnik I by the Soviets in 1957 caused one of the greatest upheavals in the scientific and academic communities our society has experienced. This event spurred a decade of research and development unparalleled in this Nation's history. Adding forceful impetus to the country's emerging priority on technological development was the Federal Government's sponsorship of research and development carried on in the private sector.

Research and development carried on in the State of Utah by business entities and our higher education system has contributed greatly to this upsurge in the areas of aerospace technology, biomedical research, and other vital technological areas.

However, while propelling the United States to the forefront of technologically advanced countries, this partnership between Government-supported scientists and the private sector has given rise to some very serious problems. The most serious problem is the denial of small business, universities, and other entities in the private sector to enjoy the full fruits of their labors because of the Federal Government's refusal to relinquish patent rights inherent in the invention process.

As one of the cosponsors of this legislation, I believe S. 414 must provide a twofold incentive to alleviate the apparent chill on technological innovation:

(1) The greatest possible commercialization of hundreds of presently valuable, yet unused, discoveries and inventions, the titles to which are held by the Federal Government.

(2) The fullest utilization of small business and university resources in future research and development free from arbitrary patent policy and procedure.

The Federal Government holds a portfolio of nearly 28,000 patents. Only 4 percent of this total have been developed for commercial use.

Hundreds of presently useful and valuable inventions are lying dormant rather than benefiting the public in such areas as medicine and energy. Twenty-two different funding agencies dispose of patent rights on Government-financed research in 22 different ways. This is evidence that the present policies and procedures are seriously inadequate to meet the continuing and increasing need of stimulating private sector R. & D. supplemented by Federal assistance.

The U.S. role in technological innovation is in serious jeopardy of slipping from its preeminent leadership position. In many places today, it is believed that our role has been relegated to that of follower. The accomplishments achieved by this country's technological Renaissance of the 1950's and 1960's must continue to be fostered in the atmosphere which comes with the security of patent protection—strictly limited to that degree necessary to protect legitimate Federal interests. That atmosphere is now permeated with the air of confusion, arbitrariness, and most distressing—hesitancy.

Federal research and development funding now exceeds \$26 billion. The need for collaboration and harmony between the public and private sector is obvious.

The protection mandated by a uniform patent policy is now both appropriate and necessary.

**OPENING STATEMENT OF SENATOR STROM THURMOND, A U.S.
SENATOR FROM THE STATE OF SOUTH CAROLINA**

Mr. Chairman, today we are holding hearings on S. 414, the University and Small Business Patent Procedures Act. This bill would grant limited patent protection to universities, nonprofit organizations, and small businesses which are willing to spend the money necessary to develop and market inventions created during their Government-funded research.

This bill is aimed at the problem of declining inventions and innovations which we are experiencing in America today. One basic reason for the decline is the lack of a uniform Federal policy dealing with inventions developed through Government-funded programs. The guidelines which do exist tend to discourage, rather than encourage, innovation and invention development. The lack of incentive has surely hampered research and development in the university and small business community.

S. 414 also seeks to insure that when a beneficial invention is developed, it will be made available as soon as possible. Even if the Federal Government were to encourage new inventions, their impact would be very slight unless the American people were able to benefit from them.

The bill offers a limited patent right to those who developed inventions, but it also demands that they show proof of their attempts to get their inventions marketed as quickly as is reasonable. S. 414 further aids the American people by requiring that most of the manufacturing in the invention-marketing process be done in the United States.

Yet, despite the encouragement of the invention process, the bill still protects the interests of the Federal Government. The United States can refuse to allow a patent grant if it determines that such a

grant runs counter to national or public interest. The United States would also retain the license to use any invention developed through federally funded programs.

Perhaps the most significant feature of this bill is the recoupment provision. Under this provision, the Government would be able to recoup its original investment once the inventor either surpasses \$250,000 in aftertax profits or receives over \$2 million in sales of related products.

The concept behind this bill is a good one. These hearings will give us the benefit of the views of others who are knowledgeable in this area. Hopefully, we will be able to insure that this bill encourages new product innovations and helps strengthen our economy. I look forward to the testimony we will hear before this subcommittee.

Senator BAYL. Our first witness this morning is Mr. Elmer B. Staats, the Comptroller General of the United States.

Mr. Staats is a man of long and varied public service. He joined the Bureau of the Budget in 1939 and was appointed as Deputy Director by President Truman in 1950. In 1953 Mr. Staats left Government service and became Research Director for Marshall Field and Co. in Chicago. President Eisenhower appointed him as Executive Officer of the newly established Operations Coordinating Board of the National Security Council in 1954. Mr. Staats was reappointed Deputy Director of the Bureau of the Budget in 1959 and continued in this position under Presidents Kennedy and Johnson until his appointment in 1966 as Comptroller General.

Mr. Staats was also a member of the 1971 Commission on Government Procurement which reported that delays inherent in after-the-fact determination of ownership of patents arising from Government research and development programs was not effective in delivering new inventions to the marketplace.

Late last year Senator Robert Dole and I requested the General Accounting Office to review the effects of the present Government patent policies and we are certainly happy that Mr. Staats is here today to inform the Judiciary Committee about the results of that study.

Of particular significance, it seems to me, in addition to his present role as Comptroller General, is the fact that Mr. Staats was also a member of the 1971 Commission on Government Procurement, which reported that many of the existing agency patent policies concerning ownership of inventions coming out of Government research and development programs were not effective in delivering new inventions to the marketplace. Mr. Staats has had, therefore, a great deal of experience with this problem.

We appreciate very much the fact that he and his colleagues are with us today. Please proceed, Mr. Staats.

**TESTIMONY OF ELMER B. STAATS, COMPTROLLER GENERAL OF
THE UNITED STATES; ACCOMPANIED BY JOHN W. CRAFT AND
JACK S. HEINBAUGH**

Mr. STAATS. Thank you, Mr. Chairman.

* | If I might just inject a bit of a personal note, I have had interest in this subject for a great many years, both before I became Comptroller

General and since. I think the fundamental problem that we face in this country today has to do with the decline in our rate of productivity growth.

As you know, for the last 10 years the rate has been running about 1.6 percent a year, which is exactly one-half of what it ran for the previous 20 years. The most recent quarter is down to 1.1 percent.

It is due to many factors, but this hearing is certainly relevant to the whole problem of how are we going to improve the productivity growth in this country.

I am going to skip over the first few paragraphs and start on page two, on the need for uniform patent legislation. I will submit for the record a short background paper on past efforts to set Federal patent policy.

There have been a number of attempts to establish a uniform patent policy for the Federal Government. Foremost among them have been the Presidential Memorandum and Statement of Government Patent Policy first issued in 1963 and revised in 1971.

These attempts have been relatively unsuccessful and policy has developed over the years on an agency-by-agency basis. There are wide variances in the way agencies have interpreted the Presidential policy, which embodies both title-in-the-Government and title-in-the-contractor policies.

Additionally, piecemeal legislation has made uniform implementation by the agencies increasingly difficult. As a result, today there are approximately 20 different patent arrangements employed by the various executive agencies.

The proposed legislation would, in our opinion, go a long way in overcoming this confusion. It deals explicitly with licensing and sets forth ownership provisions for small business and nonprofit organizations.

However, the treatment of other business entities would still be governed by Presidential policy or statute.

The bipartisan Commission on Government Procurement, which included members from the Senate, House, executive branch agencies, and the private sector, was established to recommend improvements in all aspects of procurement policy. A major task group of the Commission reviewed Government patent policy.

The Commission placed considerable importance on the need for Government patent policies to stimulate commercialization of inventions. Its December 1972 report stated that effective patent policy must take advantage of the fact that development will be promoted by those having an exclusive interest; at the same time, the policy must provide for others to exploit the invention if an exclusive interest does not produce the desired result.

The Commission was skeptical of the Presidential policy because it relied on after-the-fact disposition of patent rights. They saw that policy as causing delayed utilization of discoveries, increased administrative costs, and a lessening in the willingness of some firms to participate in Government research work.

Nevertheless, the Commission recommended prompt and uniform implementation by the executive agencies so that further assessment could be based on actual experience. If such an assessment revealed

weaknesses in the policy, the Commission suggested a legislative approach which would permit retention of title by contractors, subject to march-in rights and other safeguards. It also recommended enactment of legislation granting all agencies clear-cut authority to issue exclusive licenses.

The Commission considered the Committee on Government Patent Policy to be in the best position to assess agency progress in implementing the revised policy.

The Committee on Government Patent Policy was established by the Federal Council for Science and Technology to fulfill a requirement of the 1963 Presidential statement. The committee was to analyze the effectiveness of Federal patent policy and recommend revisions or modifications.

The committee, which included representatives from most of the R. & D. agencies, evaluated executive agency experience under the Presidential policy and concluded, in 1975, that it had not been effectively or uniformly implemented.

The committee found that patent policy legislation was needed to unify agency practices for allocating rights to contractor inventions and to clarify agency authority to grant exclusive licenses for Government-owned inventions.

The committee's conclusion that legislation was needed appears to have been influenced by two situations. First, there was the enactment of patent legislation applicable to individual agencies, particularly section 9 of the Federal Nonnuclear Energy Research and Development Act of 1974, with title-in-the-Government orientation. The same language has since been incorporated by reference in other acts affecting various agencies' R. & D. programs, such as the water resources and solid waste disposal acts.

The second situation was the confusion created by two lawsuits brought against the Government, by Public Citizen, Inc., that questioned the authority of Federal agencies to exclusively license inventions and allow Government contractors to retain title to inventions. Because both suits were dismissed for lack of standing to sue, and not on their merit, the issue was not resolved.

The need for legislation is also supported by our review of current patent procedures and practices at selected agencies. We expect to report the details of our findings to this committee by the end of June. We found that the Presidential policy has not been implemented uniformly. Agencies, in establishing procedures for determining rights to inventions, are often free to move in almost any direction.

The most notable recent changes have taken place at the Department of Health, Education, and Welfare, and the Department of Defense, with respect to nonprofit organizations.

These two agencies follow the policy established by the Presidential memorandum and statement as revised in 1971. During fiscal year 1978, they provided over 60 percent of Federal R. & D. funding for colleges and universities.

We will also discuss the Department of Energy and the National Aeronautics and Space Administration, both of which operate under policies established by statute.

First the Department of Health, Education, and Welfare.

Administrative developments during the last 2 years at the Department of Health, Education, and Welfare appear to be leading to a reversion to policies and practices followed at the Department prior to GAO's 1968 report to the Congress.

At that time, we reported that HEW was taking title for the Government to inventions resulting from research in medicinal chemistry. This was blocking development of these inventions and impeding cooperative efforts between universities and the commercial sector.

We found that hundreds of new compounds developed at university laboratories had not been tested and screened by the pharmaceutical industry because manufacturers were unwilling to undertake the expense without some possibility of obtaining exclusive rights to further development of a promising product.

To correct this, we suggested to the Secretary that HEW expedite determinations of rights and use Institutional Patent Agreements—IPA's—which would permit universities with approved technology transfer programs to retain title.

HEW followed our suggestions and, as of October 1978, had implemented agreements with 72 institutions. The National Science Foundation, another major agency supporting R. & D. at colleges and universities, began using these agreements in 1973. IPA's were endorsed for governmentwide use by the Committee on Government Patent Policy in 1975, and Federal Procurement Regulations on IPA's were issued in 1978.

In July 1978, HEW's Office of General Counsel circulated for comment a patent policy draft report recommending that the Department's use of IPA's be reconsidered because IPA's delegate to grantee institutions power over the desirability, method, and pace of development of inventions. This, the report stated, was conceptually inconsistent with any HEW objective other than rapid commercialization.

Beginning in November 1977, the HEW Assistant General Counsel for Business and Administrative Law had begun delaying review of case-by-case determinations of rights prepared by the Patent Branch. In a statement issued August 15, 1978, the General Council acknowledged that a backlog of cases existed and said it resulted from a more careful review. XX

The purpose of this review, according to the General Counsel, was to make sure that assignment of patent rights to universities and research institutes did not stifle competition in the private sector in those cases where competition could bring the fruits of research to the public faster and more economically.

We found that the Assistant General Counsel's review of draft determinations during this time was averaging 6 months. We examined four cases in some detail. In three, the review affirmed the correctness of the Patent Branch's determination to grant title to the contractor. These reviews took from 8 to 15 months to complete. Review of the fourth case took about 14 months, reversing the determination of the Patent Branch and retaining title for the Department.

The Pharmaceutical Manufacturers Association is concerned about HEW's delays in processing individual cases, reevaluation of patent policy options, and possible reversion to patent practices and procedures used prior to our 1968 report. In a recent letter to the Secretary

of HEW, the association stated that the research-based prescription drug industry feels more strongly than ever that an exclusive interest is essential if Government-financed new drug compounds are to enter clinical programs funded by the private sector.

The Association argued,

In our view, HEW's patent policy should not be structured so as to "restrain or regulate" the availability of inventions resulting from HEW research. This strikes us as truly an attempt to suppress technology to the detriment of the public. *

The policies and regulations of the Department of Defense are based on the Presidential policy. Most Defense contracts allow contractors with an established commercial position to retain title to their inventions.

Because nonprofit institutions generally lacked an established commercial position, Defense interpreted the Presidential policy as requiring the use of a deferred determination clause—where rights are determined after an invention has been identified.

However, for many years, the Department got around this by using a "special situations" section of the Presidential policy to put a title-in-the-contractor type of clause in contracts with certain qualifying universities and nonprofit organizations.

In August 1975, Defense, with no advance notification, revised its regulations, discontinuing use of the "special situations" exception. Instead, it required universities which wanted a title retention clause to furnish information to the contracting officer for determining whether the work to be performed was in a field of technology directly related to an area in which the university had an effective technology transfer program or an established commercial position. ✓

Because of the additional administrative burden, many research institutions subsequently elected not to submit the information Defense required for the title retention clause. As a result, there was an 80 percent increase in the use of deferred determination clauses by Defense during fiscal year 1976.

Our review of cases processed during that year showed that although contractors' requests for greater rights in identified inventions were approved in all cases, the Department took from about 1 to more than 7 months to make those determinations. ✓

The University Patent Policy Subcommittee of the Committee on Government Patent Policy reported that it appeared that a deferred determination often acts against the expeditious development and utilization of inventions by delaying a decision that could have been made at the time of funding. Administrative costs of both the Government and universities are unnecessarily increased by the need to prepare, review, and respond to requests for rights on a case-by-case basis.

The Navy noted, in February 1976, that not only had an additional administrative burden been placed on universities but that the time necessary for contracting and patent officers to make a determination on the appropriate patent clause had increased drastically.

In 1977, the Air Force, after conducting a thorough review of the revised policy, determined that the practice of qualifying institutions for each contract was moving in a direction counterproductive to a cost-effective, reasonably acceptable policy.

To date, Defense has not implemented the use of Institutional Patent Agreements. This inaction and HEW's reconsideration of the use of IPA's are particularly difficult to understand because they run counter to the 1975 Committee on Government Patent Policy study and the considerations which led to the regulations issued in 1978.

The Atomic Energy Act of 1954 and section 9 of the Federal Non-nuclear Energy Research and Development Act of 1974, as amended, govern Department of Energy patent policy. Section 9 is probably the most detailed, comprehensive individual statute enacted to date. It provides that normally the Government will take title to inventions. But it also gives the DOE Secretary discretionary authority to waive the Government's rights in favor of the contractor if certain criteria are met.

The results of operations under the Nonnuclear Energy Act of 1974 are significant because, as I noted previously, the same language has been incorporated by reference in other statutes. DOE appears to be functioning adequately under its legislated patent policies.

However, there are problems. Our review of a recent year's cases showed that the time for determining rights to identified inventions was lengthy, averaging about 13 months. DOE recognizes that its policy creates problems for both the Department and its prospective contracts. Delays in the R. & D. contracting process are caused by the substantial burdens created by petitioning, negotiating, and determining waivers.

We feel that a patent policy that provides for Government ownership places a burden upon the Department to see that the resulting technology is utilized. It becomes the Government's responsibility to obtain domestic and foreign patents, to advertise their availability for licensing, to negotiate licensing agreements, to develop related technology packages, and to enforce the patents against unlicensed users.

Since the Department has only limited resources to carry out these functions, it is likely the commercial potential of some DOE-funded inventions may never be realized.

DOE's mission is to work in a cooperative relationship with industry to develop commercial energy alternatives. It works, therefore, in areas with high commercial sensitivity. In this respect, the Department noted that there are contractors which refuse to work with it because of its patent policies.

One other problem we noted is that DOE has taken the position that section 9 does not allow it to use institutional patent agreements whereby a contractor or grantee with an approved technology transfer program has first option to principal rights. It is possible that other agencies governed by the same statutory language may not adopt policies in line with the IPA approach. The proposed act we are considering today will eliminate the uncertainty by authorizing the IPA approach.

The National Aeronautics and Space Administration's patent procedures are governed by section 305 of the Space Act of 1958. The Government obtains rights to inventions reported by NASA's contractors unless the Administrator waives these rights. These procedures are similar to DOE's except that recommendations for granting waive are made by an inventions and contributions board.

Now to turn to the bill which is before us today.

The proposed legislation addresses the administrative and legislative-based problems of the agencies. It would establish uniform Government-wide procedures under which small business, university, and and other nonprofit organizations could obtain title to inventions arising from Government-supported R. & D. It would also establish clear authority and a uniform framework for licensing Government-owned inventions.

The proposed act would place initial responsibility for commercializing research results on the inventing contractor—the organization or individual with the most interest in and knowledge of the invention. It would provide the Government with “march-in” rights. These rights limit the administrative burden because they would be exercised only in specified situations, such as when the agency determines that the contractor has not taken effective steps to achieve practical application of the invention. | X

Studies have shown that of the 8,000 inventions disclosed annually to the Government, only a handful attain commercial importance. It would be hoped that an easing of the redtape leading to determinations of rights in inventions would bring about an improvement of this record.

The act should solve a number of significant problems not currently satisfied by the Presidential policy. This is especially true in regard to agencies' dealings with universities and nonprofit organizations. While it is not the uniform Government-wide policy envisioned by the Procurement Commission in that it does not assign patent rights for larger contractors, it is a clear legislative mandate establishing policy that is badly needed.

The act would also provide authority and a legislative framework for licensing of Government-owned inventions. Its statutory guidelines would make clear the authority of all agencies to issue exclusive licenses under patents held by them.

Under a uniform Government-wide title-in-the-contractor policy, this licensing authority would generally apply only to in-house inventions of Federal employees. However, the bill's licensing provisions are applicable to all inventions when the Government retains title, including those of larger contractors not assigned title by the bill. I would be concerned if the Federal agencies were to use this licensing authority as a reason for retaining title to inventions of contractors which do not qualify as small business or nonprofit organizations.

This is not to say that there will be no situations in which contractors' inventions will require Government licensing to bring them to application. But it has been the experience of agencies with policies of granting title to the contractor that a willing contractor-inventor is more likely to expeditiously commercialize an invention than a Government licensee.

We have submitted for the record, Mr. Chairman, some section-by-section comments which I will not take the time to read. However, I did want to comment on one provision of the bill which relates particularly to the role GAO would play.

Under the provision of the bill, GAO would be notified of agency determinations when the agency retains title. If our monitoring re-

vealed a pattern of nonconformity with the spirit of the act, we would so notify the head of the agency and request an explanation. At least annually we would be required to report to the Judiciary Committees on the act's implementation by the agencies.

Our preference is to not be required to monitor patent policy implementation in this particular, I might say ~~case-by-case~~, manner. We prefer to consider this aspect of an agency's operation as part of our overall reviews of procuring and contracting functions and R. & D. programs.

As you know, we normally inform agency heads and the Congress when we find agencies not properly fulfilling their statutory responsibilities. The implementation of this act by the agencies and the efficiency of the agency's own monitorship would, of course, be included in our normal oversight reviews.

In summary, we believe a clear legislative statement of a uniform, Government-wide patent policy is long overdue. While the proposed act is limited to small business and nonprofit organizations, in our opinion it provides a legislative basis for progressing to a uniform policy for contractors. With these reservations, we believe the act will go a long way to clarify the muddled patent situation that presently exists. It will provide the Federal agencies with a clear statement of the policy supported by the Congress to insure the expeditious commercialization of discoveries from Government-funded R. & D.

We would be happy to respond to any questions, if you have them.

Senator BAYH. Thank you, Mr. Staats. We appreciate your thoughtful statement, and we look forward to working with you as we proceed through the legislative process on this, which I hope we can do expeditiously.

Let me think out loud, because you raised some points that I think are legitimate. Let me give the rationale behind our approach and then, if you have suggestions for improving this bill, we would certainly like to know about them.

We are concerned, as you pointed out, with the need to get this technology to the marketplace, not only because it serves people but, from an efficiency standpoint, I can't think of anything that wastes money faster than spending research dollars to develop a good idea that just sits there. We want to get the ideas moving.

By the same token, we recognize we have a responsibility to protect the taxpayers' dollars that are invested. The reason we have made the distinction between the large companies and small and nonprofit companies is really twofold. One, small businesses have proven that they can usually generate more results from each research and development dollar than large businesses. Small businesses have a proven record as the creators of new technologies, and will often take risks that the big companies are not willing to match. Second, and I think more significantly, large contractors, have banks of lawyers and the resources necessary to go through the 13-month delay period that you mentioned some agencies require to determine ownership of patent rights to inventions arising from Government-supported research and development.

Now, is there any better way to approach that? If there is, we would like to know about it.

The way we intend for this to function, of course, is that the Presidential policy still could be pursued by the large contractors on a case-by-case basis. As you say, we certainly don't want to have the passage of this bill imply that large companies should never retain patent rights.

Mr. STAATS. We fully understand, and recognize and support the rationale for limiting this legislation to the small businesses and non-profit organizations. Some of the principles which are established here are similar or identical to the principles endorsed by the Procurement Commission for all contractors. But certainly this would give the Government experience. It is a step in the right direction.

If later on it developed that the experience was satisfactory, as we think it will be under this legislation, there could be another step taken at some future time.

I agree with you that nonprofit organizations and small businesses, for the most part, are not in the same position as the large contractors who have more capital. They have more resources. They have more skilled people and know how to handle these cases.

Therefore, while we recognize this is a Government-wide problem and probably should be dealt with at some later time, we ought to move ahead now and get this part of it established.

There is a minor technical point that occurs to me. In the definition of nonprofit organizations, State and local governments have not been included. That is something you might want to think about, because particularly in the area of productivity in the State and local government sector, more money is being spent by them now to develop ways in which they can improve the technology of local public services. That is a minor matter that can be easily cleared up.

Senator BAYH. We would like to have any ideas that could improve this bill.

Senator Dole, I know you are in a hurry to go. He has been very patient, as busy as he is, being here this morning. I will yield to you, Bob. If there are further questions, I will come back.

Senator DOLE. I think most of the questions we prepared have been answered, at least in part, to my satisfaction. But in reading not only your testimony but other statements, we read from time to time that contractors refuse to do work for the agencies. You mentioned DOE. Is that rather widespread? Are there really a lot of contractors out there?

Mr. STAATS. Your question is a good one, but it is also very difficult to answer because in many cases this will be a factor but maybe not the governing factor. It may not be the sole factor. Or it may not come up simply because they say, "We are just not interested." Therefore, there is nothing on the record which will make it explicit that that is the reason they didn't enter into the competition for the contract.

I know what you are dealing with here. But we think there is enough evidence to support the view that, in addition to the factor of delays and the added costs, we ought always to be interested in getting the maximum competition for Government contracts and grants. We ought not to leave anything in the way that can reasonably be taken out, which can cause people not to come into that kind of competition.

Future
step

Senator DOLE. I know we will have some testimony later on that. I may not be able to be here, but I have read it. That would indicate it is a substantial problem. Perhaps we can deal with it in this legislation.

Mr. STAATS. I guess what I am saying is, it is very difficult to document and prove conclusively that that was the factor in all of these cases.

Senator DOLE. I noted your comments with reference to HEW, and there does seem to be some reversal policy. It was our belief, and again I don't know all the circumstances that surround everything in government or HEW or any other place, but I think there was an effort by the Patent Branch at HEW to follow the 1968 directive. One result of that was I guess the removal of the head of the office.

I am not certain if you went into the circumstances of that or care to comment on that. But it has been suggested that Mr. Latker, because of his cooperation with Congress, may have placed his position in jeopardy. I don't know if that is a fact. But it is a matter of some concern, because here we have a public servant who is trying to expedite the process and follow the directive. If in fact he has been terminated because of that, then I think we have a responsibility to determine what the facts are.

Mr. STAATS. I don't have any personal information. My colleagues are free to comment if they know something.

Mr. HEINBAUGH. We know, of course, he was dismissed, but I don't think we know just why.

Senator DOLE. I think it is something we probably need to pursue, because there are different conclusions reached. Maybe they were accurate, maybe not. But I think it important that we protect the rights of those who are trying to follow the policy we are trying to implement.

If I may, Mr. Chairman, I would like to submit other questions to Mr. Staats in writing and other questions to the following witnesses in writing as well, if that is all right.

Senator BAYH. Yes.

I appreciate your bringing up the Latker case. I share your concern about that. In fact, I talked to some of Mr. Latker's superiors down there. They didn't totally satisfy me about what happened or why.

I must say I am disturbed whenever someone who has been asked to cooperate with members of the legislative branch is suddenly fired. For an individual like that to in any way fall on hard times as a result of that cooperation I find totally unacceptable. Again, I have been unable to find out the facts.

Mr. STAATS. Mr. Chairman, may I add one point here. In the report of the Commission on Government Procurement, we outlined what was called an alternative approach, which is substantially the approach you have incorporated in this bill. The Commission was faced with a situation where there had been very recent statements of Presidential policy. This report was made in 1972. The Commission at that time felt that it might confuse the situation if we did not support the Presidential policy, give it a chance to operate.

But now here it is, 7 years later. We have had the Committee on Government Patent Policy which concluded we needed legislation.

Alternative approach

Our own work indicates that the situation has not improved—if anything, it has deteriorated—since 1972.

We therefore support generally the lines of the alternative approach, which the Commission outlined in its report in 1972 and, for the most part, the concept that has been incorporated in the bill. There are some differences, but they are relatively minor.

Senator BAYH. I appreciate the positive statements about this legislation you already made. This bill has been subject, it seems to me, to two general criticisms. As is often the case, the two are totally irreconcilable. Nevertheless, there they are.

One criticism comes from those who believe the policy should cover all big businesses. We have already dealt with why we have made the distinction between large and small contractors. You appear to be comfortable with that explanation.

The other criticism comes from those that feel that this bill is a front to allow the large, wealthy, corporation to take advantage of Government research dollars and thus to profit at the taxpayers' expense. We thought we had drafted this bill in such a way that this was not possible.

Would you care to comment on this scenario as a valid criticism?

Mr. STAATS. Of course, this is the key question. There is no doubt about that. In my opinion, the bill does have adequate safeguards. They are essentially the safeguards which are provided for in the alternative approach proposed by the Procurement Commission.

It preserves the idea, the concept, that the Government would retain for its own procurement, its own need, a relatively free license. It preserves the idea that the Government will still have the right to come in and require the exploitation of a patent. It cannot be just locked up. It also preserves the idea, which the Commission endorsed, that if there are substantial profits involved, then the Government would share in those profits. You might quarrel about the particular figure which is used in your bill, but I would not. I think that a fair judgment has been made with respect to the cutoffs here.

I think that you have to look at this issue not in terms of giving something away which is valuable property; it is a question of really making sure that the Government's investment has been translated into beneficial effects for the economy as a whole. If tax is collected, the Government benefits from the point of view of the impact on the economy.

You have to look at it also in terms of being sure that the Government does not have to pay twice. This bill does preserve that right.

So I am not concerned about the concern which might be expressed that this is giving away something which ought not to be given away. I don't look at it that way. I don't believe that it would be a fair way to look at it.

Senator BAYH. If you have any further thoughts on that particular question, I would like to have them, because you have a good reputation for being able to ferret out loopholes. I appreciate your comments. If you have others as this bill moves through the legislative process, I would be very glad to have them.

We have a few questions here that I will submit to you in writing, along with the others, if you don't mind. I know you and your colleagues are busy. We appreciate very much your contribution here.

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I would like to ask your opinion before you leave of the oversight role that this bill would give to the GAO.

Mr. STAATS. We are flexible on this. Our problem always is that we are overworked—as a matter of fact, we had a budget cut last year and the House markup this year gives us another reduction. So we have to always be concerned about whether we can cover all the things we have to cover.

Senator BAYH. I understand. Why don't we look at what might be the best role and see whether some of us who are on the Appropriations Committee might be able to help on the resource end if there is a need. We need, it seems to me, some sort of a neutral body that can make sure this bill is implemented in the way the Congress intends it to be.

Mr. STAATS. We will be happy to work with you on that. We are flexible, but you can understand what our problems are.

Senator BAYH. I certainly can. I know you may feel complimented when people have trust in you and ask you to do things, but it can be disturbing if you are not given the resources to do the job.

Mr. STAATS. It disturbs me sometimes, too.

Senator BAYH. Thank you very much. I appreciate your excellent testimony.

Mr. STAATS. Thank you.

[The questions and answers previously referred to, Mr. Staats' prepared statement, and additional material follow:]

RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY ELMER B. STAATS

Question No. 1. Mr. Staats, the Executive branch conducted an administrative review and concluded in 1968 that qualified universities should be allowed to retain title to inventions they made under federal research and development. This program, known as the Institutional Patent Agreement or IPA, is now available for any agency to adopt after the Federal Procurement Regulation Amendment 187 went into effect last year. I have a copy of a letter that Mr. Philip G. Read, Director of Federal Procurement Regulations wrote to all of the agencies asking if they had adopted an IPA program. The replies to Mr. Read from the agencies not now having an IPA program unanimously indicate that these agencies have no intention of adopting this type of approach. Did you find any evidence that the agencies are capable or interested in forming a uniform patent policy on their own? If so why haven't they adopted the IPA program?

Answer. Agencies may have varying reasons for not implementing Institutional Patent Agreements, thus preventing a uniform approach. For example, NASA and DOE take the position that their use of IPAs is prohibited by statute. Also, frequently there is a reluctance on the part of agencies to adopt new procedures when they are not required to, especially when the procedures involve major changes from the way the agencies have operated in the past. I believe that the experience of the legislatively created Commission on Government Procurement is illustrative. We have been monitoring the agencies' implementation of the Commission's recommendations and find that, after 7 years, Executive branch action has not yet been completed on some of them. This is why we believe that legislation is necessary if there is to be uniformity in patent policy. The proposed Act would call for contracting procedures under which all agencies would make maximum use of the Institutional Patent Agreement approach to assign title to patents arising from Government-supported research by universities.

Question No. 2. It appears from your testimony that some agencies like HEW and DOD which once had liberal patent policies regarding universities are now moving in the opposite direction of having lengthy bureaucratic delays before any determination about ownership of patent rights can be made. Did you find any evidence why such agencies are changing their policies? Could this change

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Implementation
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be the result of large staffs of patent attorneys trying to justify their existence by creating more work for themselves?

Answer. We found that the patent staffs at HEW and DOD are not large. In our opinion the delays were the result of changes initiated by agency officials in interpreting and implementing the Presidential Policy. As I noted in my statement, there are wide variances in the way agencies have interpreted this policy and the agencies without legislated patent policies are often free to move in almost any direction.

Question No. 3. In light of the evidence that you found of bureaucratic delays inherent in a case-by-case review of patent petitions would you conclude that this burden falls most heavily on small businesses and universities who do not have the financial capability of retaining large staffs of patent attorneys in these long periods of review by the agencies?

Answer. Because case-by-case review of patent petitions are imposed on all petitioners alike, it is only natural that the financial burden would be most felt by those in the least favorable position to shoulder it. In most cases, small businesses and universities would certainly fall in the category of those with the poorest chances of affording the necessary professional help.

Question No. 4. Agencies such as DOE have a patent policy of retaining ownership of patent rights to all inventions arising from agency supported research and development unless the contractor files a petition to retain title which you testified can take as long as 13 months to complete. Couldn't this type of delay and uncertainty over ownership of the patent drive away from DOE exactly the types of high technology, innovative firms who have the most to contribute toward solving our energy problems?

Wouldn't this type of delay fall especially hard on the small company which is competing with energy giants that are financing their own research and development without having to go through bureaucratic delays at the agencies?

Is it possible that this type of patent policy forces small businessmen who can't afford to conduct their own research and development on promising energy ideas, but are unwilling to risk losing resulting patent rights to the Government to have no alternative but to turn to the large energy company as sources of funding, and thereby create exactly the anticompetitiveness that Government retention of patent rights is supposed to discourage?

Answer. While we know of no specific instances of companies shying away from DOE R&D work, for the most part it would be the smaller company that could least afford an expensive, lengthy determination of rights to its Government-supported discovery. A small businessman in this situation either could seek financial help wherever he could find it—possibly from large energy companies—or elect not to pursue the discovery. Neither course may be in the best interest of the Government or the public. The proposed legislation would eliminate this kind of situation.

Question No. 5. Because of the evidence that you found that many agencies have different ideas about what constitutes an efficient patent policy wouldn't it be desirable to have a neutral body like the GAO oversee the implementation of this bill if it is enacted?

Could the GAO assume this responsibility if the Congress provided enough funding so that the necessary staff could be hired?

Answer. As noted in our prepared statement, our preference is to not monitor patent policy implementation in this manner. We would prefer to consider this aspect of an agency's operation as part of our overall reviews of procuring and contracting functions and R&D programs. If we were to assume this responsibility, funding for the staff required would necessarily be an important consideration in view of our current budget constraints.

Question No. 6. When Government retains title to inventions, has there been a record of success in developing and marketing these inventions?

Answer. The report on Government Patent Policy issued by the Federal Council for Science and Technology in December 1978 contained figures on agencies' licensing of Government-owned inventions for fiscal years 1970 through 1976. The report showed that, of the more than 28,000 patents available for licensing at September 30, 1976, only about 4.5 percent were licensed. This experience was about the same as for fiscal year 1975, but was down from about 7.8 percent in fiscal years 1970 and 1971. Some of the agencies exceeded the Government-wide

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average. For example, at September 30, 1976, HEW had 23 percent of its patents and patent applications licensed, while ERDA (now DOE) had licensed 11 percent of its patents. However, licensing alone, especially nonexclusive licensing, may not assure that the licensee is pursuing development and marketing efforts. NASA has one of the best, most active licensing programs of the Government agencies. As of December 31, 1978, 133 of the 3,512 inventions it owned, or about 4 percent, were licensed. NASA's licensing data may not be comparable with other agencies since it follows-up on licensees' efforts to commercialize its inventions, revoking licenses for inventions not being used. For example, NASA recently asked its 242 nonexclusive license holders about their success in developing and marketing its inventions. Responses were received from 138 licensees (57 percent). Only 50, or about 20 percent of the 242 total licensees, reported they were pursuing development and marketing efforts.

RESPONSES TO SENATOR THURMOND'S WRITTEN QUESTIONS BY ELMER B. STAATS

Question No. 1. Can a large company, not covered by this bill, ever receive rights to an invention which it has created pursuant to federally-funded research? Will this bill in any way change this?

Answer. Agencies which now award rights to an invention to a large company under the Presidential policy will, under the bill, continue to follow the same procedures. The proposed legislation is not intended to change this practice.

Question No. 2. Under section 204, what effect does the 10 year limitation have on the government's recoupment rights? If the owner of the patent received \$240,000 in the ten year period, and then received an additional \$250,000 in the eleventh year, would the government be able to recover any money?

Answer. The 10 year period provided for Government recoupment in section 204(a) could limit, in some situations, amounts that might be recovered. In the situation set forth in the question, the Government would not be entitled to a share of the \$250,000. However, if the patent holder were a nonprofit organization, it would be required to use all funds remaining after the payment of administrative expenses for the support of scientific research or education. This requirement is not subject to any time limitation such as the 10 year limitation contained in section 204. Section 204(b) provides an additional means by which the Government may recoup its investment. The Government may recoup from after tax profits exceeding \$2,000,000 received from sales of products embodying or manufactured by a process employing the invention.

Question No. 3. Under section 208(7) the Department of Commerce is to receive any royalties due to the United States under this bill. Are the funds earmarked for any particular purpose, or do they go into a general fund?

Answer. Section 210(6) would provide that funds received by the Department of Commerce be used only for the purposes of this legislation. This would establish a revolving fund. GAO believes that the public interest is best served when congressional control over activities is exercised through the appropriation process with annual reviews of programs and financing requirements. Thus, we believe proposed legislation authorizing program financing by means other than through the regular appropriation process should include provision for annual review by the Congress.

Question No. 4. Are there any indications that small companies may stop seeking work involving government work if the present patent policy is not changed?

Answer. Assertions that certain companies, large and small, refuse to work for the Government because of its patent policies surface from time to time. However, the basis in fact of the claims is difficult, if not impossible, to substantiate. Companies could refrain from doing business with the Government for a variety of reasons and patent policy as a cause may not be severable from other regulatory or economic reasons.

Question No. 5. Are the recoupment provisions of this bill sufficient to prevent exorbitant windfall profits?

Answer. The bill makes no specific reference to, nor tries to define, windfall profits. It does provide that the Government will, after specified limits are reached, share in nonprofit organizations' and small businesses' after tax profits from licenses and sales of products embodying the invention.

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RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY ELMER B. STAATS

Question No. 1. IPA's (Institutional Patent Agreements) give contractors patent rights. Through their use, between 1968 and 1977, at least 75 medical inventions were commercialized. IPA's seem to work for a number of agencies who continue to use them. NSF is one of them. Yet, HEW decided to reevaluate the use of IPA's, why?

Answer. The Department of Health, Education, and Welfare's reevaluation is being done at the request of the Secretary. In November 1977 he expressed concern about the legal implications of a policy providing for the use of IPAs and directed the Department's General Counsel to conduct a review. In July 1978, the Office of the General Counsel circulated a patent policy draft report for comment. The report expressed the opinion that the use of IPAs encourages exclusive licensing and thereby sacrifices the agency's broad objective of influencing the availability and cost of HEW-supported inventions. The report further stated that the use of IPAs is conceptually inconsistent with any objective other than rapid commercialization. As of May 24, 1979, the General Counsel had not reported the results of his review to the Secretary.

Question No. 2. In your statement, you indicated that a backlog of cases existed at HEW, resulting from a more careful review. What was the delay?

Answer. The Department's General Counsel said the backlog of cases resulted from a more careful review by the Assistant General Counsel for Business and Administrative Law. The Assistant General Counsel said that the backlog developed over a period of time and that the delay was caused by the added workload of reviewing each case file to ensure that it was complete, over and above his normal responsibilities.

Question No. 3. In citing case reviews by HEW, you indicated one case when determination of the patent branch had been reversed. Was there any substantive reason why this case was reversed? Did the reversal jeopardize the invention from ever reaching the market place?

Answer. In this case, the Patent Branch's administrative determination resulted in a recommendation that ownership rights be awarded to the research institution-petitioner. The Assistant General Counsel for Business and Administrative Law recommended that waiver of the Government's rights in favor of the petitioner be denied. The Assistant General Counsel found no legal justification for the waiver, noting that the research institution had not promoted the invention and would not supply any of the risk capital needed to develop it. A prospective licensee had approached the research institution and assisted it with the patent application and waiver petition. The Assistant General Counsel further found that all of the development would be done by the licensee and that exclusive licensing appeared to be necessary to promote further development. In these circumstances the Department decided to retain title for the Government. It is reasonable to assume that the prospect's desire to obtain license to the invention would continue and the chances of it reaching the marketplace may not be jeopardized.

Question No. 4. I take it from your testimony that from 1968 until the 2 year period that you spoke of, HEW was expeditiously processing case by case reviews, and that failure to do so in the last 2 years was due to a new layer of reviewing, above the patent branch. On the basis of this, do you believe that any further recommendations to the Executive, asking for expeditious review, would be fruitful on a continuing basis?

Answer. The Department has eliminated the backlog of older cases. Therefore, requests for expeditious review might not be necessary. In our opinion, the proposed legislation supporting a general policy of title-in-the-contractor and authorizing the IPA approach would offer a better solution.

Question No. 5. If not, do you consider civil servants administering these policies in jeopardy in having to adjust to the whim of policy makers on short notice?

Answer. Passage of legislation such as that described in the previous answer would result in patent policy administration by statute, removing it from the prerogative of agency administrators and resulting in uniform implementation throughout the executive branch.

PREPARED STATEMENT OF ELMER B. STAATS
GOVERNMENT PATENT POLICY BACKGROUND

With the increase in the Federal Government's research and development (R&D) effort subsequent to World War II, individual Federal agencies reacted differently to the problem of allocating rights to resulting inventions. This was a matter which traditionally had been left to administrative control, and the patent policies of the Federal agencies were generally fashioned without any central guidance or overall coordination.

As the Congress began to take a greater interest in the allocation of rights to these inventions, it enacted a number of statutes establishing policies for specific agencies or specific programs within agencies. Examples are contained in the legislation establishing the National Science Foundation and the National Aeronautics and Space Administration. As a result of this piecemeal approach, legislation in this area lacks consistency. The Congress has yet to establish a uniform patent policy for Federally supported (or funded) inventions.

In 1963, the first attempt was made to establish a unified Government patent policy. On October 10 of that year, President Kennedy issued the "Presidential Memorandum and Statement of Government Patent Policy" which applied to the R&D programs of all Federal agencies, except those having specific statutory patent requirements.

There are two alternative ways, at opposite ends of a spectrum, in which the Government may allocate patent rights: (1) a "title" policy where the Government takes title to the patent rights and then grants licenses (which may be either exclusive or nonexclusive) to use the invention, or (2) a "license" policy where the contractor takes title to the rights, subject to a commitment to bring the invention to commercial use and a royalty-free license in the Government.

The 1963 Presidential Statement embodied both "title" and "license" policies, rejecting the concept of a single presumption of ownership. The policy attempted to identify those contracting situations where the public interest would best be served by acquisition of patent rights by the Government, acquisition of rights by the contractor, or deferring the disposition of rights until the invention was identified rather than making the determination at the time of contracting.

Section 3 of the 1963 Presidential Statement required the Federal Council for Science and Technology to establish a patent advisory panel, to analyze the effectiveness of the policy, and to make recommendations for revision or modification as believed necessary in light of the practices of the Federal agencies under the policy. In December 1965 the Federal Council established the Committee on Government Patent Policy to carry out these functions. The Committee, comprised of policy level officials from the R&D sponsoring agencies represented on the Federal Council and representatives of the Departments of State and Justice, identified three basic policy questions or issues underlying the Presidential Statement. These issues were:

What effect does patent policy have on industry participation in Government R&D programs?

What effect does patent policy have on the commercialization of Government sponsored inventions?

And what effect does patent policy have on business competition in commercial markets?

To help examine these issues, the Committee in September 1966 commissioned Harbridge House, a research and management consultant firm, to collect and analyze data and prepare reports which would: (1) help test the effects of alternative patent policies; (2) lead to affirmation or revision of the President's policy or assist in formulating useful legislation; and (3) be useful to executive departments and agencies in administering Government-wide policy, whether established by the Congress or the Executive Branch.

The Harbridge House report submitted in May 1968 indicated that no single approach to the allocation of patent rights was a proper solution since the degree of commercial utilization of Government-sponsored inventions, commercial competition, and industry participation in Government R&D was attributable to several important factors. Among these factors were the mission of the contracting agency, the purpose and nature of the contract, the commercial applicability and

market potential of the invention and the extent to which the invention was developed and/or promoted by the contracting agency.

Based on the results of the Harbridge House study and the actual operating experience of the agencies under the Presidential policy, the Committee in its 1968 Report on Government Patent Policy recommended certain improvements to the policy. These would provide:

Agency heads with additional authority to permit contractors to obtain greater rights to inventions where necessary to achieve utilization or where equitable circumstances would justify such allocation of rights;

Additional guidance to the agencies in promoting the utilization of Government sponsored inventions;

Clarification of the rights of states and municipal governments in inventions in which the Federal Government acquires a license; and

A more definitive data base for evaluating the administration and effectiveness of the policy and the feasibility and desirability of further refinement or modification of the policy.

In August 1971, President Nixon approved these recommendations and issued a revised Statement which was substantially in accord with the 1963 Statement. The revised Statement (which is still in effect) provides that the Government normally takes the principal or exclusive patent rights where:

- (1) The principal purpose of the contract is to develop products for use by the general public;
- (2) The principal purpose of the contract is directly related to public health, safety or welfare;
- (3) The contract is in a field of science or technology principally developed by the Government, and acquisition of exclusive rights by the contractor might lead to contractor dominance of the field; or
- (4) The contract is for the operation of a Government-owned facility.

In other situations—where the purpose of the contract is to build on existing technology, to develop information, products or processes for use by the Government, and the subject matter of the contract is directly related to an area in which the contractor has an established non-governmental commercial position—the contractor normally acquires the principal or exclusive patent rights. However, where the commercial interests of the contractor are not sufficiently established to be covered by the preceding criteria, disposition of patent rights is considered on a case-by-case basis, after the inventions have been identified and reported to the Government.

Regulations implementing the revised Statement have been issued by the General Services Administration (GSA) and are contained at section 1-9 of the Federal Procurement Regulations (FPR) and section 101-4 of the Federal Property Management Regulations (FPMR). Both sets of regulations were challenged in separate lawsuits in which it was alleged respectively that non-acquisition of title by the Government, and exclusive licensing of Federally-owned patents, constituted a disposal of property in violation of Article IV, section 3, clause 2 of the Constitution.

In April 1973 FPMR 101-4 was challenged in *Public Citizen, Inc. v. Sampson*. The District Court found for the plaintiffs in a decision without an opinion, and the Government appealed. The Court of Appeals reversed the lower court, finding that the appellees lacked standing to sue. FPR 1-9 was also challenged by *Public Citizen, Inc.* in February 1974 but the District Court dismissed the complaint on the grounds that the plaintiffs did not have sufficient standing to sue. The judgment was affirmed on appeal. ✓

Article IV, section 3, clause 2 of the Constitution grants to the Congress sole power to dispose of and make rules respecting property belonging to the United States. The noted court challenges, although dismissed on procedural grounds, involved the substantive issue of the GSA Administrator's authority to promulgate regulations disposing of such property since the asserted governmental authority derived not from a congressional enactment, but from a "Presidential Statement." It is important to note that such an issue does not arise where the Congress legislates for the disposition of Government property and provides for regulatory authority in such legislation.

The Commission on Government Procurement was created by Public Law 91-129 in November 1969 to study and recommend to the Congress methods to promote the economy, efficiency, and effectiveness of procurement by the Executive Branch. The statute provided for a bipartisan, 12-member body. Two mem-

bers of the House of Representatives and a public member were appointed by the Speaker of the House; two members of the Senate and a public member were appointed by the President of the Senate. Two members of the Executive Branch and three public members were appointed by the President of the United States. The Comptroller General of the United States was designated a member by the statute.

In December 1972, the Commission issued a report to the Congress that recommended prompt and uniform implementation of the revised Presidential Statement. The Commission felt that it was premature to disturb the latest Presidential effort and that any major departures from that policy should be deferred until the revised policy could be evaluated in the light of actual agency experience. However, the Commission also provided for an alternate approach in the event that experience under the Presidential policy was unsatisfactory.

The Commission's alternate approach involved the repeal of all existing legislation concerning the disposition of rights in inventions made under Government contracts and its replacement by a statute of Government-wide application. The alternate approach provided for allowing the contractor to obtain principal rights in the invention with the Government obtaining a royalty-free nonexclusive license together with certain "march-in" rights. ("March-in" rights, which also exist under the revised Presidential Statement, are rights reserved by the Government by which it, without compensation, can require the contractor to license others under certain circumstances.)

Motivated by the lawsuits discussed earlier, new statutes affecting several agencies patent policies, and its continuing evaluation of Executive agency experience under the revised Presidential policy, the Committee on Government Patent Policy decided in September 1975 to draft legislation. Its purpose would be to obtain maximum Government-wide patent policy uniformity.

After preparing and considering several legislative proposals the Committee adopted the policy concepts of the Commission's alternate approach. This legislative proposal would permit the contract to obtain invention rights subject to the usual license to the Government, with a requirement that third parties be licensed under resulting patents in specified public interest situations. In August 1976 the Committee's draft legislation was forwarded to the Office of Management and Budget. The Administration, however, never acted to support this legislation.

In 1977, Representative Thornton introduced H.R. 8596; that bill took an approach similar to the alternate approach for Federal patent policy proposed by the Commission. The Comptroller General, in commenting on this bill, noted its similarity to the Commission alternate approach and stated, "We supported the patent policy recommendations of the Commission and we continue to believe that establishing a uniform Government-wide patent policy could foster a greater degree of commercial utilization of Federal inventions." (B-140600, September 13, 1977). No hearings were held on H.R. 8596.

B. 414 SECTION-BY-SECTION COMMENTS

Section 201—Definitions

Subsection (a) defines Federal agency as including "any executive agency as defined in section 105 of title 5, United States Code." This definition would include the General Accounting Office.

Subsections (b) and (c) respectively define funding agreement as "any contract, grant, or cooperative agreement entered into between any Federal agency and any person," and contractor as "any person that is a party to a funding agreement" (emphasis added). There is, however, no definition of person provided. A definition of person which would include partnerships, corporations, institutions, associations and other entities is necessary if such organizations, as well as individuals, are to be clearly covered by subsections (b) and (c).

Section 201 provides no definition of inventor, yet the term is used in sections 202(c) (7) and 202(d) of S. 414. Such a definition should be provided to clarify what distinction between contractor and inventor is intended in sections 202(c) (7) and 202(d).

Section 202—Disposition of rights

Subsection (a) sets forth two instances where a Federal agency may provide against retention of title to a subject invention by the contractor. The first

of these is when the contract is for the operation of a Government-owned research or production facility. The second is a potentially broad category for exceptional circumstances when the agency determines that restriction or elimination of the rights to retain title to any subject invention will better promote the policies and objectives of the Act.

An earlier version of S. 414 contained a third category for restriction or elimination of the right to retain title. This was where retention of title by the contractor might cause disclosure of classified information or otherwise impair national security. The elimination of this safeguard to national security is in our view ill-advised. Such a provision seems to us to be necessary to clearly provide protection for the security interests of the Government.

Subsection (c) provides that funding agreements with small business firms or nonprofit organizations must contain provisions to effectuate certain requirements of the Act. One such provision would stipulate that the Federal agency has the right to require periodic reporting on the utilization or efforts at obtaining utilization that are being made by the contractor. This appears to be the only means an agency would have to monitor the contractor's compliance with the provisions of the legislation. Therefore, it would be prudent to add another required provision to section 202(c) to insure that both the agency and the Comptroller General have the right to examine the pertinent books, documents, papers, and records of the contractor, or any of his assignees or licensees, in order to monitor compliance with the Act.

Subsection (d) and section 203 (march-in-rights) provide for agencies to act in accordance with "regulations promulgated hereunder" but do not specify the source of the regulations. The issuing authority should be specified, or if the intent is that regulations be promulgated by each agency individually, the sections should be amended to clarify this intent.

Section 208—Domestic and foreign protection of federally owned inventions;
Section 210—Coordination of Federal licensing practices

Sections 208(7) and 210(6) pertain to fees and royalties received by the Department of Commerce from patent licensing. The Department is to use these funds for the purpose of this legislation, thus establishing a revolving fund. GAO believes that the public interest is best served when congressional control over activities is exercised through annual reviews and affirmative action on planned programs and financing requirements through the appropriations processes. GAO has, therefore, advocated that a program be financed through direct appropriation or that legislation authorizing financing through other means provide for adequate and continuing congressional control. GAO believes that, to maintain congressional control, proposed legislation to authorize program financing by means other than through the regular appropriation process should include provisions for annual review by the Congress, coupled with such limitations and allowances for flexibility as deemed appropriate.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., July 17, 1979.

B-133386

Hon. BIRCH BAYH,
U.S. Senate.

DEAR SENATOR BAYH: On September 15, 1978, you and Senator Dole wrote that you had introduced a bill to establish a uniform Federal patent procedure for small business and nonprofit organizations and intended to hold hearings in the 96th Congress. You asked that we provide testimony, including a discussion of the procedures of the Departments of Energy and Health, Education, and Welfare for determining the patent rights for inventions arising from Government supported research and development. The procedures of these departments were to be contrasted with those of other Federal agencies.

As a result of discussions with representatives of your office and Senator Dole's, and your letter of January 8, 1979, we also obtained information on the patent policies and procedures of the Department of Defense and the National Aeronautics and Space Administration.

We gave testimony before the Senate Judiciary Committee on May 16. A background paper on Government patent policy and detailed comments on the

bill were submitted for the record. Answers to your questions were furnished for the record on June 21.

A summary of the patent policies and practices of the four agencies are included as enclosures to this letter. We obtained this information by working with patent officials of the respective agencies, but we did not ask the agencies for formal review or comment. The material is also being furnished to Senator Dole. This completes our work to satisfy your request. We are pleased to have been able to support your efforts toward a uniform Federal patent policy.

Sincerely yours,

ELMER B. STAATS,

Comptroller General of the United States.

Enclosure.

DEPARTMENT OF ENERGY PATENT POLICIES AND PROCEDURES

The Department of Energy's (DOE) patent policy is based on Section 152 of the Atomic Energy Act of 1954, as amended; Section 9 of the Federal Non-nuclear Energy Research and Development Act of 1974; and, to the extent not inconsistent with these statutes, the Presidential Memorandum and Statement of Government Patent Policy as revised August 23, 1971. Title 41 of the Code of Federal Regulations, Part 9-9, implements these statutory and Presidential guidelines.

DOE patent policies require the Government to acquire title to subject inventions made under contracts, grants, and other arrangements for research, development, and demonstration, but also provide for waiver of certain rights. When the Government retains title, the contractor retains a nonexclusive, revocable, paid-up license in the invention and the right to file and retain title in any foreign country in which the Government does not elect to secure patent rights.

The Department's policies provide that the Secretary may waive the patent rights of the Government to any invention made or to be made under contract with DOE if he determines that the interest of the United States and the general public will best be served by such waiver. There are two types of waivers--advance and individual. An advance waiver is requested at the time of contracting. If granted, the waiver results in a contract provision in which DOE waives its patent rights to all inventions made or conceived under the contract. An individual waiver is requested when a particular invention is made or conceived under a contract.

DOE's legislation established four objectives in making waiver determinations:

- Making the benefits of the energy research, development, and demonstration programs widely available to the public in the shortest practicable time;

- Promoting the commercial utilization of such inventions;

- Encouraging participation by private persons in DOE's energy programs;

and

- Fostering competition and preventing undue market concentration or the creation or maintenance of other situations inconsistent with antitrust laws.

DOE's regulations implementing its legislation also provide 13 specific criteria for the Secretary's consideration in granting advance waivers and 12 specific criteria for individual waivers.

WAIVER OF RIGHTS TO UNIVERSITIES AND SMALL BUSINESSES

Specific criteria in DOE's legislation and implementing regulations (issued July 13, 1977) provide for preferential treatment for small businesses and non-profit education institutions. Waivers are generally granted to small businesses if the contract involves their privately developed technology.

For advance waivers, DOE considers approved technology programs the equivalent of manufacturing and marketing capabilities, thus providing universities an equal footing with industry in requesting advance waivers. However, an approved program is not sufficient in itself to justify an advance waiver. The waiver request must be considered in light of the four objectives and 13 criteria established by the regulations.

DOE does not usually grant individual waivers to contractors, including small businesses, for identified inventions if DOE continues to fund development. The only basis for considering an exception is the extent to which the contractor will cost share development. DOE places great weight on cost sharing in making its waiver decisions.

For nonprofit educational institutions with technology transfer programs and capabilities that have been approved by DOE, the Department also generally grants individual waivers when it does not continue funding development after an invention is identified.

DOE's decision on each waiver request is supported by a "Statement of Considerations" which spells out the reasons for either granting or denying the waiver. Each statement cites at least one objective and the specific criteria mandated by the legislation, and explains the basis for the recommended determination. All waiver determinations are coordinated with and concurred in by the appropriate program division.

INSTITUTIONAL PATENT AGREEMENTS

DOE interprets its legislation as prohibiting the use of institutional patent agreements for waiving title to universities having approved technology transfer capabilities. The rationale for the Department's interpretation is founded on its waiver policies which are derived from the legislation discussed above.

However, for universities having DOE approved technology transfer programs, the Department adopted an abbreviated waiver petition in April 1979. This petition was developed to limit the information universities would have to submit when petitioning DOE for waiver of domestic patent rights to an identified invention.

PROCESSING ADVANCE AND INDIVIDUAL WAIVERS

As of December 31, 1978, DOE had received 422 petitions for waivers from about 5,600 invention disclosures made on more than 6,000 contracts. The Department granted 216, or 51 percent; denied 46, or 11 percent; and closed or had withdrawn 48, or 11 percent. The remaining 112, or 27 percent, were in process. These consisted of 54 petitions for advanced waivers and 58 for individual waivers.

Three hundred of the 422 petitions received by DOE were for advance waivers and 122 for individual waivers. DOE gives processing priority to advance waiver petitions because they usually are made prior to contracting and, therefore, could affect contract negotiations. Thus, only 18 percent of the advance waiver petitions were in process on December 31, 1978, while 48 percent of the individual petitions were in process. With a caseload of 112 waiver petitions in process at the end of 1978, DOE was about one year behind in processing.

We analyzed processing time on 30 individual waivers which DOE identified as calendar year 1977 cases. The Department's processing time for closed cases ranged from three to twenty-five months, averaging about 13 months. Determinations on seven cases had not been rendered as of December 31, 1978. These petitions had been outstanding from 14 to 29 months, averaging 19 months from the date the petition was received by DOE.

Analysis of DOE's 1977 and 1978 determinations disclosed that 121 waivers were granted and 49, or 40 percent, were to small businesses and universities. During this same period DOE denied 17 requests, of which 5, or 29 percent, were petitions of universities. Two university petitions were denied without prejudice because the Department was continuing to fund the invention. No small business petitions were denied.

CASE STUDIES

We reviewed 13 cases where contractors or inventors petitioned DOE for waiver of rights to identified inventions. Two cases were reviewed at the request of the Senate Subcommittee on the Constitution. The other 11 cases were selected because they were the oldest cases open when our review commenced in October 1978. During our review, 10 of the 13 petitions were approved, one was denied without prejudice (the contractor can petition again after DOE ceases project funding) and one was closed because the inventor failed to submit the required information. The remaining case also was closed because the petitioner did not submit required information but was reopened upon request for reconsideration. The time required to make determinations on the cases ranged from 10 to 41 months, averaging about 22 months from the time DOE received a formal petition.

We found the reasons for the delays in making determinations varied from case to case. In three cases the delays were attributable to DOE.

One case involved a vortex gas liquid heat exchanger developed by an employee of Sandia Laboratories. The inventor filed a waiver petition in February 1976. In June 1976, the Division of Military Applications informed the General Counsel's office at headquarters that the invention was not a subject invention conceived with DOE funding and that neither the Department nor Sandia planned to further develop or commercialize it. DOE, however, did not notify the inventor until almost two years later, in February 1978, that it would assert no rights in the invention. DOE personnel attributed the delay to an administrative oversight caused by the press of other business. They also pointed out that the inventor did not pressure DOE to resolve the case.

In another case, Texas Instruments, Inc. invented a material for solar absorption surface panels and petitioned for a waiver in September 1975. In November 1975, the Department's Chicago patent office recommended to the General Counsel's office that a waiver be granted. The Chicago office believed that a waiver would make the invention available to the public in the shortest time and would also promote the commercial utilization of the invention. However, the waiver was not granted until February 1979, or 41 months after it had been requested. A significant portion of the delay was attributed to obtaining the program office's assessment of DOE's plans for further funding and concurrence in the waiver.

In the third case reported by the Subcommittee, Stanford University requested a waiver in November 1976 to a fast transient digitizer device developed by an employee at the Stanford Linear Accelerator Center. In its petition, Stanford claimed that the device was not a subject invention. The University, however, had not previously informed DOE of this in its invention disclosure report. In response to a Department inquiry, Stanford advised in April 1977 that it wanted full domestic and foreign rights to the invention but was not sure whether filing patent applications would be economically justified. During the same month, DOE's California patent office recommended to its General Counsel's office that the waiver be granted. The office noted that the invention was being fabricated and tested for potential use in the Department's weapons testing program under a contract with EG&G, Inc., at a DOE-owned, contractor operated facility. EG&G, however, was not developing the device to the point of commercial application and did not plan to commercially manufacture the device.

In August 1978, DOE informed Stanford that its refusal to file a patent application on the invention until after the waiver determination could be viewed as a lack of intent to commercialize. DOE subsequently denied the waiver without prejudice on January 3, 1979, on the basis that it was still funding the invention. Case records indicate that nothing occurred on this case for a ten month period (October 1977 through July 1978), and the invention was being developed by EG&G largely due to the inventor's efforts. Over 25 months elapsed between Stanford's request for waiver and DOE's denial.

The second case identified by the Subcommittee for our review involved Purdue University. Purdue requested a waiver on September 29, 1977, to an invention made under a DOE contract and a National Science Foundation (NSF) grant. The invention consisted of a selective solvent extraction process utilizing cellulosic materials.

In October 1977, Dow Chemical expressed commercial interest in the solvent involved in the process. In a letter to the inventor in January 1978, Dow reaffirmed its interest in the solvent technology, but stated that it would prefer to wait until it had a clearer definition of the patent situation from DOE and NSF before beginning work. Purdue did not inform DOE of Dow's interest in the solvent.

In January 1978, DOE's Chicago patent office recommended to the General Counsel's office that the waiver be granted. However, in February 1978, the Division of Solar Technology objected because the Division had awarded Purdue a new \$220,000 contract to further develop the invention.

NSF released its interests in the invention to DOE in April 1978. Congressman Fithian of Indiana informed DOE in April 1978 of the State of Indiana's interest in the invention and urged that the waiver be granted. Also, in April 1978, an Indiana based firm informed DOE that it had indicated to Purdue that it would commit \$3.8 million to build a plant to prove the commercial feasibility of the invention. According to Congressman Fithian, this firm had also applied for a federally guaranteed loan for this purpose.

In June 1978, Congressman Fithian informed DOE that the State of Indiana would make \$750,000 available to Purdue on July 1, 1978, to pursue scaled-up

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research on the invention. On July 24, 1978, or 10 months after Purdue petitioned, DOE granted the waiver contingent upon the State of Indiana granting the \$750,000. Purdue accepted the terms of the waiver on August 21, 1978. Dow Chemical had informed Purdue on August 11, 1978, that it was no longer interested in licensing the solvent technology.

Delays on the remaining 9 cases were attributed as follows:

For 5 cases, after requesting waivers, the petitioners submitted unsolicited proposals to DOE for funding to further develop the inventions.

In 2 cases the petitioners failed to provide the required information.

In 1 case there were problems in getting the Department of Defense to lift a secrecy order imposed by the Navy on the patent application.

In another case the inventor failed to obtain invention release from his employer, file a complete petition, and notify DOE of change of address.

LICENSING

DOE does not actively promote licensing of its 4,244 domestic patents and patent applications. As of March 31, 1979, 435 or about 11 percent of its inventions had been licensed. The Department had issued 1,211 nonexclusive and 2 exclusive licenses. Because DOE does not follow up with its licensees, the Department does not know how many of its inventions are being developed and marketed.

Foreign patent applications are filed by DOE on less than 20 percent of its domestic patents. The Department maintains approximately 2,000 foreign patents on about 500 of its inventions. In calendar year 1978 DOE's royalties from foreign licenses on eight inventions totaled about \$174,500. Domestic patents are licensed royalty-free.

MARCH-IN RIGHTS

The Nonnuclear Energy R&D Act specifies the minimum rights DOE must acquire under each waiver. These include the following march-in rights:

The right to require the contractor to license others at reasonable royalties if the invention is required for use by Government regulation, or is necessary to fulfill health, safety, or energy needs;

The right to terminate the waiver in whole or in part if the contractor is not taking effective steps necessary to commercialize the invention, or will not take such steps within a reasonable time; and

The right to require licensing at reasonable royalties, or to terminate the waiver in whole or in part if it is shown at a public hearing held 4 years after the grant of a waiver that the waiver had tended to violate the antitrust laws, or the contractor has not taken, and is not expected to take, effective steps to commercialize the invention.

DOE's nuclear activities are also covered because similar provisions are a basic part of the Presidential Memorandum and Statement of Government Patent Policy and the Federal Procurement Regulations.

DOE's regulations stipulate that the normal exercising of its march-in rights requires the licensing of others rather than terminating the waiver. Contractors have maintained that the possibility of DOE terminating the waiver serves as a deterrent for investing risk capital in commercialization. DOE believes, however, that if the contractor is investing money in the development of the invention, it should feel assured that the waiver cannot be terminated unless there is a violation of the antitrust laws. DOE said that, overall, its contractors have not found march-in rights retained by the Government particularly objectionable and declared that these provisions are not a serious impediment to the Department's contracting function.

DOE said that march-in rights to protect the public's interest were developed to take care of and address the patent policy issues of contractor windfall profits, suppression from granting contractors rights to inventions. The Department believes that march-in rights, although available to the Government for more than 10 years, have not been utilized because such problems are illusory and not actual. If and when negative effects result from allowing a contractor to retain title to an invention of commercial importance, march-in rights are there to address them. Otherwise, DOE believes they will never be used.

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE PATENT POLICIES AND PROCEDURES

On April 11, 1953, the Federal Security Agency and other related agencies were consolidated into the Department of Health, Education, and Welfare (HEW). The patent regulations of the Federal Security Agency served as the model for the Department's existing regulations (45 C.F.R. Parts 6-8). Although the Department's regulations have been revised to incorporate the objectives of the Presidential Memorandum and Statement of Government Patent Policy and other special provisions affecting HEW, the regulations have not changed philosophically from their early years.

In general, HEW's regulations provide discretion to the Assistant Secretary for Health to: (1) Permit an organization (whether or not for profit) to retain rights to inventions identified during the performance of either HEW grants or contracts; (2) enter into an Institutional Patent Agreement (IPA) with a nonprofit organization whose patent policies are consistent with HEW's aims and the public's interest. An IPA provides the organization first option to future inventions made under HEW grants.

In 1958 the Department's regulations were amended to permit commercial concerns to retain the first option to future inventions when conducting cancer chemotherapy drug research under HEW contracts. This step was needed to help ensure the participation of the best qualified pharmaceutical firms, following indications that the industry would not participate without such an amendment. This exception, however, has been denied to newer drug development programs in the National Institute of Drug Abuse and the National Institute of Child Health and Human Development. According to HEW, industry participation has been difficult to obtain because of the Institutes' inability to guarantee rights to future inventions.

The Department's regulations also parallel and incorporate by reference Executive Order 10096, which governs allocation of Government employee inventions. Disposition of substantially all HEW employee inventions results in Government ownership. These inventions comprise a major portion of the Department's patent portfolio and are available for licensing.

GAO REPORT ON HEW PATENT PRACTICES

A long period of HEW uncertainty over the discretionary allocation to the innovating organization of inventions resulting from Department funded grants and contracts was brought to a close by GAO's report to the Congress, "Problem Areas Affecting Usefulness of Results of Government Sponsored Research in Medicinal Chemistry", August 14, 1968.

GAO reported that HEW's practice of retaining title-in-the-Government for inventions resulting from research in medicinal chemistry was blocking development of these inventions and cooperative efforts between the university and commercial sectors. GAO found that hundreds of new compounds developed at university laboratories had not been tested and screened by the pharmaceutical industry because these manufacturers were unwilling to undertake the expense without some possibility of obtaining on a timely basis exclusive rights to further development. GAO criticized HEW for its failure to use the discretion permitted by its regulations in either entering into IPAs or making timely determinations on requests for greater rights after identification of inventions.

In response, the Department reinstated its IPA program, revising and standardizing its agreement to ensure uniform treatment of institutions. In September 1975 the Federal Council for Science and Technology endorsed a modified HEW IPA program for discretionary use by all Executive Branch R&D agencies and a July 1978 Federal Procurement Regulation provided guidance on IPA use. As of December 1978 the Department had implemented IPAs with 75 institutions.

In 1974 HEW surveyed individual petitioning institutions and institutions with IPAs which had obtained greater rights to inventions in the performance of HEW-funded research since the GAO report. The institutions reported that 78 exclusive and 44 nonexclusive licenses had been negotiated under patents and applications filed on 329 inventions. HEW estimated that the licensees committed approximately \$65 million of private risk capital to develop these

inventions. By the end of fiscal year 1976 the number of HEW-funded inventions held by institutions had increased to 517.

The institutions also reported, however, that the rights to over 60 percent of the inventions they retained had not been licensed and may never be licensed. Thus, the retention of rights by institutions does not guarantee that the inventions will be developed and marketed.

Following the GAO report, the Department's regulations were amended to provide for exclusive licensing. As of December 1978, 19 exclusive and 90 non-exclusive licenses had been granted. HEW's Patent Branch said that, although it has done its best to license the Department's patent portfolio, it has not been able to duplicate the technology transfer accomplished by the universities. Successful technology transfer, the Branch said, requires the presence and cooperation of the inventor and/or inventing organization as an advocate of its invention or the possibility of licensing is severely decreased.

CASE STUDIES

We reviewed five cases at the request of the Senate Subcommittee on the Constitution. One involved HEW's licensing of a small business firm. The other four cases concerned individual waivers to nonprofit institutions.

LICENSING CASE

American Science and Engineering (AS&E), a small business firm, petitioned HEW in September 1976 for an exclusive license to its circle array tomography (CAT) scanner system and associated cable handling mechanism. In November 1976 the National Cancer Institute (NCI), which had funded the project, favored issuance of a nonexclusive license to AS&E. In December NCI requested that an exclusive license be granted. This request followed a meeting between the HEW Patent Branch, NCI, and AS&E officials where the company contended that their new type CAT scanner could not be easily and cheaply adapted by other manufacturers. Also in December, AS&E petitioned HEW for foreign patent rights, which the Assistant Secretary for Health granted in January 1977.

In an internal memorandum dated February 1977, the National Institute of Neurological and Communicative Disorders and Stroke questioned the proposed issuance of an exclusive license to AS&E because another company had developed a similar system. The Office of the Assistant Secretary for Health, however, following the recommendation of the National Institutes of Health Inventions and Patents Board, advertised in the Federal Register on April 7, 1977, that it intended to grant AS&E an exclusive license unless, before June 6, 1977, the Department received either statements as to why the license would not be in the best interests of the United States or applications for nonexclusive licenses.

Although statements and/or license applications and notices of interest in filing applications were received from seven firms (none of which were small businesses), the National Institutes of Health Inventions and Patents Board recommended at a meeting on June 10, 1977, that a 3-year limited exclusive license be granted to AS&E. After granting the license on June 17, 1977, the Assistant Secretary for Health cancelled both the license and AS&E's foreign rights on July 21, 1977.

Regarding cancellation of the license, the Assistant Secretary wrote:

I am compelled to take this action because the limited exclusive license was granted in violation of the applicable policies and regulations. Under the Presidential Statement on Government Patent Policy (36 F.R. 16887, August 26, 1971) and the Federal Procurement Regulations (41 CFR 1-9.107-3(a)) which implement that Policy Statement, the Department did not have authority to grant AS&E a limited exclusive license to practice the inventions developed under its contract with the National Cancer Institute unless that license was a necessary incentive to bring the inventions to the point of practical application or unless the Government's contribution to the inventions was small compared to that of AS&E. The responses to the notice of intent to grant an exclusive license to AS&E, which appeared in the Federal Register (42 F.R. 18151, April 7, 1977), established that an exclusive license was not a necessary incentive to bring the inventions to the point of practical application. The contract under which the inventions were made was fully funded by the National Cancer Institute and thus the Government's

contribution to the inventions was not small compared to that of AS&E. The exclusive license to AS&E was therefore granted without authority and in violation of the Presidential Statement on Government Patent Policy and the Federal Procurement Regulations.

The General Accounting Office believes the AS&E case demonstrates that an agency operating under the Presidential policy can move in almost any direction when determining rights to inventions.

WAIVER CASES

One case involved two inventions by University of Texas scientists relating to the hormone thymosin used for treatment of malfunctioning immune systems, which can make people susceptible to arthritis and several kinds of cancer. These inventions were made with National Institutes of Health (NIH) funding and reported to HEW in September 1977, when the University also petitioned for rights. This was over four months after the University obtained a patent on one invention and over 10 months after it filed a patent application on the second invention.

HEW's Patent Branch received NIH comments in October and November 1977 and sent a determination to the Assistant General Counsel for review in December. This determination granting rights to the University was not acted on by the Assistant General Counsel until August 30, 1978, when it was sent to the Assistant Secretary for Health, who signed it in September.

It appears that development of the inventions was not impaired because the Assistant General Counsel delayed granting rights to the University. In July 1977 the inventor reported that a drug firm's studies of the invention showed that the compounds are not toxic.

In another case a Columbia University scientist with an NIH grant invented a solution for treatment of persons with severe burns. Although the University filed a patent application in December 1974 and the invention was published in International Surgery's June-July 1975 issue, the invention was not reported to HEW until March 1976.

Research Corporation, an invention management firm, together with Columbia petitioned HEW for rights in October 1976. Research Corporation estimated that it would take from 5 to 8 years and an investment of about \$850,000 to market the invention. Therefore, a time limited exclusive license would have to be offered before a commercial firm would make such an investment.

NIH informed HEW's Patent Branch in December 1976 that it did not object to Columbia and Research Corporation retaining title, but the Patent Branch did not send such a determination to the Assistant General Counsel until October 1977. Patent Branch officials could not explain why this delay occurred.

The Assistant General Counsel then delayed the determination another 11 months until September 1978 when it was sent to and signed by the Assistant Secretary for Health.

A third case involved an invention entitled, "Undecapeptide and Tumor Assay." This invention, discovered by the Weizmann Institute of Science under an NIH contract, could be useful in a follow-up for post-operative diagnosis and prognosis on cancer patients. The Institute first reported the invention to HEW in 1974, when the Department decided that patent protection was not warranted. Subsequently, in June 1976, the full results of the research were published in scientific journals.

The following October a drug firm approached the Weizmann Institute indicating it would be willing to prepare, file, and prosecute a U.S. patent application as consideration for an option to an exclusive license for some limited period. The Institute requested HEW's permission to file a U.S. application in November 1976. The Department granted permission on December 1, 1976, and the application was filed later that month. Through Yeda Research and Development Company Ltd., its patent agent, the Institute petitioned HEW for rights in February 1977. In the petition, Yeda stated its intention to grant the drug firm exclusivity as an incentive to market the invention.

In response to a HEW Patent Branch request for additional information, Yeda informed the Department in August 1977 that from two to three years and from one to five million dollars would be required to develop the invention to the point of submission to the Food and Drug Administration. NIH, in its comments to the Patent Branch in September 1977, stated that it was virtually impossible to predict the usefulness of the invention and its role in diagnostic testing. NIH

said that it had no objection to permitting Yeda to retain title and that it was unlikely that the invention would be developed without an exclusive license to a potential manufacturer. On November 4, 1977, the Patent Branch sent a determination granting rights to Yeda to the Assistant General Counsel for review.

However, on September 8, 1978, the Assistant General Counsel sent a determination retaining title for the Government to the Assistant Secretary for Health. The Assistant General Counsel found no legal justification for the waiver, noting that Yeda had not promoted the invention and would not supply any of the risk capital needed to develop it. The drug firm had assisted Yeda with the patent application and waiver petition and would develop the invention. The Assistant General Counsel further found that exclusive licensing appeared necessary and recommended retaining title for the Government. On January 24, 1979, the Assistant Secretary denied Yeda's petition.

In the remaining case two University of Arizona scientists invented a potential method for testing the effectiveness of drugs in individual cancer cases without administering the drugs to the patient. The University reported the invention to HEW's Patent Branch and requested a waiver in July 1977. The invention was also published in the July 1977 issue of Science.

NIH in September 1977 informed the Patent Branch that it did not object to the University retaining title to the invention, but added that it had contracts with other institutions for related research and that commercial interest would be high enough that an exclusive license would not be needed to stimulate development of a marketable product. In reply to a Patent Branch request, the University in October 1977 provided additional information for NIH evaluation, estimating that development would take from 3 to 5 years and would cost a licensee from \$2,250,000 to \$5,000,000. In November NIH informed the Patent Branch that the University's petition should be granted even though many questions regarding the invention's clinical utility were still unanswered. The Patent Branch on December 29, 1977, sent a determination granting title to the University to the Assistant General Counsel for review.

The Assistant General Counsel's office advised the Patent Branch in April 1978 that the petition would not be favorably considered in the near future and in September 1978 returned the determination to the Patent Branch for further evaluation. Meanwhile, in July 1978 the Patent Branch had learned of a potential licensee's interest in funding development of the invention in return for an exclusive license. The Patent Branch returned the determination to the Assistant General Counsel in November 1978. This determination, granting title to the University, was approved by the Assistant Secretary for Health on March 23, 1979.

DEPARTMENT OF DEFENSE PATENT POLICIES AND PROCEDURES

The policies and regulations of the Department of Defense (DOD) are based on the Presidential Memorandum and Statement of Government Patent Policy. Most DOD contracts allow contractors with an established commercial position to retain title to their inventions in accordance with Section 1(b) of the Presidential Policy.

Because nonprofit institutions lacked an established commercial position, DOD interpreted the Presidential Policy as requiring the use of a deferred determination clause—where rights are determined after an invention has been identified. However, for many years the Department got around this by using the "special situations" provision of Section 1(c) of the Policy to put a title-in-the-contractor type of clause (license clause) in contracts with universities on a DOD list of nonprofit organizations with "approved" patent policies.

On August 29, 1975, DOD, with no advance notification, issued Defense Procurement Circular (DPC) 75-3, revising its Armed Services Procurement Regulation (ASPR). This circular terminated the Department's use of its list, and thereby did away with the approved patent policy concept as a special situation under Section 1(c). In lieu thereof, the circular provided that any prospective contractor having an effective program for the transfer of technology, as demonstrated by its licensing of inventions, would be entitled to a license clause in a contract where a deferred patent rights clause would otherwise be appropriate.

Educational and nonprofit institutions were required to demonstrably have such programs in order to be entitled to the license clause, whether or not their patent policies had previously been approved. Additionally, the revision required that the work to be performed under the contract must be in a field of tech-

nology directly related to an area of technology in which the university had an effective licensing program.

The Senate Subcommittee on the Constitution asked GAO to examine DOD's decision to discontinue its special situations treatment of nonprofit institutions. We found that the DOD revision was intended to implement the revised Presidential Memorandum and Statement of Government Patent Policy and was the subject of an ASPR case established in March 1975.

At an ASPR Committee meeting in May 1975, the Patents Subcommittee Chairman briefed committee members on the proposed revisions. The case record shows:

The OASD (I&L) Staff Representative present indicated that he no longer objected to the publication of the revised ASPR provision and recommended that the normal requirement for Industry comments be waived. The Subcommittee Chairman then briefly described the differences between the proposed ASPR coverage and the recently published FPR coverage. As a result of the discussion at this meeting, the Committee agreed that the finally approved coverage should be published in the next DPC; that a letter should be prepared by the Subcommittee Chairman to the Industry Associations normally solicited for comment, informing them that their comments were not requested prior to publication because the ASPR coverage parallels the FPR and Industry was provided two opportunities to comment on that coverage. Moreover, DOD representatives were part of the group that developed the FPR coverage and therefore were able to review the Industry comments on that coverage.

On July 9, 1975, the Committee approved the ASPR revision, and reviewed and approved the letter to industry. This letter, subsequently dated August 29, 1975, was sent to educational and nonprofit institutions on DOD's list of universities with approved patent policies. The letter, which was signed by the Department's representative serving on the Committee on Government Patent Policy, did not explain DOD's rationale for not obtaining comments prior to publication of DPC 75-3.

In September 1975 the Committee on Government Patent Policy adopted the recommendations of its University Patent Policy Ad Hoc Subcommittee. That report basically recommended that all agencies of the Executive Branch provide universities and nonprofit organizations a first option of title retention to substantially all inventions generated by them with Federal support if they are found to have an established technology transfer capability.

In November 1975 the California Institute of Technology replied to DOD's letter:

* * * the University community is confused and surprised by the fact the DPC 75-3 appears to move in substantially the opposite direction to the philosophies of and proposals made in the July 1975 report of the University Patent Policy Ad Hoc Subcommittee * * *. It is our understanding that DOD has strong representation on said Ad Hoc Committee.

The Institute also commented on DOD's implementation of the revised ASPR:

We have already had several instances of attempting to qualify for a "license" clause in connection with individual contracts and grants. Apart from the fact that these procedures will materially increase the work load of contracting personnel on both sides, it would appear that the criteria being utilized in this area is counterproductive. Specifically, we are being required to indicate successful past licensing in the specific field of technology of each proposal. The net result, particularly in universities engaged in basic research and continually moving into new fields, will be to slowly diminish the areas in which a university contractor might qualify for advance waiver. It should be recognized that a successful licensing activity at a university provides a capability in all fields and that industrial representatives seeking new technology at universities are interested in all fields of technology in which the university may be involved. It is strongly urged that the Department of Defense reconsider the narrow interpretation placed upon the expression "directly related to the field of technology" as currently applied by Contracting Officers and DOD Patent Counsel, and accept the much more practical proposition that a well-organized and proven patent licensing program at a university can be effective in all fields of technology.

Because of the additional administrative burden, many research institutions subsequently elected not to submit the information DOD required for the title retention clause. As a result, statistics published in the Federal Council for Science and Technology's Report on Government Patent Policy showed that there was an 80 percent increase in the use of deferred determination clauses by DOD during fiscal year 1976. Our review of cases processed during that year showed that, although contractors' requests for greater rights in identified inventions were approved in all cases, the Department took from 1 to more than 7 months to make those determinations.

The University Patent Policy Ad Hoc Subcommittee of the Committee on Government Patent Policy reported that it appeared that a deferred determination often acts against the expeditious development and utilization of inventions by delaying a decision that could have been made at the time of funding. Administrative costs of both the Government and universities are unnecessarily increased by the need to prepare, review, and respond to requests for rights on a case-by-case basis.

The Navy noted in February 1976 that not only had an additional administrative burden been placed on universities, but that the time necessary for contracting and patent officers to make a determination on the appropriate patent clause had increased drastically. In 1977 the Air Force, after conducting a thorough review of the revised policy, determined that the practice of qualifying institutions for each contract was moving in a direction counter productive to a cost effective, reasonably acceptable policy.

Despite its representation on the Ad Hoc Subcommittee which endorsed them, DOD has not implemented the use of Institutional Patent Agreements.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PATENT POLICIES AND PROCEDURES

NASA patent policies and practices are based on Section 305 of the National Aeronautics and Space Act of 1958, the 1971 Presidential Memorandum and Statement of Government Patent Policy, and Executive Order 10096. Section 305 provides that any invention conceived or first reduced to practice in the performance of work under a NASA contract becomes the exclusive property of the Government, unless the NASA Administrator determines that the interests of the United States will be served by waiving all or part of the Government's rights. Rights to inventions made in-house by NASA employees are determined by the agency pursuant to provisions of Executive Order 10096, dated January 23, 1950.

REPORTING AND EVALUATING INVENTIONS

Section 305 of the Space Act provides that NASA contracts contain provisions requiring reporting of inventions, discoveries, improvements, and innovations. NASA evaluates those for which it has or may acquire the right to file for a patent. This evaluation is basically a two step process and applies to both contractor inventions and inventions of its own employees.

The first step, basically a technological evaluation, is to determine the technical significance of the invention, its potential use by or for the Government, and its commercial potential. If further interest is justified, it is then evaluated for patentable novelty. This is basically a legal evaluation to determine whether a patent can be obtained, and if so, its scope. The determination to file for a patent is based on a composite of these two evaluations and is made by the NASA Patent Counsel. Once a domestic patent application is filed there is a review to determine whether foreign patent protection should be sought, and if so, in what countries.

As an incentive for the reporting of inventions, NASA makes a monetary award for each invention on which a patent application is filed. The amount of the award is based on consideration of such factors as the technological significance of the invention, its value to NASA in carrying out its programs, and the commercial use or potential of the invention.

For calendar years 1959 through 1978, 37,474 invention disclosures were reported to NASA and 3,302 patents were issued. Excluding the 1,043 invention disclosures still being processed at December 31, 1978, NASA had obtained one patent for about each eleven inventions reported by its employees and contractors.

Section 305 also establishes a procedure for NASA to review all patent applications pending in the U.S. Patent and Trademark Office on inventions which ap-

pear to the Commissioner of Patents and Trademarks "to have significant utility in the conduct of aeronautical and space activities." Additionally, Section 305 provides procedures for a Board of Patent Interferences hearing to establish title whenever the NASA Administrator believes that an invention not reported to NASA was made under a NASA contract. From January 1959 through July 1977, NASA reviewed 9,600 applications and contested 174 of them. NASA succeeded in obtaining patent rights in 114 of these cases.

OWNERSHIP RIGHTS

NASA obtains rights to inventions reported by its contractors unless its Administrator waives these rights. The agency's waiver policy, established by Section 305 of the Space Act, is implemented by the NASA Patent Waiver Regulations (14 C.F.R. 1245.1). These regulations also incorporate the objectives and criteria set forth in the Presidential Memorandum and Statement of Government Patent Policy.

Rights to inventions made in-house by agency employees are determined by NASA based on provisions of Executive Order 10096, i.e. in the same manner as other agencies covered by this Order.

INVENTIONS AND CONTRIBUTIONS BOARD

The NASA Administrator's waiver of rights may be to an individual invention or to a class of inventions, and is granted upon the recommendations of an Inventions and Contributions Board (ICB). The ICB is appointed by the Administrator and consists of a chairman and no less than six members who are senior NASA program officials. The ICB meets at least monthly and provides recommendations on waiver requests, licensing of inventions, and monetary awards.

NASA WAIVER POLICY

NASA's Administrator is empowered to grant two types of domestic waivers. Advance waivers are those granted for any invention which may be made under a given contract. Individual waivers are those granted for inventions identified and reported subsequent to the start of a contract. The Administrator can also grant foreign waivers.

ADVANCE WAIVERS

NASA's ICB will recommend grant of an advance waiver unless:

- (1) A principal purpose of the contract is to create, develop or improve products, processes, or methods which are intended for commercial use by the general public at home or abroad, or which will be required for such use by governmental regulations; or
- (2) A principal purpose of the contract is for exploration into fields which directly concern the public health, public safety, or public welfare; or
- (3) the contract is in a field of science or technology in which there has been little significant experience outside of work funded by the Government, or where the Government has been the principal developer of the field and the acquisition of exclusive rights at the time of contracting might confer on the contractor a preferred or dominant position; or
- (4) the services of the contractor are for the operation of a Government-owned research or production facility or for coordinating and directing the work of other.

To recommend an advance waiver, the ICB must also find that the work called for under the contract is to build upon existing knowledge or technology; is to develop information, products, processes, or methods for use by the Government; and is in a field of technology in which the contractor has acquired technical competence directly related to an area in which the contractor has an established nongovernmental commercial position. These criteria are prescribed by the Presidential Memorandum and Statement.

NASA's Patent Waiver Regulations also take into account the "exceptional circumstances" and "special situations" provisions of the Presidential Memorandum and Statement.

Examples of exceptional circumstances recognized by NASA include: a contract where participation of the contractor may only be secured through the grant of waiver and the contractor is deemed essential to a NASA program; a

contract having as a principal objective the application of aerospace-related technology to other uses in accordance with an established NASA technology application program and where the grant of the waiver would materially advance this objective; or, a cooperative endeavor where the contract calls for a significant contribution of funds by the contractor to the work to be performed.

Also, in the case of an individual invention identified prior to contract execution, exceptional circumstances may be found (1) where waiver is a necessary incentive to call forth risk capital and expenditures to bring the invention to the point of practical or commercial application and (2) where either the contractor has established substantial equities at his own expense in the development of the invention or, the grant of an advance waiver will significantly advance availability of the invention to the general public.

Examples of special situations include: a newly formed company having a definite program for establishing a nongovernmental commercial position in the field of the contract or a directly related area; an established company lacking an established nongovernmental commercial position in the field of the contract or a directly related field, but having established plans and programs for achieving such a position; and an educational or nonprofit institution having an established patent policy and an effective program for acquiring rights to inventions and bringing the results of such inventions to commercial application by itself or through others.

For calendar years 1959 through 1978, NASA received 906 petitions for advance waivers. The Administrator granted 463. Contractors reported 216 inventions or classes of inventions (on which they intended to file patent applications) under these contracts.

INDIVIDUAL WAIVERS

NASA's ICB will recommend grant of a waiver after identification and reporting where the Board makes the following findings:

(1) The invention is not directly related to a governmental program for creating, developing, or improving products, processes, or methods for use by the general public at home or abroad.

(2) The invention is not likely to be required by governmental regulations for use by the general public at home or abroad.

(3) The invention does not directly concern the public welfare.

(4) The invention is not in a field of science or technology in which there has been little significant experience outside of work funded by the Government, or where the Government has been the principal developer of the field and the acquisition of exclusive rights in the invention would not likely confer on the petitioner a preferred or dominant position.

The Board must also find that, in view of the petitioner's plans to bring the invention to the point of practical application, the incentives provided by waiver will increase the likelihood that the benefits of the invention would be readily available to the public at an early date.

If the Board is unable to make one of the four findings to support a waiver, the Board may still recommend that waiver of rights be granted by the Administrator if it finds that such waiver is a necessary incentive to call forth risk capital and expenditures to bring the invention to the point of practical application, or that the Government's contribution to the invention is small compared to that of the contractor.

NASA contractors reported 31,357 inventions to the agency for calendar years 1959 through 1978. They requested 1,366 waivers and the Administrator granted 1,035. About 3 percent of the inventions reported were waived.

PATENT UTILIZATION

NASA believes that one of its objectives under the Space Act is to enhance the leadership of the United States in aeronautical and space activities and make the results of these activities available to the public. Thus, NASA has implemented various programs to promote the commercial development and utilization of aeronautical and space technology. NASA said its patent policies and procedures have been adopted to augment these programs and its decisions regarding the allocation and utilization of patent rights are made with this objective in mind.

PATENT UTILIZATION-LICENSING

NASA's program for licensing inventions to which it has acquired title is based on Section 305 of the Space Act and is implemented by NASA Patent Licensing Regulations (14 C.F.R. 1245.2). Both nonexclusive and exclusive licenses are available.

In order to locate prospective licensees who want to commercialize an invention, NASA uses a variety of methods to inform the public of its technology available for licensing. Abstracts of the agency's inventions appear in its publications. Additionally, NASA inventions available for licensing are listed in the Federal Register and the Official Gazette of the U.S. Patent and Trademark Office.

The National Technical Information Service also publishes a weekly journal entitled "Government Inventions for Licensing" which includes NASA abstracts and licensing information. NASA said that it has not been able to identify or relate any licensing inquiries for agency owned inventions to the NTIS journal. NASA also said it holds and participates in licensing conferences and workshops and its Industrial Applications Centers disseminate both abstracts of inventions available for licensing and information on how to obtain licenses.

NASA promotes nonexclusive licenses, but may grant exclusive licenses if it determines that the invention is not likely to be brought to commercialization under a nonexclusive license or by further Government funding and that the exclusive license will provide the necessary risk capital to achieve commercial use of the invention. NASA normally does not require royalties for a non-exclusive license but may for an exclusive license.

DOMESTIC LICENSING

Each application for a domestic license is initially reviewed in NASA's Office of General Counsel. If the application conforms to the regulations and the license requested appears appropriate, the application is forwarded to the Inventions and Contributions Board. The ICB recommends to the Administrator whether a nonexclusive or exclusive license should be granted and any terms and conditions of the license.

If a determination is made to grant a nonexclusive license, the terms and conditions are negotiated by the Office of General Counsel. If the determination is made to grant an exclusive license, notice of this intent, along with the identification of the invention, license, and special terms and conditions, are published in the Federal Register. The exclusive license will be granted unless, within 30 days of the notice, a statement is received from any person setting forth reasons why it would not be in the interest of the United States to grant the proposed license, or an application for a nonexclusive license is received which states that the invention is likely to be brought to practical application within a reasonable period of time.

As of December 31, 1978, NASA had 251 licenses in force on 123 of its 3,512 domestic patents and applications. Nine of these licenses were exclusive and 242 nonexclusive.

NASA negotiates a specific date for commercialization with its licensees and requires that the invention be practiced for the term of the license, which usually is less than the term of the patent. Licensees are required to report annually on their progress in commercializing the inventions. NASA recently inquired about commercialization efforts of its 242 nonexclusive licensees; 138 or 57 percent responded. Fifty, or about 20 percent of the total licensees, reported they were pursuing development and marketing efforts.

FOREIGN LICENSING

Inventions on which NASA obtained patents in foreign countries are available for licensing in those countries. NASA's foreign licensing objectives are to further the interests of U.S. industry, enhance U.S. economic interests, and advance U.S. international relationships.

Foreign licenses can be either exclusive or nonexclusive. In granting foreign licenses, preference is given to the applicant who has previously been granted a license for the invention in the United States. NASA requires royalties or some other consideration under all foreign licenses.

As of December 31, 1978, NASA had 787 foreign patents on 184 inventions. Fifty-nine were licensed exclusively to 7 licensees.

PATENT UTILIZATION-WAIVERS

Where NASA waives property rights to inventions made under its contracts, the Inventions and Contributions Board periodically monitors the waiver recipients. Through 1977 NASA waived rights to 1,046 inventions, but subsequently voided 258 of these. NASA said that 193 or about 18.5 percent of its waived inventions were utilized or commercialized.

NASA's data on 523 inventions waived prior to 1975 showed: 84 in use in a commercial process, product, or service; 15 fully developed with Government use; 91 under development; 68 available for licensing; 228 without active commercialization or licensing efforts; and 37 obsolete.

Waiver recipients reported that the 15 fully developed inventions were ready for commercial use, but they had found only Government use in addition to NASA's use.

Most of the 91 inventions under development were being developed by the waiver recipient. Where development was being done by licensees, the inventions resulted primarily from university and nonprofit research organizations.

The only effort being undertaken for 68 inventions was to find a licensee. Many of these inventions resulted from universities and research organizations which did not have manufacturing capability. In some cases where the waiver recipient was a manufacturer, the invention was reported as being outside of its business or manufacturing activity.

NASA believed the 228 inventions without commercialization or licensing activity may have some utility. The agency, however, attributed the lack of interest in these to the following: no commercial need or market; inventions too costly to develop; inventions not cost competitive; technology too sophisticated; market too small to justify production; funding not available; and invention shelved indefinitely because of other priorities.

Thirty-seven inventions were obsolete because (1) other or better products and methods were available; (2) they were superseded by other technology; (3) they were not compatible with present systems; or (4) the state-of-the-art had passed them by.

MARCH-IN RIGHTS

NASA includes march-in rights in its waiver instrument. The Administrator reserves the right to require the granting of a nonexclusive or exclusive license for the practice of the invention:

(1) Unless, within 3 years after the patent is issued, the waiver recipient has taken effective steps to bring the invention to the point of commercial application and thereafter continues to make its benefits reasonably accessible to the public, or

(2) Unless, within 3 years after the patent is issued, the waiver recipient has taken effective steps to make such patent available for licensing on terms that are reasonable, or

(3) As may be appropriate to satisfy governmental regulation for public use or as may be necessary to fulfill health or safety needs or other public purposes.

Under the terms of the waiver instrument, the recipient agrees, if requested by NASA, to provide a written report to the agency not more often than annually on the commercial use of the invention. NASA evaluates these reports to ascertain compliance with conditions of the waiver.

NASA has not enforced its "march-in" rights by directing waiver recipients to license others under the conditions specified in the waiver instrument. Rather, when the recipient does not comply with requirements, the waiver is voided and title to the invention is taken back by NASA. The invention then is made available for licensing to third parties under the agency's licensing regulations. On December 31, 1977, NASA had voided 258 waivers. All of these were voluntary on the part of the waiver recipient. NASA said that most of the waivers were voided at the request of the recipient and not for failure to comply with "march-in" provisions in the waiver instrument.

Senator BAYH. Our next witnesses are a panel of witnesses in the area of health research: Dr. Leland C. Clark, Jr.; Dr. Hector F. DeLuca; and Dr. H. Donald Putney.

Dr. Leland C. Clark, Jr., received a Ph. D. from the University of Rochester in 1914 and has published nearly 300 scientific papers and is author or coauthor of a number of patents. He is currently professor of research pediatrics at the Children's Hospital Research Foundation, in the Cincinnati College of Medicine, Cincinnati, Ohio. Dr. Clark is well-known for his invention, the Clark electrode, which is used worldwide for measuring oxygen in blood, streams and rivers, and food products. He also invented the first bubble-defoam heart lung machine and pioneered its use in some of the first animal and human open-heart surgery.

Dr. Hector F. DeLuca is the chairman of the Biochemistry Department of the University of Wisconsin in Madison, Wis. He is an honors graduate of the University of Colorado and received a Ph. D. in biochemistry from the University of Wisconsin. Dr. DeLuca has been involved in a number of important discoveries in the field of vitamins and their effect on the human metabolism. Dr. DeLuca is also credited with over 350 publications in his field of expertise.

Mr. H. Donald Putney is a graduate of the University of Kansas and is presently serving as the senior vice president of the Fox Chase Cancer Center in Philadelphia, Pa. Mr. Putney has been very involved with cancer research at the center and was kind enough to fill in for his colleague, Dr. Baruch S. Blumberg, who was unable to attend today's hearing.

Senator BAYH. We appreciate it, doctors, that you are with us today. I have no preference as to who shall speak first.

Mr. PUTNEY. I might suggest, Mr. Chairman, that since Dr. DeLuca has a plane to catch this afternoon, he be first to lead off.

Senator BAYH. That is the most practical protocol I have heard in a long time. [Laughter.]

TESTIMONY OF DR. HECTOR F. DELUCA, CHAIRMAN, BIO-CHEMISTRY DEPARTMENT, UNIVERSITY OF WISCONSIN, MADISON; DR. LELAND C. CLARK, JR., PROFESSOR OF RESEARCH PEDIATRICS, CHILDREN'S HOSPITAL RESEARCH FOUNDATION, CINCINNATI, OHIO; MR. H. DONALD PUTNEY, SENIOR VICE PRESIDENT, THE FOX CHASE CANCER CENTER, PHILADELPHIA, PA.

Mr. DELUCA. Thank you very much, Mr. Chairman.

It is a great pleasure to speak on behalf of Senate bill No. 414 dedicated to the maximum utilization of scientific information generated from federally supported gifts, grants, and contracts.

I am a recipient of Government support in the health research area and have, through my efforts and the efforts of my colleagues, been able to generate some 23 U.S. patents and 80 foreign patents. This work was supported with a combination of funds from the University of Wisconsin and U.S. Government grants, primarily from the Department of Health, Education, and Welfare.

In addition, I have had the experience of dealing with the National Institutes of Health on a case-by-case basis for permission to file and assign patents to the nonprofit organization, Wisconsin Alumni Re-

search Foundation. I have also had considerable experience with the use of the Institutional Patent Agreement between the University of Wisconsin, with WARF as the designee of the university under this agreement, and DHEW. My experience could therefore be of benefit to those of you considering bill No. 414 since it will illustrate the effectiveness of the IPA system.

As an introduction, I am a Harry Steenbock research professor and chairman of the Department of Biochemistry at the University of Wisconsin-Madison. I have recently been honored by being elected to the National Academy of Sciences and have received other awards in recognition of my contributions to the field of nutrition and biochemistry.

My work has been devoted to understanding how vitamin D works to promote healthy bone, muscle, and nervous tissue. During the course of our investigation we learned that vitamin D had to be changed in the body to functional forms before it could work. This led to the isolation, identification, and chemical synthesis of the active forms of vitamin D.

One of these proved to be a new hormone necessary for bone growth and development and for regulating the blood levels of calcium and phosphorus. These active forms of vitamin D and chemical synthetic analogs have been the basis for the patents referred to above. In addition, we have conceived many divergent uses for those activated forms of vitamin D both in medicine and agriculture.

In 1968 we isolated and identified a form of vitamin D called 25-hydroxy-vitamin D. At that time all patents resulting from NIH-supported work were the property of the Federal Government. Application for rights to the patent seemed difficult since previous attempts by WARF and the university with other inventions from the university were rejected.

To meet deadline dates we risked filing the patent application at our own expense. We then applied on a single case basis for permission to file a patent and assign patent rights to WARF, a nonprofit organization that contributes research moneys to the University of Wisconsin.

After a considerable length of time, and primarily because of the foresight of an NIH Administrator, N. Latker, permission was granted. This compound has not yet made its appearance on the market in the United States but has finally appeared in France as a treatment for bone disease. ✓

The timespan is essentially 10 years without a product available to the U.S. public. Much of this delay is due to the uncertainty by drug companies regarding investment of capital to develop the compound as a drug without adequate protection.

In our continuing work we isolated and identified the most active form of vitamin D found in the body; namely, 1,25-dihydroxyvitamin D₃ in 1971. By that time we enjoyed an IPA with DHEW. WARF was able to quickly negotiate with Hoffmann-LaRoche, Nutley, New Jersey, and assign them a nonexclusive license to develop this substance for the treatment of disease. Roche was, therefore, assured that their investment would be protected and spent considerable sums of money to develop the product by devising a commercially feasible

method of preparation, and by carrying out the Food and Drug Administration required toxicology and testing.

This resulted in a product called Rocaltrol now available to the American public for treatment of debilitating and previously unmanaged bone disease caused by kidney failure. In large measure therefore the IPA route resulted in an important new medical breakthrough available to the American public in 7 years, a remarkably short time for the development of a drug under the American-FDA system.

Most important, an industrial company was willing to invest its time and funds to develop the compound. This compound is now being readied for wide use in the treatment of a variety of bone diseases with great promise. Thus the American public, who invested their tax dollars to support our research, will receive in return the benefit of their investment quickly by using the American patent system to its full advantage.

Furthermore, from the foreign filings we anticipate that the U.S. will receive considerable income from royalties paid for use of American-developed technology. The IPA has worked extremely well between the University of Wisconsin and NIH and there are several reasons why. I would like to enumerate these reasons.

(1) To begin with, an inventor or research investigator supported by Federal research grants is not encouraged to develop new and novel patentable ideas unless there is an institutional agreement that serves as an inducement for that inventor to conceive and to divulge new inventions.

Under Government ownership of patents there is no feedback of funds to the institution or to the inventor and thus the inventor is deprived of an important inducement to conceive and develop inventions. I believe that without the IPA I would not have been encouraged to file any of the patent applications which are now resulting in clear benefits to the American population and to the United States in general.

(2) Especially in the health science field, industrial companies are reluctant to invest large sums of money required to carry out the tests needed for approval by the FDA for a new therapeutic substance unless their investment is protected from invasion by other companies.

It is of considerable interest to note that very few Government-owned patents are picked up and developed by industry as has been demonstrated by Senators Bayh and Dole. If, however, patent protection is available, the companies are willing to invest their funds to develop a new substance for market and treatment of disease, a necessary step for the public to benefit from NIH-supported research.

(3) When an inventor files applications both in the United States and foreign countries, foreign industries utilizing American technology are forced to pay royalties to the United States, thus giving an important boost to the balance of payments.

Furthermore, it provides an equal opportunity, if not an advantage, for our companies to compete with foreign companies for the development of American inventions. If patents are not filed by an inventor, or are filed only in the United States—as with most Government-owned patents—foreign companies can file ancillary patents, develop an in-

vention on the basis of American technology and then reap benefits from the American consumer without paying for the original research. If the system of patentable inventions is discouraged, the primary loser is, I submit, the American public.

A final point worth making is the question of whether the support of a scientist by a Federal grant means that the Federal Government owns the ideas and concepts originated by the scientist. It seems to me that this may well be an invasion of human rights to have an agency that supports the work of a scientist assume ownership of the scientist's ideas.

This legislation would rightfully give back some of the ownership to the inventor and his home institution, who can return the products of his inventiveness to support his continued work and the work of his colleagues in that institution. This legislation is I believe extremely important to individuals such as myself, and I feel it is extremely important to the taxpayers who pay the bills in the first place.

My last comment should, of course, mention that the IPA gives the Federal Government royalty-free use of the patents; and, furthermore, there are march-in rights, as have been discussed.

There is one additional point that perhaps needs high-lighting. That is there is no reward to a scholarly scientist at a university for patents filed. Therefore, he receives no credit in his quest funding for his research based on patents.

This means that if he gets no feedback from his patent efforts back to his institution, there is no way that he will be rewarded. Therefore, there are a number of inventions that never see the light of day. They are never filed. They are never pursued.

This is something that is very hard to measure, but I am sure it is very real. If there is an IPA agreement with institutions, inventors will want to proceed with their patent applications. I think there is a degree of inventiveness that really will be tapped under this legislation.

Thank you.

Senator BAYH. Thank you very much, Dr. Deluca.

Either Dr. Clark or Dr. Putney? Do you have a plane to catch? Please go ahead.

Dr. CLARK. I feel in the mood to go ahead.

Senator BAYH. Move when the mood hits you.

Dr. CLARK. All right.

Thank you very much.

I feel honored and very pleased to be here.

I am here to give my response, to bill #14. I have studied this bill and believe that it will further invention in this country and it will, also, facilitate cooperation between the academic and industrial world by removing inhibitions on free and easy communication of ideas and findings.

A note about where I am now.

The primary purpose of our nonprofit research institute is to do research and to help sick children. Incidental to doing this research, inventions sometimes arise, an invention to help in the research or to directly benefit the children.

I happen to be at this particular institute because about 25 years ago I brought my heart/lang machine there, a very simple kind of

heart/lung machine, which is still very widely used, to see if we could develop the knowledge and the team to use it for open-heart surgery in children.

In the past 25 years in the course pursuing the inventive process, I have interfaced with universities, nonprofit institutions, patent lawyers, small business, the U.S. Air Force, the NIH, and private funding agencies. I can assure you that rules and regulations which are in conflict with one another and which cause doubt about the ownership and disposition of the fruits of the brain, the intellectual property of creative people, such conflicting rules have a repressive and chilling effect on the inventor. Such chaotic regulations are extremely costly to deal with, involving, as they often do Government and private funding agencies, patent attorney, university administrators and the inventor.

Often the actual costs of an invention and the patent itself pale to insignificance before these legal hassles and discussions about ownership. There are many cases in universities—and there are one or two in ours—where the cost caused by the delay in determining ownership far exceeded the money or effort put into the invention itself. For a scientist the many hours dissipated in these complex negotiations are distracting and unproductive. They turn off the creative juices. The natural flow of ideas and scientific experiments is disrupted. Far too much time of creative scientists is spent in preparing grant contracts and/or applications, quarterly, semiannual, annual, comprehensive, and final reports and nonproductive paperwork, as it is. If creativity and innovation are to be increased the scientist/inventor must have more freedom from distraction and more time in the library and laboratory concentrating on science.

By clearly establishing ownership rights in advance, bill 414 would lift this burden of snarled redtape resulting from the complicated labyrinth of regulations now in effect.

Remember the matter of ownership of an invention is usually the first sentence in any inventor business agreement.

If I may say so, it is personally as frustrating to a scientist/inventor to see his invention set aside for prolonged consideration or treated clumsily as it is for a writer to have his works ignored or banned or an artist to have his paintings stored in the attic.

Bill 414 clears the way from the beginning of the idea to the invention and to the innovation process required, to benefit society.

There is a song now which I think Stevie Wonder sings, which says: "I can see clearly now."

Bill 414 is an invigorating breath of fresh air. I think it does clear the air. And, speaking as one inventor, it will be a very happy day, indeed, when it becomes the law of the land.

Aside from science benefiting mankind through inventions, in terms of instruments and devices which help the sick, as Philip Handler, president of the National Academy of Sciences, said only a couple of weeks ago in testimony before the House of Representatives, March 6, 1979, "Science itself is paced by ideas and instrumentation." So, the encouragement of instrumentation has a way of leading the technology.

I want to say there have been some positive effects of this bill already.

It has increased the attention being paid to the intellectual property of nonprofit research institutes and the ways in which work between

industry and colleges can be facilitated. I think the publicity about S. 414 has had a very positive effect from what I have heard up until this point.

If I can pause just a moment to illustrate a point with one of my own inventions, the oxygen electrode, which I invented some 25 years ago, is a perfect illustration of how an invention intended to first solve a relatively small medical problem, that of measuring oxygen in the heart/lung machine, which had just been invented and which most people thought was a pretty crazy idea, anyway, spread. This invention of measuring oxygen, spread to many other uses and many other fields.

The most recent article about this, which I read while on the plane coming here, deals with the prevention of blindness and respiratory and brain death or damage in the newborn with an on-the-skin, warmed clock-type oxygen electrode. This electrode reads the amount of oxygen directly in the arterial blood with a device which is simply placed on the skin, much in the same way as a stethoscope.

Oxygen electrodes are being used right this very minute to judge arterial oxygen blood levels and pulmonary function in older lung-disease patients, cancer and burn patients, and many others. The electrode has been in space and is presently finding wide use in measuring oxygen in streams of water supplies to assess pollution.

Thousands of scientific papers and several books have been written describing its use in cell biology, cancer research, in controlling food spoilage, and so on.

Hence, this simple device, made at first from a bit of glass, a piece of silver, and a platinum wire—and I have one right here, which I will hold up. This is one I made just before I came. It is a small piece of glass tubing, with a platinum wire in it. One also requires a silver wire and a piece of cellophane.

By putting this together in a certain way and using a battery, with this instrument it is possible to measure the oxygen in blood, in the air in this room, or in this pitcher of water in front of me.

The use of this electrode has prevented much mental retardation and much death and agony in the world.

What I show you here costs less than a dollar, probably less than 10 cents, actually. By the time it gets to commercial production, it takes a form more like this and it is connected to a modern electronic instrument. But by the time it is mass-produced and made available to the public, it may cost more like \$100. And for good reason, as we shall see.

I would now like to show how this electrode is an example of the ways in which an inventor plays a key role, often a vital role, in the development of an invention.

When this electrode was first described at a meeting of the newly formed Society for Artificial Internal Organs in 1956, the few other investigators present who were experimenting with other types of heart/lung machines were very anxious to have a sensor electrode to monitor the adequacy of oxygenation of blood by their machines. I made a few oxygen electrodes—each one was somewhat different—and sent them out. These were technical people who were easily able to connect batteries and meters so as to use the electrode to measure

oxygen to suit their needs. But they would often run into problems, crack an electrode or obtain a reading which did not make sense, and call me for advice. It became evident to me that something which worked elegantly for me, was not so elegant or simple for someone else and that, in any case, I did not care to get into the manufacture of small lots of electrodes with hand-tailored advice. This showed there was a clear need for a standardized commercially available electrode instrument, but the market appeared very limited.

The director of the research institute did not think the electrode was worth patenting, but had no objection to my doing so. I, however, believed from the day I had the idea, made the first electrode, and saw that it worked in both liquids and in air, that it had enormous potential and should be patented. I had many fantasies that day about its possible uses: Warning devices in mines, altitude hypoxia warning, monitoring surgical patients before, during, and after anesthesia, measuring the metabolism of cells and tissues, preventing spoilage of food, controlling stream pollution, and so on. Most of these dreams of mine came true and many more besides. The point is, as part of the mental process which leads to an invention, the inventor often envisions possibilities for application which are not immediately evident to others. The inventor's personal persistence and confidence is often the deciding factor which carries the idea forward and prevents the invention from being set aside or ignored.

In the early days of the oxygen electrode, a small company in a college town in Ohio agreed to put this instrument into small-scale production. Later, a large company began development of the electrode for possible large-scale production. During the latter's development work, they changed the design in such a way that they ran into serious problems. So serious, in fact, that this large company was on the verge of dropping the entire project. A few of the scientists who had used the first homemade electrodes had obtained erratic results and had announced that the Clark electrode didn't work. If this had been a Government-owned patent and someone there with no firsthand experience was handling this license, I suspect the whole invention might have ended there. Such dark days for an inventor are common. As an inventor in this case, I was able to stand my ground and point out that it was the large company that was at fault. The small company, staying closer to the original model, was having no particular problems. The invention got going again and survived in good health to this day. With bill 414, the inventor's institution would be responsible for licensing, and the inventor would be motivated and would also have the authority to see that the invention succeeded for the good of all.

Now, though, let's look at what I said a moment ago about the comparative price of my homemade electrode and the commercially available electrode. There is a long road between the invention working in the inventor's laboratory and the product available to all. An instrument, a medical sensor, to be useful to society, must often be, for example, mass producible, reproducible, interchangeable, rugged, fool-proof, esthetically acceptable, serviceable, replaceable, precalibrated or pretested, and coordinated with electronic systems and microprocessor readouts. In addition, instruments which are to be used in diagnosis or

treatment of patients, must pass stringent requirements set up by the FDA. The company must also provide operations manuals, parts supply, service, marketing, and even considerable teaching. The cost of development of a single new sensor concept in medicine may run into millions of dollars, and of course this cost must be recouped before a profit can be made. Many companies will not begin such a project without the stability and protection of patents and some sense of confidence that there will be an adequate demand to offset these costs.

Hence, the direct involvement of the inventor often lends not only guidance but stability to the expensive development process. His faith in a potential and often invisible market may be the critical factor.

This type of electrode—or “sensor”—can also be used to illustrate how inventions follow one another. By merely changing the way in which I connect this platinum to the battery—that is, I connect now the platinum wire to the positive pole—I still use a bit of membrane and an enzyme. The enzyme is found in green mold on bread or penicillin byproducts.

We then have an electrode which can measure glucose. This glucose electrode now is in commercial production. It can measure glucose in one-tenth of a drop of blood. It gives the result in less than a minute and is so simple to use, it can be used by relatively unskilled paramedical personnel.

The lives of infants—and the brains of infants, I may say, also—are being saved by this electrode, saved by this electrode because in certain premature infants, sudden large drops in blood glucose concentrations occur and if not corrected promptly, may cause irreversible brain damage. Frequent sampling, requiring less than a drop of blood from a simple heel puncture, gives the necessary information, at the time it is needed.

It is beginning to be used in agriculture to judge the maturity of crops.

A simple electrode like this can also be modified so as to measure other things. For instance, it will soon be possible to measure uric acid, amino acids, cholesterol, and a number of other substances of medical interest. It is presently being used to measure glucose and sucrose in plants, which are the main sugars all plants make from sunlight. And this has played an important part in our technology.

The manufacture, sales, and use of all such devices now must run into millions of dollars each year. And, of course, it brings about the employment, also, of many people who teach the use of such devices.

No modern hospital is without blood, gas, and PII technicians. So, the economic benefit purely on that basis is large from this relatively minor invention.

I want to take one second to tell you about an invention that is just now being born.

It is possible to make a sensor from very simple materials, such as these, and measure galactose, which is a very rare sugar. It used to be called brain sugar. We all have small amounts of it in our brain. Sometimes the metabolism of this sugar goes haywire. When this happens, we encounter a rare metabolic disease in children, which is too rare to interest any large manufacturer in making a galactose electrode—perhaps even far too small to interest a small manufacturer without some help to enter such a field.

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Yet, if that disease in these babies is not detected and if they are allowed to drink milk for a week or so, they become blind and they can become mentally retarded.

The reason I am describing this here is to say, here is an electrode that doesn't exist yet but it may exist because of the hope or will of persons who are intimately connected with such problems.

However, the Yellow Springs Instrument Co., which made the first oxygen electrodes and now manufactures the glucose electrode—which, incidentally, was turned down by a large company as being unworkable—has been actively developing galactose oxidase membranes for electrodes to be used in the measurement of lactose in the food processing field, and this same membrane is being tested in our laboratory for measurement of galactose in blood. We hope that this cooperative effort will eventually lead to the necessary testing for FDA approval for medical use.

A symbiotic relationship between small business and university researchers often makes possible, developments which would otherwise never have even begun.

I, further, have faith that this galactose electrode will be found useful for the measurement of, strangely enough, glycerin and, hence, triglycerides in blood.

We also have a device for measuring cholesterol which is presently being developed by this company.

I want to say one more word about another project that I am working on, because it also illustrates another way in which inventions can be facilitated by a cooperative venture between a university and industry.

Several years ago I found that mice and other animals could survive in certain kinds of organic liquids. They could be totally immersed in such liquids for hours and survive. The outcome of this was that research started on using such liquids for artificial blood.

In 1968 when I joined the staff of the Children's Hospital Research Foundation, they had no patent policy. Since the work on the development of artificial blood was partially supported by an NIH grant, I felt that we would be in a better position to act promptly, if we had a patent policy approved by the NIH, in the event that a patentable blood substitute was found.

After considerable thought and discussion, a patent policy was drawn up and approved by the Board of Trustees and subsequently approved by the NIH.

We later applied for a fairly broad patent on the use of a certain class of compounds for use in artificial blood preparations.

Since then, several other inventions have resulted in patent applications by other members of the staff, our cholesterol patent is assigned to the institution and a licensing agreement is being negotiated.

To get back to artificial blood—here is some liquid—artificial blood—an emulsion that was made day before yesterday from a new compound. This pearly white liquid carries as much oxygen as human blood. It has been given to primates with no ill effects and appears to be a possible emergency substitute for whole blood.

In order to get where we are, we have had to work with SunTech, which is a division of the Sun Oil Co., located in Pennsylvania, who

have the facilities and know-how to synthesize pure fluorinated organic compounds. These compounds are very difficult, indeed, to make and could only be made with the cooperation of such a large company.

SunTech applied for and received a contract from the NIH to make these new compounds, which were considered to be important for this research. An agreement was reached between SunTech and the Government giving SunTech the right to patent compounds, useful as artificial blood, which might be discovered. And this was followed by a joint agreement with SunTech and Children's Hospital that all discoveries in this area would be jointly owned.

This then made possible not only synthesis of these compounds, but also completely free and open discussion between the technical people at the Sun Oil Co. and our small group at the Children's Hospital.

We discussed ideas and theories based on the results of our experiments with the compounds. And two patents were issued jointly as a result of this work. Another one has been applied for.

SunTech has contributed funds to the research, and to our institute, to help in testing these compounds synthesized under the contract with the NIH.

Great progress has been made on this project. And there has been no hassle over the ownership of the rights to this type of perfluorocarbon-based artificial blood.

But if I may insert just one bothersome point, I should mention that the Japanese have been spending millions of dollars on development of artificial blood by somewhat similar approaches, where the United States has been only spending thousands. They have just announced successful tests on 12 human volunteers in Japan using compounds that we do not consider to be the best.

In fact, we have just found a new and very good compound, which is the one in this vial, and hope that the Japanese do not obtain substantial amounts of it to test before we can even finish our tests.

There is a real problem here, I think, which has to be faced sometime. And that is, we are required to give reports and publish freely, as university professors, our results as we go along. And, yet, we do not want such publication of reports to jeopardize the patent picture and, hence, the ability to transfer this kind of progress to the public.

One last thing:

My recent electrode and enzyme electrode device—

Senator BAYH. Dr. DeLuca I know you must leave to catch your plane. I would like to send you some questions in writing to complete your testimony.

Dr. DeLuca. That would be fine. I would be glad to do that.

If there is one you would like to have on the record at the moment, I could take a few more minutes.

Senator BAYH. Thank you, but because Dr. Clark is still involved in his testimony I don't want to interrupt him.

I will ask the reporter to place your responses to my written questions here in the record when I receive them.

I am sorry the unavoidable delay in beginning today's hearings had put us in this kind of a bind. We didn't know we were going to have a hearing held previously to this one this morning, which required us to start so late.

Dr. DeLUCA. Thank you very much.

Senator BAYH. We appreciate the contribution you have made in support of this bill. Your statement today has been very helpful in demonstrating the need for this type of legislation.

Dr. Clark, why don't you go ahead?

Dr. CLARK. It will just take me a moment to finish.

I want to bring out one point, if I may—that while inventions that we have been talking about, for the most part, this morning have come from research in the medical field and some obviously do involve the NIH in one way or another, the invention I have been discussing in particular involves the transfer of electrons and protons and energy from one system to another. It is not inconceivable to me that by stimulating research in physical and electrochemical studies in medicine, and by looking at plant and animal life in terms of chemistry and physics and at the ways in which living cells collect and disperse energy—that through this process of basic science, we may find creative new ways to bring about use of energy from the Sun and from new biological sources.

One final statement is that invention will continue despite Government or any other regulations, because it, like curiosity and freedom, cannot be really repressed. But the process of innovation, in bringing forth of the fruits of the invention for the public good, requires clear definition and protection of the rights of intellectual properties.

Bill 414 is very encouraging and a major step forward. It is heart-warming. It will certainly stimulate inventions, especially where Government grants and contracts are involved. As I understand it, the IPA's between institutions and the NIH will be given official recognition by the passage of bill S. 414.

This testimony would not be complete without saying that Mr. Norman Latker is held in high regard by scientists, patent attorneys, and university staff. His efforts to get inventions from the laboratory to the clinic and to society over the many years is well known and highly valued. His championing of the inventive process for the public good has gained him the respect of many.

Senator BAYH. Thank you, Dr. Clark.

Mr. Putney?

Mr. PUTNEY. Mr. Chairman, it is indeed a pleasure to have the opportunity to appear before this committee and speak on behalf of Senate bill S. 414.

I am here to speak in behalf of Dr. Blumberg, who, unfortunately, had a previous prior engagement and is unable to be here.

His statement has been prepared. And I request that it be submitted as a matter of record.

I shall not attempt to read his statement but only to summarize certain points contained in his statement.

Dr. Blumberg's statement has to do with two patents:

The first patent is entitled, "The Vaccine Against Viral Hepatitis and Process."

The second patent is entitled, "Process of Viral Diagnosis and Reagent." This is also referred to as a radioimmunoassay or a test for hepatitis.

The vaccine patent was filed in the U.S. Patent Office on October 8, 1969. It issued on January 18, 1972; whereas the radioimmunoassay invention was filed in the U.S. Patent Office on April 30, 1970, and it issued on March 18, 1975.

Our concern is not over the length of time to process the patent but has to do with the excessively long period of time to resolve the matter of title determination.

At the time of filing, the Institute for Cancer Research, did not have an institutional patent agreement (IPA). We were required to file an invention report and a petition for a determination of title. This we did for the radioimmunoassay on January 1, 1970—and for the vaccine on February 17, 1971.

However, it was not until August 16, 1974, that the letters of determination or patent rights for both inventions was signed by the Assistant Secretary of Health.

That document provided that the DHEW did not see fit to grant domestic license rights to the Institute but did grant foreign rights, creating an extremely weak position, if not a surrogate role, for negotiating a license agreement with the manufacturer.

The result is the situation where one company is now producing hepatitis test-kit controls in an estimated 90 percent of the worldwide market, reaps high profits, and pays no remuneration to the Government—save for license fees to the inventors, or to the Institute.

Under the vaccine patent, development work is now proceeding at a rapid pace under the foreign license agreements. Clinical trials are underway. And the company has made a substantial, capital investment in order to produce the product abroad.

However; the important point in this context is that—

If the objective of the patent system is to facilitate the transfer of the benefits of a discovery to the public as quickly as possible, such a delay as we encountered should not be permitted and should be avoided at all costs. Delays in determining the disposition of rights to an invention can cause delays in publishing results and risk exceeding time limits for filing patent applications.

In our case, this danger was somewhat lessened by the fact that the Institute for Cancer Research requested and received permission from the DHEW patent officer, Mr. Norman Latker to file for patents at an early stage. A serious problem did lie, however, in the fact that the Institute could not enter into licensing agreements with qualified manufacturers for the development of the inventions during the long wait for the title to be determined.

I do not believe that this is the appropriate place or time to discuss the Government's decision not to grant domestic title to the invention to the Institute for Cancer Research. But I do wish to report that the Institute entered into foreign licensing arrangements with Merck and Company for the development of a vaccine for hepatitis B.

Abbott Laboratories is currently producing a product using techniques outlined in our patent for the "Process of Viral Diagnosis and Reagent." The test kit they market has been declared by the FDA to be the most effective test for hepatitis now available.

Incidentally, Abbott controls an estimated 90 percent of the world market and has earned tens of millions of dollars from this product.

I understand that in both instances, licensing agreements have been issued to the manufacturers by the Federal Government. The effect of this is that little or no royalties are paid and no support is provided from this source for support of basic research.

At this moment we are also in the process of filing a report of invention with the DHEW concerning our discovery of a new process for detecting hepatitis. We believe this process has marked advantages over the present process.

In spite of the difficulties encountered in the patent-rights-determination cases referred to earlier, the Institute for Cancer Research vigorously pursued foreign licensing arrangements with an eminently qualified manufacturer for the production and marketing of a vaccine for hepatitis. Our licensing agreement, because of the DHEW restriction, is limited to foreign sales.

The monetary return from these license agreements is modest by any standard. Under the vaccine patent, the agreement calls for a 3-percent royalty with a ceiling on total dollar sales.

A portion of the revenue generated by this agreement will be shared by the inventors, according to arrangements provided in the DHEW institutional patent agreement. The largest portion of the royalties will be used by the Institute for Cancer Research to support its basic and clinical cancer investigations.

As to the radioimmunoassay patent, the Institute's foreign coverage consisted only of patent protection in Canada and Belgium. Our licensing agreement with Abbott Laboratories for those two countries was a flat \$75,000.00 settlement. Yet, the reward to the manufacturer amounts to many millions of dollars from the sale of their product.

Who, then, is the real benefactor of these products?

Certainly, it cannot be argued that to award title rights to a non-profit institution amounts to a "give-away" practice and that the public will suffer.

Concerning Senate bill S. 414, Dr. Blumberg notes the following features with endorsement:

The exclusivity provision of section 202(7) (b):

This feature enables the qualified manufacturer to make a sufficient investment of capital and resources to produce such products as vaccines or other biological materials.

In this regard, it should be remembered that the number of firms interested in the development, production, and marketing of such products as vaccines and diagnostic tests is limited to a very few manufacturers in the United States.

The reason for its high development costs were strict governmental regulations, administered by the U.S. Bureau of Biologics, Food and Drug Administration, and so forth.

Those who do remain do so because of either their total capability in terms of resources or the uniqueness of their product.

This uniqueness can best be preserved by an exclusive license agreement between the producer and the holder of the patent. This is especially important if small businesses are to be encouraged to enter the field of vaccine production and diagnostic testing.

Under section 204, Dr. Blumberg notes that the point is well taken that the Government should receive some return on its investment. However, his concern stems from the mechanism proposed in the bill for determining the extent and what appears to be a cumbersome procedure for the remuneration of the Government's investment.

Consider for a moment that a nonprofit research institute, such as the Institute for Cancer Research, is vastly different from a small business which is geared to the profitmaking concept. It exists for the purpose of acquiring and disseminating knowledge.

To survive, it depends on the multiplicity of funding sources, all awards being based on a not-for-profit premise.

Is it fair, then, to conclude that under such circumstances, the Federal Government's share may in many instances be the lesser of other forms of support? Is it proper, then, to return the Government's investment without reference to the other funding sources?

Further, under section 204, Dr. Blumberg raises the concern that the remuneration clause appears to be one designed to diffuse the intent

of the proposed legislation, which is to provide a mechanism to strengthen the basic or applied research efforts in America.

"There is great merit to the concept that royalty income, if restricted to supporting research," as is now proposed under the bill, would broaden the base for the continuing support of the research.

I would like to briefly amplify some of Dr. Blumberg's concerns in this regard and present them as suggestions for consideration.

Under section 202, it is proposed that the United States be entitled to a share, to be negotiated, "of up to 50 percent of all net income received by the contractor above \$250,000."

The question is then asked:

When does the negotiation take place? Before or after consummating a license agreement with a manufacturer?

I can visualize quite a difficult chain of events, in negotiating a license agreement with a manufacturer. My concern is at what time should the negotiation with the Government take place? Should it precede the signing of an agreement with a manufacturer? Should the negotiations for reimbursement follow the coming to terms with a manufacturer?

I can visualize a scenario there where the burden of paying the Government for its investment would rest entirely with the grantee institution and not the manufacturer.

The second point is: How or by what standards is "net income" received by the contractor to be "uniformly accounted for"?

Third: The act states that the United States be entitled to an amount no greater than "the portion of Federal funding."

How is the portion of Federal funding to be determined with reference to the period or timing of the Federal funds? That is to say, is that portion to be applicable only to the year in which the invention is conceived? Or does one take into consideration the total period of the grant support?

I am reminded of the fact that some grants last 10, 15, or even 20 years. Is only the year in which the invention was conceived to be considered. Or should the full term of funding support be used?

The fourth point is with respect to the purpose of the grant.

Should all of the dollar support provided by the grant contract be considered in the formula?

For those of us who are involved in the funding of research activities in the United States know that we have various types of funding instruments.

One of them is a program/project grant, which is usually a very large comprehensive grant awarded to an investigator. Sometimes to such an extent that it will support large segments of an entire department in a medical school.

We also have what we refer to as a "core" grant. These are very large funding instruments used to provide salary and resource support of multidisciplinary programs. It would be extremely difficult to determine just what portion of such grants are applicable to the invention.

Fifth is the question of the relationship to the other funding sources, which I have already alluded to.

Further, in the act it is stated that, the Government is also entitled to an additional remuneration, "to be negotiated, in excess of \$2 million."

Again, the questions that I have just referred to would have to be resolved.

Dr. Blumberg has suggested that consideration be given to an alternate formula, whereby the Government's remuneration is based on the percentage of net sales applicable at a given rate on a formulated or sliding scale basis. As for example the base of \$250,000 would remain as it is in the proposed act with no remuneration to the Government. From \$250,000 to \$500,000, there would be a return to the Government at a rate of say 1 percent. This could be followed by further intermediate breaks in percentage to say \$1 million in net sales beyond which, the lowest rate would be applicable.

Such a procedure, in our opinion, would enormously facilitate license agreements with a prospective manufacturer, and would insure an equitable base for the remuneration by the avoidance of different interpretation by the various governmental sponsoring agencies.

Again, Mr. Chairman, may I say it is a pleasure to have the opportunity to speak at this hearing.

I am very sorry that Dr. Blumberg was unable to be here. I hope that I have fairly represented his statement.

Senator BAYH. Thank you.

Is there anything we can do about the problem that was mentioned of ideas arising from American research and development programs being taken abroad, manufactured, and then exported to the United States?

Do I sense that to be a real problem here, Dr. Clark and Mr. Putney?

Dr. CLARK. To me, it is a real problem. It is a complication.

And I think that it has a tendency to inhibit the free exchange of information even between an investor and the Government, say, the NIH.

Of course, 1 year after publication in the United States, you can still file for a patent. That is a nice provision. Once the public statement has been made in a foreign country, however, the patent rights, generally speaking, are sacrificed.

So, the natural impulse, I think, is that the university person is to give away information as rapidly as possible. After all, that is why he is in the university. And that is really what he is rewarded for.

But it does carry the danger that it can jeopardize the whole system.

Senator BAYH. Do you have any observation, Mr. Putney?

Mr. PUTNEY. I certainly agree with what my colleague here is referring to.

The only way to help prevent the pilfering of information as you say is if there is reason to believe that an invention is going to be generated out of the work, then there has to be established at the institution some means to control the release of publications prior to filing for a patent. This is contrary to accustomed procedure in what we are now doing.

I don't know any other way out of that dilemma. It is a tough problem.

Senator BAYH. If you have any ideas, we would be glad to have them.

Mr. Putney, you got into the idea of paying back money to the Government whenever one of those inventions achieves a certain level of success in the marketplace.

Mr. PUTNEY. You are referring to our suggestions regarding the mechanism of remuneration of the Government investment?

Senator BAYH. Yes, I refer to it because we need to figure out exactly how this could be most effectively done.

I would hope you could work with us to try to find a way we could shore up or improve the way in which we have dealt with this problem in S. 414.

We are certainly not wed to the present language in the bill requiring paying back the Government.

We want to convey very strongly the feeling that there should be in this bill some formula for returning money to the Government in the most efficient manner.

You have talked about the different kinds of grants.

Is it possible in the research area to be able to work backward and to determine at what point in a 10-year grant that a patentable began to develop?

Mr. PUTNEY. Yes. That is possible to do to be able to say that in a given period, that this is when this idea was conceived.

However, the point of my concern is how to formulate a plan that is fair to all concerned. I feel that the manner in which the bill is now drafted, leaves the matter open to interpretation by each of the various governmental agencies. And there is the troublesome question of negotiation.

It would be very confusing to be negotiating a license agreement with a manufacturing concern and, also, had to negotiate an agreement with the Federal Government.

Our suggestion is to have a set or prescribed formula arrangement, whereby the Government would be remunerated for its expense on a given percentage basis.

This could be included as a "boilerplate" requirement to be incorporated into every contractual arrangement for a license agreement.

I would be delighted to work with you in a study along this line leading to a proposed amendment to the bill.

Senator BAYH. Thank you.

I would appreciate it if you would.

We have a few other questions here. But I think, because the hour is late and we have imposed on both of you gentlemen for a long period of time that I will submit the rest of my questions to you in writing.

[The questions and answers previously referred to and the prepared statement of Mr. Blumberg submitted by Mr. Putney follows:]

RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY DR. HECTOR F. DELUCA

Question No. 1: Doctor, you have been involved in the creation of a number of patentable inventions arising out of federally-supported research and development programs. Would you say that the examples of bureaucratic delays on determining ownership of patent rights that were presented at the hearing on S. 414 are typical of the kinds of problems that universities and nonprofit organizations who do not have agreements with funding agencies on the ownership of patents can have?

Answer: I certainly do believe that the bureaucratic delays described during the hearings on S. 414 are typical of the problems university inventors and nonprofit organizations have with funding agencies over ownership of patents. These delays occur at several stages. First, the universities have set up their bureaucratic systems to determine what portion of an invention can be ascribed to a particular fund. It takes many months to complete this before the university system can even approach a funding agency. The funding agency then for unexplainable reasons will take at least a year and a half, and often longer, to determine ownership. Even after this is determined, it has been the experience of a number of nonprofit organizations that the governmental agencies retain ownership and the invention goes no further. In my experience prior to the institutional patent agreement between the University of Wisconsin and HEW with WARF as the University designee, it took one and a half years before my first patent could reach a final determination at the National Institutes of Health. The only reason it reached such a determination was due to the efforts of Mr. Norman Laker, who I understand is no longer with HEW for obscure and worrisome reasons.

Question No. 2: Could you contrast the efficiency of delivering a new drug or medical device to the market when a university or nonprofit organization retains title to the patent and when the funding agency retains title?

Answer: We have first-hand information on the efficiency of delivering a new drug or medical device to the market when a university or nonprofit organization retains title to a patent. In 1971 we discovered a new hormonal form of vitamin D. In 1972 we completed chemical synthesis of that substance and late in 1972 our patent was issued and immediately taken by the Hoffmann-LaRoche Company through a license agreement with the Wisconsin Alumni Research Foundation. By the end of 1978 this drug, which is important for treatment of bone disease, is available to the public on a prescription basis. This is a remarkably short time for any compound, but especially a compound invented at a university. On the other hand, many inventions are not even disclosed in the absence of an institutional patent agreement, and those that are, either never reach the market or if they do it takes many, many years. The major problem is that drug companies will not invest their funds to develop a new drug unless it has assurance that its investment will be protected. The only assurance that can be provided is patent protection. I am sure the record will show that patents retained by university or nonprofit organizations are much more efficiently delivered to the market than patents retained by a funding agency.

Question No. 3: How would passage of the University and Small Businesses Patent Procedures Act affect the ability of inventors like yourself to see their important medical discoveries delivered to the American people as quickly as possible?

Answer: Since we have past experience with an institutional patent agreement between HEW and the University of Wisconsin, we know that this procedure rapidly delivers medical discoveries to the American people. In addition, it encourages inventors such as myself to conceive of and disclose inventions as rapidly as possible because there is a feed-back to the institution and usually to the inventor himself/herself.

Question No. 4: In your experience does there seem to be any justification for an agency to take over a year, as sometimes happens, before any determination can be made on disposition of patent rights?

Answer: There is no justification whatsoever for an agency to take a year or longer to determine disposition of patent rights. It is inconceivable to me why this sort of time is required to make such a determination, especially since government agencies retain march-in rights and furthermore retain license-free use of all inventions generated under their support.

RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY DR. HECTOR F. DELUCA

Question No. 1: I understand that inventions evolving from grants to universities require a great deal of development at private expense. Do you then believe that a distinction should be made between rights to inventions arising from grants, and rights arising from contracts with universities or nonprofit organizations?

Answer: I do not believe that a distinction should be made between rights to inventions arising from grants as opposed to those arising from contracts with

universities or nonprofit organizations. Normally, most contracts with such groups tend to be not as product-oriented as might contracts with industrial concerns. In other words, and even though a contract is considered to be narrower in scope in that it generally expresses a more definitive pathway or a more specific end result, inventions arising under such contracts still tend to be wholly incidental to the purpose of the contract and are not the object of the contract. As a consequence, in most cases, these inventions, just as those arising under grants, require a great deal of development and, therefore, incentives necessary to their development must be afforded if they are to be transferred to public for its benefit.

Question No. 2: Do you believe that universities have demonstrated over the past their capability to commercialize their inventions through retention of invention rights?

Answer: I believe that it is clear that universities have demonstrated their capability to commercialize their inventions through the retention of rights and licensing of the inventions. Strong evidence of this capability has been present through the technology transfer which has occurred under institutional patent agreements as between various universities and government agencies, specifically DHEW and NSF.

Question No. 3: If you were to compare the record of inventions developed by the universities, when they retain invention rights, with that of the executive agencies when they retain the rights, which of the two has demonstrated a better capability of commercializing products?

Answer: Without question, the universities have demonstrated a better capability of commercializing inventions than have the Executive agencies of the government.

RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY LELAND C. CLARK, JR.

Question 1: You have been involved in a number of very important medical discoveries. Could you tell me whether or not there is any incentive for an inventor such as yourself to remain involved in the development of a patentable invention when the funding agency retains title?

Answer 1: The answer is no. If the funding agency retains title to the invention it may well have an effect on society which is much worse than if the invention had never occurred in the first place. It can actually be devastating because it may place the invention out of reach of everyone who could benefit and of course no one else can ever invent it again. If no one is willing to be licensed by the government to make it, or if the government claims title to it and does nothing, the idea and the invention are doomed to stay in purgatory.

No one wants to invest large sums of money to develop and perfect an invention if they think there is a chance that the government will license a competitor as soon as they have it perfected. There are two questions posed to an inventor: Have you applied for a patent and who owns it? If the answer is Yes, to the first question but a grant or contract (say from the NIH) is mentioned in answering the second question, interest often fades rather rapidly.

The reason for all this is not that the inventor or the company does not want the government and society to have their just do. It is the opposite: The reason is the inventor and the company do want society and government to have its just share.

Question 2: In general would you say that it is usually very desirable to the licensee of a patent to have the inventor involved in the development process in case there are any unexpected problems that might arise that could call for an adaptation or change in the invention?

Answer 2: Without doubt, it is very desirable to have the inventor of a patent involved in the development process.

In one of my best inventions—the micro blood glucose electrode—now widely used—problems were encountered in the early stages of the development which caused one company (the main one working on it) to come very close to abandoning the whole idea. It was only because I personally intervened on behalf of the correctness of my original idea and immediately coped with the stumbling blocks they believed they had encountered that the development went ahead. There are many examples of this in my own involvement with development and there must be thousands of examples in the lives of other inventors. Very often

the personal drive of the inventor is matched by the personal drive and identification with the invention—a champion of the project—within a company.

With many medical inventions, development work often also involves the dedicated university physician. The inventor may play a vital role in seeing that the physician's needs are accurately translated and transmitted to the development team. The inventor not only may become the liaison person between the clinic and the company engineering staff, but he must see that the invention when it is molded so as to be produced on a larger scale it is not decreased in quality, but if possible increased in quality.

Could I add, that all this leavening process proceeds best if the oven is kept warm by free exchange of ideas among all these individuals. Clear advance understandings concerning rights promotes this process.

Question 3: How practical is it to expect an agency which has not been involved in a research project to foresee what the ultimate contribution of a resulting invention will be?

Answer 3: An agency cannot foresee the ultimate value of an invention.

It is almost completely impractical to expect that an agency which has not been involved in a research project can foresee the ultimate contribution of an invention. Although necessity is the mother of invention (and I think that in patent law "need" is a criterion of "invention") the need for something can at best often be seen only dimly by others. Often, it is only after an instrument is available and researchers or clinicians begin to use it, that its potential value even begins to be appreciated. An inventor in a university or medical center, is in a position to see, firsthand, situations where the use of his invention could prevent suffering or needless delays in diagnosis, treatment, and recovery. This knowledge can be the deciding factor in selling the idea when conventional market surveys print out discouraging findings.

Sometimes, the question itself from the inventive mind, such as "if you could have a continuous indication of blood sugar without the need for removing blood, would this be useful?"—begins the whole process, which finally climaxes in a market.

Question 4: How would passage of S. 414 affect the ability of an inventor to push his invention to its greatest possible application?

Answer 4: The primary major effect it would have from the standpoint of an inventor would be to clear the decks for action. It would enhance the inventive process by providing an atmosphere where creativity can flourish. It would begin to reverse the depressing distrust for government that has arisen in the minds of scientists. It may even be the beginning of a new era where government can become a patron of the inventor. And, where the now-latent inventiveness of Americans will be aroused to serve, not only the medical needs, as it has so proudly done in the 1950's and 60's, but the great needs of the future in the fields of energy and environment.

Further, by the inventor having a free hand to talk to potential manufacturers, convincing them of the importance and potential market for the instrument, delays in getting the invention to the public can be prevented.

RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY LELAND C. CLARK, JR.

Question 1: Do you believe that new medical technology increases health costs?

Answer 1: I think that new medical technology pays for itself many times over its dollar cost. New medical discoveries and their development constitute one of the biggest, if not the only, dollar bargains available today.

My oxygen electrode for example, costs only a few dollars to make and less than a thousand dollars to patent and launch commercially. In the past twenty years, it would be easy to show that this oxygen sensor has saved millions of dollars—probably billions of dollars—in preventing disease, blindness, mental retardation, loss of wildlife, and damage from pollution. It has decreased the cost of research by substituting a simple, direct reading instrument which rapidly and continuously measures oxygen, in place of more costly and labor-demanding, cumbersome equipment. It has therefore helped decrease the cost of doing both basic and clinical research.

It has helped make possible safe and reliable open-heart and stroke surgery. In this sense, by facilitating some of the greatest steps forward in medical care,

such inventions have increased cost, but open-heart and aortic surgery last year extended the useful and productive lives of over 100,000 individuals. They will produce goods and pay taxes.

Even one of the most recent inventions, a sensor about the size of a pencil, which measures sugar glucose directly in a fraction of a drop of blood in less than a minute (which only costs a few hundred dollars to invent and reduce to practice) has already saved tens of thousands of dollars because it can perform an analysis for a fraction of the cost of the older methods. A related sensor I am developing will prevent blindness in certain babies with metabolic disorders.

There is a long list of advances in medical technology often cited to show the incredibly high dollar return of research to society: Antibiotics, vaccines, open-heart surgery, vitamins, and anti-high blood pressure drugs. Some of these directly depend upon instrumentation and some indirectly. *New medical technology often in the short-run but always in the long-run drastically reduces health costs.* While a few extremely complicated medical inventions have been accused of increasing medical costs, most new medical devices or inventions by speeding diagnosis, or improving treatment and speeding recovery will actually save money by shortening the hospital stay.

Question 2: Do you think that cost-containment strategies have any relationship with what S. 414 is trying to accomplish?

Answer 2: Well, I certainly think that many inventions decrease costs in many ways. An invention by its very nature tends to be a device which makes a tough job easier. Putting 4 wheels on a platform makes it easier to transport. Of course before you have such a car it does not cost. If you do not like the cost, you can go back to the horse or walk. The advances in medicine are here to stay. But many can be simplified and, I believe, are getting simplified.

And, so by encouraging invention one will know that the costs will be decreased. S. 414 by clarifying procedures removes the very high cost and delay of establishing ownership. In a recent case that I know of, an improvement patent on an incubator for infants was easily obtained because of its novelty and utility. But the legal costs of sorting through the jungle of agency rules, or lack of rules, were very high. They were many times the cost of the patent itself. Time and money of a research foundation which could much better have been spent on research or even perhaps another patent, or a better one, were spent on these foolish and expensive title searches over a period of many, many months. I am sure you could get much testimony on this subject. Sometimes the cost is no doubt the loss of the invention itself, because everyone gives up and begins a new search to solve the original technical problem.

RESPONSES TO SENATOR THURMOND'S WRITTEN QUESTIONS BY LELAND C. CLARK, JR.

Question 1: Can a large company, not covered by this bill, ever receive rights to an invention which it has created pursuant to federally-funded research? Will this bill in any way change this?

Answer 1: As I read this bill it would not change the patent situation with respect to large companies, except that it would clarify the situation with respect to universities. It seems to me large companies would be more willing, at least than they are at this moment, to sign patent agreement with the development of medical discoveries made in universities.

Question 2: Under section 204, what effects does the 10-year limitation have on the government's recoupment rights? If the owner of the patent received \$240,000 in the ten-year period, and then received an additional \$250,000 in the eleventh year, would the government be able to recover any money?

Answer 2: I don't know.

Question 3: Under section 208(7) the Department of Commerce is to receive any royalties due to the United States under this bill. Are the funds earmarked for any particular purpose, or do they go into a general fund?

Answer 3: I think it would be a good idea if the funds collected by the Department of Commerce went back into research. This would help make the research self-supporting and Congress would have access to this information each year when funding is being considered. The National Science Foundation has a broad view, tends to support basic research which is always badly needed especially now—and is a symbol of Congress' interest in science throughout the world.

Perhaps all income from invention should go only to support basic research. I would go further, personally, and recommend that the income from inventions go for the most part to support science in small colleges and undergraduate programs in universities. I know I would work even harder on inventions or at least feel very good about it—if I know I was supporting and encouraging young scientists at the college level.

Question 4: Are there any indications that small companies may stop seeking work involving government work if the present patent policy is not changed?

Answer 4: My opinion, based on my many contacts with small businesses over the past 20 years, is that small companies will stop seeking government work if the present bill, S. 414, is not passed. Many small companies (like inventors, universities and non-profit research institutions) are watching the progress of this long awaited bill with very keen interest. I can assure you of this: passage of this bill will do much to erase the growing fears that small business has of getting involved with government work. They often feel that they have too much to lose, for the relatively small amount of federal help that may be involved. If the present conditions continue, I believe that many small companies will avoid government contracts altogether. There is a great and renewed interest in better relationships between industry and universities—it can be strongly felt in the biomedical world—passage of Bill S. 414 would increase this cooperation.

Question 5: Are the recoupment provisions of this bill sufficient to prevent exorbitant windfall profits?

Answer 5: I think windfall profits should certainly be avoided. I am inclined to believe that the provisions of this bill, in particular the recoupment provisions, will decrease the probability of this ever happening nearly to the vanishing point. It would be a mistake to add new controls and procedures over business, especially small business, to prevent such a remote possibility.

RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY DONALD H. PUTNEY

Question No. 1: When important medical discoveries are made under Government research and developed like Dr. Blumberg's, what effect does the long period of delay and uncertainty before any determination is made on ownership of the patent rights have on the speed with which these drugs can be made available to the American public?

Answer: As stated in our presentation before the Senate Judiciary Committee Hearing on S. 414, if there is a concern to do everything possible to shorten the time between the issuance of a patent and its application for the benefit of the public, then such delays as we encountered in resolving the matter of determination of title should be avoided as far as possible.

From the very outset, the magnitude of our inventions was clearly evident to all knowledgeable people working in the areas of detection and vaccines. Huge programs for developing tests for hepatitis or to find a vaccine for hepatitis were being designed and/or developed at the National Institutes of Health. In many populations, such as returning Vietnam veterans, hepatitis was reaching epidemic proportions. A safe, efficient, and quick test for hepatitis was of paramount importance.

Every effort should have been exerted to resolve the question of title ownership to the inventions as quickly as possible. Instead, the procedure for resolution was to refer the question to review by all of the separate institutes of the NIH, including the Bureau of Biologics. Prolonged meetings were held with representatives of these institutes and bureaus, including representatives of the Office of the Assistant Secretary of Health. To respond effectively, the Institute had to employ the services of legal counsel and divert the energies of the inventors and staff from their labors in the laboratory. That in itself was a costly factor.

In order to meet the test required in the petition for determination of patent rights, whereby the Institute could demonstrate that it could negotiate a license agreement with a qualified manufacturer, it was found necessary to enter into invention disclosure agreements—a highly questionable procedure unless one has the full protection of an issued patent and full rights to that invention.

Who can say what this delay cost in terms of dollars to the productive capacity of people in America? Certainly anyone who has suffered or witnessed the ravages of hepatitis knows full well the debilitating effect of the disease. Extrapolate the time lost from productive enterprise, plus the cost for medical

care, and one comes to a figure that runs well into the hundreds of millions of dollars per year in lost national productivity.

As to the situation concerning the vaccine for hepatitis, we can only point out with regret that after five years the world still does not have the benefits of the invention. What part did the delay for title determination play? Let the record clearly show the more than three years delay on that score. The vaccine invention has far-reaching applications beyond its immediate application against hepatitis. In many areas of the world, particularly in the tropics, a major cause of death from cancer is due to hepatoma (cancer of the liver). It appears that chronic infection with the hepatitis virus increases the probability of developing cancer of the liver. Therefore, it can be concluded that a vaccine for hepatitis can be a vaccine for the prevention of a very common type of cancer.

What are the savings to the world community to be realized by this invention? Possibly the answer can only be best estimated in the multiple billions of dollars range.

Question No. 2: It would seem that at least in your situation not only did the delay in the determination of ownership slow down the marketing of Dr. Blumberg's discoveries, but because of the refusal of grant ownership domestically to the Institute for Cancer Research, the inventor received no monetary return from marketing in the U.S. of the hepatitis test kit. Couldn't this type of treatment by the Government discourage medical researchers from even trying to report patentable inventions to the funding agency?

Answer: The response is in the affirmative. Dr. Blumberg's explanation concerning his interest in patents is quite candid. He, like most academic scientists, was not concerned with personal monetary gain from the applications of research, his being an inquisitive desire for new knowledge. As a research administrator for more than 30 years, I concur with Dr. Blumberg's premise. But scientists are also realists. The real issue with royalty arrangements is not so much associated with the need for financial reward by individual scientists, but generates from the belief or premise that there is a compelling need for continued and adequate funding of the research in America. Revenue derived from inventions could help nonprofit institutions meet that need.

In our opinion, if it were to become well publicized that all revenue generated by inventions, whether allocated to the United States or retained by the parent institution, would be "plowed back" into research, more effort would be directed towards the filing and prosecution of inventions.

Question No. 3: Could you explain to us how a large company marketed a hepatitis test kit largely patterned on Dr. Blumberg's work, and what financial return your Center received for this?

Answer: At the time our invention was conceived and reported to DHEW, researchers at a large pharmaceutical manufacturing company also conceived a similar patent. The two patents issued at relatively the same time. The company proceeded to market the product on the basis of their patent, while at the same time obtained a permit from the FDA, and later a nonexclusive license from DHEW to practice under the ICR patent.

Since ICR did not have domestic rights to its invention, it was powerless to instigate any claim against the company's invention.

The DHEW did grant foreign rights to the Institute for Cancer Research for the radioimmunoassay patent, knowing that the only foreign filing ICR possessed was in Canada and Belgium. Later, the company and ICR entered into an indemnity against suit arrangement for those Canadian and foreign rights for a lump sum settlement of \$75,000.

Question No. 4: I appreciate your comments on some of the difficulties that you found in the present Government pay-back provision contained in Section 204 of the bill. Do you agree that some formula should be included to return money to the Government when an invention arising out of Federally-supported research achieves success in the marketplace?

Answer: Dr. Blumberg and I have gone on record in support of the concept that the United States should be reimbursed for the return of some of its investment. We have concerns as to the methods of determining the amount of the remuneration of the government.

In a separate letter we have made a suggestion for amendment to S. 314 which we believe will provide a more equitable and standardized procedure. Aside from this, the government's share must always be considered in relation to support provided by other than federal sponsoring agencies. There are instances where

the government's share of support of an invention is the lesser of other forms of support.

May I take this opportunity, on behalf of Dr. Blumberg and myself, to thank you for providing us the opportunity to testify before the Subcommittee on the Constitution in behalf of Senate Bill S. 414.

We hope that our remarks will be helpful in securing the passage of this important legislation. Please let us know if you need additional information.

RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY DONALD H. PUTNEY

Question No. 1: How did the delay between the time of filing the Report of Invention and Petition for Determination of Title affect the invention for a vaccine for hepatitis and a test for hepatitis?

Answer: Our concern is with the excessively long period of time taken to resolve the matter of title determination. Further, because the DHEW granted only foreign licensing rights, we were placed in an extremely weak position for negotiating a license agreement with a manufacturer.

The important point is that the objective of the proposed legislation, hastening the transfer of new knowledge to practical application as quickly as possible, is being thwarted. Delays in title determination postpone delivery of an invention's benefits to the public. Results of studies may be published late and time limits exceeded for filing patent applications. We received permission from the DHEW patent officer, Mr. Norman Laker, to file for patents at an early stage, but we could not enter into licensing agreements with qualified manufacturers for development of these inventions during the long wait for title determination. This delayed bringing the inventions to the public in a timely manner.

Question No. 2: Foreign licensing arrangement with Merck and Company for the vaccine for hepatitis.

What countries were involved?

Answer: Great Britain and the former British Colonies: Ghana, Guyana, Hong Kong, Kenya, Malaya, Singapore, Sri Lanka, Tanganyika, Uganda, Zanzibar, Jamaica, Trinidad, and Tobago, Canada, France, Belgium, Sweden, and Japan.

How did the licensing arrangements affect future licensing on the domestic scene?

Since the federal government, through the Department of Commerce, retained title for the domestic rights, Merck, according to our best information, has entered into a license agreement with the federal government for the vaccine patent.

However, we believe that the impetus for the development of the patent was primarily attributable to our efforts in negotiating for foreign license agreement with Merck. As stated, advanced clinical trials are being conducted, and foreign production of the product is being planned for by the company. We do not know how these activities apply to the development of the product for the domestic market, since the administration of the domestic patent is not under our cognizance.

Question No. 3: Return of government investment. Would the procedure suggested of a repayment based on net sales invite errors on a lesser scale than the payback provision of the bill? Are there other alternatives?

Answer: It is our understanding that the basic intent of the proposed legislation is for the purpose of facilitating the transfer of the benefits of a discovery to the public as quickly as possible and not primarily for the purpose of generating funds for reimbursement to the federal government. We concur with the concept that the government should receive some return on its investment.

Our concern in this regard has to do with the procedure proposed in S. 414 for reimbursement to the government for its investment. It seems to us that the proposed procedure has serious drawbacks. These are found in the difficulty in determining uniform solutions to the "portion of funding" of the federal funding support. And with the procedure whereby "the United States shall be entitled to a share, to be negotiated, of up to 50 per centum of all net income . . .". In these two areas we see an inherent danger in the fact that the burden for reimbursing the government would be placed entirely upon the licensor (grantee/contractor/institution). The bill does not state whether the negotiation with the government be accomplished prior to or following the consummation of the license agree-

ment between the licensor and the licensee. If the negotiation were to be accomplished prior to the licensor/licensee agreement, then that factor could be incorporated into the payment or royalty arrangement. However, if the government negotiation is accomplished after the licensing agreement is consummated, then the burden of payment would have to be borne entirely by the licensor. Unless, of course, there would be a proviso incorporated into the license agreement for an adjustment to accommodate the payback to the government.

Suffice it to say, the entire procedure appears to be extremely cumbersome. It lacks uniformity of definition, and will undoubtedly be subject to different interpretations by each of the governmental sponsoring agencies.

Our suggestion is based on a formula which should be stated in the legislation and required to be incorporated in every patent license agreement between the grantee/contractor institution and the manufacturer. We believe that this would greatly reduce, if not completely remove, errors of the kind noted above from the payback provision.

As for an alternate, it might be desirable to apply the government payback on a percentage of the royalty paid to the contractor rather than a percentage of net sales as suggested. However, we do not favor that procedure in that it would diminish the visibility of the government's return, it would place a heavy burden on the licensor, and would be difficult to account for the proper apportionment between the government and the contractor, particularly in cases of sub-licensing agreements by the manufacturer with affiliates and others.

RESPONSES TO SENATOR THURMOND'S WRITTEN QUESTIONS BY DONALD H. PUTNEY

Question No. 1: Can a large company, not covered by this bill, ever receive rights to an invention which it has created pursuant to federally-funded research? Will this bill in any way change this?

Answer: It is our understanding that S. 414 is limited to nonprofit organizations, including universities, and to small businesses. The latter are described under section 2 of Public Law 85-536 (15 USC 632) and implementing regulations of the administrator of the small business administration. To our knowledge S. 414 will not change the present procedure for a large company to receive rights to an invention generated under federally funded research awarded to that particular company. Again, it is our understanding that generally the federal government will retain title to patents generated under federal support at large manufacturing companies and will award a license to develop, manufacture, and sell the product only on a nonexclusive basis. Whether that procedure will accomplish the same results are envisioned in S. 414 is doubtful in our opinion.

Question No. 2: Under section 204, what effect does the 10-year limitation have on the government's recoupment rights? If the owner of the patent received \$249,000 in the ten-year period, and then received an additional \$250,000 in the eleventh year, would the government be able to recover any money?

Answer: The license agreement between a qualified institution and a manufacturer should describe the method or procedure for payments by the manufacturer. It would seem that if a particular schedule of payments is designed so as to circumvent the ten year limitation, by a procedure of "deferred" payments, then quite rightly the government should be entitled to a share of the income earned after the ten-year limitation period. However, if the revenue were earned after the ten year period, say as a result of new market development, or new use of the product, then the government should not be entitled to any share of such revenue, by virtue of having received its share during the ten year period.

Again, this raises the question of intent. What happens if it is found that some new market development was delayed beyond the ten year period? Or new use of product held pending the termination of the year period? For these reasons, and others, we believe that this section of S. 414 is weak and could lead to serious administrative difficulties and possibly to legal problems.

Question No. 3: Under section 208(7) the Department of Commerce is to receive any royalties due to the United States under this bill. Are the funds earmarked for any particular purpose, or do they go into a general fund? ✓

Answer: We believe that there should be an earmarking of funds received by the United States from royalties earned by the contractors under this bill, and such earmarking should be for research. This concept should be equally adhered to by the contractor as well as the government.

As in our case, when filing the petition for determination of title as well as for the institutional patent agreement (IPA), the Institute for Cancer Research avowed that royalty payments to the Institute would be restricted solely for the support of its research activities.

We would support with great enthusiasm an amendment to S. 414 stipulating the earmarking of revenues to the government for research support purposes.

Question No. 4: Are there any indications that small companies may stop seeking work involving government work if the present patent policy is not changed?

Answer: We defer answering this question to the representatives of small business companies.

Question 5: Are the recoupment provisions of this bill sufficient to prevent exorbitant windfall profits?

Answer: If "windfall" is defined to mean "unexpected," then it would seem unlikely that there are no safeguards under the present recoupment provisions to prevent exorbitant profits—windfall or otherwise. The proposed act does not provide ceilings or guidelines on royalty arrangements between the licensee and the licensor. Such limitations as there are in S. 414 are defined as to what the government may receive in the form of return on its investment. Here again the formula is unclear by the use of the reference to "amounts to be negotiated."

This question again points up what we believe is a serious deficiency in the S. 414. That is the "amounts to be negotiated" are a matter of negotiation between the government and the contractor, thus leaving the contractor with the sole burden of paying the government. The arrangement for reimbursing the government for its investment in the invention should be a basic component of the licensing agreement, so that when license agreement negotiations are being conducted, the government's payback factor is clearly understood, and accounted for at the time the licensing agreement is consummated.

PREPARED STATEMENT OF BARUCH S. BLUMBERG SUBMITTED BY DONALD H. PUTNEY

Mr. Chairman, members of the Committee on the Judiciary, it is a privilege to have the opportunity to express my views on Senate Bill 414, "University and Small Business Patent Procedures Act."

It is my understanding that the purpose of the proposed act is to amend title 35 of the United States Code in order to establish a uniform Federal patent procedure for small businesses and nonprofit organizations; to create a consistent policy and procedure concerning patentability of inventions made with Federal assistance; and for other related purposes.

I would like to state at the outset that I support that objective. Because I do feel this way about the proposed legislation, I accepted the invitation to participate in this hearing. I would like to first tell you why I became interested in patents. In common with most academic scientists, I had not, in the past, been concerned with applications of research. At the end of the Johnson administration there was a statement from the Federal Government, which had generously supported our research for many years, that it was now interested in seeing the applications of this basic work. There was also an indication that funding would be restricted and that scientists should look to sources other than the Government for the continuation of their support. At this time, Dr. Millman and I decided to apply for patents. I also became aware that the conditions under which the NIH grants were issued required that any patentable discovery should be patented; and, as a consequence, we submitted the patents which we will discuss later. My appearance here today is in pursuance of this same objective. I should like to address two areas of concern:

The procedures or methods used and the end result of title determination by DHEW to patents that arose from inventions conceived at my laboratory, and

Comments pertaining to Senate Bill S. 414 itself.

During the course of our investigations during the 1960s, two inventions were conceived at my laboratory at the Institute for Cancer Research. As a result of prompt disclosure and proper filing, letters patent were issued as follows:

Vaccine against viral hepatitis and process. B. S. Blumberg and I. Millman, filed October 8, 1969, issued January 18, 1972.

Process of viral diagnosis and reagent, J. A. Coller, I. Millman, and B. S. Blumberg, filed April 30, 1970, issued March 18, 1975.

Concomitantly, the DHEW patent counsel was informed of these inventions, and verbal authorization given to proceed with filing for patent. A report of invention and petition for determination were filed with DHEW patent counsel on January 7, 1970 for the "Process of Viral Diagnosis and Reagent."

The report of invention and petition for determination for the "Vaccine against Viral Hepatitis and Process" were filed on February 17, 1971 with DHEW patent counsel.

The Institute for Cancer Research did not have an institutional patent agreement with the DHEW at the time the inventions were conceived, necessitating the filing of these documents. Subsequently, we were informed that the sponsoring agency, the National Cancer Institute, supported transferring title to the Institute for Cancer Research, but the National Institute of Allergy and Infectious Diseases, the National Institute of Arthritis and Metabolic Diseases, the National Heart and Lung Institute, and the Division of Biological Standards were not in favor of waiving domestic title to ICR for either invention.

Likewise, the DHEW patent counsel took the position that the review of our petition must be made not only by the National Cancer Institute, the immediate sponsoring agency, but by the other NIH institutes because their research interests were within the area of science concerned with the inventions.

This led to a series of meetings with NIH representatives, beginning on May 28, 1971 and continuing through August 1972.

In April 1971 DHEW patent counsel waived NIH foreign title rights to the inventions, but it was not until August 26, 1974 that the letters of agreement were executed with DHEW allowing the government to retain title to the patents with the right to license them.

On August 16, 1973, an institutional patent agreement was signed by the Assistant Secretary of Health.

I cite these chronological events in order to provide a perspective on the amount of time taken just to resolve the question of title determination. If the objective of the patent system is to facilitate the transfer of the benefits of a discovery to the public as quickly as possible, such a delay as we encountered should not be permitted and should be avoided at all costs. Delays in determining the disposition of rights to an invention can cause delays in publishing results and risk exceeding time limits for filing patent applications. In our case, this danger was somewhat lessened by the fact that the Institute for Cancer Research requested and received permission from the DHEW patent officer to file for patents at an early stage. A serious problem did lie, however, in the fact that the Institute could not enter into licensing agreements with qualified manufacturers for the development of the inventions during the long wait for the title to be determined.

I do not believe that this is the appropriate place or time to discuss the Government's decision not to grant domestic title to the invention to the Institute for Cancer Research, but I do wish to report that the Institute entered into foreign licensing arrangements with Merck and Co. for the development of a vaccine for hepatitis B. Advanced clinical trials are under way to determine the efficacy of the vaccine in humans.

Abbott Laboratories is currently producing a product using techniques outlined in our patent for the "Process of Viral Diagnosis and Reagent." The test kit they market has been declared by the FDA to be the most effective test for hepatitis now available. Incidentally, Abbott controls an estimated 90 percent of the world market and has earned tens of millions of dollars from this product.

I understand that in both instances licensing agreements have been issued to the manufacturers by the Federal Government. The effect of this is that little or no royalties are paid and no support provided from this source for continuing basic research.

At this moment we are also in the process of filing a report of invention with the DHEW concerning our discovery of a new process for detecting hepatitis. We believe this process has marked advantages over the present process.

In spite of the difficulties encountered in the patent rights determination cases referred to earlier, the Institute for Cancer Research vigorously pursued foreign licensing arrangements with an eminently qualified manufacturer for the production and marketing of a vaccine for hepatitis. Our licensing agreement, because of the DHEW restriction, is limited to foreign sales.

The monetary return from these license agreements is modest by any standard. Under the vaccine patent the agreement calls for a 3 percent royalty with a ceiling on total dollar sales. A portion of the revenue generated by this agreement will be shared by the inventors, according to arrangements provided in the DHEW institutional patent agreement. The largest portion of the royalties will be used by the Institute for Cancer Research to support its basic and clinical cancer investigations.

As to the radioimmunoassay patent, the Institute's foreign coverage consisted only of patent protection in Canada and Belgium. Our licensing agreement with Abbott Laboratories for those two countries was a flat \$75,000 settlement. Yet, the reward to the manufacturer amounts to many millions of dollars from the sale of their product.

Who, then, is the real benefactor of these products? Certainly it cannot be argued that to award title rights to a nonprofit institution amounts to a "give away" practice and that the public will suffer.

COMMENTS CONCERNING SENATE BILL 414

Since my interests in this regard lie in the development of vaccines and other biological materials, my reasons for advocating support for S. 414 may be summarized as follows:

The number of firms interested in the development, production, and marketing of such products is limited to a very few manufacturers in the United States. High development costs and strict governmental regulations (administered by the U.S. Bureau of Biologics, the Food and Drug Administration, etc.) deter many companies. Those who do remain do so because of either their total capability in terms of resources or the uniqueness of their product.

This uniqueness is preserved by license agreements between the producer and the holder of the patent.

This feature enables a qualified manufacturer to make an investment of capital and resources sufficient to produce such products as vaccines or other biological materials.

Exclusivity is an important factor in this premise. I note with approval that provision for this has been made under section (7) (b) by the stipulation of a 5- to 8-year limiting clause (see pages 8 and 9).

These concepts appear to me to be well incorporated in the language of bill S. 414, but I am concerned about the guidelines for returning investment funds to the Government (section 204).

The point is well taken that the Government should receive some return on its investment. My concern in this regard stems from the mechanism proposed in the bill for determining the extent of the Government's investment. Let me point out that a nonprofit research institution such as the Institute for Cancer Research is vastly different from a small business which is geared to profit making. It exists for the sole purpose of acquiring and disseminating knowledge. To survive, it depends upon a multiplicity of funding sources, all awards being contingent on a not-for-profit premise.

Consequently, the Institute's research program, including my own laboratory, is supported by funds from many sources other than the federal government, among them the American Cancer Society, the Commonwealth of Pennsylvania, private foundations, and endowment funds of the Institute.

It is fair to conclude under such circumstances that the Federal Government's share may in many instances be the lesser of other forms of support. Is it then proper to return the Government's investment without reference to the other funding sources?

In addition, the length of funding should also be considered. In arriving at a remuneration formula, is the Government support to be determined on the basis of 1 year? 2 years? 10 years? Let me remind you that some grants are now in their 20th year. Resolution of this question could become an accounting nightmare. Furthermore, most funding agreements are not for the purpose of making an invention. The invention generally is a by-product of the research program.

This clause appears to me to be one which will diffuse the intent of the proposed legislation, which is to provide a mechanism to strengthen basic and applied research efforts in America. In my opinion, there is great merit to the concept that royalty income, if restricted to supporting research, would provide the proper motivation for an institution to vigorously prosecute patent applica-

tions and thus strengthen the intent of the legislation. In addition, royalty incomes retained by the grantee institution would lessen the need for continuing grant or contract support and thus be in the public interest. It would also increase the possibility of independence, which is very valued in our national character.

If, however, royalty income were to flow back to the Government, would it not then behoove the Government to likewise restrict such funds for research? The present language does not provide for that consideration. The conclusion to be drawn is that the matter is left open to interpretation which could greatly diminish or virtually negate the intent of the bill.

Finally, it does seem that inclusion of this requirement would create a tendency to drive up the rate of royalty payment, thereby increasing the cost of the product.

I feel that either this clause should be eliminated or an alternative formula should be considered so that repayment to the government is based on a percentage of net sales, applicable at a given rate and prorated on a sliding scale dollar value.

Thank you for the opportunity to present my views in support of this important legislation.

Senator BAYH. Thank you very much, Dr. Clark and Mr. Putney.

We next have a panel of small business presidents: Mr. Patrick J. Iannotta, Dr. Arthur S. Obermayer, and Dr. Walter D. Syniuta.

Our second panel of witnesses are presidents of small business research companies. These types of companies now receive less than 4 percent of the Federal research and development expenditure, yet small companies have been the most innovative sector of the economy, and according to recent studies they achieve more output per research and development dollar than their larger competitors.

Mr. Patrick J. Iannotta is the president of Ecolotrol, Inc., in Bethpage, N.Y. Mr. Iannotta was an economics major at Queens College and founded Ecolotrol, Inc., in 1969 to work on developing innovative water pollution control devices. Mr. Iannotta is also the vice president for small business of the Long Island Association of Commerce & Industry, a member of the executive committee of the U.S. Chamber of Commerce Small Business Council and a member of the Small Business Administration's high technology advisory committee, and is also involved with the Long Island Forum for Technology and the National Small Business Association.

Dr. Arthur S. Obermayer is president and founder of Moleculon Research Corp. in Cambridge, Mass., a company specializing in the chemicals and plastics field. Dr. Obermayer received a B.A. degree with high honors from Swarthmore College and was awarded a Ph. D. in chemistry from MIT. He is currently vice president of the American Association of Small Research Companies, has served as treasurer of the Federation of American Scientists, and as a director of the Smaller Business Association of New England. In addition, Dr. Obermayer was founder and first chairman of the Research Management Association, president of the Association of Technical Professionals, and a director of the Boston Industrial Mission.

Dr. Walter D. Syniuta is the president of Advanced Mechanical Technologies, Inc. Dr. Syniuta received a doctor of science degree from MIT in mechanical engineering and was a Ford postdoctoral engineering fellow. He founded Scientific Energy Systems Corp. in 1968 before establishing his present company. Dr. Syniuta's company has developed what appears to be a very efficient house space heater and water

heater, along with a diagnostic device now being used at Massachusetts Children's Hospital.

All of the panelists have had some experience with Government research and development contracting through their companies. I think that their experiences will be representative of what many small businessmen have encountered when they enter the world of Government patent policy.

TESTIMONY OF PATRICK J. IANNOTTA, PRESIDENT, ECOLOTROL, INC., BETHPAGE, N.Y.; ARTHUR S. OBERMAYER, PRESIDENT, MOLECULON RESEARCH CORP., CAMBRIDGE, MASS. (AND VICE PRESIDENT OF THE AMERICAN ASSOCIATION OF SMALL RESEARCH COMPANIES); AND WALTER D. SYNIUTA, PRESIDENT, ADVANCED MECHANICAL TECHNOLOGY, INC., NEWTON, MASS.

Senator BAYH. I understand, Mr. Iannotta, you have another appointment and you are going to have to leave us.

Do you want to start off?

Mr. IANNOTTA. Mr. Chairman, regarding the electrode in connection with oxygen sensor previously discussed, our firm is now involved with the development of a very sophisticated measuring control unit for energy conservation using precisely that type of probe. What was initially developed for the health field, will now be used to help solve our energy problem.

The problem I will discuss is the problem of small companies, particularly my company, in dealing with the agencies of the Federal Government in obtaining R. & D. grants—and, more specifically, not the foreground patents discussed earlier but the background patents; that is, patents that have already been issued, paid for, and developed by the company.

We started our company in 1969, 10 years ago, to develop a process for the treatment of sewage and industrial waste water. We felt this was a good opportunity for us, because the Government was about to undertake a very large capital program in this area, which is now estimated to cost something on the order of \$1 plus-some-odd billion.

Our system was one that basically used the same micro-organisms as other systems. But, by utilizing specific techniques, we were able to increase the productivity so as to cut down treatment time from an average of 6 hours to approximately 15 minutes.

It was very difficult for us to interest the Government at all in the concept for approximately 5 years. By the time we did have some interest on the part of the U.S. Government, we had approximately 20 Japanese firms who visited us. We had visitors from the city of Tokyo. We had visitors from Germany, England, South Africa, Israel, and many of the European countries. By the time we were able to interest the U.S. Government, we had published three papers and had received an award for one and had had 5 years of operating data. By the time we were able to interest the U.S. Government, they advised us that we had a system that was so far along in development that we would not be able to qualify for research funds but rather only a development grant.

We were excited about that, because at the same time the Government did a study that indicated there would be approximately a 15-percent cost differential between our technology and those currently being used.

As you are aware, under Public Law 92-500—the Federal Government is now paying 75 percent of the costs of constructing municipal sewage treatment and facilities.

Although we were interested, what we were not prepared to do in our discussion with the Government was to risk our patent rights—that is rights under patents which had already been issued. We had the patents, which we felt were of significant value.

As we began to negotiate the contract, which was really a subcontract for a grant to a municipality, the Government wanted rights under our background patents. The problem we had with this was that once we had given up such rights, particularly, given the very difficult economic environment we faced in the early seventies, when capital was at a premium, we felt we would not be in the position to raise capital.

The total contract to us was in the amount of approximately \$100,000. Our gross profit was to be not more than \$7,500. And if our costs were higher than anticipated, we would have taken a loss. If they were lower than anticipated, we would then be limited to a gross profit of no more than 7.5 percent of the gross cost of the contract.

The end result of this was a series of negotiations. Initially we were willing to trust the Government to grant certain rights—and that was really naive. We were also naive when we started the company, thinking we could sell the technology based on cost effectiveness. We were naive in dealing with the Government—based on a very ambiguous, confusing set of regulations.

I would conclude with a very brief history which I will submit for the record.

What happened was that we received our first response of our request for waiver under the patent regulations about a week after the grant was signed.

We prepared all of the necessary documentation. We submitted it to the agency's patent counsel. I flew down and spent the day with them in order to reach an agreement.

At this point, the agency was nearly at the end of its fiscal year. We were assured that we had an agreement and asked to start the work.

We began working with our customer. Approximately 4 months into the study, after we had expended approximately \$30,000 of our funds, we received a letter saying that the deal was not really an "agreement" and the agency had unilaterally changed it.

What that did was to put us in the situation wherein our background rights were now in jeopardy. We had two options: to discontinue the work and sue the Government or to have an initial contract with the municipality honored by customer.

The municipality decided to honor our contract, and we continued on that basis.

We did turn down that grant. It took us 7½ years to interest the Government enough to negotiate the grant. And after we considered it to be lack of good faith on the part of the Government, we turned

them down. But we continued to negotiate to protect our customer. That was a mistake, because subsequent to that, in the next 7 months, since we tried to salvage something for the county, which is now on the line for \$100,000, we were asked to sign patent clauses to contracts even if we were not to participate.

We were bullied and threatened. It was just a very difficult situation for us, not being a very large company, to cope with this.

And the only recourse we had was not to work with the Government.

I must say I am now in a new product line. We are still in the environmental business. Our new product has nothing to do with the Government.

I feel I have been emancipated.

The real problem, from what I have seen, is the fact that most of the regulations are ambiguous.

I believe that somewhere I once read there were 22 separate Government policies. I would suggest there is no Government patent policy, since the ones I have read are so ambiguous and open to broad and changing interpretations.

We felt it was extremely difficult to deal with the Government. Particularly since in the commercialization of this technology, the only protection we had on a national basis in competition with much larger firms, some with sales in excess of \$6 billion, was our patent.

In a last resort to try to protect our customers position, we inquired whether we would be able to retain the same patent rights that the Government agency gave to a multibillion-dollar competitor in the field. We were advised that that would not be possible. We were really bewildered.

The Government argued that we would have a monopolistic position, which was difficult to understand, inasmuch as at that point, our sales were something less than \$1 million.

Frankly, it was a very frustrating experience trying to deal with the Government. After all, all we were trying to do was to protect what we already owned.

I do have some of the concerns outlined in terms of the payback schedule.

In terms of the question of foreign trade raised earlier, I would like to add that one of the frustrations we have had is, our firm in the last year has spent nearly \$50,000 or \$60,000 in trying to obtain patent rights with Japan.

The reason for that is that our system specifically is applicable to the needs of that market. They are spending billions of dollars each year—and we would like a chance to compete.

Our frustration was that much of the information we gave to the Government in trying to get them interested in our system—subsequently turned up in Japan. And now they are in the world market competing against us.

Our technology has succeeded. We are just beginning to commercialize it in the last year.

We have a 28-million-gallon-a-day plant in the city of Pensacola, Fla. We have been accepted as an innovative technology by the EPA in Nassau County.

I might add that the frustration of getting technology into the industry, because of the Government's regulations—the redtape—must be shared by the Congress, I think. In the last 2 years—under Public Law 95-217—if you have a technology that shows a 15-percent differential in total costs, not only will the Federal Government pay the standard 75 percent Federal participation on those projects but will add 10 percent for a total of 85 percent and will give a 100-percent guarantee to either fix, repair, or modify it if the system doesn't work.

So, on that basis, we are in far better shape.

The point I am trying to make is that the patent clause on a \$100,000 grant precluded us from participating. Here the Government is spending something on the order of \$3 to \$5 billion a year with virtually no technical options.

This scenario, I think, is documented as well by a study done by Booz-Allen for the EPA, which outlined some of these difficulties.

The major problem I have with Government patent regulations is that they are ambiguous. The background patents regulations are confiscatory. And, most importantly, they change with the individuals involved on an ongoing basis.

Big companies—I was able to look through some of the files within EPA—I found that large companies, like Ford Motor Co. and others, were able to get patent rights I would have been happy to live with. The rationale was usually based on the fact they had large research budgets and the risk of the bureaucracy of the agency was that if they didn't grant the waivers, they wouldn't participate in the program.

To the small company, which tend to have one product line, the risk is that the company, either gives up its patent rights or he doesn't participate. It's systematically excluded.

Fortunately, we were strong enough and had enough faith in our invention that we were able to take back and not participate.

I have one other comment with reference to the bill.

With reference to the bill, there is no specific clause in terms covering background patents. Much of the argument I have seen—and I have read some of the testimony given last year before the Small Business Committee—deals to a great extent with inventions that have been developed under Federal grants.

There is a very interesting clause in the regulations which is known as the clause on the specified work object. What that term means is: anything you do under a grant or a contract, whether patented or not patented.

So, if a firm has a product that is patented and participates, at the Government's request, in obtaining the information that the Government wants, there are rights that immediately accrue to the background patents.

Senator BAYH. You mean, the Government has the patent rights to any invention that you might make along with rights to the technology that you already had before you participated in the Government contract?

Dr. IANNOTTA. Precisely. They have a right to force you to license them.

Senator BAYH. Excuse me; they force you to license them? But you would still own them?

Dr. IANNOTTA. Yes. We would still own them.

The problem with that is—in fact, the best argument the agency gave us for assigning it is—they said they never used it.

I indicated that if they never used it, they shouldn't have had it.

The problem I have with the licensing—I have seen this happen to other small companies. By chance, someone decided if a small company can't penetrate the market fast enough—or for whatever other reason—they are forced to give them a license.

Up until 1969, you could have a license agreement and have a reasonable fee coming back. There was no difficulty with it.

The fact of the matter is, that this is not the case.

In 1969, the Supreme Court had a case in which they said that licensees can sue licensor to invalidate its patents.

Essentially, what happens—and I have seen this—not the Government contracts but small firms—the licensee just stops paying. And when you don't get the fee, it cuts off your ability to fight back because of the lack of cash flow, it cuts off your ability of having options in terms of what you might do with your company.

The large firm, has insulated itself in terms of risks, under the worst case it pays what it would have paid anyhow.

To protect a patent, it usually costs about a quarter of a million dollars. Our firm surely wasn't in a position to do that.

On top of that, approximately 60 to 70 percent of all patents prosecuted are invalidated in the appeals process. So, what that essentially does is, it puts us in a very difficult position.

The last point:

We would be married to someone we didn't know.

Perhaps they had a reputation that was not necessarily one of ethical conduct. And if we have a license agreement—you have to share the technology. You have to share each other's know-how. You have to work together. I have to monitor it.

There is no way that our company was in the position to take on the appointment—we wanted a licensee we would be comfortable with.

In fact, when we did take on a license agreement, our critical consideration was the fact of trust in people. We need to marry people you trust.

The fact that the Government had that right on a contingency basis also precluded us from obtaining capital from outside sources. Not from the public but, I think, the institutions. The reason being: If you were successful in the marketplace—you did penetrate it and you were commercially successful—any number of people could come through and request a license. Therefore, whatever competitive advantage you had could dissipate quickly.

You don't really make money on licensing. You make money by selling products. The biggest risk in innovation is not in the invention: it is the innovative process of the commercialization, in getting people to accept the products—that it works and it is reasonable. That is a "hard sell."

It is very easy to reap the benefits of proven technology once the market is established. And big companies are very apt to do that.

So, I think this is a very needed bill.

The only other concern I have on the bill, Senator, is this.

From what I have seen, the large companies get very favorable treatment out of the Government in terms of patent acquisitions, whereas small companies do very poorly in that regard.

X Under the bill, we may find ourselves in the position of having to pay back the Government, whereas the large companies may, under the old regulations, not pay back anything and obtain equal treatment. I just bring that to your attention.

I would have been willing to live with the contracts given to the Ford Motor Co. or, even, Union Carbide—with or without a payback. But I couldn't get them.

Senator BAYH. That is the reason for this bill.

Mr. IANNOTTA. The bill is fine.

Senator BAYH. Thank you very much.

I understand you have to leave soon.

We have some questions for you. We will ask you to provide the answers for the record, if you would, in writing.

Thank you very much.

It is very productive, if painful, to have the benefit of your personal experiences for our record.

Dr. SYNIUTA, would you like to proceed now?

Dr. SYNIUTA. All right.

Senator BAYH. If you have arranged otherwise, it doesn't make any difference to me.

Dr. SYNIUTA. I don't think it makes any difference—not to me, anyway.

I want to take this opportunity to thank you for giving me the opportunity to speak on behalf of this bill.

I am going to start on page 2. And I will make some extra comments.

I think innovation is accomplished by individuals, not by governments and industries. However, these individuals must be practically motivated. And this requires adequate support from government and/or industry.

X Most often, the incentive for both individuals as well as businesses boils down to financial reward. And when this is removed, their innovative productivity declines.

It would appear that most government officials do not appreciate the importance of the profit motive in the technology-innovation process. There is a general belief on the part of government officials that where a Federal dollar is spent, there must be Federal ownership of the resulting product.

There ought to be a much broader view, in which Federal funds can be used to stimulate innovation and in which ownership of the resulting output would remain with the innovative concern, who would be free to exploit the development to the fullest. In this way, the public would benefit from jobs, taxes, et cetera.

No one benefits from the 28,000 odd "shelved" government patents which are presently federally owned as a result of federally funded research and development.

Problems of small innovative businesses in dealing with Government policy in patent rights, background patents, and rights in data:

The development of new products or processes by small businesses

is very costly and risky. A successful product introduction involves product development and market-entry costs, which in most cases far exceed the initial concept development costs.

Yet, the basic patent protection usually emanates from the initial R. & D. phases—those in which Federal R. & D. funds are most likely to be spent.

Existing Government patent policy with respect to Federal R. & D. funds inhibits commercialization of resulting development by small innovative firms.

The following is an excerpt taken from the patent rights section of a current Government contract (reference 8) :

Section (b)—Assignment to the Government.

The Seller agrees to assign to the Government the entire right, title, and interest throughout the world in and to each Subject Invention, except to the extent that rights are retained by the Seller under paragraphs (b) (2) and (c) of this clause.

Section (c)—Seller License.

The Seller reserves a revocable, nonexclusive, paid-up license in each patent application filed in any country on a Subject Invention and any resulting patent in which the Government acquires title.

Thus, if the seller (contractor) accepts Government support, he relinquishes title to any subsequent inventions conceived during the contract and, in fact, must grant the Government any rights to inventions made prior to receiving Government support—that is, background rights.

It is true that in dealing with certain Government agencies, a waiver of Government patent rights may be negotiated—that is, if the business concern is aware of and understands the procedure. The success or failure of this action depends on the disposition of the particular bureaucrat who is in charge of the proceedings.

Large businesses are well equipped to fight this battle, whereas small businesses are not.

As a result, there is a reluctance on the part of small innovative businesses to seek Federal funding for innovative concepts for fear of losing their patent rights. Instead, they may channel their federally supported efforts to such areas as technology assessments or other "paper studies," hoping that the inventive product-development work will come from internal resources. Or they may seek Government support only in those areas that they have no intentions to commercialize. And they may attempt internal development of those innovations which have commercial potential without Government funding.

This approach creates two negative results.

One is that Government support may gravitate toward technologies or innovations which do not have high economic potential—thus, the 28,000 Government-owned patents that are presently gathering dust.

The other is that the development of practical innovative concepts that are "too good to give away" is retarded due to insufficient support.

In both cases, present Government patent policy ends up being counterproductive in spurring development of worthwhile technologies.

Often the development of new products by small R. & D. companies will involve participation by larger businesses, such as a large manufacturer. In fact, several Government agencies actively encourage the involvement of large manufacturing concerns in research, development, and demonstration (R.D. & D.) projects. Most often, such involvement by a manufacturer will involve cost-sharing by the manufacturer if he is expected to derive benefits eventually from the R.D. & D. program.

If the subject of an R.D. & D. program involves a proprietary technology, perhaps including a background-patent position, then a small R. & D. company is usually able to elicit interest on the part of a manufacturing concern in jointly undertaking a Government contract only if the manufacturer would be in a position to profit from such a venture.

Both a small business and a large manufacturer are willing to risk an investment in terms of cost-sharing and diversion of personnel and facilities in order to evaluate the technical and commercial feasibility of a new concept as long as such a commitment holds the promise of profiting as a result of a proprietary position.

All too often, however, it is the Government's patent policy and rights in technical data which prevent involvement by an otherwise interested manufacturer. Even if a basic patent position has been established prior to any Government involvement, the Government's patent policy requires that contractors grant to the Government any nonexclusive licenses to background patents for the purposes of practicing R.D. & D. on the subject of the contract.

The Government can even require the contractor to license background patents to others. Subject inventions—that is, inventions conceived under the contract—are assigned to the Government. The contractor receives a revocable, non-exclusive license; and the Government is free to grant licenses to others.

This policy removes the major incentive for involvement by a manufacturer and/or an R. & D. company—the incentive that in return for his investment, he could profit from a proprietary position in the subject of the contract.

The contract terms also grant rights in technical data to the Government, including certain limited rights to proprietary data.

For example, the Government can require confidential disclosure of proprietary data to itself and to other parties, which may include competing companies.

There is additional concern due to the Freedom of Information Act, inasmuch as freedom of information may take precedence over any contractual guarantee of confidentiality.

There have been instances of Government agencies being forced to disclose confidential data. We have experienced such a problem.

The net result of the policy is that once an otherwise interested concern reads the "fine print" in the Government's contract, they are all too often no longer interested in participating in any way.

If the Government really wishes to achieve a larger involvement by industry in its R.D. & D. programs, why should it place such a burden on obtaining cooperation?

You must realize that in most cases a company not otherwise involved in Federal R. & D. needs to be convinced that it can benefit through involvement in a Government contract. The mysteries of Government contracting and the underlying fear of Government involvement are enough of a concern. The primary incentive—that of profit—for industry involvement should not be compromised as well.

I will give you just one example of the approach that one small company has taken, which is our company. And this example has to do with an innovative energy-saving concept.

In the summer of 1976, we conceived an idea for a heat-actuated residential heat pump. Analysis indicated that the concept would improve both the heating and cooling efficiency of a home substantially and that it offered the potential to provide the first practical and alternative approach to home heating that was both energy-saving and cost-effective.

The concept required reduction to practice and a great deal of research and development before it would be ready for marketing—and, indeed, before its feasibility could be proved.

The most readily available and appropriate source of R. & D. money would have been from the Department of Energy. However, because of our concern over the loss of proprietary rights, we made the decision not to approach the Government.

Instead, we have pursued a much slower course of action. By using our own—limited—internal R. & D. funds, we built a simple “proof-of-principle” model. And then in 1977, we applied for a patent.

Although the patent was recently issued, this project is dormant, essentially, due to lack of funds. We were granted the patent on April 10.

Had we chosen the alternative path and utilized Government R. & D. funds to develop this concept, we would no doubt be much further along. From a business standpoint, however, we would be just as badly, if not worse, off. Since we would not have invested a significant amount of money as compared to Government R. & D. funding, there would be little chance that we would have been permitted to retain proprietary rights.

And, as a practical matter in that regard, the Nation would fare no better, inasmuch as there would be a low probability of obtaining the necessary private-investment capital to commercialize the product because of the lack of proprietary rights or the strings that would be attached.

This is an ideal example of the “no-win” position that a small company finds itself in with regard to financing innovative product development. The company cannot afford to finance development internally, nor can it afford to accept Government assistance.

Until the Government recognizes this situation, it will continue to finance developments which are never commercialized, while the concepts that are “too good to give away” fail to get developed because of lack of support.

Recommendations: The Government should liberalize its patent policy in such a way that contractors can retain rights to subject as well as background inventions as long as they take action to protect and implement these inventions.

The Government should continue to require that the owners of rights to inventions promote commercialization or else permit others to do so. However, this should be provided for without compromising the owner's right to profit from his innovation and investment.

Government rights in technical data should be more restrictive with regard to proprietary rights.

The Government must offer stronger guarantees that proprietary data will be kept confidential and that contractors would not be obligated to license proprietary data to others unless they elect not to pursue commercialization of the technology, themselves.

I support the University and Small Business Patent Procedures Act—S. 414—wholeheartedly. I believe that the patent-policy changes that are included in the bill would provide the kinds of incentives to innovative small businesses that are needed in our Nation today.

In discussing this bill with Children's Hospital—with the director of research and administration—I learned that they support this bill wholeheartedly.

Dr. Broseghini has written a letter to me on this subject. And I have attached that letter to my written testimony.

Senator BAYH. Thank you very much. It will be put in the record.

I appreciate your contribution here. We appreciate having the benefits of your experiences in this field, and I appreciate your support of this bill.

We would value any further points you might have with respect to details as we go along.

Dr. Obermayer, would you like to proceed?

Dr. OBERMAYER. Thank you for giving me the opportunity to testify before you this morning.

Before I go into my prepared testimony, I should like to state briefly what I believe to be a useful and simplified way of describing the problem of Government patent ownership.

First, we must recognize that the purpose of a patent is to give an inventor the opportunity to manufacture and market his invention for a certain period of time free from competition.

The Government doesn't have to worry about competition from U.S. industry. That is not the problem. It may have to worry about foreign countries but not U.S. industry.

Therefore, when the Government owns a patent, the Government in fact does not use it. It does not need to use it.

When a patent isn't used, it really isn't worth anything to anybody and has no real value by itself.

But an irony of the situation is that the Government normally retains U.S. patent rights for itself but gives away foreign rights. The control of foreign rights appears to be much more important in terms of the health of the U.S. economy.

In the rest of my testimony, I would like to amplify on this theme. In the brief time that is available—I know the hour is getting late—I should like to raise a few questions and propose a few answers.

The first question is: Why do so many small high-technology companies avoid Government contracts?

The second question: Why do the bidders on Government contracts usually not include the most experienced and best qualified companies in the field?

And the third question is: How can Congress change the situation?

The answers require an understanding of the factors that motivate small businessmen. And we need to start with a discussion of the fundamentals.

The goal of a company is to make profits; in other words, to maximize the return on an investment.

The small high-technology company that has a product to sell usually finds itself competing with large companies that have much greater financial muscle and marketing clout. If the small company is to succeed, it must have a superior product and a means for protecting its product's superiority.

If the small company's new product shows market acceptance, big companies will try to jump in with similar products and overwhelm the small company with massive advertising, well-developed channels of distribution, and sophisticated marketing approaches. The small high-technology company's principal protection in the commercial market is its proprietary know-how and patent protection.

This is the way my company evaluates its position. We will not enter a new market unless we have some protected technological advantage. And our reaction is typical. Even the other witnesses today have made similar statements.

When the Government is looking for a company to do research and development in a field where we have experience, we are very cautious about submitting a proposal. Even though we may be as well qualified as any bidder, we become concerned that we may compromise our patent rights by accepting a contract. Many Government agencies require that small businesses who accept contracts not only give the Government title to any patents coming out of the work but, also, give the Government background patent rights; that is, the right to use patents already obtained and paid for by the company. And I am the third witness to express concern about background patent rights today.

As a further affront, the Government usually takes a rather cavalier attitude toward protection of any of the company's proprietary information—or "know-how"—which is submitted with a proposal. All too often, proprietary information supplied by one company later appears in another company's proposal. It is no wonder that many companies which have important new technologies with significant patent implications carefully avoid becoming entangled with the Government.

We must recognize that not all research-oriented companies view patent rights in the manner I just described. Some firms' principal business is soliciting Government contracts. They attach little or no importance to patent rights and commercialization, because they feel that obtaining Government contracts is an end in itself. Such companies are not necessarily the most qualified to do the work. Rather, they are the most experienced at writing Government proposals. Most defense and aerospace contractors fit this category.

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However, as the Government expands into areas where commercialization is important, it needs contractors who understand and regularly deal in the commercial world. Commercialization or public use is the ultimate goal of most research and development sponsored by the Department of Energy, the Department of Transportation, the Department of the Interior, and the Department of Health, Education, and Welfare. It is ironic that these very agencies, whose ultimate goal is to stimulate commercialization of technology, normally use very restrictive patent provisions in their contracts; whereas, the Department of Defense, whose ultimate goal is not commercialization, is much more reasonable. It normally gives title to inventions to the contractor companies.

The current patent provisions in Government contracts have led to many peculiar situations. Patent provisions that are intended to help civilian agencies often help only the military. Patent provisions that are intended to stimulate the U.S. economy often only provide business and jobs overseas.

Perhaps a few examples would be useful.

About 2 months ago my company had a new idea for an air-quality monitoring system. This type of air-monitoring system has important potential applications both to the military for the detection of chemical-warfare agents and to civilian agencies for the measurement of air pollutants and toxic gases in the workplace.

It looks like patents will result when we reduce the idea to practice. Our decision was to submit an unsolicited proposal only to the military agency, because if we received a military contract, we would have been able to retain title to patents developed under the contract. With the two civilian agencies—the National Institute for Occupational Safety and Health and the Environmental Protection Agency—we would have been required to relinquish our patent rights.

As another example:

A friend of mine, who is president of a 4-year-old research and development company, had an idea a few years ago for a metal extraction and recovery process that could represent a major breakthrough in the mining and metal-processing industries. In order to obtain Government support for the original development, the company had to assign U.S. patent rights to the Government. However, the company was allowed to retain foreign patent rights.

Now, after 3 years and several hundred thousand dollars of research and development effort, they feel that the process is approaching practical reality. They have explored commercialization with more than 10 U.S. companies, most of them in the mining industry. No one expressed strong interest, principally because exclusive rights could not be offered.

Finally, they did find one interested firm—in Japan. They offered the Japanese company exclusive patent rights in Japan. And the Japanese company has taken an aggressive position in the pursuit of commercialization.

This is a typical case wherein the U.S. system encourages the export of technology leading to foreign sales, foreign production, foreign jobs, and has an adverse effect on the U.S. economy. I could have presented many other examples with respect to different products,

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different agencies, and different companies—but with the same general scenario and the same general conclusion.

Senator BAYH. I won't ask you to do it now. But, if you could, I would like for you to write down a few of those examples in the kind of detail you just gave us.

I think that kind of horror story is the best example that we need to jog some people.

No wonder that many people are saying things about America like: We have gone to sleep, we have gotten soft, we are not thinking anymore.

When you see this kind of ingenuity ending up benefiting other countries instead of our own, that is absolutely unforgivable, in my judgment.

I don't believe any of the agencies involved want this to happen. Innovation is being tied up in the bureaucracy and the redtape. People in the agencies are afraid to make decisions on patent ownership because they might be criticized or receive some unfavorable publicity.

I would like to receive any examples of this type of thing that you may know about because I want to use them.

I am saying that to both of you gentlemen.

Dr. OBERMAYER. The kinds of problems presented here are not new. They go back many decades. For example, the 5-year time interval between the Wright brothers' first successful flight—in 1903—and their first airplane sale to the U.S. Government—in 1908—is attributable largely to the Wright brothers' concern about the protection of their proprietary data and patent position during their dealings with the U.S. Department of War. It was just as difficult then as today for the inventor/innovator to deal with an entrenched bureaucracy.

Senator BAYH. The more things change, the more they stay the same.

Dr. OBERMAYER. The remaining question I should like to address is: What can Congress do?

There have been many patent bills considered and reviewed over the years. The arguments for one or another of them are often technical and complex. Finally, for the first time, the focus is on one bill. This bill isn't perfect, but it will be a major improvement over existing patent regulations. And it has a broad base of support.

I am here today representing both the American Association of Small Research Companies, which is the only national organization of small research-based businesses, and, also, the Smaller Business Association of New England, which is the largest and oldest regional small business organization in the United States. Both of these organizations are behind the bill. Additionally, the bill was endorsed by the Small Business and Science and Technology Conference this past year. Further support comes from the Patent Policy Subcommittee and the Government Procurement Subcommittee of the President's Domestic Policy Review of the Industrial Innovation. These panels of business leaders have explicitly recommended that the commercial rights under Government-supported research be transferred to the private sector. They have indicated that the implementation of this recommendation could have a major impact on industrial innovation.

The legislation before you today has a broad base of support, both within the Congress and among the informed public. The opportunity for passage of a significant piece of legislation is here. And I hope you will act on it, because it will increase domestic jobs, allow for more effective use of technology, improve business opportunities, and benefit our entire economy.

Senator BAYH. Thank you very much.

I have questions that you gentlemen might give some attention to for the record.

I hate to impose on you further.

Senator BAYH. Let me ask both of you to deal with what, it seems to me, is a "Catch 22" kind of situation we have here.

I speak as one who is very interested in helping resolve this problem but who has had little or no experience in the complexities of it.

I have nothing but pride and admiration for those of you who have the ingenuity at your disposal to be able to find innovative solutions to old problems.

At a time when we are concerned about "bigness," and a decrease in competition—is it an oversimplification to suggest that the present patent policies tend to stifle competition and, perhaps, force the individual entrepreneur to choose between a Government relationship, which presently has an unacceptable ownership provision, and cutting a deal with a major corporation, so that, instead of having an individual business out here competing on its own, you really have a large corporation going out and co-opting the competition? Is that an oversimplification?

Dr. SYNIUTA. It is not an oversimplification—that is exactly what happens.

Let me tell you what we have been able to do with large corporations and what our philosophy is with regards to commercial product development.

We are a small company employing 24 people of which 14 or 15 are scientists. Less than 30 percent of our business is with the Government. We solicit Government money to fill in the dry spells.

We solicit funding for market studies, demonstrations, and so forth, where there is no real research and development; and maybe a little development but no major research effort. We have also avoided the very large companies—but we do approach the medium-size companies and are usually able to make an arrangement which allows us to maintain our proprietary interest.

We have such a deal with two firms at present, wherein they want to expand their product line, and they solicit new ideas for consideration by their marketing and sales personnel.

We come up with innovative ideas—maybe half a dozen—we give a brief presentation and they will come back and choose those ideas which appear to be most attractive. We go ahead and develop the concepts, obtain patents and develop prototypes, and so forth.

They go into production. And we get a royalty return.

There is a joint ownership of the product in spite of the fact that they have paid for all of the development costs and own the patent rights.

But here is a firm—a medium-size firm—that has the vision that fosters innovations, something that the Government could also provide. That is a profit motive.

We not only get paid for our research and development, and make a profit on this R. & D., but we get a chance to do even better by having an opportunity to participate in the profits from sale of the products.

I think that is important.

Senator BAYH. Dr. Obermayer, do you have any additional comments on that?

Dr. OBERMAYER. I completely agree with Dr. Syniuta.

We are very cautious as to what kind of proposal we submit to the Government. For example, we would rather submit a proposal for test and analysis than for research and development, because test and analysis usually means no patents will come out of it. Research and development usually would imply patents.

If the research and development to be performed is right at the heart of our proprietary business interests, we will not submit a proposal unless we can have title to resulting patents.

Senator BAYH. I assume that both of you gentlemen and your companies are typical of a lot of similar kinds of companies that have highly skilled, deeply motivated—highly professional kinds of people—which can be the source of tremendously important new ideas to our country.

Is that a fair summary?

Dr. SYNIUTA. I think there have been a number of recent studies that have pointed out that small businesses have been much more productive in spending the Federal R. & D. dollars, as you mentioned earlier this morning.

I think we are such a company. We are not interested in being a "paper machine" for the purpose of producing Government documents. Instead, we want to produce products, and this we are doing without Government involvement.

We, in fact, use the Government R. & D. work to cover some of our overhead and in that way, we are helped by the R. & D. work.

But, as I mentioned in my testimony, we shy away from doing the innovative work simply because we don't want to relinquish our rights to the patents and, hence, the potential financial reward.

Senator BAYH. Would either of your companies have problems with the concept of having a payback provision in the bill similar to that found in section 204?

Do you have suggestions you might make now or for the record later as to how to perfect this requirement?

Dr. OBERMAYER. In general, we would have no problems with the payback provisions as they are described in the bill.

It is commonly said in intercompany negotiations: "If you can help me make money, I would be glad to share it with you." I feel that most small companies that can make a profit as a result of Government support would be willing to pay back some of it to the Government. That is no problem.

However, I think there is a problem of defining the specific payback conditions. If a company receives a large Government contract,

wherein a small section of it relates to patentable technology, does the payback provision apply to the entire large contract or only to the small section of it? This is a very important consideration, but could it be handled by regulation after the legislation is passed?

Senator BAYH. I am afraid of leaving such an important provision in the bill up to each agency as to how they will implement it. We could easily find ourselves in the same sort of situation that we now have with all sorts of different programs and requirements.

Both of your companies have had experience with the Government and with private corporations as far as selling and developing technology.

Would it be too much to ask you if you would give some specific attention to this payback provision and to make any suggestions you might wish to make, so that when we begin to move along here, we will have some ideas, perhaps, for putting the best possible payback mechanism in the bill.

Dr. SYNIUTA. We would be happy to do that.

Senator BAYH. Thank you very much.

You have been very helpful.

We are going to move as rapidly as we can on this.

I have another day of hearings scheduled in early June. Then we want to take inventory of where we are, because I just find it unforgivable to continue to allow the present patent policy to plague us.

We appreciate your helping us move toward the resolution of the problem.

Thank you very much.

[Whereupon, at 1:15 p.m., the subcommittee recessed, to reconvene at the call of the Chair.]

[Letters submitted by Dr. Iannotta, the questions and answers previously referred to and the prepared statements of Dr. Syniuta and Mr. Obermayer with attachments follow:]

ECOLOGROL, INC.
ENVIRONMENTAL SPECIALISTS,
Bethpage, N.Y., February 20, 1979.

Mr. JERE W. GLOVER,
Deputy Chief Counsel for Inter-Governmental Affairs,
U.S. Small Business Administration, Washington, D.C.

DEAR JERE: Enclosed herein is a draft of a letter I plan to forward you officially after you have had an opportunity to review the attached material. Is this what you want? Is it in the format you need? Can I be of any further assistance?

After you have had an opportunity to review the enclosed, I will call your office to answer any questions you may have. Thanks for your interest.

Very truly yours,

PATRICK J. IANNOTTA,
President.

Enclosure.

[Draft]

FEBRUARY 20, 1979.

DEAR JERE: With reference to your letter of February 13, 1979, I have enclosed herein material which I believe offers an encapsulated view of our dealings with EPA, over number of years. It is important to realize that our major concern during these negotiations was not principally with the disposition of new subject inventions developed under EPA grant since the grant itself was extremely limited in time, objective and funding. Our major concern was our ability to protect from Governmental control our already issued background patents, which were developed at great personal risk and sacrifice during a very finan-

cially difficult 7 year period. Paradoxically, it was EPA's condition for funding the project, that the process be sufficiently demonstrated and that sufficient "base line design criteria be available" to insure a low risk profile. The objective of the EPA grant was only to optimize an already proven process, not to develop it. It was our belief then and it is even more strongly held today, that if we were not able to hold on to our basic background patents in an unencumbered form, that we would not be able to negotiate a license, raise capital or compete in the market place.

What was particularly upsetting was that a number of very large firms were able to acquire much more reasonable waivers from EPA then EPA was willing to afford us. Since it is clear that large firms are not dependent on patents, but market position to protect their interest, it was difficult to understand EPA's logics particularly since some of their earlier grantees now dominated the market. You must understand that to a small technical firm a patent position is its only really strength particularly in an open, competitive, and difficult business environment.

The enclosed material, I believe manifest the type of "Alice In Wonderland"—Catch-22 approach that a small business man finds himself when he looks for assistance from the Federal Government. In our opinion the net results of EPA patent policy if one could be found, was not to make the technology available to the public, but to stifle the incentive and limit the capital available for small technical firms to enter the market. Further, given the nature of our business, which requires municipalities and consulting engineers to acquire EPA approval on all projects, this forced lack of financial and technical recognition by EPA of our technology serve to further isolate us from the market. The net effect was to insulate those who were already dominate in the market place, and to keep from the municipality cost effective technological options. This problem was subsequently corrected in December, 1977, when Congress in passing PL 95-217, gave municipalities a 100% Federal guarantee to protect against the failure of utilizing "Innovative" Cost Effective Systems, while also offering additional financial incentives. Since the Government has already spent over twenty billion dollars to build Sewage Treatment Facilities since 1972, and anticipates the expenditure of an additional \$20 to \$30 billion over the next ten years, even minor savings according to a GAO report would have a significant impact on the federal budget.

We have always found EPA's patent position to be contradictory, inconsistent, counter productive and confused. And the material enclosed I hope will offer some understanding of what the problem was as we saw it.

Areas to include:

1. Background Patents and Specified Work Object.
2. Governmentally forced licensee's right to sue to invalidate licensors patents.
3. Concern over EPA reprisals.

LIST OF ENCLOSURES

I. A brief history of our negotiations with EPA up to and including April 29, 1977.

II. The official response by EPA to our request for waiver, dated February 22, 1979. It is important to note that although the letter itself, does not speak about EPA position requiring a claim on our background patents, it is covered in the agreement forwarded us (copy attached). It is in this letter, that EPA admits that after "numerous discussions they have concluded that a waiver of the type requested is essentially justified".

III. Statement by Dr. Thomas Murphy, Deputy Assistant of Administration for Air, Land and Water Use at EPA, before the subcommittee of Environment and Atmosphere of the Committee of Science and Technology, House of Representatives, on September 28, 1977, reviewing the lack of innovation in the construction grants program.

He states: "In general the participation of a private entrepreneur seems to be an essential element in successful innovation". "Key features which constrain innovation" (Includes). "An absence of incentives for assumption of the risk of innovation".

IV. Union Carbide Terms Not Available: Letter from Mr. Roehenek, stating that clauses EPA has allowed Union Carbide will not be considered as part of

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our negotiations. This we felt was discriminatory particularly since Union Carbide now dominates the field. The net affect of EPA's position has been to reduce market competition from alternative process technologies.

V. Ecolotrol letter April 29, 1977.

VI. Ecolotrol letter July 7, 1978.

VII. Ecolotrol letter June 8, 1978.

VIII. Summary: The end product of seven years of negotiation was our refusal to sign the patent clause and to abandon the EPA grant. We believe strongly that if we had signed the clause, we would not be in business today.

HISTORY OF PATENT NEGOTIATIONS EPA—GRANT No. R-804-65401

March 30, 1976: Grant package was submitted to E.P.A. requesting a deviation from the normal patent rights clause.

June 30, 1976: Received letter from Tim Oppelt, E.P.A. Project Officer advising us that "review process is completed" and that "all review comments have been highly positive."

August 26, 1976: Grant was officially signed by E.P.A.

August 30, 1976 (week of): Received a phone call from Mr. Bochenek, E.P.A.'s Patent Counsel, requesting material to support our request for a deviation (This was our first contact with E.P.A.'s patent office—2 months after the review process was supposedly completed and 4 days after the grant was signed.)

September 8, 1976: In response to Mr. Bochenek's request one of our employees flew to Washington D.C. specifically to hand deliver to Mr. Bochenek all the supportive information he had requested.

September 13, 1976: Patrick Iannotta, President of Ecolotrol flew to Washington and met personally with Mr. Bochenek from 10:30 A.M. to 5:30 P.M. to hammer out an agreement. By the end of the meeting, a mutually acceptable patent clause had been developed.

October 15, 1976: After repeated inquiries to Mr. Tim Oppelt (EPA Project Officer) asking him to determine the status of the agreement within E.P.A.'s patent office, Mr. Bochenek called Mr. Iannotta to inform him that the agreement was still acceptable but since our grant had already been signed "he had put our (paperwork) on the back burner" because he had more pressing matters to resolve with grants which had not yet been signed. He told Mr. Iannotta "not to worry, there was no problem".

October: On the basis of this phone call Ecolotrol continued to work in good faith on the project and met on October 27, 1976 with Mr. Oppelt to get the project "moving faster".

February 1977: Mr. Bochenek sent E.P.A.'s "official" response to Ecolotrol's patent deviation request. (A response which E.P.A. has taken without any consultation with Ecolotrol and which is inconsistent with the mutually agreeable terms worked out last September. This response has come 11 months after the grant package was submitted and 5 months after the deviation was supposedly "worked out".

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF GENERAL COUNSEL,
Washington, D.C.

Re: EPA Grant R804654-01—Subagreement with Ecolotrol, Inc.

Mr. H. JOHN PLOCK, Jr.,

Commissioner of Public Works, County of Nassau, Department of Public Works,
Mineola, N.Y.

DEAR MR. PLOCK: Enclosed is a draft patent clause developed in this office in response to a request from Ecolotrol for a deviation from the standard patent clause used in EPA grant regulations. Specifically, Ecolotrol requested that it be permitted to retain title to any invention conceived or first actually reduced to practice in the course of or under its sub-agreement with the County of Nassau under the referenced grant. As a result of numerous discussions within EPA it has been concluded that a waiver of the type requested is essentially justified, and the enclosed clause in paragraph (b) reflects this view.

However, in view of the apparent likelihood of a Step 1, 2 and/or 3 grant under EPA's Construction Grant Program, to the County of Nassau to perform further, extensive work in connection with the Ecolotrol proprietary technology, it was felt that any waiver of rights to new inventions should be subject to an

agreement by Ecolotrol that in the event any such Step 1, 2 or 3 Construction Grant is awarded, the rights granted under the referenced grant would be subject to re-negotiation. This position is taken; since any such further grant support would unquestionably serve to further enhance the background proprietary position of Ecolotrol, and very probably also the value of any new inventions made under the above referenced grant. In addition, it is recognized that any other construction grants awarded by EPA which use the Ecolotrol technology, could very likely result in, one, a monopoly position to Ecolotrol and secondly, and perhaps even more importantly, result in a situation where EPA would have funded development of foreground inventions, further perfection of background inventions and then would be in the position of paying significant royalties to Ecolotrol via the EPA Construction Grants Program.

It is respectfully requested that the enclosed clause be forward to Mr. Patrick Jannotta, President of Ecolotrol, for his review and any comments he may wish to make. Either you or other representatives of the County of Nassau and Mr. Jannotta may feel free to contact the undersigned at (202 755-0794 regarding this matter.

It should be noted that any construction grant awarded by EPA is deemed, itself, subject to and to include the EPA patent rights clause contained in 40 CFR Part 30, Appendix-B.

Sincerely yours,

BENJAMIN H. BOCHENEK,
Patent Counsel (A-134).

Enclosure.

(6) To "practice an invention or patent" means the right of a licensee on his own behalf to make, have made, use or have used, sell or have sold, or otherwise dispose of according to law, any machine, design, manufacture or composition of matter physically embodying the invention, or to use or have used the process or method comprising the invention.

(7) "Administrator" means the Administrator of the U.S. Environmental Protection Agency or his authorized designee.

(b) Licensing Requirements.

Ecolotrol hereby agrees that, to the best of its ability, it will either directly or through its licensee(s) or assignee make available an embodiment of its Background Patent(s) as a Commercial Item, for use or practice with a Specified Work Object or Subject Invention. If the Contractor, its licensee(s) or assignee feels it no longer desires, or if it is unable, to make such Commercial Item(s) available, it shall notify the Administrator, and upon request by the Administrator, or his designee, will license such Background Patent(s) to any designated responsible applicant for practice on reasonable terms and conditions including reasonable royalties.

(n) Renegotiation of Patent Rights

The Contractor (Ecolotrol, Inc.) hereby agrees that in the event EPA, either has, or in the future, awards a Step 1, 2 or 3 construction grant that involves any form of experimental, developmental, research or demonstration work on processes covered by Background Patents or otherwise proprietary to Ecolotrol, its licensee(s) or assignee, Ecolotrol, its licensee(s) or assignee, as appropriate, agrees that, the portions of this clause related to rights in Subject Inventions and/or Background Patents shall be subject to renegotiation at the option of the Government of the United States.

STATEMENT OF DR. THOMAS MURPHY, DEPUTY ASSISTANT ADMINISTRATOR FOR AIR, LAND, AND WATER USE, EPA, BEFORE SUBCOMMITTEE ON THE ENVIRONMENT AND ATMOSPHERE OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. HOUSE OF REPRESENTATIVES, SEPTEMBER 28, 1976

"Generally, the return on R. & D. investment for the private manufacturer is low. The market is not that large and competition is keen among suppliers. Most of the cost for treatment works is in concrete and steel; less than a quarter of the total cost goes for vendor hardware.

Often, innovation results in a process change rather than a new marketable piece of equipment. It is very difficult to establish a proprietary position in the municipal wastewater treatment market, especially with procurement specifications which can be relatively easily met by competitors."

Moreover, since the market involves multiple decisionmakers rather than a single customer, it is time consuming and difficult to sell all of the participants.

Thus, we see a relatively low level of private R. & D. on wastewater treatment technology and that which does occur being focused primarily on cost reduction for existing equipment.

The primary involvement of the private vendor comes at the technological marketing phase of the innovation process.

Some of the more successful examples of innovation in wastewater treatment technology have been characterized by aggressive involvement of a private manufacturer.

Examples included "pure" oxygen aeration and pressure sewer systems. In general, the participation of a private entrepreneur seems to be an essential element in successful innovation.

However, it is itself not sufficient to assure innovation, since the private interests tend to focus on marketing rather than development. Therefore, private manufacturers are largely dependent upon the existence of new technologies which have already been developed, such as through the Federal R. & D. programs.

In summary, the development and use of municipal wastewater treatment technology has the following key features which constrain innovation:

A low level of involvement of private manufacturers; especially in developing innovative technology.

A dependence of private manufacturers, with some notable exceptions, upon the availability of marketable technology which has been developed by others.

An absence of incentive for assumption of the risk for innovation.

A lack of incentive for taking the additional time necessary for a thorough cost-effectiveness analysis of innovative alternatives, and

A lack of full scale cost and operating data on many available innovative technologies.

From the preceding discussion, it is clear that we see a continuing need for innovation in municipal wastewater control technology.

It is also clear that the process of innovation for municipal wastewater technology is very complex and, it currently functions, includes a number of factors which, in fact, constrain innovation.

One of the key elements in the overall process is the Federal research program. In my remarks I have tried to describe how and why the research program has evolved into its present form, that of providing highly focused applied research and development support for near term agency needs, especially those of the construction grants program.

Within its current budget limits, is this research program addressing the right problems and allocating its resources appropriately?

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF GENERAL COUNSEL,
Washington, D.C., July 8, 1977.

Re EPA Grant RS04654-01.

Mr. PATRICK IANNOTTA,
President, Ecolotrol, Inc.
Bethpage, N.Y.

DEAR MR. IANNOTTA: This is to confirm that it will take about one week for me to obtain a copy of the patent rights clause used in the Union Carbide contracts of about 1969-70 that were awarded by the Department of the Interior. Since I will be on vacation July 10-16, I shall call you on about July 18 regarding this matter, and other aspects of our patent clause negotiations.

Incidentally, the use of certain clauses in the Union Carbide contracts will not be considered a precedent for use thereof in your contract with Nassau County. Thus I suggest we narrow the remaining issues to the matter of the "renegotiation" provisions of the proposed patent rights clause I sent to Mr. Plocks in February 1977, and which you discussed in your letter of June 8, 1977, to him.

I shall contact you on about July 18, upon my return from vacation, and hope that we can confine further negotiations to the single matter of paragraph (n) Renegotiation of Patent Rights in the aforementioned proposed patent rights clause.

Sincerely yours,

BENJAMIN H. BOCHENEK,
Patent Counsel (A-134).

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ECOLOTRON, INC.,
ENVIRONMENTAL SPECIALISTS,
Bethpage, N.Y., April 29, 1977.

Re E.P.A. Grant R804-65401.

Mr. FRANK FLOOD,
Nassau County, Department of Public Works,
Sanitation Water Supply, Mineola, N.Y.

DEAR FRANK: Pursuant to our meeting of April 19, 1977, our phone call this afternoon, and with reference to Mr. Ben Bochenek's letter to Commissioner Plock dated February 22, 1977, I would like to indicate that we at Ecolotron will require additional time to complete an adequate response to this correspondence. As you are aware, the "official" response that E.P.A. has now communicated in writing is quite different from the terms of an agreement reached with E.P.A. last September. In our opinion, Mr. Bochenek's correspondence of February 22, 1977 appears to be ambiguous, lacks specificity, and addresses issues never before raised. We, to say the least, are not only surprised, but shocked and in a state of disbelief.

We are, obviously, pleased that the first paragraph of this letter states that "as a result of numerous discussions within E.P.A., it has been concluded that the waiver of the type requested is essentially justified". However, the second paragraph of this letter goes on to request concessions on our part which are not only inconsistent with our previous agreement, but appear to be inconsistent with E.P.A.'s own regulations. These concessions if accepted, would seriously jeopardize our company and our ability to commercialize this technology within the United States. Mr. Bochenek's concern that Ecolotron may have a "monopoly position" is difficult to understand. We are a small business in competition with some of the nation's largest firms (i.e. Union Carbide, F.M.C., Air Products, etc.); most of whom have already received significant E.P.A. support. It is for these reasons that we must carefully study the proposed terms of this agreement.

Since E.P.A., after eleven months, has raised new and substantive issues for the first time, we must prudently conduct research as to their meaning and implication. Also, since we are a small company and a number of our key employees who have been intimately involved in these negotiations will be out of the country for the next several weeks, it is estimated that we will require at least 30 to 40 additional days to develop an adequate response. Nevertheless, at this time we do not believe that we can comply with the terms of this agreement. I have also enclosed for your information, a history of our negotiations with E.P.A. concerning this matter.

I hope this meets your requirement. If I can be of any further assistance, please do not hesitate to contact me.

Very truly yours,

PATRICK J. IANNOTTA,
President.

ECOLOTRON, INC.,
ENVIRONMENTAL SPECIALISTS,
Bethpage, N.Y., July 7, 1978.

Mr. FRANCIS J. FLOOD, P. E.,
Director of Environmental Engineering, Division of Sanitation and Water Supply,
Department of Public Works, Nassau County Executive Building, Mineola,
N.Y.

DEAR MR. FLOOD: With reference to our recent discussion concerning E.P.A.'s patent clause, I find it very difficult to summarize the many years of ongoing negotiations into only two or three pages, but I will try.

Fundamental problem: Every right granted under the waiver that E.P.A. has presented is sustainable by us only upon our ability to demonstrate that we have made the technology "reasonably available" or "available at terms reasonable under the circumstances." The problem is that E.P.A. does not wish to define precisely what "reasonable" means. This leaves their interpretation of reasonableness and our rights open to an ever-changing set of standards, which can be modified or significantly changed at any point in the future.

To test the validity of our assertion, one only need look at the record for these negotiations. In the name of "reasonableness," the E.P.A. has asked us to set aside valid and binding contracts, to sign a patent clause when we are not even a participant to a grant, unilaterally changed an understanding after we

had been assured we had an agreement, and invested substantial corporate funds on the basis of said assurance, refused to grant us patent rights equal to those given a six billion dollar firm for fear that we would develop a "monopoly position," etc. etc

Thus, E.P.A., who has admitted not having a unified patent policy, would ask us to leave the very foundation of our business open to the whims and impressions of any number of the E.P.A. individuals, who may meet from time to time, now and in the future, to determine what "reasonableness" is. This is not reassuring, particularly in light of the fact that during the entire course of these negotiations, E.P.A. has not, in our opinion, acted "reasonably" or in "good faith."

A fair waiver is essential to Ecolotrol's existence: Ecolotrol is a small, high technology company, whose ability to exist and to carry on its normal corporate functions rests primarily on our know-how and patent position. We are in competition with significantly larger firms, many of whom have already received significantly larger firms, many of whom have already received significant E.P.A. assistance. The ambiguity in E.P.A.'s position would not only cause us significant weakness in the market place, but would also preclude us from obtaining the necessary capital that is required to accelerate the availability of our technology.

E.P.A.'s position: Mr. Bochenek, in his letter to you dated February 10, 1978, states, "... said changes will unjustifiably leave the government with no control over either subject invention or background patents." This is consistent with the tenor of our own negotiations. It is clearly E.P.A.'s position that it must have "control" of our patents. To offer E.P.A. this type of control, would probably cause our firm to go out of business.

Ecolotrol is entitled to the waiver: Mr. Bochenek, in his letter to Commissioner Plock dated February 22, 1977, states, "As a result of numerous discussions within E.P.A. it has been concluded that a waiver of the type requested is essentially justified . . ."

Ecolotrol has acted in good faith: It is important to realize that we had accepted a "good faith" agreement reached between Mr. Bochenek and myself, September 13, 1976, and proceeded to work under the terms of the grant, only after we had received a verbal assurance from E.P.A.'s patent council, that the waiver as agreed was granted and for us "not to worry."

We initially accepted a relatively risky clause based on our respect for the County and our assumption of E.P.A.'s good faith. When the E.P.A. unilaterally changed the terms of conditions of that patent clause, it became clear that a higher degree of specificity would be required in order to protect the interest of our company and our employees from further unilateral and arbitrary actions.

E.P.A. has not acted responsibly: What is perhaps most disturbing to me, is the fact that E.P.A. has tried to bully concessions from us, which we were not prepared to make. They have completely disregarded their own regulations, asked us to set aside valid and binding contracts, have taken a position that impinges upon the rights of the County, and have even gone so far as to require us to sign a patent clause for a step 1 grant, even if we are not a participant to the grant. As far as we can learn, this is not standard operating procedure. We know of no one else who has been required to accept such arbitrary, capricious, and arrogant conditions. Thus, it is very difficult to assume that the E.P.A. has been working in "good faith."

Ecolotrol has been consistent: In our letter to Mr. Bochenek dated September 7, 1976, I stated, "... Equities require that we be allowed to protect our investment and commercial position . . . to do otherwise would be unreasonable and would require us not to contract with Nassau County in this important effort to accelerate the availability of fluidized bed technology." Since we have over one million dollars invested in this development effort, and feel that E.P.A. has taken virtually no risk, we believe that their desire for control over our background patents is arrogant and confiscatory.

Ecolotrol as a monopoly: I think it important to realize that we have spent close to seven years trying to interest the government in helping to accelerate the development of the fluidized bed process. It has taken us in excess of five years alone to get a "fair" technical evaluation. It has taken us an additional year to define the grant so that it would be consistent with E.P.A.'s own budgetary restraints, and it has now taken several additional years of ongoing negotiations with an ever-increasing, ever-changing definition of E.P.A.'s requirements to try and develop a patent clause.

It is also interesting to note, that E.P.A.'s stated concern in refusing a fair waiver, is that Ecolotrol might develop a "monopoly position," and yet Mr.

Bochenek has categorically stated that the terms that E.P.A. has granted to Union Carbide, a six billion dollar firm, for the development of a competitive process, would not be made available to us. This is striking, in light of the fact, that E.P.A. has stated that after months of consideration our request for waiver is "essentially justified." We believe E.P.A.'s position clearly discriminates against small business.

Competitive requirement: Mr. Bochenek, in his letter to you dated February 22, the Federal Water Pollution Control Act as amended are further reasons for 1978, indicates that "the competitive requirement" of section 204 (a) (6) of the Federal Water Pollution Control Act as amended are further reasons for E.P.A.'s position on this. This is not true. Section 204 (a) (6) requires "at least two brand names or trade names of comparable quality." It is clear from your letter to Mr. Bochenek dated October 17, 1977, that our licensee Dorr-Oliver, a major New York State Stock Exchange Company and equipment supplier is already in direct competition with us and is making this system available under the name Oxitron. Even if Dorr-Oliver were not in competition, the clause specifically allows the availability of a "or equal capability."

Now 85% Federal funding for full-scale units plus 100% guarantee to correct any deficiencies with absolutely no patent provision: Although we never discussed this with Mr. Bochenek, on December 27, 1977, the President signed Public Law 95-217, Clean Water Act amendment for 1977. Under section 17, E.P.A. will give any municipality which decides to utilize "innovative technology" even at a multi-million dollar installation, an additional 10 percent in Federal Construction Grants Funds: plus a 100 percent guarantee of the cost of correcting any deficiencies, with absolutely no patent clause or limitation on our profits.

In light of these facts, it is absolutely absurd that the government can maintain the position that it should have "control" over our patents, on a \$100,000 grant, particularly in light of the fact that we were limited to a maximum \$7,500 profit before taxes, and on which we have actually lost money, not including the cost of trips to Washington, legal fees, etc. associated with the development of this patent clause.

Conclusion: It is our position that E.P.A.'s requirements are without merit, arrogant, discriminate against small companies, and inconsistent with the intent of Congress. The basic and fundamental problem is that E.P.A. has no patent policy and therefore, its interpretations are open to the whims and impressions of any number of individuals now and in the future. We cannot in good faith jeopardize the entire investment in our company to such a random procedure. It is, therefore, for these reasons that I must reject the terms of E.P.A.'s waiver. Particularly in light of Mr. Bochenek's latest "take it or leave it" option.

If I can be of any further assistance, please do not hesitate to contact me.

Very truly yours,

PATRICK J. IANNOTTA,
President.

ECOLOGROL, INC.,
ENVIRONMENTAL SPECIALISTS,
Bethpage, N.Y., June 8, 1977

Re E.P.A. Grant R 804654-01.

Commissioner H. JOHN PLOCK,
Nassau County Department of Public Works,
Mineola, N.Y.

DEAR COMMISSIONER PLOCK: With reference to our correspondence to you dated April 29, 1977 and Mr. Bochenek's letter of February 22, 1977, we have tried in good faith to analyze the terms and conditions of the patent clause attached thereto in as much detail as time will allow. We are, of course, pleased that "As a result of numerous discussions within E.P.A., it has been concluded that the waiver of the type requested is essentially justified." Unfortunately, we find the patent clause attached thereto to be inconsistent with that statement, with the agreement we reached with E.P.A.'s patent council in September, 1976, and with stated E.P.A. policy and objectives.

The thing that strikes one immediately when trying to evaluate the terms and conditions set forth in Mr. Bochenek's letter is a lack of specificity upon which an adequate evaluation can be made. Without a clear definition of their terms' meaning and a better understanding of E.P.A. objectives, we must state categorically that we cannot accept the terms of the patent clause as presented. This is particularly true in light of our recent experience in negotiating with

E.P.A. in September of last year when an agreement reached in September, 1976 was unilaterally changed in February, 1977 without consent.

E.P.A.'s requirement that, as a condition of this grant, Ecolotrol must agree to renegotiate if Nassau County, or if anyone else is ever to accept some future Step 1, 2 or 3 grants under the construction grants program, with or without Ecolotrol's participation, is to our mind discriminatory and unreasonable. If such terms were accepted, it would destroy for us or anyone else any incentive to undertake the cost and risk required to fully commercialize this technology. We would be put in the position of incurring all the initial risk and then having to share the benefits of our labors at governmental whim.

Mr. Bochenek's argument that we will become a monopoly is patently absurd, when one considers that thousands of E.P.A. construction grants projects and the huge multi-national companies, many of whom have already received significant E.P.A. support, with whom we must compete.

Mr. Bochenek's statement that E.P.A. would be put in the position of paying "Significant Royalties" to Ecolotrol via E.P.A. construction grants program is impossible to evaluate since he has never defined what "Significant Royalties" are. Thus far our only experience with E.P.A.'s thinking are the terms of the research grant currently under consideration. In this grant E.P.A. has required us to accept a gross profit before taxes of only 7½ percent. We can do almost as well in the bank. In fact, most mature American companies have an after tax profit of 10 percent. Obviously, high-risk, new technology companies must have higher profits to survive and grow.

There is also the unanswered question as to what would trigger such patent clause renegotiations. The mere granting of a patent? The issuance of a Step 1, 2 or 3 grant with or without Ecolotrol's participation? Domination of the industry? Five hundred million dollars in annual sales? What would we be expected to renegotiate? What would one hope to accomplish? These are all unanswered and have not been addressed in Mr. Bochenek's correspondence. Therefore, we must conclude that the patent clause as presented is totally and completely unacceptable and must be rejected.

Unfortunately, we believe no other response can be appropriate.

If you should have any questions or if I can be of any further assistance, please do not hesitate to contact me.

Very truly yours,

PATRICK J. IANNOTTA,
President.

RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY WALTER D. SYNIUTA

Question 1. Has your company had any experience with government supported research and development, if so could you briefly summarize your experience? Would you be interested in more involvement in these present programs?

Answer. Yes, we have been involved with government supported research and development, and in my testimony, I describe the problems which face small businesses. As a small innovative business whose goal is to be a manufacturer of high technology products (several of which are now just entering the market), we would very much appreciate any government support. None of the products which are presently being introduced have had any government support, because of our concern over ownership of patents and proprietary rights.

Question 2. The House and Senate Small Business Committees have concluded that it is in the national interest to have more small business involvement in government research and development. Do you think that there is any possibility of accomplishing this goal as long as the present patent policies are in effect? What do you think the effect of passage of the University and Small Business Patent Procedures Act will be on the small business community?

Answer. I agree with the House and Senate Small Business Committees conclusions regarding national interest and more small business involvement in government research and development; a number of recent studies by government and industry have pointed to the previous dramatic success of small innovative business in the development and marketing of new products. In my opinion, there is a low probability that innovative small business will increase its involvement in government R&D under the present patent policies. Small business will continue, however, to seek government funding for ideas which show little hope for commercial success, while saving the more attractive ideas for themselves.

Many medium and large size corporations operate government contract profit R&D centers, whose sole purpose is to generate a profit on government research, with no goal to commercialize—they simply respond to the Commerce Business Daily R&D program announcements in an attempt to obtain funding and increase profits. Under the present government patent policies, and widely differing regulations between different agencies, it is not attractive for small business to take its best ideas to the government. I believe Bill S. 414, will provide the patent protection that small business needs, and will definitely result in better small business/government relations and greater involvement.

Question 3. If there were language added to the bill requiring the head of any funding agency to state in writing why it was felt that the agency should have access to a small business background rights, and gave the opportunity for the contractor to call for a hearing to discuss this decision, would this be a reasonable solution to the problem of losing background rights which Mr. Iannotta ran into?

Answer. Adding language to the bill regarding background rights would not solve the problem. In my opinion, background patents and proprietary data clearly belong to the small business which has generated the ideas. Allowing the head of a funding agency or other bureaucrat to adjudicate ownership is simply unacceptable.

Question 4. As Mr. Staats pointed out in his testimony earlier today there really is no such thing as a Government patent policy but simply 20 different statutes and regulations governing the agencies about disposition of patent rights. How can small businesses, which do not have large staffs of patent attorneys, operate under so many complex, contradictory patent policies?

Answer. We have not dealt with all twenty (20) government agencies, but have worked with three or four, and have found no consistent policy regarding patents. I agree with Mr. Staats, it is impossible for small business to deal with this problem effectively and as a result many small corporations refuse to do business with the government.

Question 5. It has been maintained that there is no shortage of contractors who are willing to accept Government research and development contracts. Is a patent policy which maintains that any resulting patentable invention of the agency's research should be retained by the funding agency likely to attract the most innovative contractor? How would the passage of the University and Small Business Patent Procedures Act affect the attractiveness of Government research and development contracts to the innovative small businessman?

Answer. I believe I have already addressed this question in my testimony. Of course, there is no shortage of contractors who are willing to accept government R&D contracts. They accept government work that they do not believe in or care about—this work provides funds for salaries, overhead and profits. The motivation is quite different for small innovative businesses who are attempting to develop proprietary products or services on which to build their organizations. This is why it is so important for an innovative business to retain its proprietary rights; the large firms are able to protect their proprietary rights with their team of attorneys and general know-how in dealing with different agencies. The University and Small Business Patent Procedures Act will definitely make government research attractive because all the rights to potentially attractive commercial developments would be retained, and small businesses would then retain the most effective incentive there is—the profit potential from the sale of products and services.

RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY WALTER D. SYNITUA

Question 1. There is a school of belief that if the government is helping to fund the research, it should also retain the patent rights to inventions resulting from this research. What are your feelings on this?

Answer. As I indicated in my testimony, inventions are made by individuals or small groups of people and not by the government or large industry. If an individual or small business is not allowed to profit from his talent, investment and extra effort, then innovative developments are not likely to result. The government does not manufacture products and therefore there is no reason for it to own patents except as protection against other governments. The government presently owns some 30,000 patents which are not benefiting the tax

payer in any way. Bill S. 414 will provide the proper incentives for innovators to explore commercialization of their ideas and if successful, the nation will reap the benefits in taxes, exports and jobs.

Question 2. How do you feel on the alleged charge that the granting of exclusive rights presents dangers of company monopolizing technology and reaping substantial profits?

Answer. I do not see any dangers of company monopolizing technology and reaping substantial profits. On the contrary, small businesses even with the protection of a patent, find it difficult to compete with large businesses because of limited capital with which to protect their position. Exclusive rights with government protection and support, might result in the development of new industries such as the "computer" business did in the past, and government would then benefit from increased taxes and jobs.

PREPARED STATEMENT OF WALTER D. SYNIUTA

GOVERNMENT-INNOVATIVE SMALL BUSINESS PATENT POLICY

There is an urgent need to restore incentives for innovative small business to take risks on new technology developments and for Government and industry to form more of a partnership in developing new technologies if we are to succeed in improving our stumbling economy, falling productivity and high inflation. In past times of crisis, such as the threat of Soviet preeminence in space technology, our Government was able to mobilize our high technology sector, and we need to do this again.

Innovative technology has helped our Nation generate some 30 million new jobs. Exports of high-technology products have increased more than four times from the early sixties to the early seventies (Ref. 1). However, we are fast losing our world leadership position in innovation (Ref. 2), and one dramatic illustration of this fact is evidenced by our performance in the patent field. The percentage of patents granted to United States residents declined 21 percent between 1971 and 1976. Patents granted to foreign residents grew by 16 percent and became 37 percent of all United States patents granted in 1976.

Several different studies have identified the strong leverage of high technology and the role of small innovative businesses in creating jobs, improving productivity, increasing exports and in reducing inflation (Refs. 3, 4, 5, 6). Applied research is most vital to technological innovation, and is the most frequently cited source of new technology leading to major innovations. Basic research is cited second in frequency as a source for innovation (Ref. 1).

On the basis of a sample of major innovations introduced to the market between 1953 and 1973, small businesses were found to produce about 24 times as many innovations per R. & D. dollar as large firms. The total number of innovations produced by small firms was greater than for large firms, while the total R. & D. expense per scientist/engineer was approximately half that of the larger firms (Ref. 7). In spite of this impressive output, small firms receive only 3½ percent of the total R. & D. funds. There is an urgent need for much greater participation by small innovative businesses in Federal R. & D. If the Government is to stimulate and support new technology developments, to achieve this, it will be necessary to solve several attitudinal and policy problems which stifle Government-industry cooperation.

Innovation is accomplished by individuals, not by governments or industries. However, these individuals must be properly motivated and require adequate support from government and/or industry. Most often the incentive for both individuals as well as businesses boils down to financial reward, and when this is removed, their innovative productivity declines. It would appear that most Government officials do not appreciate the importance of the profit motive in the technology innovation process. There is a general belief on the part of Government officials that where a Federal dollar is spent there must be Federal ownership of the resulting product. There ought to be a much broader view, in which Federal funds can be used to stimulate innovation, and ownership of the resulting output would remain with the innovative concern, who would be free to exploit the development to the fullest. In this way the public would benefit from jobs, taxes, etc. No one benefits from the 28,000 odd "shelved" Government patents which are presently Federally owned as a result of Federally funded research and development.

PROBLEMS OF SMALL INNOVATIVE BUSINESSES IN DEALING WITH GOVERNMENT
POLICY IN PATENT RIGHTS, BACKGROUND PATENTS AND RIGHTS IN DATA

The development of new products or processes by small businesses is very costly and risky. A successful product introduction involves product development and market entry costs which in most cases far exceed the initial concept development costs. Yet the basic patent protection usually emanates from the initial R. & D. phases—those in which Federal R. & D. funds are most likely to be spent.

Existing Government patent policy with respect to Federal R. & D. funds inhibits commercialization of resulting developments by small innovative firms. The following is an excerpt taken from the Patent Rights section of a current Government contract (Ref. 8):

"Section (b) Assignment to the Government. The Seller agrees to assign to the Government the entire right, title, and interest throughout the world in and to each Subject Invention, except to the extent that rights are retained by the Seller under paragraphs (b) (2) and (c) of this clause.

"Section (c) Seller License. The Seller reserves a revocable, nonexclusive, paid-up license in each patent application filed in any country on a Subject Invention and any resulting patent in which the Government acquires title."

Thus, if the Seller (contractor) accepts Government support, he relinquishes title to any subsequent inventions conceived during the contract, and in fact must grant the Government rights to inventions made prior to Government support (background rights).

It is true that in dealing with certain Government agencies a waiver of Government patent rights may be negotiated—that is, if the business concern is aware of and understands the procedure. The success or failure of this action depends on the disposition of the particular bureaucrat in charge of the proceedings. Large businesses are well equipped to fight this battle, whereas small businesses are not.

As a result there is a reluctance on the part of small innovative businesses to seek Federal funding for innovative concepts for fear of losing their patent rights. Instead, they may channel their Federally supported efforts to such areas as technology assessments or other "paper studies," hoping that the inventive product development work will come from internal resources. Or, they may seek Government support only in those areas that they have no intentions to commercialize, and may attempt internal development of those innovations which have commercial potential without Government funding. This approach creates two negative results. One is that Government support may gravitate toward technologies or innovations which do not have high economic potential, thus the 28,000 Government-owned patents that are gathering dust. The other is that the development of practical innovative concepts that are "too good to give away" is retarded due to insufficient support. In both cases, present Government patent policy ends up being counterproductive in spurring development of worthwhile technologies.

Often the development of new products by small R&D companies will involve participation by larger businesses such as a large manufacturer. In fact, several Government agencies actively encourage the involvement of large manufacturing concerns in research, development, and demonstration (RD&D) projects. Most often, such involvement by a manufacturer will involve cost-sharing by the manufacturer if he is expected to eventually derive benefits from the RD&D program.

If the subject of an RD&D program involves a proprietary technology, perhaps including a background patent position, then a small R&D company is usually able to elicit interest on the part of a manufacturing concern in jointly undertaking a Government contract only if the manufacturer would be in a position to profit from such a venture. Both a small business and a large manufacturer are willing to risk an investment in terms of cost-sharing and diversion of personnel and facilities in order to evaluate the technical and commercial feasibility of a new concept, as long as such a commitment holds the promise of profiting as a result of a proprietary position.

All too often, however, it is the Government's patent policy and rights in technical data which prevent involvement by an otherwise interested manufacturer. Even if a basic patent position has been established prior to any Government involvement, the Government's patent policy requires that contractors grant to the Government non-exclusive licenses to background patents

for the purposes of practicing RD&D on the subject of the contract. The Government can even require the contractor to license background patents to others. Subject inventions, that is, inventions conceived under the contract, are assigned to the Government. The contractor receives a revocable non-exclusive license, and the Government is free to grant licenses to others. This policy removes the major incentive for involvement by a manufacturer (and an R&D company)—that in return for his investment, he could profit from a proprietary position in the subject of the contract.

The contract terms also grant rights in technical data to the Government, including certain limited rights to proprietary data. For example, the Government can require confidential disclosure of proprietary data to itself and to other parties, which may include competing companies. There is additional concern due to the Freedom of Information Act, as freedom of information may take precedence over any contractual guarantee of confidentiality, and there have been instances of Government agencies being forced to disclose confidential data.

The net result of the policy is that once an otherwise interested concern reads the "fine print" in the Government's contract, they are all too often no longer interested in any participation. If the Government really wishes to achieve a larger involvement by industry in its RD&D programs, why should it place such a burden on obtaining cooperation? You must realize that in most cases a company not otherwise involved in Federal R&D needs to be convinced that it can benefit through involvement in a Government contract. The mysteries of Government contracting and the underlying fear of Government involvement are enough of a concern. The primary (profit) incentive for industry involvement should not be compromised as well.

An example of the adverse effects of Government patent policy is our own experience with an innovative energy-saving concept.

In the summer of 1976, we conceived an idea for a heat-actuated residential heat pump. Analysis indicated that the concept would improve both the heating and cooling efficiency of a home substantially and that it offered the potential to provide the first practical and alternative approach to home heating that was both energy saving and cost effective. The concept required reduction to practice and a great deal of research and development before it would be ready for market, and indeed before its feasibility could be proved.

The most readily available and appropriate source of R&D money would have been from the Department of Energy. However, because of our concern over the loss of proprietary rights, we made the decision not to approach the Government. Instead we have pursued a much slower course of action: using our own limited internal R&D funds, we built a simple "proof-of-principle" model, and then in 1977 we applied for a patent. Although the patent recently issued, this project is essentially dormant due to lack of funds.

Had we chosen the alternative path and utilized Government R&D funds to develop this concept, we would no doubt be much further along. From a business standpoint however, we would be just as badly if not worse off. Since we would not have invested a significant amount of money as compared to Government R&D funding, there would be little chance that we would have been permitted to retain proprietary rights. And as a practical matter, the Nation would fare no better, since there would be a low probability of obtaining the necessary private investment to commercialize the product because of the lack of proprietary rights or the strings that would be attached.

This is an ideal example of the "no win" position that a small company finds itself in with regard to financing innovative product development. The company cannot afford to finance development internally, nor can it "afford" to accept Government assistance. Until the Government recognizes this situation, it will continue to finance developments which are never commercialized, while the concepts that are "too good to give away" fail to get developed because of lack of support.

RECOMMENDATIONS

The Government should liberalize its patent policy so that contractors can retain rights to subject as well as background inventions as long as they take action to protect and implement these inventions. The Government should continue to require that the owner of the rights to inventions promote commercialization or else permit others to do so. However, this should be provided

for without compromising the owner's right to profit from his innovation and investment.

Government rights in technical data should be more restrictive with regard to proprietary rights. The Government must offer stronger guarantees that proprietary data will be kept confidential, and that contractors would not be obligated to license proprietary data to others, unless they elect not to pursue commercialization of the technology themselves.

I support the University and Small Business Patent Procedures Act S. 414 wholeheartedly. I believe that the patent policy changes which are included in the bill would provide the kinds of incentives to innovative small business that are needed in our Nation today.

Bill S. 414 also has the enthusiastic support of the Children's Hospital Medical Center, Boston and I have attached their letter expressing their support to my testimony.

THE CHILDREN'S HOSPITAL MEDICAL CENTER,
Boston, Mass., April 5, 1979.

DR. WALTER SYNIUTA,
President, Advanced Mechanical Technology, Inc.,
Natick, Mass.

DEAR DR. SYNIUTA: I am writing in support of the bill Senators Dole and Bayh have introduced to establish a government-wide patent policy.

For many years Children's Hospital did not have an institutional patent policy. However, as we increased our research activities the Hospital's Board of Trustees determined that the establishment of a patent policy was in the best interests of the institution. Our reasons for developing a patent policy were based upon the fact that it was apparent that the hospital, through its research activities, was developing technology that could not be easily transferred to the private sector without some guidelines as to how this was to be done. Furthermore, the federal government itself encouraged us to develop a technology transfer program and the establishment of a patent policy was our initial response. More importantly we feel, as do many agencies of the federal government, that the private sector can play a more significant role in the support of basic research in universities and hospitals. Consequently, we have actively encouraged collaborative research programs with industry.

However, since over 80 percent of the R&D funds at this institution are derived from the federal government it is difficult, if not impossible, to isolate those research activities sponsored by industry from those sponsored by the federal government. Since the federal government takes a global view of ownership rights in inventions developed with even minimal federal support, it becomes apparent to us that further encouragement of industrial support for research will be extremely difficult to accomplish. Since the hospital does not have the resources for further development of ideas or inventions resulting from research conducted by our staff we must look forward to active participation by industrial firms that have the ability to undertake very expensive testing and development activities. We do not feel that under the present patent policies of the federal government this is possible. We find it incongruous that the government encourages technology transfer but, by adhering to restrictive patent policies actively discourages meaningful technology transfer.

To suggest, as some opponents of the Dole-Bayh bill have, that universities and other non-profit organizations have as a primary purpose in petitioning for changes in government patent policies the accumulation of "excessive profits" is untrue. Even should a university participate in profits resulting from marketable inventions is this not a reasonable mechanism for an institution to lessen its demands for further federal support of its research activities?

The Dole-Bayh bill offers a reasonable and intelligent approach to furthering the technology transfer program of the federal government. It is a thoughtful approach to the problems faced by small business and non-profit organizations. It offers a unique opportunity to increase participation of small businesses in the support of research at non-profit organizations which can only benefit the American public in the long-run.

Please express to the Congress my whole-hearted support for passage of the Dole-Bayh bill in this session.

Sincerely,

ALBERT L. BROSEGHINI,
Director, Research Administration.

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- (3) "The Economic Leverage of Technology", speech by Dr. Thomas A. Vanderslice, Vice President, the General Electric Company, reporting on Data Resources Inc. Study for General Electric, (1977).
- (4) "The Role of New Technical Enterprises in the U.S. Economy", John O. Flender and Richard S. Morse, M.I.T. Development Foundation, Inc., Cambridge, Mass., (1975).
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- (7) "Small Firms and Federal R&D", William L. Scheirer, Report of the Office of Federal Procurement Policy Interagency Task Force, OMB (1977).
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RESPONSES TO SENATOR BAYH'S WRITTEN QUESTIONS BY ARTHUR S. OBERMAYER

Question 1. As an officer in an organization of small business research firms with the capability to conduct a wide range of research, can you offer any general comments about why only 4 percent of Federal Research and development goes to small businesses? Do you think that any attempt to set aside a certain percentage of government research and development for small business will be successful until there is some certainty about disposition of patent rights on resulting inventions?

Answer. There are many factors that lead to only 4 percent of the Federal R. & D. budget going to small companies but the principal one is what I like to call the "small company syndrome." The decision makers at the working level within the Administration want to avoid personal risks. They want to take safe positions. If they select a small company, they are subject to criticism if the company doesn't perform. Their superior asks why they selected an unknown company. If a "GE" or an "RCA" is selected and doesn't perform, the bureaucrat's response can be that a big, well known company was chosen, and if the big company couldn't perform, probably no one could have been successful. This is especially true of R. & D. where judgment is the key in the selection process, and the only delivered product may be a report.

In regard to the second part of your question, a small business set-aside is important in its own right, because it forces bureaucrats to take action.

The Bayh/Dole bill and a small business R. & D. set-aside are two complementary approaches, where neither is dependent on the other, but each would benefit by the passage of the bill. The Bayh/Dole bill would result in better qualified bidders on government contracts, and the set-aside would insure that more contract opportunities would be available. It would be a serious mistake, however, to hold up either bill waiting for passage of the other legislation.

Question 2. Assuming that there was no question of an agency taking background rights to an invention arising out of federally supported research, but that there still was uncertainty over the ownership of future inventions, do you think that more small businesses would be interested in joining Government research and development programs? In other words, would a case-by-case determination of patent rights to inventions be attractive to small businesses?

Answer. "Deferred patent rights" i.e., the determination of patent rights at the end of a contract, has the same meaning to the businessman as no patent rights. When the conditions for getting patent rights are not well defined and specific, the businessman does not know where he stands and cannot plan accordingly. Uncertainty is perhaps the major factor that prevents business decisions. The Bayh/Dole bill is certain and specific. The current regulations depend too much on the whims of contracting officers. It is very risky to make a time or financial

commitment to a project with the realization that a few years into the project, someone can pull the rug out from under you.

Right now we are involved in a government contract where there are two alternative patent provisions from which we may choose. The first is the standard deferred patent rights clause, while the second requires the investment of equivalent private matching funds in order for us to have title to inventions. The matching funds alternative is much easier to live with because it is well defined and represents an achievable objective. The deferred patent rights clause may in the long run be less expensive, but it depends too much on vagaries of individuals in government.

Question 3. If there were language added to the bill requiring the head of any funding agency to state in writing why it was felt that the agency should have access to a small business background rights, and gave the opportunity for the contractor to call for a hearing to discuss this decision, would this be a reasonable solution to the problem of losing background rights which many small businesses encounter when conducting research and development for Government agencies?

Answer. Under some circumstances the agency may need access to background patent rights. This can be handled by requiring the contractor to license his patent under reasonable terms and conditions if he cannot meet the government manufacturing requirements on his own. The language in the act should be explicit enough so that it is hard to abuse. The right to a hearing is of relatively little value to the small company, because it will normally be unable to afford the legal and travel expenses to exercise this right.

Question 4. As Mr. Staats, the Comptroller General of the U.S. pointed out in his testimony there really is no such thing as a Government patent policy but simply 20 different statutes and regulations governing the agencies about disposition of patent rights. How can small businesses which do not have large staffs of patent attorneys operate under so many complex, contradictory patent policies?

Answer. The small company has great difficulty operating under so many different patent policies that are subject to so many individual interpretations. Often mistakes are made. The small businessman may sign a contract without fully understanding the implications of the contract terms. Sometimes he even recognizes that the patent terms are not reasonable, but he is put into a "take it or leave it" position and as a hungry small businessman who has made a disproportionate personal and financial investment, he is reluctant to turn the contract down. A favorite ploy of government contracting officers is to delay completing the draft of a contract until the last possible date, e.g. the last day of the fiscal year in which the project is budgeted. Then they ask the contractor to come to Washington to sign a previously unseen contract document, or they mail it to the contractor but require it to be returned on the next day. This pre-empts the possibility of a realistic negotiation of contract terms.

A very recent example which has involved me personally has been the negotiation of patent rights under a particular government small business program where 21 separate contract awards were made by the same group within the same agency. We received two of the 21 awards and negotiated very different patent provisions in our two contracts. The difference in provisions had absolutely nothing to do with the work content; however, one came out of fiscal year 1978 funds, and we first saw the contract one day before the end of the fiscal year. We obtained more favorable patent terms in the second contract where we were not under a strict time deadline. I subsequently advised another awardee under this program how to benefit from my experiences, and as a result he later negotiated a third and even more favorable patent clause. There was no substantive basis for any of these different patent clauses; it was just a matter of the circumstances at the time of negotiation.

Question 5. It has been maintained that there is no shortage of contractors who are willing to accept Government research and development contracts. Is a patent policy which maintains that any resulting patentable invention of the agency's research should be retained by the funding agency likely to attract the most innovative contractor? How would the passage of the University and Small Business Patent Procedures Act affect the attractiveness of Government research and development contracts to the innovative small businessman?

Answer. The most innovative contractors will usually avoid government contracts where they are likely to lose their patent rights. If they do agree to work

for a funding agency that retains patent title; it will be in an area where either they have no commercial interest or they do not anticipate any patentable inventions arising.

RESPONSES TO SENATOR DOLE'S WRITTEN QUESTIONS BY ARTHUR S. OBERMAYER

Question 1. You stated that you were "very cautious" about submitting a proposal to the government. Can you elaborate on this and tell us under what circumstances you will agree to participate in government contracts?

Answer. If we are dealing with a government agency that takes title to patents resulting from the contract, we will submit a proposal only if either it does not relate to our principal commercial interests or it is structured in such a manner that no patentable inventions are likely to come out of the contract. Under the above circumstances, if we receive a contract, we carefully monitor the individuals working under the contract to make certain that they actually restrict their work to non-patentable subject matter.

Question 2. You indicated that not all research oriented companies view patent rights in the same manner your company does. Did I understand you to imply that these companies are not interested in delivering inventions to the market place in the form of goods to the public?

Answer. Yes. That is correct. They are in the government contract business. They derive all of their income from government contracts, and their sales and marketing effort is directed toward seeking more government contracts. Such companies, (or in large companies this applies to divisions) usually do not have the experience or capability to sell commercial products, and they therefore have little interest in patents.

RESPONSES TO SENATOR THURMOND'S WRITTEN QUESTIONS BY ARTHUR S. OBERMAYER

Question 1: Can a large company, not covered by this bill, ever receive rights to an invention which it has created pursuant to federally-funded research? Will this bill in any way change this?

Question 2. Under section 204, what effect does the 10 year limitation have on the government's recoupment rights? If the owner of the patent received \$249,000 in the ten year period, and then received an additional \$250,000 in the eleventh year, would the government be able to recover any money?

Question 3. Under section 208(7) the Department of Commerce is to receive any royalties due to the United States under this bill. Are the funds earmarked for any particular purpose, or do they go into a general fund?

Answer. Questions 1, 2, and 3 could be better answered by legal authorities or government witnesses.

Question 4. Are there any indications that small companies may stop seeking work involving government work if the present patent policy is not changed?

Answer. There will always be small companies that seek government contracts—if they can have their costs covered and be awarded a fee. However, when the government retains patent rights, usually, there is not sufficient incentive to attract the best and most innovative small companies.

Question 5. Are recoupment provisions of this bill sufficient to prevent exorbitant windfall profits?

Answer. It is inappropriate to use the term "exorbitant windfall profits" in this instance. Under normal circumstances the government funded research which results in a patentable invention will only represent somewhere between 1 percent and 10 percent of the total cost of bringing a new product to market. Because the private investment usually is so much greater than government contribution, the investing company has the right to expect a reasonable profit . . . perhaps even more than provided under the recoupment provisions.

PREPARED STATEMENT OF ARTHUR S. OBERMAYER

Today, I should like to raise a few questions and propose a few answers. The questions can be easily stated: first, why do so many small, high technology companies avoid government contracts; second, why do the bidders on government contracts usually not include the most experienced and best qualified companies in the field; and third, how can the Congress change the situation?

The answers require an understanding of the factors which motivate small businessmen. Starting with fundamentals, the goal of a company is to make profits . . . to maximize return on investment. The small, high technology company that has a product to sell usually finds itself competing with large companies that have much greater financial muscle and marketing clout. If the small company is to succeed it must have a superior product and a means for protecting its product's superiority.

If the small company's new product shows market acceptance, big companies will try to jump in with similar products and overwhelm the small company with massive advertising, well-developed channels of distribution, and sophisticated marketing approaches. The small, high technology company's principal protection in the commercial market is its proprietary "know-how" and patent protection. This is the way my company evaluates its position. We will not enter a new market unless we have some protected technological advantage; and our reaction is typical.

When the government is looking for a company to do research and development in a field where we have experience, we are very cautious about submitting a proposal. Even though we may be as well qualified as any bidder, we become concerned that we may compromise our patent rights by accepting a contract. Many government agencies require that small businesses who accept contracts with them not only give the government title to any patents coming out of the work, but also give the government background patent rights; that is, the right to use patents already obtained and paid for by the company. As a further affront, the government usually takes a rather cavalier attitude toward protection of any of the company's proprietary information or "know-how" which is submitted with a proposal. All too often, proprietary information supplied by one company later appears in another company's proposal. It is no wonder that many companies which have important new technologies with significant patent implications, carefully avoid becoming entangled with the government.

Not all research oriented companies view patent rights in the manner I have just described. Some firms' principal business is soliciting government contracts. They attach little or no importance to patent rights and commercialization because obtaining government contracts is an end in itself. Such companies are not necessarily the most qualified to do the work; rather they are the most experienced at writing government proposals. Most defense and aerospace contractors fit this category; however, as the government expands into areas where commercialization is important, it needs contractors who understand and regularly deal in the commercial world. Commercialization or public use is the ultimate goal of most research and development sponsored by the Departments of Energy, Transportation, the Interior, and Health, Education and Welfare. It is ironic that these very agencies whose ultimate goal is to stimulate commercialization of technology normally use very restrictive patent provisions in their contracts whereas the Department of Defense, whose ultimate goal is not commercialization, is much more reasonable. It normally gives title to inventions to the contractor.

The current patent provisions in government contracts have led to many peculiar situations. Patent provisions that are intended to help civilian agencies often help only the military. Patent provisions that are intended to stimulate the U.S. economy often only provide business and jobs overseas. Perhaps a few examples would be useful.

About two months ago my company had a new idea for an air quality monitoring system. This type of air monitoring system had important potential applications both to the military for the detection of chemical warfare agents and to civilian agencies for the measurement of air pollutants and toxic gases in the workplace. It looked like patents would result when we reduced the idea to practice. Our decision was to submit an unsolicited proposal only to the military agency because if we received a military contract we would have been able to retain title to patents developed under the contract. With the two civilian agencies, the National Institute for Occupational Safety and Health, and the Environmental Protection Agency, we would have been required to relinquish our patent rights.

As another example, a friend of mine who is President of a four year old research and development company had an idea a few years ago for a metal extraction and recovery process that could represent a major break-through in the mining and metal processing industries. In order to obtain government sup-

port for the original development, the company had to assign U.S. patent rights to the government, but the company was allowed to retain foreign patent rights. Now, after three years and several hundred thousand dollars of research and development effort, they feel that the process is approaching practical reality. They have explored commercialization with more than ten U.S. companies, most of them in the mining industry. Not one expressed strong interest, principally because exclusive rights could not be offered. Finally, they did find one interested firm—in Japan. They offered the Japanese company exclusive patent rights in Japan and the Japanese company has taken an aggressive position in the pursuit of commercialization. This is a typical case where the U.S. system encourages the export of technology leading to foreign sales, foreign production, foreign jobs, and has an adverse effect on the U.S. economy. I could have presented many other examples with different products, different agencies and different companies, but with the same general scenario and the same general conclusion.

The types of problems presented here are not new. I could have easily provided numerous examples of small businessmen's problems with the patent provisions in government contracts going back ten or twenty years ago. In fact, the five year time interval between the Wright Brothers' first successful flight in 1903 and their first airplane sale to the U.S. Government in 1908 is attributable largely to the Wright Brothers' concern about the protection of their proprietary data and patent position during their dealings with the U.S. Department of War.

As early as 1965, it was clear that patent regulations under government contracts were not leading to the proper incentives. In that year, the Federal Council for Science & Technology set up the Committee on Government Patent Policy to assess how this policy was working in practice and to provide the information necessary to objectively modify the policy. As an outgrowth of this activity Harbridge House published an excellent, multi-volume Government Patent Policy Study. The data presented, the cases examined, and the conclusions reached are just as valid today as they were then (their Summary and Analysis of Findings is included as Appendix I to this statement). The only difference is that after more than a decade of ignoring their conclusions we find ourselves with an unfavorable balance of trade, a rapidly declining technological superiority over foreign countries and serious economic problems at home. As a further step, the President issued a Government Patent Policy Memorandum in 1971 (see Appendix II to this statement) providing agency heads with additional authority to permit contractors to obtain greater rights to inventions where necessary to achieve utilization. However, as the old proverb goes, "you can lead a horse to water, but you can't make him drink." The Presidential Memorandum gives agencies the authority to award greater patent rights to contractors, but it doesn't mandate a specific course of action. Contracting officers are not going to go out on a limb. Such bureaucrats will avoid potential criticism by limiting, as much as possible, the patent rights they provide to a contractor. They will take the safe approach even though it may not be in the national interest.

For example, my company is a participant in a government program involving over 40 small business contractors. The original program announcement stated that contractors could get broader patent rights in accordance with the President's Patent Policy Memorandum of 1971. However, when the contracts were written up, the broader patents right clause was excluded from the contract provisions. The broader patent rights clause was added only when I insisted that it be inserted. Most of the other small business contractors have settled on less than they were led to expect, and now hope that they can work out a more favorable patent arrangement at the completion of the contracts.

The remaining question I should like to address is "What can Congress do?" There have been many patent bills considered and reviewed over the years. The arguments for one or another are often technical and complex. Finally, now for the first time, the focus is on one bill. This bill is not perfect, but it will provide a major improvement over existing patent regulations and it has a broad base of support. I come here today representing both the American Association of Small Research Companies, the only national organization of small research-based businesses, and also the Smaller Business Association of New England (SBANE), the largest regional small business organization in the U.S. Both of these associations are behind the bill. Additionally, in February of this year, the bill was endorsed by the Small Business Science and Technology Conference.

Further support comes from both the Patent Policy Subcommittee and the Government Procurement Subcommittee of the President's Domestic Review of Industrial Innovation. These panels of business leaders have explicitly recommended that the commercial rights under government supported research should be transferred to the private sector. They have indicated that the implementation of this recommendation could have a major impact on industrial innovation (see the section of the Draft Report on Patent Policy included as Appendix III to this statement).

This legislation has a broad base of support both within the Congress and among the informed public. The opportunity for passage of a significant piece of new legislation is here. I hope you will act upon it because it will increase domestic jobs, allow more effective use of technology, improve business opportunities, and benefit our economy.

APPENDIX I: DRAFT REPORT ON PATENT POLICY

[A Draft Report of the Advisory Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovation established as part of the Domestic Policy Review, Dec. 20, 1978]

PROPOSAL V—TRANSFER COMMERCIAL RIGHTS TO GOVERNMENT-SUPPORTED RESEARCH TO PRIVATE SECTOR

The United States patent system is designed to stimulate the progress of the useful arts by encouraging the public disclosure of new technology and making available to the public new products and processes utilizing this technology. It is not necessary to go through the expensive, time-consuming procedure of obtaining a patent to fulfill the function of disclosing information to the public. This can be accomplished by a simple publication. On the other hand, the patent grant has played an important part in commercializing inventions, making new products available to the public. The Federal Government does not normally participate in this function.

The theory of the patent grant is to give the inventor or his assignee the exclusive rights to his invention for a period of time so that he can invest the time and money necessary, commercialize the invention and develop a market for the product or process incorporating the invention. Since the government is not in the business of developing inventions for commercial use, it has no need to own patents. On the other hand, the government is a substantial user of products and services and in that context needs, or at least can benefit from, a license to use patents.

Experience has shown that the government, as a purchaser or consumer of goods and services, is not in a position to take advantage of its ownership of patents to promote enterprise. Private companies, on the other hand, who are in a position to utilize the patent grant are ordinarily unwilling to take a nonexclusive license under a government-owned patent and commit the necessary funds to develop the invention, since it has no protection from competition. This is a major reason that over 90 percent of all government patents are not used. Another important reason is that the government obtains patents on technology which, in the opinion of the private sector, does not provide an attractive business opportunity.

Several years ago, the Federal Council for Science and Technology supported the most thorough study ever conducted on the issue of government patents, commonly referred to as the Harbridge House Report. The following findings were included in the report:

"Government ownership of patents with an offer of free public use does not alone result in commercialization of research results.

"A low, overall commercial utilization rate of government-generated inventions has been achieved: that rate doubled, however, when contractors with commercial background positions were allowed to keep exclusive commercial rights to the inventions.

"'Windfall profits' do not result from contractors retaining title to such inventions.

"Little or no anti-competitive effect resulted from contractor ownership of inventions because contractors normally licensed such technology, and where they did not, alternative technologies were available."

The idea that what the government pays for belongs to the people is not only appealing, it is true. The question is: What instrumentalities can be brought to

bear to maximize the possibilities that the people will indeed have available the fruits of their government's expenditures? Nonexclusive licenses to undeveloped inventions, offered by the government or anyone, have few takers, whereas patent ownership or exclusive licenses of sufficient duration are much more likely to attract the money and talent needed to make and market real products to meet consumer needs.

If the results of federally sponsored R&D do not reach the consumer in the form of tangible benefits, the government has not completed its job and has not been a good steward of the taxpayers' money. The right to exclude others conferred by a patent, or an exclusive license under a patent, may be the only incentive great enough to induce the investment needed for development and marketing of products. Such commercial utilizations of the results of government-sponsored research would insure that the public would receive its benefits in the way of products and services, more jobs, more income, etc. The cost of government funding will be recovered from the taxes paid by the workers and their companies.

Therefore, all the members of this subcommittee recommend transferring the patent rights on the results of government-sponsored research to the private sector for commercialization. In the case of university or private contractor work sponsored by the government, the members of this subcommittee recommend that title to the patents should go to the university or private contractor, but some members feel the government should have "march-in-rights" (i.e., when the invention is not being used and it appears that there is a public need to use the invention, the government would have the right to transfer patent rights to those in the private sector willing to use the invention). With respect to inventions made by government employees at government expense, the subcommittee members are divided about equally between those who feel that the government employee should have title to the invention, and those who feel that such inventions should be transferred to an independent, non-governmental organization, perhaps modeled after the Connecticut Product Development Corporation, or auctioned to the private sector or transferred to the private sector in some other manner. In all cases, the government would retain a nonexclusive license to use and have made for its use inventions founded in whole or in part by governmental expense.

At the present time, the government has a portfolio of 25,000 to 30,000 unexpired patents. These include patents arising as a result of research and development work in government laboratories by government employees, and also from work done by non-government employees wherein the government retained title because it funded the work. In fiscal 1976, 2,646 patents issued to the government, of which 1,824 were for inventions by government employees.

Considerable sums of money are involved in government patent ownership, the patent budgets of the various government agencies including funding for patent attorneys, supporting staff and equipment being in the millions of dollars.

Our information indicates that the United States government has been filing in excess of 3,000 United States patent applications per year, which amounts to approximately 3 percent of the total workload in the United States Patent and Trademark Office. A decision not to file patent applications on behalf of the government would result in the PTO having available 3 percent of its total capability that could be directed to reducing the backlog in the PTO and handling special problems that have been created by the new reissue program and the anticipated reexamination procedures. In addition, this decision would save the time of government patent attorneys who normally prepare and prosecute the patent applications and the cost of having patent applications prepared by attorneys in private practice. Time and money thus saved could be utilized to provide needed services in other areas of the government.

According to this subcommittee's proposals, the decision to file a patent application would be made by the university or contractor; in the case of inventions made by government employees at government expense, the decision to file would be made by the employee, if he were to retain title, or by the independent non-governmental organization (suggested above), which would obtain title to the patent.

The subcommittee recognizes the argument that the government applies for patents to preserve its right to institute an interference with patent applications from the private sector. However, such interferences are a very rare occurrence under present practices. Furthermore, establishment of prior invention by the

government would generally constitute a defense in an infringement suit on the basis of prior invention. Prior invention may not be an adequate defense in instances where the government has not reduced the invention to practice, or has, for good reasons, kept the invention secret; special legislation may be required to provide adequate protection to permit royalty-free government use in such instances.

APPENDIX II: GOVERNMENT PATENT POLICY STUDY, FINAL REPORT, VOLUME I

(By Harbridge House, Inc., Boston, Mass.)

PREFACE

In October 1963, after 18 months of intensive interagency deliberations, the President issued a Memorandum and Statement of Government Patent Policy. The Policy established, for the first time, basic criteria to guide all executive departments and agencies not otherwise governed by statute in allocating rights to inventions made under government grants and contracts. The Policy was viewed as a first attempt to establish a central rationale for allocating patent rights government-wide in accordance with the public interest.

Because of its newness and the great concern of government and industry over the subject, the President provided for continuing evaluation of the Policy to determine the need for revision. In December 1965, the Federal Council established the Committee on Government Patent Policy, to examine the principles established by the Policy and their effect on the public interest. The Committee, comprised of policy level officials from the R&D sponsoring agencies represented on the Federal Council and representatives of the Departments of State and Justice, first identified the basic policy questions underlying the President's Memorandum. It determined that three questions represented the fundamental policy issues:

- (i) What effect does patent policy have on industry participation in government R&D programs?
- (ii) What effect does patent policy have on the commercial utilization of government-sponsored inventions?
- (iii) And what effect does patent policy have on business competition in commercial markets?

In considering a way to examine the questions, it concluded that a study contract would best collect and analyze the necessary data. In September 1966, the Committee commissioned Harbridge House to study the policy questions and to prepare reports which would: (i) help test the effects of alternative patent policies; (ii) lead to affirmation or revision of the President's Policy or assist in formulating useful legislation; and (iii) be useful to executive departments and agencies in administering government-wide policy, whether established by Congress or the Executive Branch.

The accompanying final report and three research reports describe the study findings. Volume I summarizes findings on the three policy questions. Volume II reports on Question One—the effect of patent policy on industry participation in government research and development programs. Volume III reports on one aspect of Question Two—the efforts of eight federal agencies to promote commercial utilization of government-sponsored inventions. And Volume IV reports on Questions Two and Three—the effect of patent policy on utilization of government-sponsored inventions and business competition.

SUMMARY AND ANALYSIS OF FINDINGS

A. Study objectives and approach

The primary purpose of the Harbridge House study has been to provide government policy makers with data to evaluate the effectiveness of government patent policy in achieving policy objectives. The study sought answers to three basic questions which underlie the government's objectives concerning patents arising out of government contracts:

- (i) How does patent policy affect commercial utilization of government-sponsored inventions?
- (ii) How does patent policy affect business competition in commercial markets?

(iii) How does patent policy affect participation of contractors in the government's research and development programs?

A three-phase study effort was undertaken to answer these questions: In phase one, existing data was gathered to determine what relevant information was already available. Phase two consisted of a utilization questionnaire survey to gather a broad body of new data on a large sample of government-sponsored inventions. And, phase three involved case studies of inventions and contractors in the utilization survey to develop a fuller understanding of the effects of patent policy on them.

The first phase involved four separate tasks. A literature search was conducted to determine what existing data were available on the study questions. In addition, three research tasks were conducted within government activities to (i) determine the promotional programs of eight government agencies; (ii) review reported instances of industry hesitation or refusal to participate in programs of the Department of Interior and the National Institutes of Health (NIH) for reasons relating to patents; and (iii) examine 100 contractor NASA waiver requests to determine the basis for waivers of patent title granted by NASA. These tasks, useful in themselves, also provided background information in conducting phases two and three of the study.

In the second phase of the study, commercial utilization of all government-sponsored inventions patented in 1957 and 1962¹ were surveyed through questionnaires² to gather data on utilization and licensing of a large and statistically significant group of patents. A two-year sample was selected to ensure against bias in patents issued in a given year, and the years 1957 and 1962 were chosen to allow enough time for sample inventions to be applied commercially. Although the sample predates the current policy established by the Kennedy Memorandum of 1963, patent rights in sample inventions were allocated in different ways under various programs making it possible to project the results of the study in terms of current policy.

Questionnaires on each invention were sent to organizations which developed them regardless whether the contractor or the government retained title. Similar questionnaires were also sent to firms which requested licenses to government-owned inventions, whether developed under contracts or in government laboratories to compare conditions under which inventions might be used with and without exclusive rights. Both included questions on the size and business orientation of the responder; the nature of the invention; the role it played in its commercial use; the speed with which it was applied; the type and amount of private funds invested in applying it; the sales attributable to the invention; the extent to which it was available for and resulted in licenses by patentee; and the reasons for nonutilization where it was not used commercially.

Questionnaire responses were received on about 60 percent of the sample inventions and were analyzed to determine the patterns of utilization, and the effect of patent rights and other factors on commercial use, licensing and business competition. The data were also used to select areas for case research in phase three of this study.

The case research in phase three gathered more detailed data on selected government contractors and inventions to understand better the factors which control decisions to utilize government-sponsored inventions, the utilization process, the effect of utilized inventions on business competition and the factors affecting willingness of contractors to participate in government-sponsored R&D programs. Five groups of case studies were conducted:

- (i) Twenty-one high and low utilizers of sample inventions were interviewed to determine the reasons for their performance.
- (ii) All sample inventions of TVA, and the Department of Agriculture and Interior were investigated to determine the effect of agency mission on invention utilization.
- (iii) Sixteen educational and nonprofit institutions representing a cross section of all types and sizes of organization were interviewed to determine what role they play in promoting utilization of government-sponsored inventions.
- (iv) All sample inventions involved in infringement suits were investigated to identify what effect they have on business competition.

¹ For government agencies other than DOD, AEC and NASA all patents issued from 1956 to 1966 were included because of the small number of patents issued on inventions of those agencies in 1957 and 1962.

² Copies of the questionnaires are included in an appendix to this report.

(v) An industry study involving the medicinal chemistry program of NIH was performed to determine the effect of patent policy on voluntary industry participation in, and utilization of the results of the government program.

B. Effect of Government patent policy on commercial utilization

The study sought answers to several key questions concerning commercial utilization of government-sponsored inventions. Among these were:

- (i) Under what circumstances have government inventions been utilized?
- (ii) How important have exclusive patent rights been in promoting their use compared with other factors such as market potential, prior experience and amount of private investment required?
- (iii) Under what conditions has utilization been optimized by government ownership of patents? By contractor ownership of patents?
- (iv) Has substantial private investment been required to develop government-sponsored inventions for commercial use?
- (v) Has such investment been made when everyone has been free to use the invention?

Several factors were found to have an important bearing on the answers to these questions. The intended uses of the sample inventions were found to have a primary effect on their commercial potential. Their intended uses, in turn, were determined by the R&D missions of the sponsoring government agencies. Once the invention was developed, several factors were found to affect their actual use in commercial markets—the extent of the market demand for products employing them, the degree of promotion by government agencies which sponsored them, the size of private investment required to apply them, the prior experience and attitude toward innovation of organizations that developed them, and the type of patent rights available to protect the user's investment in bringing the inventions to market.

These factors have had the following net effect on utilization of sample inventions:

Of 2,024 contractor inventions in the two sample years for which information was available, 251 were used commercially.

Two hundred were utilized by industrial contractors and all but seven were owned by them. Twenty-six of these were utilized by their licensees.

An additional 51 inventions not utilized by contractors were utilized by their licensees. Ten of these inventions were owned by educational and nonprofit institutions.

Fifty-five played a critical role in the commercial products in which they were used.

All but two resulted from DOD contracts.

The study also reviewed 126 government-owned inventions from all sources, in-house and contractor, patented in 1957 and 1962 for which a license was issued to other firms other than the inventing contractor. Ten of 126 inventions were reported used by some 50 licensees. Utilization is concentrated in TVA and Agriculture inventions which account for 60 percent of the utilized patents and 90 percent of the commercial users.

Measured in sales, commercial utilization of the inventions studied amounted to \$616 million through calendar year 1966:

\$406 million were sales by contractors who owned the inventions.

\$210 million were also by nonexclusive government licensees.

All but \$271,000 of contractor sales were from DOD inventions.

Sales of inventions, both with and without exclusive rights, were heavily concentrated in a few patents:

88 percent of contractor sales where the invention played a critical role are attributable to five patents in the fields of transistors, vacuum tubes, numerical control devices, computers, and gas turbine engines.

About half the sales of licensees are attributable to three patents on the manufacture of potato flakes.

Study inventions that were used commercially found quick application in their commercial use. About one-third were applied by the time a patent application was filed, and almost two-thirds were in use when a patent issued.

A factor instrumental in the speed of utilization is prior experience. If rapid utilization is defined as occurring within three years of application for a patent, then firms with experience achieved rapid utilization over 80 percent of the time compared with half that for firms without.

The mix of government and commercial work within a firm also has an important effect. Firms in the middle range of government activity (20 to 80 percent government business) use inventions much more quickly than companies predominantly in either the commercial or the government markets.

(1) *Effect of agency mission and commercial potential of sample inventions on utilization.*—The R&D mission of the sponsoring government agency was found to have a critical effect on the commercial applicability of the sample inventions. The Department of Defense, NASA and AEC accounted for some 90 percent of contracted research and more than 98 percent of the patents arising under contract in the years under study. Inventions covered by these patents were designed to meet operating requirements of these agencies rather than civilian needs in the great majority of cases. Their commercial applications, therefore, were essentially a by-product of governmental uses and depended largely on coincidental overlap between government and commercial requirements. Thus, over 70 percent of the reasons advanced by responders as most important to nonutilization of sample inventions relate to their limited commercial potential. This in no way measures their value for their intended use, but simply indicates the effect of differences between operating requirements of the government and civilian needs in commercial markets.

On the other hand, commercial invention with significant utilization were among the patents of these agencies in the field of transistors, vacuum tubes, numerical control devices, computers and gas turbine engines, where the necessary commercial overlap did exist.

The sample inventions of other agencies—such as the Departments of Agriculture and Interior, and TVA—were highly oriented to civilian requirements reflecting the civilian orientation of their R&D missions. Since most of the Agriculture and TVA R&D programs are conducted in-house, the sample included few inventions developed by their contract programs. However, these were supplemented with in-house inventions for which the agencies granted licenses. All that were used commercially, were used without exclusive patent rights. This was largely attributable to three factors: the commercial orientation of the inventions, good potential demand for their use, and sufficient government development of the inventions to show their commercial feasibility. Notwithstanding the commercial potential of these government inventions, agency promotion within industry was important in achieving utilization of Agriculture and TVA patents because of the need to convince firms of their commercial value. In several instances, utilizing firms acquired some measure of patent protection by developing patentable improvement to the government inventions.

Two causes predominated in case where the inventions of these agencies did not achieve commercial utilization. Lack of full technical development of the inventions was the most frequent and important. No market need due to the complexity of the invention, its high cost compared with other methods or the availability of more practical alternatives was second in importance. It is probable that some measure of exclusive rights might have encouraged private firms to complete technical development of some inventions not fully developed by the government where adequate demand existed to make them attractive investment opportunities.

The R&D programs of HEW and Interior illustrate still another effect of mission on utilization. The programs of these two agencies are oriented to civilian needs, but in many aspects, are directed toward basic rather than applied research. The sample inventions that have resulted from their work have not, for the most part, been sufficiently developed to prove their commercial value. However, should their inventions reach that stage in programs like water desalination, and medicinal chemistry, broad commercial utilization could reasonably be anticipated because of the strong potential demand for commercial innovations in these fields.

(2) *Private development costs.*—Information on private development costs required to apply sample inventions commercially was somewhat sketchy due to the age of the sample and the confidential nature of the data. But the information gathered showed significant differences in the types of costs incurred on DOD-oriented inventions (with exclusive rights owned by the contractor/utilizer in almost all cases), and civilian-oriented agency inventions (with nonexclusive licenses owned by the utilizers).

Private investment was heavily concentrated in technical development of DOD inventions. Fifty-six and eight-tenths (56.8) percent of private dollars were

spent for development compared with 22.7 percent for production facilities and 20.5 percent for marketing the product. In contrast, only 21.1 percent of private investment was required for technical development of civilian-agency inventions, while 52.2 percent was spent on production facilities and 26.7 percent on marketing.

The data confirms the relationships observed above between agency R&D mission and commercial potential of sample inventions. Civilian agency inventions, in general, are closer to commercial products when government development is complete than are DOD inventions. Thus, users of civilian agency inventions assume less financial risks in applying them than users of DOD inventions. This has a bearing on the degree of patent protection that may be needed as an incentive to utilization. All other factors being equal, more protection is required where the technical costs and financial risks are greater than where they are not.

(3) *Patent rights as incentives to commercial utilization.*—The study data show that patent rights play widely different roles in the business affairs of organizations in the sample. The sharpest distinction occurs between educational and nonprofit institutions, on the one hand, who can only achieve utilization of their inventions by licensing others, and industrial firms, on the other, who can promote utilization through direct use and licensing.

Educational institutions in the past have been much more concerned with publishing the results of their research than with promoting patents that may arise from it. Today, however, schools with large government research programs are taking greater interest in their patent portfolios and are seeking through a variety of means to promote them through licenses with industry. Nonprofit research firms also view their patents as a potentially useful source of income and actively seek to license others. In both cases, the invention must frequently arise from basic research and require substantial private development before reaching the stage where they are commercially useful. Some measure of exclusive rights appears necessary to motivate licensees to invest in the work necessary to commercialize these inventions. Where the institution has an active promotional program and the government has none, commercial utilization would appear to be promoted more effectively by permitting the institution to retain exclusive rights. Where this is not so, more individual analysis is needed to determine what allocation of rights would best foster utilization.

Industrial firms in the sample place differing weights on the need for exclusive rights in using government inventions. At one extreme were firms who rely heavily on patent rights to establish their proprietary position in commercial markets and would hesitate to invest in an invention in which they could not obtain exclusive rights. At the other, were firms so completely in the government market that they attach little or no importance to patent rights for commercial purposes. In between were firms for whom patents provide a variety of incentives. The nature and importance of these incentives to firms in the sample are outlined below.

A lack of interest in patents was characteristic of some research-oriented and manufacturing firms that do a preponderance of their business in the government aerospace and defense markets. No desire to expand into commercial markets and no mechanism for the commercialization of inventions were noted. When these firms obtain patents, their sole purpose is recognition within the company of technical competence.

In a second group of firms patents were secondary to broad technical and management competence in maintaining their position in commercial markets. Firms expressing this attitude toward patents were generally manufacturers of complex systems and technical products, such as aircrafts, jet engines, computers, or communications equipment. Although as much as 75 percent of their sales may be direct to the government, these firms frequently sell similar products to commercial markets. Inventions developed during the course of R&D activities tend to be auxiliary components and subsystems or incremental improvements to the basic product. These inventions are not as important to these companies in sustaining sales or selling new products as is the basic engineering management and production capability of the firm. New ideas and inventions are incorporated in product modifications or in new models with little consideration given to the protection offered by patent rights. Using a new idea to enhance product performance is regarded as more important than assuring that the company owns the exclusive right to use it.

A third group of firms believe that corporate ownership of patents offers flexibility in design, both in the United States and abroad (through ownership of corresponding foreign patent rights), and provides trading material for cross-licenses with competitive firms. Ownership of a patent, however, as a prerequisite for new product development is a relatively minor factor compared with market considerations and investment requirements associated with commercialization of the invention. A change in government patent policy may affect firms in this category by causing them to choose more carefully the areas in which they are willing to undertake government research. Faced with the possibility of being unable to obtain title to patents they develop, these firms may refuse to contract in research areas that would impair their operational flexibility.

A fourth group of firms actively seek ownership of patents, to establish and maintain proprietary positions in new technologies, as well as in established product areas. Invariably, however, estimates of market potential and corporate investment requirements determine which product areas are developed. The makeup of the patent portfolio may indicate the direction for product development in order to strengthen proprietary positions, but development is rarely, if ever, undertaken solely because patent protection is available. A change in government policy from license rights to title rights would limit the government-sponsored R&D activity of firms in this category because of possible conflict with company-sponsored research activities. Contract opportunities would be examined on an individual basis and, in many cases, the government might be refused.

A fifth group of firms regard patent rights as essential to their business activities, and are careful to avoid government claims or conflicts over ownership of inventions. Their policies generally lead them into one of two business patterns. In the first pattern, firms will assure corporate ownership of patents before initiating work on a government contract. They may assure ownership either by negotiating contracts that permit them to acquire title to patents on inventions they may develop, or by developing and patenting basic inventions with limited private funds and then seeking contract work in order to develop additional technical competence, push the state of the art, explore a new technology, or determine if commercial applications may begin to be drawn off. In these situations, firms deliberately select areas of government research to match their commercial interests in order to generate product ideas with commercial possibilities. New research firms with strong technical abilities and limited capital typically follow this pattern, as do specialized firms that have concentrated their business in a limited area of technology.

In the second pattern, firms consciously isolate government work from their commercial operations and pursue these activities separately. The sample firms in this category did only a small percent of their business with the government and were quite independent of it. Frequently, inventions derived from government contract work by these firms will be assigned automatically to the government to avoid title conflicts or commingling with company-sponsored R&D. In other cases, government R&D will be undertaken only in areas where there is no potential conflict with corporate proprietary objectives and in order to enhance the corporate image. The technical value of government contracts to the commercial interests of these firms is rarely considered a valuable supplement to in-house research and development.

Many diversified companies follow different patent policies in their commercial and government markets. These firms may place a strong emphasis on maintaining proprietary positions in commercial markets and express a relative lack of interest in patents arising from government work. The primary purpose of securing patents on government-sponsored research discoveries as in the case of the wholly government-oriented firms, is to provide professional recognition for technical personnel.

Lastly, an important difference was observed between the research-oriented firms doing business with DOD, NASA and AEC, and the product-oriented firms whose interests are aligned with Agriculture and TVA. The former were much more aggressive in their search for useful innovations in the work they performed than the latter who tended to rely on the results of government laboratory programs for innovations in their fields. Thus, although the food, textile, and fertilizer industries are less patent-conscious, they are also more conservative in the risks they are willing to take in applying new inventions. This accounts for the frequent need for active government promotion of Agriculture and TVA inven-

tions even when the inventions appear to have clear commercial applications.

(4) *Effect of patent policy.*—Notwithstanding the varying roles assigned patent rights by the firms described above, the key question is whether permitting them to retain exclusive right will, on balance, promote utilization better than acquisition of title by government.

The study data indicate that the answer is yes in at least the following circumstances:

(I) Where the inventions as developed under government contracts are not directly applicable to commercial uses and the inventing contractor has commercial experience in the field of the invention. This occurs most frequently with DOD, NASA and AEC inventions. In the case of DOD, the fact that it does not actively promote commercial use of its patents is an added factor. In these instances the inventing contractor with commercial experience appears to be the logical candidate to attempt utilization either directly or by licensing others; and

(II) Where the invention is commercially oriented but requires substantial private development to perfect it, applies to a small market, or is in a field occupied by patent sensitive firms and its market potential is not alone sufficient to bring about utilization. Inventions in this category may arise with any agency and may have had only limited government development toward a commercial application.

C. Effect of Government patent policy on business competition

To evaluate the effects of government patent policy on business competition, the study tried to answer three questions:

(i) What are the effects on competition of the acquisition of exclusive commercial rights to government-sponsored inventions?

(ii) Do they increase or decrease concentrations in commercial industries?

(iii) Do they create or eliminate significant areas of market power?

In evaluating the impact of government patent policy on competition, it is important to distinguish the effects of patent policy from other effects which may result from industry participation in government programs. Competitive advantages in commercial markets may well accrue to government contractors through knowledge gained in new technologies, through sharpening of technical skills, and through government funding of R&D work, which has parallel commercial areas of interest. But these are quite separate from the advantages of owning patents to specific inventions. This study has tried to measure only the latter. And, it has tried to measure it in terms of the inventions included in the survey sample. While a broader study of the cumulative effect of government-sponsored inventions patented over several years might have provided more definitive data, we believe that the study data provides a representative and useful picture of the effects of patent policy on competition.

The study indicates that both in number of inventions utilized and in sales volume, the patents sampled appear to have had small impact on commercial markets. Although over 80 percent of both sample inventions and utilization were concentrated in 50 firms, only 55 inventions owned by contractors—2.7 percent of the sample—played a critical role in their commercial use, and five were responsible for \$201 million out of the \$406 million in cumulative sales attributable to contractor inventions. This utilization of critical-role contractor-owned inventions is low compared with the total sales of these firms and the industries in which they participate. Of equal importance is the fact that very few instances were reported where owners of government-sponsored inventions refused to license their patents. Only 15 inventions—less than 1 percent of the sample—involved such refusals, and these 15 refusals involved just five companies.

The study did show that government retention of title, when coupled with full development and active government promotion of inventions having high commercial potential, has promoted competition. A striking example of this is the fertilizer industry where TVA developed high concentrate fertilizers, patented them, proved their effectiveness on pilot farms and their commercial feasibility in pilot production, and aggressively promoted their use among farmers and fertilizer manufacturers. Industry sales have increased greatly through the manufacture of these fertilizers by many small regional producers. In circumstances like these, government retention of title can be an effective spur to competition because licenses are available to all comers. But several additional factors must be present for patent policy to have this effect. It must be evident to licensees that

the invention has good commercial potential. The invention must be producible in commercial quantities and marketable at a cost that is competitive with alternative product. And the risks of recouping development costs must be no greater than similar investment opportunities available to the licensee.

In most cases, government agencies have to go far beyond discovery of an invention to create these conditions. Some agencies do—as described in the Volume III report on government efforts to promote utilization of government-sponsored inventions. The Department of Agriculture, for example, has an active program of developing inventions to the point of commercial feasibility. Potato flakes and frozen orange juice are two of its well-known successes. That agency, in promoting potato flakes, sponsored pilot production of the product and performed a market study in supermarkets in a major city to determine the product's consumer appeal. The study was then made available to the food industry to stimulate interest in the product.

In other cases, allowing industry to retain title to inventions has promoted competition. The clearest example of this is the small firm which penetrates a market of large competitors on the strength of a patent on a government-sponsored invention.

Notwithstanding the utilization programs employed by government agencies, none except AEC has an express statutory mission to increase business competition in commercial markets for its own sake. When it does occur, however, it is an indirect result of their efforts to accomplish their basic mission. From our observations of the study inventions and insofar as the effect of patent policy is involved, competition does not appear to have been adversely affected by this lack of direct concern, for three reasons:

- (i) The rate of utilization of government inventions has been low.
- (ii) The agencies—such as TVA and Agriculture, whose inventions are most likely to be utilized—either developed them in-house or took title to them when developed under contract.
- (iii) And industrial owners of government-sponsored inventions have been willing to license them upon request or, where they were unwilling to license, alternative technologies were available to competitors in the great majority of cases.

Based on all observations of the sample inventions we have found little evidence of adverse effects on business competition by permitting contractors to retain title of government-sponsored inventions.

D. Effect of Government patent policy on industry participation in Government R&D programs

The effect of government patent policy on industry participation in R&D programs was the most difficult factor to measure because of the difficulty of obtaining data on the question. However, a useful understanding of problems in this area was obtained by studying the medicinal chemistry program of the National Institutes of Health (HEW) and various contracts of the Department of the Interior. This aspect of the study attempted to answer such questions as:

- (i) Do competent business organizations refuse to undertake government R&D work—either entirely or in selected areas—because of government patent policy?
- (ii) What effect does policy have on application of a contractor's most advanced private technology to government programs?
- (iii) Does patent policy have any influence on the flow of information concerning new developments between a contractor's government and privately sponsored work?

The data available to us only allows us to define some first-order effects of the policy in this area.

Industry's main concern about participating in government research has been the compromise of private investment in research and invention. Frequent objection was made to the "peephole" effect of government programs, whereby the government receives rights in the accumulated results of private work. The "peephole" effect has its counterpart in patent matters where an invention has been conceived at private expense, but reduced to practice under a government program. The traditional patent provisions classify this as a government invention and dispose of its rights under the terms of the contract.

The reach of the contract has been extended in some program to background patents owned by the contractor at the time of contracting. This practice causes

the sharpest industry reaction of all because firms feel caught between their wish to participate in government programs and the need to protect their private investment and competitive position.

The major adverse effects of patent policy on participation are program delay, loss of participants, diversion of private funds from government lines of research, and refusal to use government inventions and research when questions regarding a company's proprietary position are raised. These adverse effects occur selectively, but they have occurred at important points in government programs observed in the study.

The key to the participation questions, however, lies in the attitude of prospective contractors toward the role of patents in their activities. As noted in connection with utilization, patents have varying importance to organizations doing business with the government. Industrial firms whose major business objective is participation in government work and systems-oriented companies in the study sample were at one end of the scale and were found to assign patents a secondary role compared with technical and management competence. Patents typically were used by the former to provide recognition to technical personnel and to project the creative quality of their work to their government customers. Systems firms, on the other hand, were found to rely on patents to ensure design freedom, provide material for cross licensing agreements as well as to recognize creativity in their technical personnel. The data indicates that firms in these two categories are not likely to refuse to participate in government R&D for patent reasons. However, systems firms may encounter participation problems at the subcontract level if the government acquires title to all inventions developed under its program.

On the other hand, firms which place a high value on patents for defensive purposes tend to choose among the areas in which they are willing to undertake government research and may decline to participate in programs which impair their operational flexibility. And, firms in research-intensive industries like electronics and new technically-oriented firms seeking to develop a proprietary product-line through government research were found to rely on patents to establish proprietary positions. These firms tend to be selective in their government-sponsored research and may decline to participate in programs which conflict with their privately sponsored research and development or which do not promote their growth objectives for proprietary lines.

Firms which follow this policy even more fully try to assure corporate ownership of patents before initiating work on a government contract or may consciously isolate government work from their commercial operations. In the latter case, there is usually little interchange of technical innovations between the government and commercial activities of the firm and there may be some loss of relevant technical experience and applications to the government work.

Lastly, large diversified firms often follow different patent policies in different divisions of the organization. Accordingly, they may be willing to participate in government programs with small concern for patents in some areas but with great concern for patent rights in others. It is difficult to generalize about these firms except to notice that their policies tend to follow the patterns of the industries in which their divisions participate. Their behavior may, therefore, resemble any of the categories of firms described above if their divisions have similar business profiles.

With respect to educational and nonprofit institutions refusal to participate for patent reasons is not normally a problem. However, instances were found in Department of Interior programs where patent problems were encountered because of conflicting institutional obligations arising from joint support of a research program or where rights in background patents were sought as a condition of the project. With the rising interest in nonprofit institutions in patents as a source of revenue, greater concern over patent rights can be expected from institutions with large research programs as financial pressures on these organizations continue to increase.

Viewing the participation problem from the standpoint of individual government agencies, the effect of patent policy varies with the nature of their R&D programs and the contractors that participate in them. Participation problems are not a concern to TVA which performs virtually all its research and development itself and, therefore, has little or no contractual interface with industry. They are also minimal in Agriculture programs since that agency contracts almost all its extramural research and development with educational and nonprofit institutions. In addition, the firms that do participate in its programs do

relatively little research and development on their own and tend to be less patent conscious than those participating in defense-aerospace work.

The direct effect of policy on NSF and HEW programs also appears to be small because most of their contract research is either basic in nature, offering limited opportunities to develop patentable inventions, or is performed by nonprofit institutions who, for the most part, are interested in the research for itself. However, some problems may be encountered in instances of joint or overlapping research at nonprofit institutions where the rights of other parties may be involved. And, a significant indirect effect has been noted in an important HEW health program where voluntary noncontractual participation by a patent sensitive industry was curtailed because of patent considerations.

The Department of Interior, like HEW and NSF, has a number of programs—such as a water desalination—which are oriented toward developing basic technologies. The Agency contracts in these areas with research-oriented industrial firms (many of whom are patent conscious), as well as educational and nonprofit institutions, and acquires title to patents on which they are based have been interpreted to require the agency to acquire rights in existing patents owned by contractors because of their relevance to the contract effort and future utilization of contract results. These factors—patent conscious organizations and acquisition of rights to contract inventions and existing patents—have resulted in several instances of hesitation or refusal to participate in the government program. Insufficient data was available to establish how widespread the reaction was or its overall effect on Interior programs.

The largest number of opportunities for participation problems occur, of course, in DOD, NASA, and AEC programs because of the size and scope of their contract effort. Only a limited amount of data was available on this question for these agencies but a few general observations may be made. At least as to the majority of DOD inventions, to which contractors are normally permitted to retain title, no problem arises. In addition, NASA's policy of waiving title to inventions to promote utilization under appropriate circumstances provides a method for resolving competing government and industry objectives with regard to patents arising under contract. Lastly, interviews with industrial firms in the survey sample indicate that—except where a large investment in private research, know-how, inventions and/or patents considered to be valuable in commercial markets exist—acquisition or improvement of technical skills is sufficiently important to them in most cases to justify participating in government programs in their areas of interest even though patent provisions are not completely suitable to them.

However, this does not mean that either a title or license policy will equally serve the government's interests under all the above circumstances, since the policy selected may also affect industrial decisions to use contract inventions commercially. Here again, a balancing of government objectives appears necessary to ensure that the net effect of the patent policy promotes the government's overall goals.

APPENDIX III: GOVERNMENT PATENT POLICY

[From the Weekly Compilation of Presidential Documents, Aug. 30, 1971]

The President's Memorandum for Heads of Executive Departments and Agencies, August 23, 1971

On October 10, 1963, President Kennedy forwarded to the Heads of Executive Departments and Agencies a Memorandum and Statement of Government Patent Policy for their guidance in determining the disposition of rights to inventions made under Government-sponsored grants and contracts. On the basis of the knowledge and experience then available, this Statement first established Government-wide objectives and criteria, within existing legislative constraints, for the allocation of rights to inventions between the Government and its contractors.

It was recognized that actual experience under the Policy could indicate the need for revision or modification. Accordingly, a Patent Advisory Panel was established under the Federal Council for Science and Technology for the purpose of assisting the agencies in implementing the Policy, acquiring data on the agencies' operations under the Policy, and making recommendations regarding the utilization of Government-owned patents. In December 1965, the Federal Council established the Committee on Government Patent Policy to assess how

this Policy was working in practice, and to acquire and analyze additional information that could contribute to the reaffirmation or modification of the Policy.

The efforts of both the Committee and the Panel have provided increased knowledge of the effects of Government patent policy on the public interest. More specifically, the studies and experience over the past seven years have indicated that:

(a) A single presumption of ownership of patent rights to Government-sponsored inventions either in the Government or in its contractors is not a satisfactory basis for Government patent policy, and that a flexible, Government-wide policy best serves the public interest;

(b) The commercial utilization of Government-sponsored inventions, the participation of industry in Government research and development programs, and commercial competition can be influenced by the following factors: the mission of the contracting agency; the purpose and nature of the contract; the commercial applicability and market potential of the invention; the extent to which the invention is developed by the contracting agency; the promotional activities of the contracting agency; the commercial orientation of the contractor and the extent of his privately financed research in the related technology; and the size, nature and research orientation of the pertinent industry;

(c) In general, the above factors are reflected in the basic principles of the 1963 Presidential Policy Statement.

Based on the results of the studies and experience gained under the 1963 Policy Statement certain improvements in the Policy have been recommended which would provide (1) agency heads with additional authority to permit contractors to obtain greater rights to inventions where necessary to achieve utilization or where equitable circumstances would justify such allocation of rights, (2) additional guidance to the agencies in promoting the utilization of Government-sponsored inventions, (3) clarification of the rights of States and municipal governments in inventions in which the Federal Government acquires a license, and (4) a more definitive data base for evaluating the administration, and effectiveness of the Policy and the feasibility and desirability of further refinement or modification of the Policy.

I have approved the above recommendations and have attached a revised Statement of Government Patent Policy for your guidance. As with the 1963 Policy Statement, the Federal Council shall make a continuing effort to record, monitor and evaluate the effects of this Policy Statement. A Committee on Government Patent Policy, operating under the aegis of the Federal Council for Science and Technology, shall assist the Federal Council in these matters.

This memorandum and statement of policy shall be published in the Federal Register.

RICHARD NIXON.

NOTE.—The text of the memorandum was released at San Clemente, Calif. The statement of policy mentioned in the memorandum is printed in the Federal Register of Aug. 26, 1971 (36 F.R. 16889).

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THE UNIVERSITY AND SMALL BUSINESS PATENT PROCEDURES ACT

WEDNESDAY, JUNE 6, 1979

U.S. SENATE,
COMMITTEE ON THE JUDICIARY,
Washington, D.C.

The committee met, pursuant to recess, at 9:47 a.m. in room 228, Dirksen Senate Office Building, Senator Birch Bayh presiding.

President: Senators Bayh (presiding), Metzenbaum, Thurmond, and Dole.

Also present: Subcommittee on the Constitution: Nels Ackerson, chief counsel and executive director; Mary K. Jolly, staff director; Linda Rogers-Kingsbury, chief clerk; Christie Johnson, assistant clerk; Joseph P. Allen, legislative assistant. Brenda Levinson, counsel to Senator Dole; Kim Pearson, minority legislative assistant; and Dennis Shedd, counsel to Senator Thurmond.

Senator BAYH. We will reconvene our hearing this morning, with special appreciation for all of you who are here to once again share your expertise with the committee.

Today the Senate Judiciary Committee is holding its second day of hearings on S. 414, the University and Small Business Patent Procedures Act.

At our last hearing, the committee heard from a number of expert witnesses who testified about the delays and frustrations that many promising inventions face when a small business or university contractor makes a patentable discovery under federally-supported research and development.

The problem in a nutshell is that while the agencies have a horrid record at developing and marketing new discoveries themselves, they are reluctant to part with the patent rights to inventions even when the inventor is willing to undertake the risk and expense of development. The result has been that many good ideas are being drowned in a sea of redtape and uncertainty.

There is now a great deal of concern about the health of American innovation. Newsweek magazine for this week has a cover story entitled "Has America Lost Its Edge?" And there are a number of bills that have been introduced trying to spur American inventiveness.

The Federal Government is now by far the largest source of research and development money in the country. Unless good ideas and inventions coming out of this effort reach the marketplace, there has been little real gain to the public. The bill that we are considering today would allow universities, small businesses, and nonprofit organiza-

tions to retain patent rights to inventions that they make under Government-supported research and development while guaranteeing the rights of the Government to use the invention without the necessity of paying any royalty fees. The bill would also return money to the Government whenever one of these inventions achieves a certain level of success in the marketplace. Thus, S. 414 creates an incentive for the inventor to take the time and effort needed to market new inventions while protecting the legitimate needs of the Government.

The Comptroller General, Mr. Elmer B. Staats, told the committee on May 16, 1979, that the GAO study of Government patent policy had revealed that there are now a wide variety of policies followed by different agencies.

Agencies such as HEW and the Department of Defense which had implemented liberal patent policies regarding universities have now begun to reverse themselves and have instituted a policy of reviewing patent petitions on a case-by-case basis. HEW frequently takes 8 to 15 months to complete this review with no certainty as to who will end up owning the patent. The Comptroller General stated that passage of S. 414 would be a constructive step in ending this uncertainty and making sure that we have the best possible patent policy governing our large research expenditures.

Presidents of three small research companies told the committee that the confusion and uncertainty that now exists over ownership of patent rights was one of the principal reasons that the innovative small business is reluctant to get involved with agency research programs.

Small businesses have proven to be the most innovative segment of the economy. When these innovators no longer will participate in Government research, the loss is suffered by everyone. The small business witnesses said that a bill like the University and Small Business Patent Procedures Act was essential if the small businessman was to participate in our research effort to the greatest possible extent.

I think that we should all remember that we are still living to a great extent "on Grandfather's money" in that our standard of living is a direct result of the initiatives made earlier in this century by a handful of men and women who had good ideas that they pursued until these ideas had achieved their full potentials.

The resulting breakthroughs in medicine, communications, and transportation have benefited all mankind. Still, we cannot assume that this rich inheritance will never run out. We must make sure that the great ideas of our own time are given the opportunity to achieve their potentials. I do not think that an impersonal Government agency is able to give a new idea the same amount of intense interest and attention as the inventor. The result is that many good ideas taken by the funding agency perish on the shelves of Government because there is no incentive for anyone to invest the time and effort necessary to develop a new discovery.

The witnesses that the committee has scheduled today should be able to shed some more light on the role of Federal research on innovation, and more specifically, on what the best possible policy should be for determining ownership of resulting inventions. We must insure that good ideas are delivered to the marketplace where they can bene-

fit the public while protecting the legitimate needs of the Government.

There are many indications that America is falling behind its international competition in a number of areas. Ironically, many foreign companies have been able to take new ideas from our research, patent and manufacture them abroad, and then export the resulting products to America. Importation of manufactured goods is now the second largest drain on our dollar right behind imported foreign oil.

Countries such as Japan and West Germany have been able to pay for their oil imports, even though they have fewer natural resources than the United States, on the strength of their innovative economies. I think that it is time for the Government to stop tying up innovation in redtape and provide incentives for American ideas to be developed here while providing new jobs and benefits for the public which is supporting our research effort. S. 414 is a much needed first step in this direction.

Our first witness this morning is Dr. Betsy Ancker-Johnson, vice president of General Motors for the Environmental activities staff. Dr. Ancker-Johnson is also the former Assistant Secretary of Commerce. We are privileged to have her here with us this morning.

TESTIMONY OF DR. BETSY ANCKER-JOHNSON, VICE PRESIDENT OF GENERAL MOTORS FOR THE ENVIRONMENTAL ACTIVITIES STAFF AND FORMER ASSISTANT SECRETARY OF COMMERCE, ACCOMPANIED BY NORMAN LATKER, FORMER CHAIRMAN OF THE SUBCOMMITTEE ON UNIVERSITIES OF THE GOVERNMENT PATENT POLICY COMMITTEE

Dr. ANCKER-JOHNSON. Thank you.

Mr. Chairman and members of the committee, I appreciate the opportunity to appear before the committee to testify in support of S. 414. I appear as former chairman of the Committee on Government Patent Policy. With me today is Norman Latker, former chairman of the Subcommittee on Universities of the Government Patent Policy Committee.

Allow me to begin by inviting you to indulge with me in a bit of whimsical speculation upon a familiar Biblical story. In the original version of this story, the ill-fated Samson reveals to Delilah that the secret of his superhuman strength lies in his unshorn locks. Delilah wastes no time in confirming the truth of this revelation the next time Samson sleeps.

From our knowledge of human physiology, we are aware that, absent divine intervention, there exists no correlation between the length of one's hair and the strength which one possesses. Samson's contemporaries we must suppose were no less well informed on this point than we are. A close reading of the story indicates that, between the time of his birth and his meeting with Delilah, Samson had never experienced a haircut.

Since Samson had neither theoretical or experimental evidence for tying his undisputed strength to the length of his hair, we are justified in asserting that his information on the subject came directly from God.

Query: If God had not made this direct revelation to Samson, how many haircuts would we expect him to have had before he stumbled upon the true secret of his strength?

Before you answer this question too hastily, let me emphasize an obscure point in the original story. After Samson's hair has been cut, but before he becomes aware of the fact, he rises from sleep, note that the Phillistines are menacingly near, and announces that he will dispatch them in the same way he has previously dispatched so many of their countrymen.

In short, Samson does not feel the loss of his strength; he discovers his condition only when he calls upon his strength and finds that it is missing.

God has not spoken to us on the true secret of our historic preeminence in high-technology commerce. There is, of course, no single element which can lay exclusive claim to being the secret of U.S. technological success. And yet, in that collection of elements which, taken together, offer a convincing explanation, there exists one whose importance has so escaped recognition that it alone can be described as "secret." This element consists of the intellectual property system: generally, of which the patent system constitutes a major part.

There are two reasons, it seems to me, why the importance of the patent system to our industry and in particular to our international trade, has received so little recognition. Apparently our Founding Fathers, while they provided in the Constitution for the patent system, had no notion of the fundamental role which this system would ultimately play in our modern society. The patent system was designed to perform a single function; in fact, it performs two functions superbly.

And the second function, unanticipated by the authors of the Constitution, has assumed an importance well beyond the first. The intended purpose was to promote the progress of science and the useful arts by holding forth to inventors the opportunity of financial reward in exchange for disclosure of new inventions. The profit incentive was expected to add substantially to the number of disclosures arising from preexisting inducements such as fame, professional recognition, desire to better society, et cetera.

Apparently the Founding Fathers did not consciously frame the patent system to promote the domestic and international commerce of the United States. They assumed that market forces would be sufficient to pull the truly promising inventions into commerce, while ignoring the less promising. This assumption is, doubtless, true over the long term. Yet, in the short term, it is demonstrably false. And in commerce, where the race is to the swift, it is the short term that counts.

We now know that the surest way to delay commercialization of an important invention is to dedicate it to the public. Penicillin constitutes a classic case.

The amount of penicillin produced in the first 12 years following Fleming's Nobel Prize-winning but unpatented discovery was insufficient to save the life of the one patient who received it all. Had Fleming patented his invention, it would have been brought to the public years earlier, with the saving of countless lives. He discovered too late, and to his profound regret, that the patent system is more important to the commercialization process than to the invention process.

Thousands of inventions are made each year that go unpatented. Only a handful of these reach the marketplace in the short term. A patented invention which is made freely available on a nonexclusive basis is indistinguishable from a nonpatented invention. In other words, our existing Federal policy insures that billions of R. & D. dollars spent in the United States each year are doomed to repeat Fleming's folly.

Samson would have had great difficulty in understanding how a simple haircut can affect one's physical strength. We seem to have experienced no less difficulty in understanding how a patent can serve any function other than that of promoting the progress of science and the useful arts.

How, exactly, does the patent system promote our domestic and international commerce? Allow me to illustrate.

Fleming published the results of his work on penicillin—in 1929. His right to apply for a patent in Great Britain and in most industrialized countries of the world—expired on the date of publication.

Since his contribution to the progress of science and the useful arts culminated with his publication, he could offer no further consideration to the commonwealth in exchange for the grant of a patent. Note here that the patent system does not confer a reward after the act of invention: it offers an inducement prior to the act of disclosure. Now, suppose that a few years later, after recognizing his mistake in not having applied for a patent, Fleming decides to rectify his error by asking the British Parliament for private relief legislation.

What might he say to convince Parliament that it was in the public's interest, rather than merely in his interest, to excuse the late filing of his application and to allow him to obtain product claims on penicillin? He would tell the truth. He would indicate that entrepreneurs were unwilling to invest the substantial risk capital necessary to build a penicillin plant because they feared that within a few weeks or months, long before they could recover their investment, penicillin would be synthesized.

If he held a patent on penicillin, with product claims, Fleming could guarantee the security of their investments by licensing the production of synthetic penicillin on terms which would permit the amortization of preexisting plants.

Thus, he would argue, the immediate benefits to Great Britain, without the expenditure of public funds, would be the creation of a penicillin industry, new jobs, greater tax revenues, improvements in balance of trade, plus the saving of countless lives. Indeed, all these things would have been possible if Fleming had filed patent applications around the world prior to his initial publication.

This is the second, unrealized function of the patent system, one that has little to do with progress in science and technology, except as a source of additional research funds, but a great deal to do with domestic and international commerce.

In speaking of Samson earlier, we noted the possibility that a considerable period of time might intervene between a routine haircut and his awareness of a loss of strength. Obviously, the longer the interval, the less likely Samson would be to discover the true cause. Let us add to Samson's difficulties by supposing that his loss of strength

is not absolute and instantaneous, but gradual and extending over a period of many years. We would then have a second explanation for our prolonged failure to note the relationship between changes in patent policy on the one hand, and changes in our economy on the other.

Consider the case of another Nobel-Prize winning invention, the transistor. This one had two advantages from our point of view at the outset: It was an American invention (Bell Telephone Laboratories), and it was patented.

However, in 1956, the Justice Department ordered A.T. & T. to license its entire transistor technology and, indeed, every single patent it owned—over 5,000—to any firm anywhere. Such licensing was to be without any charge. In other words, A.T. & T. was ordered to do with its patents in 1956 precisely what the Federal Government did then and does now with its patents; namely, license them to any company around the world free of charge.

Three U.S. firms did not share in this largesse. GE, RCA, and Westinghouse, having been previously licensed, were ordered to continue paying royalties to A.T. & T., thus reducing your and my telephone bill, while the foreigners paying no royalties reduced your and my telephone bill not at all.

The significance of this new patent policy was not apparent to the thousands of people then employed in manufacturing radios, phonographs, and other consumer electronics. It took 12 years for the industry to wither. By that time, the haircut had long since been forgotten, to say nothing about the name of the barber.

A former Attorney General, while serving as a member of this committee, once offered a delightfully incisive comparison of those who see all things as they are and ask "Why?" and those who see things that have never been, and ask "Why not?" The first of these groups is generally thought to be populated by scientists; the latter by visionaries.

However, there exists one segment in our society which asks and answers both questions: Our inventors.

Our task this morning is to join their ranks. I hope that we now know the why, just as, for different reasons, Samson knew the why of his extraordinary strength. Let us now examine S. 414 and dwell on the why not.

Our present fragmented patent policy places ownership of most federally funded inventions in the hands of the Government, rather than in the hands of the inventing organizations. Licenses under these federally funded patents—assuming a patent is sought and obtained—are, for the most part, made freely available to any and all comers, domestic and foreign.

The effect of this policy is to nullify the second, the commercialization function of the patent system, and to cast doubt upon the necessity for the first. After all, does the Government induce itself to disclose its inventions to the public by holding out to itself the promise of a patent by which it can make no profit?

S. 414 asks the rhetorical question: Why not allow small businesses and universities to retain patent rights in their Government-funded discoveries, with the hope and expectation that the commercialization of these discoveries will thereby be facilitated.

Insofar as university and small business inventions are concerned, S. 414 is intended to, and will, correct the negative effect of our present Government patent policy upon commercialization. In future years, S. 414 will be remembered as a turning point in our attitude toward intellectual property, evidencing not merely our awakening to the problem, but our firm determination to remain first in a peaceful but brutally competitive world.

Japan has announced its intention to capture various elements of the computer market in the 1980's. No one suggests that this is an idle boast. In fact, many in this country believe that we should emulate "Japan, Inc."—that our Government should join in the planning and management of specifically targeted commercial pursuits, with the objective of insuring the dominance of our industry in international trade.

Such an approach, I fear, would end many of the freedoms we now enjoy, and is unlikely to be successful in any event. The first casualty would be our pluralistic approach to the problem-solving; centralization of control means the prioritization of available strategies, and the elimination of funding for those at the bottom of the list.

S. 414 is a much sounder approach than "Japan, Inc." It assures the continuation of the Nation's pluralistic approach by entrusting to our innovators—at least those associated with small businesses and nonprofits—the burden of commercialization as the price of ownership. In addition, S. 414 will motivate contractors to take advantage of foreign patent systems, thereby enhancing the base of our technological commerce.

To suggest that the private sector is in a position to ignore the innovations generated by Government research and development, and still remain competitive, overlooks the fact that the Government funds half of the Nation's research and development.

Further, Government participation in basic research is increasing as the private sector shifts to applied research, much of which is necessary to meet Federal regulations. The increased presence of Federal funds supporting life sciences and energy research in the nonprofit sector is especially important to those industries involved in the delivery of new products and processes relating to such technologies.

Increased funding will naturally result in many of the best preliminary leads being encouraged by Government funds. Passage of S. 414 is especially important if we are to gain industrial aid in their commercialization.

S. 414 will certainly emphasize the role of the technology transfer units already in place in many universities. These groups track science and technology, establish property protection on university discoveries, and then seek out those who would apply these discoveries to meet needs in our society.

The bill's bringing together of the industrial and nonprofit sectors throughout the innovative process could prove very stimulating and productive to both sectors.

I have been disturbed by the number of inventions in the Government's patent portfolio which have never been licensed. I wonder if it would be feasible to amend S. 414 to permit the contractors covered by the bill to retrieve their as-yet-unlicensed inventions.

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Some major inventions within the portfolio may well reach fruition under S. 414, if it is thus amended.

Senator BAYH. Excuse me. Do you think that these Government-owned inventions are likely to be developed if the bill is not made retroactive as you suggest?

Dr. ANCKER-JOHNSON. No, they could be, if the bill were amended in such a way as to be, if you like, retroactive. There are some patents in the portfolio whose lifetimes, because of the 17-year duration of a patent, make them available for licensing, however, they have not been licensed under the nonexclusive approach.

In other words, there are nearly 30,000 patents in the Government's portfolio to date. A mere handful of those, perhaps a thousand, have been licensed at any one time. The other 29,000 are not. One would assume that there are many in that portfolio that have not been licensed because they offer no protection to someone who obtained that license on a nonexclusive basis.

Therefore, if you were to amend the bill to allow those unlicensed patents to be retrieved by their inventors so that they could then have an exclusive right to the patents, it would be a way to insure some more transfer of technology quickly.

Senator BAYH. You do not read the bill to permit that to happen?

Dr. ANCKER-JOHNSON. No, sir, because that would be a retroactive event.

I also have some concerns over the payback provisions of section 204. I understand the motivation underlying this section. My fear is that the costs of administration will far surpass the amount of the Government's recoupment. Perhaps the various departments of Government could be given the discretion to dispense with the application of this section, or compromise the Government's claim, whenever it appears that such action will result in a net financial benefit to the Treasury.

One final suggestion. No other country in the world requires its citizens to license their privately funded inventions to foreigners for manufacture abroad and importation to the country responsible for the invention. We have done so frequently. I object to this practice and will continue to make my objections known.

Nevertheless, I do not intend to distract your committee from its consideration of S. 414 by pressing the issue at this time. Instead, I merely suggest that, in the event an invention covered by S. 414 should pass into the ownership of a firm which operates under a compulsory licensing decree, the S. 414 invention be deemed to be outside the coverage of that decree.

That concludes my prepared statement, Mr. Chairman. I would be very happy to deal with any questions you may have.

Senator BAYH. Thank you.

Senator Metzbaum is one of our brightest colleagues. He wanted to make a comment or two at this time.

Senator METZENBAUM. I appreciate it, Senator. I first would like to express my appreciation to Dr. Ancker-Johnson for her testimony, particularly for bringing to attention the problem of compulsory licensing decrees and for suggesting that an "S. 414 invention" be exempted from the coverage of such decrees.

As chairman of the Antitrust, Monopoly and Business Rights Subcommittee, I would like to take a look at that particular subject. It intrigues me, and I am not sure that our Nation's best interests are being served. So I appreciate your testimony to that effect. It is very enlightening to me.

Dr. ANCKER-JOHNSON. Thank you, sir.

Senator METZENBAUM. I wholeheartedly support the concept of utilizing the patent system for the purpose of transferring valuable medical, energy and other technological discoveries to the commercial marketplace for the benefit of the public. I believe such a transfer will stimulate competition and economic growth. Consequently, I have agreed to co-sponsor S. 414, the University and Small Business Patent Procedures Act.

However, I do have some problems with respect to some of the provisions of the legislation because I think they may expand the focus of the legislation beyond small businesses, universities and non-profit organizations. The legislation establishes a uniform policy under which Government agencies would be encouraged to promote patents developed under Government contracts through licensing, including the granting of exclusive licenses.

While small businesses are to be given preferences in this licensing, the bill provides as well for the granting of exclusive licenses to large businesses. The idea of granting contractors exclusive licenses to patents developed at Government expense is fraught with danger. ✓

Since the vast majority of Government R. & D. expenditures go to the largest corporations, the granting of exclusive licenses to such corporations for Government-financed inventions runs the risk of furthering concentration of economic power in the hands of the large companies, something I do not think that we should encourage.

Certain other points might be raised in opposition to this legislation or at least in connection with clarifying the thrust of the legislation. Specifically, one could argue that the definition of "small business firm" in the proposed act is so broad, that it may frustrate one of the act's central purposes—to encourage maximum participation of the small business community in federally supported R. & D. efforts and to enhance the ability of small business to compete for Government support. Second, the requirement that small contractors disclose each invention within a reasonable time is unprecedented and unfair.

A similar requirement is not presently imposed on large contractors. Third, the reporting requirements of this bill impose an onerous burden on small businesses and universities.

They will undoubtedly result in a bureaucratic maze. Fourth, the absence of standards for computing profits and the lack of a definition for the term "after tax profits" could foster contract abuse and render section 204 virtually meaningless.

Finally, it is unclear when the Government is required to negotiate its share of "additional income" under section 204 (b).

Mr. Chairman, probably there is no other Member of the Senate with whom I work more closely or have greater association with than you, and I bring these points to your attention because I am satisfied that by doing so, a process of negotiation and compromise will be initiated and the points of contention will be resolved satisfactorily as a result.

You may be assured of the fact that I am prepared and my staff is prepared to work closely with you, not to do harm to the legislation, but to further the thrust that I know you have in mind in introducing it and that I have in mind in being a cosponsor with respect to it. I appreciate your permitting me to make this statement at this time. I thought I should do it for the record.

Senator BAYH. I appreciate the comments from my colleague and friend from Ohio. Of course, the kind of questions he raises are the kinds of concerns that all of us must be very sensitive to. I have never run a small business, and I have never run a university research program.

I think it is very enlightening to see what people who have had that experience have to say about the points which were raised by my friend from Ohio. I think we can carefully analyze these concerns and then bring to bear our own determination that the Government and the taxpayer not be ripped off, while guaranteeing that good ideas and inventions made under our research and development program achieve their potentials in the marketplace. I think we can put together the kind of legislation to accomplish this goal, while being sensitive to concerns such as those raised by the Senator from Ohio.

Senator METZENBAUM. Thank you, Mr. Chairman. My leaving the meeting is not lack of interest. It is due to another committee.

Senator BAYH. We appreciate the courtesy of the Senator from Ohio letting us pursue this matter.

On this retroactive question, how important is that? In other words, with enactment of this bill eligible contractors would retain ownership to many important patents instead of continuing to fear loss of ownership to Government agencies who have demonstrated that they are rarely able to commercialize them.

Under the bill the agencies would be able to grant exclusive licenses, if these are necessary, to develop the patents that are now in the Government patent portfolio. Now I suppose we could go another way by negating patents that had already been allotted to the Government, which would establish a rather unique precedent, I would think.

Can we accomplish the same thing by providing for exclusive licensing as we would be negating these patents?

Dr. ANCKER-JOHNSON. Mr. Chairman, the difference is the following: If an amendment were made in the spirit of that comment, it would facilitate the licensing of technology which otherwise might have to go through a bureaucratic maze—I believe that is the word that your colleague, Senator Metzenbaum, used.

What I am proposing would be a very minor change in your bill but which would facilitate the licensing of those some 29,000 or so patents which are not licensed in the portfolio of the U.S. Government. It does not change in spirit anything of the bill whatever. It would simply make it somewhat simpler for those licenses to be obtained, because it would not require any involvement in the U.S. Government in the sense it does now where those who wish to license must come in and go through some minor amount of activity, at least.

Senator BAYH. In the posts that you have held, especially in your capacity as a Government administrator, you must have been very sensitive to the need to protect the taxpayer from having inventions

made under Government-supported research programs used by large corporations to restrain competition.

One of the points that has been raised, and I think will be raised later by a very distinguished witness, is the concern that we are permitting a loophole here in which, instead of benefiting the universities and small businesses, we are really opening the door for large corporations who have most of the pie now in the Government research area.

Would you comment on this scenario from your experience?

Dr. ANCKER-JOHNSON. I certainly would, Mr. Chairman. It is precisely because of my concern for the taxpayer that I so strongly support your legislation. My concern is that so little of the technology resulting from the investment of such a large number of billions of dollars of taxpayer money in research and investment, that so little of that research investment does pay off in goods and services which you and I and every other taxpayer may enjoy. That is precisely why we need your bill.

The fact that so much of that technology lies as unused technology, as I tried to point out in my testimony, is the result of the failure of the commercialization process to be completed.

As long as that, so to speak, secret aspect of the importance of a patent is not allowed to function, so long as exclusive rights cannot be obtained by someone, very much of our technology is going to continue to lie unexploited.

I fear not nearly so much the investor-entrepreneur being associated with a large business organization which is busily providing goods and services to our people, jobs for our people, taxes and all that goes with a successful entrepreneurship, as much as I fear the continued lack of use of that technology, continued leaving it on the shelf and doing so in such a way that foreigners may take advantage of it more readily than we ourselves.

Senator BAYH. Let's read the language that is actually in the bill. What we are trying to do here, of course, is to insure that this bill will enable nonprofit organizations and small businesses to deliver new products to the marketplace while insuring that the public interest is fully protected. We started with the premise that you just espoused; namely, that taxpayers' dollars invested in research that never leaves the shelf is a total waste.

Dr. ANCKER-JOHNSON. Yes, sir.

Senator BAYH. The next premise is that first preference in granting exclusive or partially exclusive licenses to Government-owned patents that are not being developed should be given to small businesses. The bill provides for this specifically in section 211(c)(3). If there are no small businesses willing to do that, then it is available to others.

The language here says that first preference in the exclusive or partially exclusive licensing of federally-owned patents shall go to small business firms, and so forth. Is there a need to shore up this section to avoid the kinds of concerns that have been expressed by Senator Metzenbaum and others?

Dr. ANCKER-JOHNSON. I think, Mr. Chairman, that not only is that language quite adequate, but furthermore, you have written into this legislation march-in rights which, should something go wrong, gives the Government an absolute method to correct it.

It seems to me that you have made the possibility for abuse virtually nonexistent by including that section in the bill.

Senator BAYH. How do you perceive those march-in rights would accomplish what you suggest?

Dr. ANCKER-JOHNSON. Should there be any abuse, Mr. Chairman, whatsoever, these criteria could be applied by the Federal Government and so make it possible for the Government to retrieve any license or any patent—or not retrieve a patent, but to obtain the rights to that patent and distribute them to whomever it deemed best for the exploitation of that technology for the welfare of the people. So you have this excellent guarantee written into the bill, and it seems to me you have fully provided for any remote possibility of abuse.

That is in section 203.

Senator BAYH. Senator Dole?

Senator DOLE. I think you have covered it. There are a couple of questions I have with reference to section 203.

It seems to some of us that we are faced with increasing competition. We are faced with declining productivity, and we have sort of an economic war going now waged against industrial nations, against OPEC, and others. I guess I could assume from your statement that the dominance of Japan in the electronics industry is probably traceable to a patent that our country made available to Japan.

Would that be a fair assumption?

Dr. ANCKER-JOHNSON. That would certainly be a part of the situation, Senator Dole. I think one would hesitate to attribute one single event to their subsequent exploitation of our technology, but that has got to be taken as one of the major pieces.

Senator DOLE. And it is also my understanding that about one-third of all the patents issued have gone to foreign governments. Maybe that is no cause for alarm, but it seems to me there ought to be some counterbalance. I don't know what percent of the 28,000 are still—5 percent or less have been approved?

Dr. ANCKER-JOHNSON. Have been licensed?

Senator DOLE. Yes.

Dr. ANCKER-JOHNSON. Yes, sir, something under 1,000, so even less, at any one time.

Senator DOLE. So I share the view you expressed, and I think other witnesses will express, keeping in mind the comments of Senator Metzenbaum and others, it seems to me the policy we have at the present time is not effective and that we have some obligation in this Congress to come to grips with it.

That is why I am pleased to be working with Senator Bayh and others trying to find an appropriate way to resolve what many of us consider to be a very important problem.

I appreciate very much your testimony.

Dr. ANCKER-JOHNSON. Thank you, Senator Metzenbaum's concerns expressed at the beginning of his remarks, referring to my testimony. I found particularly interesting in connection with your remarks, Senator Dole.

His concern that the consent decrees have expedited the transfer of our technology to, for example, Japan and other countries, whose man-

ufacturers, whose entrepreneurs, have readily exploited that technology and have contributed very heavily to our current negative balance of trade, positive for them, negative for us, I share.

I am not quite certain how he reconciles his concern for that aspect and the concern he stated later regarding the possibility of big businesses becoming the licensees. After all, all of those consent decrees were brought against corporations perceived to be, by the Justice Department, in an antitrust position.

The settlement always came about as a result of the antitrust action on the part of the Justice Department.

The result has been to strengthen greatly our competition at our expense. And, thus, I have personally no fears at all about the licensing by the Federal Government of anyone, large, small, or whatever, in our country, to produce goods and services resulting from ideas sponsored by research money from the Government.

All that activity can help to strengthen our economy, provide more jobs and tax revenues. It seems to me we are taking a self-flagellation attitude when we prevent our own industry, our own entrepreneurs, from exploiting the technology that we the people have invested in. Our inventor-entrepreneurs should be encouraged to use patents in order to make goods and services available to ourselves and anyone around the world, and in order to provide a better economy here at home for our own people.

Somehow it is a very strange attitude of mind, that says in fear of antitrust or in fear of monopoly on the part of some of our corporations, we will therefore proceed to cut our own throats, to put it in the most extreme terms.

Senator DOLE. I don't know of any examples of monopolies—and maybe there are some—that resulted from granting of patent rights. I guess we could talk about it and raise the question, but I agree with the statement you just made.

Thank you, Mr. Chairman.

Senator BAYH. Thank you, Senator Dole.

Doctor, I know that you are under time constraints, so we better let you slip away. I want to express my appreciation to Mr. Latker for the contribution he has made at some significant regrettable inconvenience to his own personal position. ✓

Mr. LATKER. Thank you.

Senator BAYH. I think it is very unfortunate. We are grateful to him and to you, Doctor.

Our next witness is Adm. Hyman G. Rickover, Director of the Division of Naval Reactors, Department of Energy.

Senator BAYH. Admiral, we appreciate your taking the time to be with us. You certainly have a great deal of sophistication in technological development.

**TESTIMONY OF ADM. HYMAN G. RICKOVER, DIRECTOR OF THE
DIVISION OF NAVAL REACTORS, DEPARTMENT OF ENERGY**

Admiral Rickover. I could not help but listen to some of the comments made by my predecessor, and it gives me concern that so many people who are talking about patents have had no practical experience with how patents really work in this country.

I think this is the sin in this whole matter, that you only hear from patent attorneys or from those in Government. And I would say this particularly about the Department of Commerce. I have previously characterized that whole department as a lighthouse without a light. You can get all sorts of theoretical arguments, but what I will try to do is tell you about my 40 or 50 years of experience with real patents and how it really works out in Government and industry.

That will be the thrust of my testimony.

Senator BAYH. We are looking forward to having you testify. You don't think the previous witness who had oversight responsibility for running the Patent Office has any practical experience about how the patent system works in this country?

Admiral RICKOVER. No, I didn't say this.

Senator BAYH. The lady just before you had this experience.

Admiral RICKOVER. The Patent Office is really a recording outfit. I am talking about people who give theoretical views about patents and about their application. That is what I am referring to.

Senator BAYH. Well the doctor had run the Patent Office.

Admiral RICKOVER. Doctor who?

Senator BAYH. The previous witness.

Admiral RICKOVER. Runs the Patent Office?

Senator BAYH. Her previous job was running the Patent Office. That was the basis of her testimony. And I just wondered if you categorized her—

Admiral RICKOVER. The Patent Office is a clerical outfit, in essence. They don't make decisions about whether a patent is used or not or what its validity is. They just look over a document and decide whether it is worthy of a patent, I am not arguing that at all.

I am here to testify on how the whole patent system works in industry as far as benefiting the United States.

I am not talking about the recording of patents. Do you understand the distinction I am making?

Senator BAYH. I just wanted to make sure we are on the same wavelength.

The way I read her testimony was that she was reporting on her observations about how the patent system had actually worked. And in that regard, I think she went a bit further than just being a clerical worker.

Admiral RICKOVER. In my opinion, the people in the Patent Office don't have much to do with how the patents are utilized. I think it is more or less of a recording outfit. They can decide whether an idea is sufficiently unique to warrant a patent, but I don't believe they have experience in seeing how the system really works in industry.

That is what we are really talking about.

Senator BAYH. Fine.

Admiral RICKOVER. I am not taking off at the Patent Office. However, I am concerned about the fact you can get a lot of theoretical ideas about patents. My intent is to tell you how the system works on the basis of my experience, if that is worth anything to you.

Senator BAYH. It will be worth a great deal to us and your practical experience is what we are after. I just wanted to say it seemed to me the previous witness was not a theoretical witness but she was report-

ing on her observations as to how she perceived the patent system operates, such as who got the patent rights and under what circumstances, while she was running it.

Admiral RICKOVER. I happen to have patents, too, which I have invariably assigned to the U.S. Government. I am talking now not only from having handled patents for many years and seen how the patent system works in industry, but I am also what you might call an inventor.

And so I speak from another aspect.

May I start now, sir?

Senator BAYH. Please. I might just say before you start, from the standpoint of "Hoosier-ese" we would describe you as "one hell of a guy."

Admiral RICKOVER. That wouldn't help me. I don't know in what kind of connotation you are using that word. [Laughter.]

Senator BAYH. If you were from Indiana, you would know that is high on the list of adulation.

Admiral RICKOVER. Well, I have been in Indiana. In fact, I once shoveled snow in Indiana many, many years ago in order that trains could get through to Whiting, Ind. You know where that is, don't you?

Senator BAYH. That is not a unique experience in Whiting, Ind.

Admiral RICKOVER. I had a unique experience in Whiting which I will never forget.

Senator BAYH. Perhaps we ought to discuss that off the record and try to get on with this statement. [Laughter.]

Admiral RICKOVER. May I start now, sir?

Senator BAYH. Please, admiral.

Admiral RICKOVER. Thank you for inviting me to testify on the University and Small Business Patent Procedures Act.

One stated purpose of the bill is to establish a uniform Federal patent procedure for small businesses and universities. As I understand it, the bill provides that, in almost all cases, small businesses and universities may elect to retain title to inventions developed under their Government contracts; the Government keeps a nonexclusive license to use the invention for Government purposes.

If the Government subsequently determines that the contractor is not effectively taking steps to achieve practical application of the invention within a reasonable time, the Government would have so-called march-in rights, under which the Government can require the patent holder to license the invention to others.

If in 10 years a small business or university makes more than \$250,000 in aftertax profits from licensing the invention, or \$2 million on sales of products incorporating the invention, the Government is entitled to a share of all additional proceeds up to the amount of Government funds spent in making the invention.

In my opinion, Government contractors—including small businesses and universities—should not be given title to inventions developed at Government expense.

That is the gist of my testimony.

These inventions are paid for by the public and therefore should be available for any citizen to use or not as he sees fit.

In private industry, the company that pays for the work generally gets the patent rights. Similarly, companies generally claim title to the inventions of their employees on the basis that the company pays their wages. In doing business with the Government, however, these same companies reverse the standard, contending that the patent rights should belong to the one who comes up with the idea, not the one who foots the bill.

In rationalizing their claim for title or exclusive rights to Government-financed inventions, contractors often use the age old arguments of the patent lobby; and here is a point I would like to make. A lot of the fuss on patents is created deliberately by the patent lobby, who make a lobby over it. If we did not have that lobby, a lot of this stuff about patents would die out.

It is formulated by these people who make a good living off it and that is true of many other aspects of our life. I think you should recognize there is a considerable vested interest in keeping this patent issue alive.

They claim that the Government is stifling technology by retaining title to approximately 25,000 patents. Now those patents are available, and I know a lot about those patents. Many of them are not worthwhile. The fact that something is patentable does not mean that it is really usable in a commercial way. A stock-in-trade argument is that these patents reflect worthwhile ideas that are not being used; that without patent protection companies will not commercialize these inventions; and that the public therefore does not get the benefit of the Government's R. & D. expenditures.

There are a lot of assumptions made in here which have very doubtful logic behind them. Generally, these are the arguments of patent lawyers, contractors, and those unable to find sponsors for their inventions. And that is another point. Does every idea have merit that has a sponsor or has a lot of money been spent on them? Most patents are not very much worthwhile. The ideas are patentable but that does not mean they should be pushed.

One of the arguments I can see being put forth, particularly from universities, is that anyone who has an idea should have the Government push his idea. I would like you to consider that point, because from my experience most of these patents are not worthwhile pursuing.

Senator BAYH. I don't want to interrupt, but no university person has said that to me.

Admiral RICKOVER. Not perhaps to you, but there is an impression by every inventor that just because he has an idea that that idea should be prosecuted, and particularly by the Government.

Senator BAYH. With all respect, sir, that is not what has been said. What has been said is that the person who has the idea ought to be able to pursue it, not the Government, but whomever discovers the idea at the university. The university then ought to be able to pursue it. No one has suggested that the Government should finance this development.

Admiral RICKOVER. But the gist of my testimony is that if the Government paid for the idea and paid for the work, then it belongs to the people. That is the thrust of my testimony.

Senator BAYH. Yes; all right.

Admiral RICKOVER. Yes; I understand you, sir.

Truly good ideas tend to be used. The reason so many Government-owned and privately owned patents are not used stems from considerations other than the need for monopoly patent rights.

Many patents are of little or no significance. Many companies seem to file patents defensively, meaning that they file numerous patents for minor details primarily to keep someone else from getting a patent in that area or to discourage potential competitors. Some people file patents as status symbols; others simply misjudge the attractiveness of their ideas. The Patent Office itself, when in doubt, tends to patent questionable items on the assumption that, if the patent becomes important, the validity of the patent can be tested in court.

Finally, it is almost impossible to tell the extent to which patented inventions are being used, particularly in the case of Government-owned patents. Government agencies do not have a reason to research for patent infringement. The Government, unlike private parties, generally has no desire to prevent others from using its inventions. The reasons the Government should take title to these inventions are primarily to insure the Government is not subsequently barred by someone else's patent from using the idea; to preclude the establishment of a private monopoly for a publicly financed invention; and to insure the public has equal access to these inventions.

Patents are generally incidental to Government research and development work, not its primary purpose, and that is a very important point to bring out.

When I place an R. & D. contract for a new design reactor, it is principally to work out the details of a design and to identify and resolve the problems of design, manufacture, and operation. If patentable inventions arise in the course of this work, they generally involve only small design features, not entirely new concepts. The bill, however, seems to be based on the notion that the Government-owned patents are predominantly good ideas which Government agencies should try to force out into the marketplace. The bill states "It is the policy and objective of the Congress to use the patent system to promote the utilization of inventions arising from federally supported research or development * * *" and to "protect the public against nonuse or unreasonable use of inventions."

Under this bill, Government agencies would be expected to promote actively the inventions that it now owns and those that arise under new contracts. The bill further requires that the General Accounting Office audit these agencies annually and report to the Congress on their progress in this effort.

In my opinion, the bill overemphasizes the importance of patents, and, if enacted, would tend to divert attention and resources of the Government agencies away from their main functions. Most agencies have enough trouble doing the job they were established to do; they should not be required to spend their time and resources trying to promote patents of dubious value. I believe that the decision to use or not use Government financed inventions is one best left for the private sector.

The bill includes some safeguards which I believe would be cumbersome and ineffective. The first involves the Government's ability to

force widespread licensing under its so-called "march-in" rights, if a contractor who holds title to a Government-financed invention were not satisfactorily developing and promoting it. The Government has had march-in rights since 1963, but to my knowledge has never used them. To be in a position to exercise these rights a Government agency would have to stay involved in the plans and actions of its patent holders and check up on them.

If a Government agency ever decided to exercise its march-in rights and the patent holder contested the action, no doubt the dispute could be litigated for years. For this reason I believe this safeguard is largely cosmetic. It would result in much additional paperwork but would probably be used no more than in the past.

A second cumbersome and probably ineffective safeguard involves the provisions for return of Government investment. The proposed procedure involves keeping track of how much the Government invested in the invention and what after-tax profits a contractor has made over a 10 year period from licensing agreements or direct manufacturing associated with the invention.

Since these are no firm standards for calculating these figures, the likelihood of manipulation and disputes is great. To comply with provisions of this bill, Government agencies would have to set up organizations; issue and implement regulations; promote patents; review and audit contractor patent development and utilization plans; intervene when these plans are not carried out; negotiate agreements; audit books and records. I believe that these requirements will be effective only in adding much unnecessary paperwork.

It sets up a huge, expensive bureaucracy. I am sure the bill does not intend it, but that is exactly what it will do.

Contractors and patent lawyers often claim that contractors will decline Government work if they are not given title to patents they develop under the Government contract. My experience has been that Government patent policy is rarely the dominant factor in company decisions to accept or reject work.

Businessmen tend to value the tangible benefits or profits and technical know-how from Government orders more than the speculative benefits of patent rights. For more than 20 years I have been able to obtain the R. & D. and manufacturing work needed for the naval nuclear propulsion program from all sorts of companies in this country, large and small, widespread geographically, without having to give away Government patent rights.

Although S. 414 is supposed to be about universities and small businesses, there is another part of the bill, section 208, which would establish patent licensing procedures applicable to all contractors, both large and small.

Under this section, Government agencies would be specifically authorized to grant exclusive licenses to use Government-owned inventions. Under the bill, the General Services Administration is authorized to prescribe the regulations governing such licensing. In the past, questions have arisen as to the legal authority of various Government agencies to grant exclusive rights to title in such inventions.

This bill would resolve these questions in favor of being able to give away Government patent rights.

Judging from the past performance of many Government agencies, the attitude of the Department of Commerce, and the influence of large contractors in individual Government agencies, there is no doubt in my mind that the regulations would be written to encourage the granting of exclusive patent rights to Government contractors.

The bill requires Government officials to make certain formal determinations prior to granting exclusive licenses. However, the bill provides a framework under which Government agencies could rationalize the granting of exclusive licenses to large contractors. Either by getting Government agencies to waive its patent rights, as authorized under some of the present laws, or under the licensing regulations that would evolve under the proposed bill, many large contractors would be able to obtain—perhaps at the outset of the contract—title or exclusive licenses to inventions developed under their contracts with the Government. This should be prohibited.

These licensing provisions of this bill are identical to the language proposed to the House Science and Technology Committee during the previous session of Congress as part of a bill to promote technology. That bill and a similar one that was reintroduced recently are aimed at giving both large and small contractors exclusive rights to inventions developed under their Government contracts.

It appears that these same interests are trying to take advantage of the small business and university title of S. 414 to achieve what they so far have failed to achieve in these other bills.

In summary, I believe that inventions paid for by the Government should belong to the public, and all citizens should have an equal opportunity to use the inventions. Private firms, particularly large companies, should not be able to get a 17-year monopoly on inventions they develop with tax dollars. When Government agencies routinely grant contractors exclusive rights to use such inventions, it promotes greater concentration of economic power in the hands of large corporations; it impedes the development and dissemination of technology; it is costly to the taxpayer; and it hurts small business.

I testified in more detail on the general subject of Government patent policy as it affects small business before the Senate Small Business Committee on December 19, 1977. With your permission, Mr. Chairman, I would appreciate having that statement included as part of my testimony today.

Senator BAYH. Without objection, so ordered.

Admiral RICKOVER. I recognize that despite my convictions on this subject, there often is strong sentiment in the Congress to do something special for small businesses or universities. If you do decide to provide more favorable treatment for them, I recommend that you do so in a manner with insures that small businesses and universities, rather than large contractors, in fact have priority or at least equal access to inventions developed at Government expense. To accomplish this, I recommend that S. 414 be modified as follows:

1. Require that the Government retain title to all inventions developed at Government expense.
2. Give small businesses and universities an automatic 5-year exclusive license to inventions they develop under their Government contracts. At the end of this period the invention would fall in the public domain. This would provide limited protection but not a

17-year monopoly. It would also obviate the need for the cumbersome safeguard provisions of the present bill, for example, "March-in rights," "return of Government investment," and the vast administrative effort associated with them.

3. Revise the preamble to eliminate any implication that Government agencies should (a) actively and indiscriminately promote all inventions arising from federally supported research or development, and (b) "protect the public against non-use—of inventions." Only a small portion of the inventions patented by Government or industry turn out to be worthwhile. This is a very important point, because everybody thinks that anytime a patent is granted some thing useful necessarily occurs and it is only rare that it does.

I think we can get ourselves hung up on the idea that patents themselves are so very important that they are inherently important. They are not.

4. Prohibit agencies from waiving the Government's rights to take title to patents developed at Government expense. Whenever such waivers are granted, small businesses or other firms are foreclosed from the opportunity to use the invention.

5. Prohibit contracts which automatically provide to the contractor exclusive licenses to any inventions developed under the contract, except as indicated in paragraph (2) above. Other firms should at least have an equal opportunity to use the invention nonexclusively or bid for the exclusive right to use it.

6. Require that the Commerce Department publicize the availability of patents to which the Government has title for a period of 6 months. If no one requests a nonexclusive license, the rights to an exclusive license could be granted to the highest bidder with small businesses having priority in the bidding.

7. Eliminate the statutory requirement for the GAO to conduct an annual review of agency performance in the area of patents. It does not seem appropriate to include this as a permanent requirement of the law. Again, another batch of considerable paperwork.

In my opinion the effects of the Government patent policy are continually exaggerated and overplayed by the patent lawyers and contractors who have a vested interest in the matter. Proposed changes regarding ownership and use of patents developed at Government expense are always presented under the banner of high sounding principles and purposes. Having observed this issue for many years, I am thoroughly convinced that almost all of such proposed changes are contrary to the best interests of the United States.

The basic principle embodied in present laws is that the Government should have title to inventions developed with Government funds. That is a sound principle I fully support. It should be modified, waived, or otherwise tampered with only for compelling reasons—and even then with great care and in the most limited way needed to accomplish the purpose.

That concludes my prepared statement, sir.

Senator BAYB. Thank you very much, Admiral, I appreciate your very deep interest in this area. I also appreciate having the chance to converse with you about this bill and also for your willingness to inconvenience yourself to be here and let us have your thoughts. I know how

strongly you feel about Government patent policy and as I say, your background in public service is exceptional. No one can begin to doubt your obvious sincerity. I should say that while I might have talked to some patent lawyers they are certainly not the main supporters of this bill. Most of the people that I have talked with have been small business people or people from our universities. I must say, I concur in the general principles you enunciate here.

I guess where I still have questions with your statement is with your premise that good ideas will be speedily developed regardless of whether or not patent protection is available. I have also concluded that the present patent policies are much more burdensome on the small businessman and on the university than they are on large corporations and that these policies are now creating exactly the kind of economic concentration that you seem to be so concerned about. I also believe that the public interest is not being served when good inventions are not being developed because the Government will not waive its patent rights to them.

When you look at your summary statement "I believe that inventions paid for by the Government should belong to the public and all citizens should have equal opportunity to use the invention—what opportunity does a citizen have to use an invention that his tax dollar helped support and which is sitting on an agency's shelf because there is no incentive to private industry to assume the risk and expense of development and marketing it?"

Admiral RICKOVER. But nearly all of these inventions that sit on the shelf are not worth much, sir. I think there is a mistaken idea abroad that every invention is useful to society, and it is only rarely that an invention is. This, I think, is one of the sources of confusion. The public, it appears, assumes that when a man invents something that it must be useful. It isn't necessarily useful. It may have unique value to an individual, but for somebody to be willing to put money into it is not necessarily so.

You find most of the inventions are not used at all.

Senator BAYH. We are told that there are between 28,000 and 30,000 patents—

Admiral RICKOVER. That's right.

Senator BAYH [continuing]. Paid for by Government research that have not been commercialized.

Admiral RICKOVER. And that probably is true of many industry patents. Frequently, you will find that there is a considerable or great proportion of their inventions that are not used either. As I mentioned in my testimony, they do it just to keep others from getting into the act, prevent others from getting in; but not many inventions are worth using.

I am constantly besieged by inventors with ideas that are very impractical.

Senator BAYH. Certainly whatever public money is in those inventions that are sitting there, benefiting no one, is being wasted. The public surely does not benefit from that.

Is that a fair assumption?

Admiral RICKOVER. No, not necessarily. There could be some benefit but the costs of further development is not worth it.

Senator BAYH. I guess you would—

Admiral RICKOVER. The idea I get out of this is that there is an opinion abroad that every invention is marvelous and it's useful.

I can talk from my experience, and I have probably had as much experience with technology as anyone in the United States. I am saying that not to boast; it is a fact.

Most of these inventions are not that important. There is a mistaken idea that every invention is useful, and if somebody pushed it we would get some good for the public out of it. But the gist of my testimony is that this is not so.

If I can get that idea across, I will have accomplished something.

Senator BAYH. I think you have done that very well, Admiral.

Admiral RICKOVER. Well, I don't know. I think you will have a hard time disabusing people of that concept.

Senator BAYH. Well, let us assume that your concept is accurate. Let us assume that a large percentage are not worthy, and let's assume that all but 100 of the 28,000 are worthless. I don't have any idea whether that is even close. There are those who would take issue with that.

But let's assume that you make a strong case on that and if—

Admiral RICKOVER. And say there are a small number that are worth developing, yes.

Senator BAYH. What assurance is there now that they will be used, will be developed?

Admiral RICKOVER. Well, I thought we had a capitalist system in this country. I thought we had a system where there are many entrepreneurs who are looking to invest their money and take chances.

Now, what your bill would do is whenever a Government contractor has an idea, the Government would promote the commercialization of the invention.

Senator BAYH. But with all due respect, Admiral, that is where we fall out.

Admiral RICKOVER. Well, if we fall out, Senator, I—

Senator BAYH. Well, perhaps "fall out" is not a good term.

Admiral RICKOVER [continuing]. I think I would be happy to be mistaken on my interpretation of your bill.

Senator BAYH. There is where we have a different interpretation of what the bill is designed to accomplish.

Quite the contrary, first of all, if in that 28,000 that have been patented, or in the next 28,000, there are 27,900 bad ideas, I don't see how any of those bad ideas are going to be developed under our bill. If it is a bad idea it is still going to sit there.

Admiral RICKOVER. I think it would be worthwhile if the Patent Office would come in and say which of these 28,000 or 29,000 ideas are of value, so the good ideas can be recommended to be produced.

Senator BAYH. Here again, I thought we were going to let the capitalistic system decide which was the good ideas, and develop it in that way?

Admiral RICKOVER. That is exactly the point. That is exactly right. I am just as strong for capitalism as Senator Dole is, and possibly yourself.

Senator DOLE. I am glad you mentioned me first. [Laughter.]

Admiral RICKOVER. Well, you ran for Vice President; I have to mention you first.

Senator BAYH. Well, that was his first time out; now he is trying to rectify that and do the job right. [Laughter.]

Senator DOLE. Right.

Senator BAYH. Indeed, he is a capitalist, I am a capitalist, I guess we are all capitalists.

Admiral RICKOVER. I want to keep that "dead hand"—and I use that in quotation marks—"dead hand" of Government out of this. I see it used so often, I want to keep it out.

Senator BAYH. All right. Now, under our bill—

Admiral RICKOVER. Sir?

Senator BAYH. Under the bill that is before us that you have given us your thoughts on, the capitalist system would not develop 27,900 bad ideas out of 28,000. It would just develop the 100 good ones.

Admiral RICKOVER. That is right.

Senator BAYH. Those, too, are sitting down there on the shelf. They are not being developed.

Admiral RICKOVER. Can you name these 100 good ideas? Can anyone name them?

Senator BAYH. Suppose there are none. Let us assume there are none.

Admiral RICKOVER. But your bill would then have created 29,000 monopolies.

Senator BAYH. Monopolies for a bad idea? How much is that worth?

Admiral RICKOVER. Well, for any idea for that matter.

Senator BAYH. All right.

Admiral RICKOVER. If you let the Government own it and make it public, anyone can use it.

Senator BAYH. But you see the concern that we have is that the public interest is not being served by this inefficient patent policy. I certainly share your concern that the public interest be served, many would say that I frequently try too hard to protect the public from various threats.

Admiral RICKOVER. I know you have.

Senator BAYH. And I have tried to keep Government out of our private lives.

Admiral RICKOVER. That is why I am so surprised at your attitude in this. I always looked upon you as a great protector of the public. Of course, in his way, Senator Dole does, too. [Laughter.]

Senator BAYH. I hope the Admiral doesn't decide to run for the Senate from Indiana.

Admiral RICKOVER. Senator Dole is smiling, so I don't think I hurt his feelings.

Senator BAYH. I don't see how you could hurt anybody's feelings by making that assessment of them.

You see, it seems to me we have agreed that if there is a worthwhile investment that isn't on the street, that has received some public support and is not developed, then it is a waste of money. There is no question about that.

What you say is most of these are worthless and should not be developed. Now under our bill if they are worthless they wouldn't be developed. Nobody is going to invest the capital in them.

Admiral RICKOVER. Senator, most of these patent ideas are incidental to other work. Generally, a man just doesn't start out to—and again I am talking from my experience—he doesn't start out with the idea that he will invent something; nor does industry decide to do a certain job just by itself. It is assigned a job by the Government, and in the process of the designing and developing that assignment an idea comes up. This is the normal process by which ideas come about.

The problem is that people usually think of patents as fundamentally useful ideas. The fact is there are very, very few such ideas. A useful idea might come once every year. These are really the details of what we are talking about.

Senator BAYH. Well, Admiral, that may or may not be true, but the idea is there and it is either a good idea or a bad idea and if it is a bad idea it is going to stay on the shelf under any system—whether the Government owns it or whether a private citizen owns it.

If it is a good idea, the question is how do we get it out and developed?

Admiral RICKOVER. I have lots of good ideas, but, unfortunately, I can't get the other 220 million people in the United States to agree with me and to put up money to develop them. That is the point.

Every man who invents something thinks that his invention is a fine idea. He would like to see it developed. When he can't find any private outfit to do it, he would like the Government to do it. That is particularly true of professors.

Senator BAYH. This is apparently where we have a very different reading of our bill, because several times you have come back to "Government pushing" and the "Government spending" to develop ideas. That is not what our bill accomplishes.

Admiral RICKOVER. That is what I get out of the bill, sir.

Senator BAYH. I think that is where we have the difficulty, and I understand your concern, but our bill really doesn't do that if you look at it. What it does say is that the private capitalistic system should be allowed to develop and market these good ideas while assuring that the public interest is protected.

The Government under this bill would say "OK, if a private small business or university is willing to invest the money, they may have a chance to develop it. The Government isn't going to spend any more money to develop it."

Admiral RICKOVER. Well, in my recommendations, if the university wants to spend its money on it, they can go ahead and do it. They are entitled to do that if they want to do it.

Senator BAYH. In talking to the university people and particularly the small business people it has become obvious that without patent protection they will not take this risk. The thing that has really concerned me is that more and more of the sophisticated research is going to the large corporations because the small businesses won't stay in it because they perceive that the present patent policies are too risky. We have a couple of good examples of this in actual practice. One is a process for converting cellulotic materials into alcohol which can be

used as a fuel. Three private concerns could not develop this promising process because the Department of Energy delayed 9 months in determining who would retain patent rights to this invention, DOE or Purdue University.

Another one was a process which could determine in advance the reaction of the human body to certain chemotherapy agents for cancer treatment.

Another was a rather sophisticated advance treatment of burns, a burn ointment, where the people involved were not willing to invest the money to commercialize an idea that had merit because they could not figure out how they were going to get profits from it in the capitalistic system because the Government was going to own the idea and would only issue nonexclusive licenses for development if the agency retained patent ownership.

Admiral RICKOVER. Well, I have heard about one of these ideas, the man who has a machine that can tell whether you have cancer in your blood. It would seem to me if I were that man I would go to the agencies that spend large sums of money on cancer studies. I think they would be very interested in the idea. I don't believe that man in particular has used all the sources that are available to him.

Naturally, being the investor of that machine, he thinks it's the greatest thing that has ever happened, and he talks up for it.

But what can you do in life? You get bills in Congress here, and the man who proposed the bill thinks it is a good one. Even if the majority of the Congress votes against it, to his dying day he will think that bill would have saved the United States.

So how do you stop that? You have to deal with the protective feeling which occurs whenever a man has an idea in which he believes.

Senator BAYH. It seems to me that although there is no litmus test for the way we vote here in the Congress, that the best litmus test that you and I would both subscribe to would be to let the private sector see whether it is going to invest the money in it.

Admiral RICKOVER. Right.

Senator BAYH. And the private sector is willing to invest the money, and the concept of the capitalistic system comes into play—and you and I both subscribe to that—when a business has a reasonable chance of making a profit from a product. And the private—

Admiral RICKOVER. Many cases show that private industry will invest money and take a chance; that is one of the fine things about the capitalistic system. People are willing to put up their own money and take risks.

Senator BAYH. Let's take, for example, "X" idea—a good one or a bad one—and if that idea is a bad one, no business will develop it. If they determine that it is a good idea and they are willing to take a chance on it in exchange for getting something out of it, they are prepared to make that investment.

Our bill is designed to take away the one bottleneck in this formula; namely, that the difference between taking a chance and not taking a chance is that the Government owns the patent rights, and, thus, the individual entrepreneur is not willing to make the investment to get it out on the street. Under S. 414 the company takes a risk, if it is a good idea they make money, if not that is tough, you lose your money. If it is a good idea you—

Admiral RICKOVER. But the entrepreneur can use it, too, if it is available to the public. Anyone can use it.

In this way you make it available to a greater number of people. That is what I don't understand about this argument. If the Government owns the patent rights, anyone in the United States can use it, whether it's industry or anyone else. The Government makes the patent available to anyone.

Senator BAYH. But let's look at it this way: I know you are sincere and I assume you give me the same credit on that point?

Admiral RICKOVER. I think you are sincere, too.

Senator BAYH. Like we had a fellow in the Indiana State legislature that in every session he would get up and tell the same story about the blind man who was asked to describe an elephant, but it all depended on what part of the elephant he was touching.

I think you are touching one part, and I am touching another part of that elephant and we are both after the same kind of thing. Let me conclude this analogy and then turn to Senator Dole for questions.

Admiral RICKOVER. But I have touched more parts of that elephant than you have, sir. That's the difference between you and me.

Senator BAYH. I am sure you have.

Senator DOLE. I am glad you are both talking about an elephant. That's all right.

Senator BAYH. My concern is that your experience is a great deal more than mine, but you have not covered the whole beast and I am still touching the part you are not touching, Admiral.

Let me go ahead, if I might, and—

Senator DOLE. Mr. Chairman, I do have to run down the hall. I have a witness testifying about three doors down the hall, but I will come back. I wanted to say, in case I do not get a chance to get back, that I think you have alerted us to some of the problems and certainly we appreciate your testimony, Admiral. Our bill may not be perfect, few things are, but you did make many good suggestions and I hope we can address some of the points that you have raised. Our intent is to promote inventions, not to frustrate the system.

As I understand it and I guess the bottom line is that you would not suggest that we do anything, but if we do take action, it should be along the line of the six recommendations that you make in your testimony?

Admiral RICKOVER. Senator Dole, I think that the country would be better off if Congress passed a law cutting in half the number of laws you pass.

Senator DOLE. I understand what you are saying.

Admiral RICKOVER. I think you will agree with that, or even much further than that. From a philosophical standpoint I think Congress can do too much. You know, every time Congress passes a law, we need more lawyers, and more strife is created. I think many times—and it is a wise political dictum—many times it is best to let things alone sometimes; that's a pretty good idea, too. Things have a way of solving themselves if people don't meddle too much in them.

There is no question in my mind that the import behind the proposed law is good, but I don't believe anyone has estimated the vast bureau-

racy and paperwork that would be required here. I have very rarely seen a law passed that would set up as much paperwork and bureaucracy as this would—unintentionally, I understand that thoroughly and it is my duty because of my experience in these matters to warn you about these potential problems.

This is all I am trying to do.

Senator DOLE. Thank you.

Admiral RICKOVER. It is not up to me to decide what you do. You are elected representatives of the people, theoretically you have the most wisdom in the United States. Notice I used the word "theoretically."

How do you like such testimony?

Senator DOLE. I like it. I have never had the privilege to hear you before and that is probably my mistake.

Admiral RICKOVER. Don't say that, I am liable to go back to your State and—you're from Kansas, aren't you?

Senator DOLE. Most of the time, right. I am out there with Alf Landon, and others. I have to get back to my hearing.

Senator BAYH. You are not going to leave me alone with this man; are you?

[Laughter.]

Senator DOLE. Well, I am an Army man myself.

[Laughter.]

Senator BAYH. Admiral, I want to reiterate what Senator Dole said. You have caused us to focus on some of these areas where there could be unintentional abuse and we do not want that.

Mr. FOSTER. I wonder if I might comment on this. Could I help you on that?

In looking at that, you are talking—if I understand correctly—about if there are 29,000 patents out there but only one good idea, how are you hurt? This presumes that nobody is using the ideas that are held by the Government, on the shelf.

We see another aspect of the coin in terms of reviewing patent applications that come to us in the course of work under the Atomic Energy Act. In those areas, the patents as the admiral pointed out earlier, are issued to big firms. Also, most Government contracts are in the domain of the big contractors. Therefore, you would expect most of the patents to come from them. As the admiral has emphasized so much, the sorts of things that seem to be getting patented are more or less nits.

This raises questions about whether the purpose of many patents is to stake out good ideas and go commercialize them, or to fence out small businesses and others. Many firms decide on the basis of patent coverage whether or not they can compete in a field. They look at a list of patents and realize there might be 10 years delay and much money needed to litigate whether the patents are valid or not and this tends to discourage competition.

Our biggest issue in patents today, as far as our business, involves two large contractors competing over who has the right to a patent, the Government or the contractor does.

This is not because of the need to go commercialize an idea, it's the fact that the idea itself is incorporated in lots of major equipment throughout the country and one of the contractors is trying to say that

everybody owes him a royalty on it. The other contractor says the Government really owns it because he wants to be able to use it and not have to pay a royalty to anyone.

There are efforts in other committees to try to sell this whole concept, the philosophy of which is very much as you described today, which is how can you be hurt if industry picks up these good ideas?

But for every guy you give an exclusive license to, or give the title to, you are fencing out all his competition, all the other small businesses who may want to get in that area and who can no longer get in that area because one guy who happened to be fortunate enough to get the Government contract now has a 17-year monopoly.

So we look in your example to another aspect of the problem. It would be that 29,000 monopolies would be created to promote the 100 good ideas that might come out of the other end. I guess the concern would be whether you're better off losing these 100 ideas rather than permitting extensive patent fencing. They are probably not the kind of ideas that would turn the world around even in those cases where they may be valid, but in order to avoid passing out so many monopolies in other areas you may have to do this.

Admiral RICKOVER. I would like to comment on what the import would be of the fine statement that Mr. Foster made.

Take the Atomic Energy Commission, the area of atomic energy—much of that information has been made freely available to all industry. All patents belong to the Government. We find that this information is constantly in use.

Furthermore, as I mentioned earlier, I think lots of new ideas that I get, and we look at them closely, they are impracticable and they also can be unsafe. We are constantly beset with these things.

Senator BAYH. Here again, you know, we seem to be going around and around. The point that I'm trying to make here is that under this bill the Government will absolutely not have to develop bad ideas, it will simply get out of the way and allow our capitalistic system to work.

Admiral RICKOVER. Who is to make the decision that is unsafe? Is it inventors? It can't be the inventor. Somebody has to make that decision.

Senator BAYH. What we are suggesting is that the agencies have compiled a very poor record for developing these patents and that we should allow the private sector to determine which patents are promising and which ones are not.

Admiral RICKOVER. Then I would again say that if we believe in our present system, I would leave it up to industry and business to do that. We have a very simple system, why don't we keep on using it?

Senator BAYH. Well, it seems to me we are so close to total agreement on philosophical grounds, I think we are trying to accomplish that same goal, and we shouldn't be as far apart as we are on the procedure to get there.

So let's look at it again.

Admiral RICKOVER. I did recommend that you throw it out to bidding. Let anybody bid on it. If the patent is Government-owned, let the people bid on it so you give everyone a chance.

Senator BAYH. That is an idea we should consider.

Admiral RICKOVER. Yes.

Senator BAYH. I don't want us to create 29,000 monopolies, but a monopoly for a bad idea is about as worthless as yesterday's newspaper. It's the 100 or the 300 or 600 that are the good ideas and the question is how do we get those out, and what can we do to stimulate private capital investment while at the same time protecting the public investment that has been made in it. That is what we are trying to accomplish.

Admiral RICKOVER. I must reemphasize that these 100 ideas which are not being used, that they are not all necessarily equally good. There is a mistaken impression abroad that the technological aspect, or the value or the worth of our society, is based on the number of patents issued. That is not necessarily so. The number of patents issued is used all the time, and we are supposedly not developing as many patents as we should have or did before—but that does not necessarily follow. No, sir.

In fact, the more industrialized the country becomes, the more patents you will get because there is no end to new aspects of research. But that does not mean that each one of these patents really contributes significantly. I think this is the thing that I am trying to dispel.

Senator BAYH. You sold me on that. The idea that it is worthless makes it just that, it's worthless.

Admiral RICKOVER. Well, the idea may be all right, it may be a valid idea but not necessarily for commercialization. That is the point.

Senator BAYH. OK.

Admiral RICKOVER. Now, people are bemoaning the fact that the Japanese are getting in ahead of us, the West Germans are getting ahead of us, but I believe the things that they are getting ahead of us on are not related to this subject.

In the first place, the Japanese have a far greater disciplined work force. The Germans have a far more disciplined work force. I think that has something to do with it, too. It has to do with the kind of society you have. We can't always try to blame these things on external things. A great deal of them are internal.

Senator BAYH. I don't suggest that this is going to suddenly do away with our deficit balance-of-payments position or anything like that.

We are looking at some small ways in which we can improve our position though.

Admiral RICKOVER. I appreciate that, Mr. Chairman, and I am sure you have known me long enough to know by now my desire is not to come here and run down the committee in any way, but rather in a forceful way to try to tell you what my experience has been. I think experience to a great extent must be considered in these bills.

Senator BAYH. Well, it will be.

Admiral RICKOVER. Thank you, sir.

Senator BAYH. Thank you, Admiral. I know how busy you are and I appreciate your taking your time to be with us here today.

[Admiral Rickover's prepared statement to the Monopoly Subcommittee of the Senate Small Business Committee on Dec. 19, 1977, follows.]

STATEMENT OF ADM. H. G. RICKOVER, U.S. NAVY, TO THE MONOPOLY SUBCOM-
MITTEE OF THE SENATE SMALL BUSINESS COMMITTEE

[This statement reflects the views of the author and does not necessarily reflect the views of the Secretary of the Navy or the Department of the Navy.]

GOVERNMENT PATENT POLICY

Thank you for inviting me to testify. For the past thirty years I have been responsible for the research, development, procurement, production, operation and maintenance of the nuclear propulsion plants in U.S. Navy warships. During World War II, I was responsible for the design, procurement, and operation of the Navy's shipboard electrical equipment. My comments today with respect to Government patent policy are, therefore, based on extensive dealings with various segments of American industry for about forty years.

The basic presumption in most laws concerning Government patents is that the Government retains title to patents developed at public expense. But, today, many Government agencies routinely grant contractors exclusive rights to these patents. I do not believe this practice is in the public interest. It promotes greater concentration of economic power in the hands of large corporations; it impedes the development and dissemination of technology; it is costly to the taxpayer; and it hurts small business. In my view, the rights to inventions developed at public expense should be vested in the Government and made available for use by any U.S. citizen.

Under our patent laws, the holder of a patent enjoys a 17-year monopoly. During this time, he can prevent others from using the invention; he can license the invention and charge royalties; or he can manufacture and market the invention as a sole source supplier. If the invention is worthwhile, he is in a position to make exorbitant profits.

Patents are a survival of so-called letters patent which were issued in large numbers during the Middle Ages and through the Age of Merchantilism. These were open—hence the word "patent"—royal letters announcing to one and all that the possessor had been given exclusive rights by the monarch to some specified office, privilege, or commercial monopoly.

Originally, the purpose of letters patent granting industrial or trade monopolies was to promote the public interest; that is, to expand the nation's industry and trade—its national economy. It was then believed that the best, if not the only way, to induce people to invest large capital sums in new industries or trading ventures was to guarantee them freedom from competition, that is, to grant them a monopoly.

In time, the public interest came to be disregarded by monarchs. They granted letters patent to court favorites or sold them to the highest bidder in order to enrich themselves. In the reign of James I, the English Parliament finally put an end to the whole system of private monopolies and privileges through the 1624 Statute of Monopolies.

One type of letters patent was allowed to survive, the patent granted to inventors. For a limited time, a monopoly under the patent was allowed in order to encourage inventors to invest their brains, time, and money in research. It was believed that this was the best, if not the only, way to induce people to produce inventions. These basic ideas were subsequently incorporated into our own first patent law of 1790.

While there are flaws in our patent system, I can see why the Government grants patent protection to private interests who invest their own time and money in making inventions. But the patent situation today is quite different from what it was in 1790. At that time, a patent was a matter that concerned the individual primarily; individuals in a preindustrial age were developing single items. Today, the development of patents generally involves large organizations and corporations.

The U.S. Government alone is currently spending—in fiscal year 1978—nearly \$26 billion for research and development. To grasp the significance of this sum, bear in mind that the total expenditures of the U.S. Government for the 11-year period, 1789 to 1800, was less than \$6 million. It was not until 1917 that the entire Federal budget reached \$1 billion.

Over the years I have frequently wondered whether, in this modern industrial age, patents are as important to industrial organizations as would appear from

the statements made by the patent lawyers. It is probable that they are over-emphasizing the present-day value of patents and it is quite possible our industry might not be hurt much if we restricted the items that could be patented.

I believe that today the important factor for an industrial organization is the know-how developed by it—the trade secrets and the techniques; these are not patentable qualities. They are things which are inherent in a company, in its methods; in its management and trained employees; in the kind of machine tools it has; how it uses these tools; and so on.

Up to the advent of the Atomic Energy Commission in 1946, and the Space Agency in 1958, most Government research and development consisted essentially of adaptations to existing technology. That is, an industrial organization would be called upon by the Government to take an item that it had already developed over a period of many years and modify it. But today, in many areas, the Government is in the forefront of technological development. As a result, it is actually the public that is financing development of entire new technologies. It is wrong, in my opinion, for the Government to grant a contractor exclusive rights for 17 years to inventions developed with public funds.

There are those, notably Government contractors, and patent lawyers in and out of Government, who have argued the opposite—that the Government should grant to contractors exclusive rights to publicly financed inventions. From what I have seen the patent lobby consists primarily of a body of shrewd, so-called experts who have been needlessly confusing the simple principles on which the patent law rests. They have been successful to the point that today many Government agencies are giving away Government patent rights.

The Department of Energy continues to operate under patent regulations which were inherited from the Energy Research and Development Administration (ERDA). The ERDA regulations are a good example of how the obvious intent of a Federal law can be stood on its head by a Government agency. ERDA's responsibilities were set forth in the Atomic Energy Act of 1954 and in the Non-Nuclear Energy Act of 1974. Both of these laws remain in effect and applicable to the Department of Energy.

Under the Atomic Energy Act, the Government, historically, retained patent rights to publicly-financed inventions. That also seemed to be the legislative intent behind enactment of the Non-Nuclear Energy Act of 1974. The Congressional Conference report for that Act, states:

"Government patent policy carried out under the NASA and AEC Acts and regulations, and the Presidential Patent Policy statement with respect to energy technology, has resulted in relatively few waivers or exclusive licenses in comparison with the number of inventions involved. The conference committee expects that similar results will be obtained under Section 9 (of the Non-Nuclear Energy Act)."

However, under the Atomic Energy Act and the Non-Nuclear Energy Act, the Department of Energy has authority to waive the Government's patent rights. The Government patent lawyers have prepared a regulation which actually invites contractors to request waivers, and urges the agency to approve them. The regulation states:

". . . To accomplish its mission, ERDA must work in cooperation with industry in the development of new energy sources and in achieving the ultimate goal of widespread commercial use. . . . An important incentive in commercializing technology is that provided by the patent system. As set forth in these Regulations, patent incentives, including ERDA's authority to waive the Government's patent rights to the extent provided for by statute, will be utilized in appropriate situations at the time of contracting to encourage industrial participation, foster commercial utilization and competition and make the benefits of ERDA's activities widely available to the public."

This regulation also states that each potential contractor should be notified at the time of bid solicitation that he may request the Government to waive its patent rights, and that a request for waiver will not be considered as an adverse factor in evaluating bids.

With these new regulations the number of waiver requests in the energy field has increased dramatically. In Fiscal Year 1975, the Energy Research and Development Administration reported receiving two waiver requests; in Fiscal Year 1976, the number increased to 106. No doubt the number will continue to grow geometrically as the patent lobby pushes this policy.

To the extent a Government agency is not bound to the contrary by the provisions of a statute, it is supposed to be guided by the Presidential patent policy

memorandum issued by President Nixon in 1971. This policy memorandum attempts in broad terms to strike a middle ground between giving away and retaining Government patent rights. However, like most attempts to reconcile irreconcilable positions, it has failed. The wording is so broad and so vague that agencies can construe what they wish from the memorandum. The Department of Defense routinely gives patents away. The General Services Administration has published procurement regulations, for most other Government agencies, which do the same.

The patent lobby would have us believe that if companies are not guaranteed exclusive patent rights, they will not accept Government contracts. Obviously, if given a choice, most contractors would like the Government to give them exclusive rights to all patents that might result from Government contracts. But very few firms would, in my opinion and from my experience, reject Government business if they were not given patent rights.

These rights are not all that important to most firms. The Atomic Energy Commission operated successfully for more than 25 years under a policy whereby the Government retained title to inventions developed under AEC contracts. That agency had little trouble finding contractors and did an excellent job of developing technology. Likewise, I have no trouble finding contractors even though they know they will not receive patent rights on my Nuclear Propulsion Program contracts.

From what I have seen, most of the people who actually run the companies are interested primarily in profits and in the technology, experience, and know-how that comes from performing the contracts. This technology, experience, and know-how is what helps the company get future Government and commercial contracts. Several studies, including a 1968 study by the Committee on Government Patent Policy, confirm that ownership of patents is usually not a major factor when companies decide what work to accept; that companies are interested primarily in how much money they can expect to make, and what they can learn.

Contractor lobby groups typically use the threat of refusing to take Government work when they try to persuade Congress to eliminate procurement safeguards or to take other actions that will benefit industry. The Defense contractor lobby, for example, has made similar threats year after year in relation to the Truth-in-Negotiations Act, the Cost Accounting Standards Board, the Renegotiations Board, and so on. They say that defense contractors will leave the business unless the Defense Department increases profits or relaxes regulations. Yet, year after year, these very same defense contractors lobby Congress and the Defense Department for more business. Their actions belie their words; and this is also the case with respect to patents.

While companies contend that they should have the right to the inventions they make at Government expense, they apply an exactly opposite principle in dealing with their own employees and subcontractors. Employees are required to give their employer the rights to any inventions that they conceive on the job. Toward their employees and subcontractors, the companies' practice is that the one who pays for an invention should own it. But in dealing with the Government, they contend that the one who actually made the invention should own it, not the one who paid for it. This is a classic example of "Heads, I win. Tails, you lose." It is also an example of the double-talk which has caused the public to hold business in such low esteem.

The patent lobby contends that contractors must be given exclusive patent rights to inventions developed under Government contracts or they will not invest in production facilities or in the future research and development work needed to commercialize an invention. This is one of the main arguments being used in promoting a giveaway patent policy.

It is nonsense to think that our technological growth will suffer unless contractors get exclusive rights to patents generated under Government contracts. From what I have seen over many years, the vast majority of patents both in and out of the nuclear industry are of little or no significance. Some individuals obtain patents as evidence of achievement, much as Boy Scouts collect merit badges. Their ideas might be patentable, but nothing worth pursuing.

Large corporations file numerous patents that are not great new developments, but minor improvements or design features. Often they file these patents simply to discourage competitors or potential competitors—particularly small firms—from trying to enter the market. And if someone wants to challenge the validity of any

of these patents, it can take hundreds of thousands of dollars and years of litigation. A high percentage of patents contested in court are ruled invalid. But not many firms are willing or able to sustain such a challenge. Thus, these patents tend to discourage competition.

Obviously, there are patents that do represent useful ideas. However, even without a patent, many of these inventions would be discovered and adopted in the marketplace based on their merits. In such cases, rather than motivating individuals or companies to come up with new ideas, the patent system has actually become a process for determining which of many firms first conceived an idea, and is therefore entitled to the royalty. If one company did not generate the idea another firm would have because of the nature of the work being done. Often, identical ideas crop up almost simultaneously in different companies. Further, many good ideas can be implemented or "commercialized," without special investment in R&D or new facilities. Or, they are sufficiently promising that companies will invest in them without patent protection.

There may be a few inventions arising under Government contracts which, in the absence of exclusive patent rights given to the contractor, might not be disseminated and used. The question then arises: Is it really worthwhile for the Government to promote the invention? Perhaps the idea is not all that good. Moreover, if the Government should decide it is in the public interest to promote or "commercialize" a particular invention, it might be better if the Government itself paid for further development, and made the results available to all citizens instead of granting to one contractor exclusive rights to the invention. And who is to say, in cases where the Government patents are waived, that the company performing the contract should automatically and exclusively get these rights. Since large corporations get the major share of Government contracts, they would be the ones to benefit most from such a practice.

The concept of granting a patent—a legal monopoly—is to encourage investors to conceive new inventions, not to guarantee a market for already existing inventions. But companies now want to have their marketing development costs guaranteed by having a patent monopoly on Government-financed inventions. Since the public has paid for the development of the invention, the risks of marketing it should be no different in principle from other risks that are inherent in a true free enterprise system. How is the risk of marketing a publicly-financed invention different from the risk a man takes when he opens a new grocery or hardware store on a corner where none existed before? We would be going still further in abandoning our so-called free competitive enterprise system if we guaranteed legal monopolies for what are essentially normal business risks.

The patent lobby contends that, under a giveaway patent policy, the public is protected because the Government would have "march-in" rights. Under this concept, contractors who have been given exclusive patent rights to inventions developed under Government contracts would be required to submit reports explaining their efforts to commercialize the inventions. If a contractor did not commercialize the invention to the Government's satisfaction, the Government would then exercise its "march-in" rights and take the patent rights back or license it to others.

The concept of granting a patent—a legal monopoly—is to encourage inventors to conceive new inventions, not to guarantee a market for already existing inventions. But companies now want to have their marketing development costs guaranteed by having a patent monopoly on Government-financed inventions. Since the public has paid for the development of the invention, the risks of marketing it should be no different in principle from other risks than are inherent in a true free enterprise system. How is the risk of marketing a publicly-financed invention different from the risk a man takes when he opens a new grocery or hardware store on a corner where none existed before? We would be going still further in abandoning our so-called free competitive enterprise system if we guaranteed legal monopolies for what are essentially normal business risks.

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This concept sounds good in principle. But the patent lawyers well know that this is a cosmetic safeguard; it offers no real protection for the public. To administer such a program would require a large Government bureaucracy to receive, review, audit, and act upon contractor reports throughout the life of each patent. Currently, the Government would have to track contractor activity on about 30,000 unexpired patents. If the Government ever tried to reclaim its patent rights, more administrative effort, and probably much litigation would be involved.

In the real world, no one in Government would ever undertake this task; nor should they. Government agencies should concentrate on their proper functions rather than wasting time trying to keep track of how well contractors are promoting and commercializing patents.

It is relevant to note that, although Presidential patent policies since 1963 have required the Government to retain "march-in" rights where the principal or exclusive rights to a patent remain with the contractor, the Federal Council on Science and Technology reports that, as of December 1975, the Government has never exercised these rights.

The patent lawyers have observed that the number of patented inventions resulting from Federal funding is very small compared with the number generated by industry with their own funds. They attribute this, in part, to "the small incentive provided by present Federal patent policy."

I believe the lower number of inventions reported under Government contracts does not show a stifling of inventions under Government contracts. In fact, most of the major advances in technology in the past 20 years have come in areas where the Government invested heavily, such as space, defense, and nuclear energy.

The lower number of Government-owned patents results from other factors, such as failure of contractors to report the inventions they develop under Government contracts; the patent rights giveaway policy followed by various Government agencies; and the Government's "Independent Research and Development" program.

I have found cases where contractors filed patent applications for themselves on items that were conceived and developed under Government contracts. These come to light only because, by law, patent applications in the field of atomic energy must be reviewed by the Department of Energy and because in my area I insist on having them reviewed. In areas outside the field of atomic energy, there is no way for Government agencies to determine whether contractors are claiming, as their own, patents which rightfully belong to the Government.

The relatively small number of Government patents stems from the very fact that the Government has been giving them away; they have been patented by the contractors. The Defense Department, for example, does not acquire patent rights under production contracts. It retains patent rights only under contracts characterized as "research." Even under R&D contracts, the Defense Department has criteria for giving away Government patent rights.

In my opinion, the Government's rights to patents developed at public expense should not depend on some arbitrary distinction between "research" and "production." Often the best ideas and technology come during manufacture of a product, rather than from the research and development work that preceded it. The Government should retain patent rights on Government contracts, regardless of the nature of the work, whenever the invention was developed at Government expense.

Another reason for the small number of Government patents is that contractors automatically get title to patents developed under the Government's so-called "Independent Research and Development" (IR&D) programs—even though all or nearly all of these costs are paid for by the Government. The Defense Department alone spends about \$1 billion annually on this program, but the patents developed do not have to be reported to the Government.

Under present rules, any U.S. citizen, for a nominal fee, can get a non-exclusive license to use a Government-owned patent. There has been little demand for these non-exclusive licenses; but that does not mean the invention is not being used, as members of the patent lobby contend.

The reasons for the Government to patent its inventions are primarily defensive: to ensure that the Government is not subsequently barred by a private patent from using an invention whose development the Government itself paid

for; to prevent the establishment of a private monopoly for an invention developed at Government expense; and to make the invention freely available to the public. If these same ends could be achieved by "defensive publication"—that is, by publishing information in a manner that would preclude others from patenting it—the public interest would be served as well as if the Government actually patented the invention.

This Committee will, I am sure, be lobbied to death by contractors and patent lawyers—both in and out of Government. There will be speeches extolling the virtues of a giveaway patent policy in relation to the patent system; the free enterprise system; the nation's declining technological growth; and the problems of small business. These are the standard speeches which lobbyists tailor to fit special occasions.

But here, the policy they advocate is contrary to the principles of free enterprise and competition. Rather than giving everyone in the marketplace equal access to publicly-financed inventions, they are advocating that the Government restrict the use of an invention to one company.

Small business, for its own advantage, should be against a giveaway patent policy. The vast proportion of Government business goes to large contractors. In Fiscal Year 1976, 50 percent of the total dollar value of research and development contracts placed by the Department of Defense went to only ten large corporations. In Fiscal Year 1977, two-thirds of the \$35-\$40 billion defense procurement budget went to the top 100 contractors. As conglomerates expand, this concentration continues to increase. If the rights to Government-financed inventions are given away to contractors, the Government itself will be promoting the concentration of economic power in the hands of a few large conglomerates.

To appreciate fully the implications of a giveaway Government patent policy, one need only consider a hypothetical case. Suppose, with the vast sums of Government money that will be spent in efforts to find solutions to the energy problems, a contractor, at public expense, develops a technological breakthrough. What would an ordinary taxpayer think when he learned that this company could, for 17 years, legally control the dissemination, use, and pricing of this invention?

For the reasons I have stated, I believe that the Government should have a strict policy of retaining, for all citizens, the rights to patents developed at taxpayer expense. Specifically, I recommend the following:

1. All Government agencies should be required by law to retain patent rights, except in exceptional circumstances, to all inventions developed at Government expense.

2. Prior to a Government agency waiving the Government's rights to any patent, the Attorney General should be required to make a written determination that the waiver is required to obtain performance of work essential to the mission of the agency and that granting the waiver will not adversely affect competition or small business.

3. All inventors should be required to certify on their patent applications that the invention was developed under a Government contract and duly reported; or that the invention was not developed under Government contracts. Criminal penalties should be provided for individuals or contractors who file, as their own, patents that have been developed at Government expense.

We now have a university panel of Dr. Frederick N. Andrews, vice president for research, Purdue University; Howard W. Bremer, Wisconsin Alumni Research Foundation, and president, Society of University Patent Administrators; and Neils Reimers, manager of technology licensing, at Stanford University, and president of the Licensing Executives Society.

Dr. Andrews, I am going to ask you to go first for three reasons. One, I understand you have a plane to catch.

Two, this will be the most alphabetically feasible thing to do.

And perhaps most importantly of all, because you are from Purdue University. [Laughter.]

I admit my normal prejudice with all respect to the other gentlemen.

**TESTIMONY OF A PANEL CONSISTING OF: FREDERICK N. ANDREWS,
VICE PRESIDENT FOR RESEARCH, PURDUE UNIVERSITY, LAF-
AYETTE, IND.; HOWARD W. BREMER, WISCONSIN ALUMNI RE-
SEARCH FOUNDATION, AND, PRESIDENT, SOCIETY OF UNIVER-
SITY PATENT ADMINISTRATORS, MADISON, WIS.; AND, NIELS
REIMERS, MANAGER OF TECHNOLOGY LICENSING, STANFORD
UNIVERSITY, STANFORD, CALIF.**

Dr. ANDREWS. Thank you very much, Mr. Chairman, and members of the Senate Judiciary Committee. I am Fred Andrews, vice president for research at Purdue University and vice president and general manager of the Purdue Research Foundation.

I am responsible for the general supervision of sponsored research at the university. During the 1978 fiscal year, this involved approximately 1,500 separate research projects which received some Federal support.

Now, having heard Admiral Rickover asking for some people who have practical experience, and while I had not intended to include this as part of my testimony, I must say that I am an inventor myself; I have three patents which are of variable importance, according to Admiral Rickover's method of analysis or evaluation.

But one of these patents is used worldwide in animal production for stimulating the growth of animals. I have personally worked on that development for nearly 20 years to bring to that state of worldwide use. It takes a great deal of effort because no invention will sell itself. It is extremely rare for an invention to be so self-evidentially applicable that the general public would be able to use it without further development.

Continued input on the part of the inventor to ultimately bring a discovery to use. Now, I mentioned that my invention is used worldwide for animals. This same material which actually involves two compounds which we derived from molds which grow on corn—and which, Mr. Senator, we have a great deal of in Indiana—this same material could be used in the treatment of certain hormone deficiencies in women.

Now because of the various Federal regulations which are required for testing to bring any such compound to use in the case of human medicine, and including the requirement that the material be tested for 10 years on monkeys, and when we realize that the life of a patent is only 17 years, there are many difficulties in bringing any inventions to practical use. I might say that difficulties in human medicine are greater than in an inanimate object like a submarine which Admiral Rickover has considerable experience with.

Now, if I may return to my prepared statement. Having given some credentials for practical experience of a period of time, I am here to testify in support of S. 414 because I believe that it is one significant step that can be taken to help university research unchain this creative giant that is America.

During my career at Purdue University I have seen our country move from a position in the world of unquestioned technical super-

iority to some lesser position not yet well-defined; and I do support the testimony given by Dr. Ancker-Johnson which emphasizes the decline in the applications of inventions made in the United States by comparison with certain foreign countries.

Although much university research involves fundamental information about the physical and biological world in which we live, and as often characterized as abstract by the general public, we have as our ultimate objective a determination to put new knowledge to work for the benefit of society. Time does not permit a recapitulation of the contributions of research to the improvement of the basic condition of man. But I can not restrain from mentioning a few discoveries which have created entirely new industries and worldwide applications.

The discovery of the basic principles of genetics made possible new varieties of corn, wheat, rice, and sorghums and other food crops which resist disease and insects and have made the United States the envy of the entire world.

The discovery of penicillin which was referred to in some detail by Dr. Ancker-Johnson, did open the way for a succession of other antibiotics which virtually revolutionized the treatment of disease and created new industries involving thousands of people.

Now, it is true that the development of penicillin was very greatly delayed and had it not been for the emergency of World War II where crash programs were developed to bring that invention to useful application I don't know what ultimately would have happened.

But the important thing about penicillin is that it opened up to the rest of the world the possibility that there were other substances which would have similar properties, and beneficial effects. And these discoveries did create wholly new industries which did indeed revolutionize the treatment of disease and which provided employment for literally thousands and thousands of people in wholly new industries.

The discoveries in solid state physics which made modern computers possible may have done more to change technical and business procedures than anything since the development of languages themselves. That is a broad, sweeping statement but I believe it to be true.

We at Purdue believe that the patent and copyright policies which were developed in earlier years in the United States are a basic part of a democratic society and the free enterprise system. These policies were meant to stimulate and protect creativity.

Now, it has been said that he who pays the cost should benefit from it. In the case of creativity, if we think for example of a work of art, should the individual who pays for the painting of a portrait—for example, should the person who pays for the painting of this portrait—

Senator BAYH. Let's—in light of certain publicity—let's point over here, Doctor.

Dr. ANDREWS. OK.

Senator BAYH. That particular picture of our former chairman is a subject of some controversy, as you know. [Laughter.]

Dr. ANDREWS. In order that I may be less controversial, let me say it this way. Should the person who pays for the future portrait which will hang on that wall receive more accolades than the artist who paints the portrait?

I think not.

The patent and copyright system was intended to protect creativity. Many a successful small business was founded on the basis of a patentable discovery by a single inventor and patentable discoveries continue to form the base upon which our current technology flourishes.

Universities do not have as their primary mission the objective of making patentable inventions and their commercial development. However, with hundreds of separate research projects, the majority of which receive Federal support in whole or in part, it is obvious that some important discoveries will be made which have immediate use and should be protected by patents.

I agree with Admiral Rickover fully that not all inventions are, or discoveries which are patentable, are useful. Some are far beyond their time and ultimately may have use; and some are interesting observations on the state of matter or the biological processes and will probably remain no more than curiosities. But some of these are extremely important and at our own university level, for example, we weed out as many as we can of those discoveries which are patentable but appear to have little likelihood of commercialization and we do indeed not invest our money to take out patents on them.

Now, the one thing which I would like to make clear is that it is very, very seldom at the university level where we use only Federal funds for a particular research project. We have several aspects to the funding. We commingle the State funds of Indiana, the Federal funds, sometimes those from private gifts and other sources. Inventions may have a variety of sponsorships.

To say that because the Federal Government made a small contribution to an invention that it should have the entire rights—I don't think that that is wholly logical.

Senator BAYN. Excuse me, Doctor, is there a rule of thumb—and I know that it would differ widely depending upon what the product or the research project was at Purdue or with other universities that you are familiar with, a general breakdown between Federal and State money? I know we also have the Purdue Alumni Association, the Ag Alumni Association, all sorts of other organizations that could play a role in the development of a crop, particularly the Ag Alumni Association.

Dr. ANDREWS. Absolutely. In the Ag experiment station, actually, where there are regular State appropriations for work of this sort, we make some discoveries which are funded entirely on State funds and I think an audit would show this to be the case.

Or, we might, as you know, get contributions, including those from the Ag Alumni Seed Association. They make regular contributions to the experimental station to sponsor its broad work.

Senator BAYN. Is there any way to judge generally what percentage of the research dollars and discoveries come from the Federal Government, or is that too general?

Dr. ANDREWS. I guess I would have to say for the university as a whole including biology, pharmacy, chemistry, and so on that the bulk receive some Federal support. Those 1,500-plus projects that I mentioned are ones that get some Federal support.

Now, I can't give you the specifics which might be wholly in the Agriculture Experimental Station, but that would probably run to several hundred at most.

Senator BAYH. Well, that is a question that I would imagine would take some thought and preparation. If you could—all three of you gentlemen, since you are all related to the university system—give me some idea of the percentages of Federal money versus State, private, or other methods of funding research for some specific products, that could be helpful to this committee. In other words, if product *x* has 25 percent Federal/50 percent State/25 percent Ag Alumni Seed Association, we would like to know that.

Mr. BREMER. We have done that in a number of cases at Wisconsin, and very often we find the contributed dollars calculated on the basis of facilities and equipment provided plus State paid salaries for the principal investigators and perhaps others is about 50 percent.

Senator BAYH. Fifty percent Federal and 50 percent otherwise?

Mr. BREMER. Yes.

Senator BAYH. Thank you.

Dr. ANDREWS. To quote Senators Bayh and Dole, "a wealth of scientific talent and work at American universities and colleges is the basis for the development of numerous innovations in science and medicine each year, but much of it is going to waste as a result of bureaucratic redtape and illogical Government regulations.

"These regulations which cover procedures governing the issuance of patents for inventors resulting from Government-financed research by universities and small businesses and has kept new and potentially beneficial ideas from being marketed."

In many cases when we go to possible corporate sponsors, whether large or small, one of the first questions they ask is "Is the Federal Government involved in this?" And in some cases if we can't give them clear evidence, as you recall in the case of some of the inventions involving alcohol production, nothing happens. There is considerable cost and risk associated with development necessary to bring an idea to practice, if possible sponsors think the rights are going to be tied up or that they won't get clear title, they show a complete lack of interest.

Upon examination of the regulations of all Federal research and fund granting agencies, and in our work with these agencies in recent years, we have found that, first, there are a great many different policies respecting technology transfer coming out of the fund granting agencies.

And, second, many agencies statutes and regulations make it clearly impossible for federally funded research results to be licensed by the private sector of our economy on any kind of basis acceptable to industry.

As a result, we perceive a need for a uniform policy respecting licensing of new technology by university research and private industry.

We also perceive a need for any such policy to meet the commercial realities of the marketplace which seem to be that in all but exceptional cases exclusive licenses are required by industrial sponsors before they will undertake the huge expenditures needed to move federally funded work done at the universities from the drawing board into the commercial marketplace which only then benefits the consumer and the taxpayer as a whole.

By way of example, any discovery of a drug which might have applicability in human medicine will ultimately cost \$10 million to \$20 million by somebody to bring it to practical use.

I think also of some devices or some systems in engineering which are patentable which can be tried out in a very small scale in the lab. Small scale applications do not tell you how the process will work in a large furnace. The initial cost of finding out whether a discovery in metallurgy is worthwhile may be \$3, \$4, \$5, or even \$8 million and under those conditions without some guaranteed protection, sponsors certainly are not going to go with the license.

In summary, we think that Senate bill 414 will accomplish these objectives and that the consumers and taxpayers of America will be the ultimate beneficiaries of this bill.

Thank you, sir.

Senator BAYH. Well, thank you very much, Dr. Andrews. I know you have to leave, feel free to leave if you must, but you are welcome to stay as long as you can.

Dr. ANDREWS. I can be here until after lunch.

Senator BAYH. Lunch? [Laughter.]

[A letter from Mr. Andrews to Senator Bayh follows:]

PURDUE UNIVERSITY,
OFFICE OF THE VICE PRESIDENT FOR RESEARCH AND
DEAN OF THE GRADUATE SCHOOL,
West Lafayette, Ind., June 8, 1979.

Senator BIRCH BAYH,
Russell Senate Office Building,
U.S. Senate, Washington, D.C.

DEAR BIRCH: I was pleased to be asked to testify in support of your bill on Wednesday. You have been a consistent and effective supporter of the Universities in this matter, and we are very appreciative.

I could not refrain from responding to some of the remarks of Admiral Rickover. He is a remarkable man, and without his determination we would not have developed the nuclear submarine at that particular time. However, the admiral has very strong opinions, and, in the case of Federal rights to all inventions made when Federal funds are involved, I believe him to be wrong. We all know that many patented inventions will never come to use for one reason or another. Some are novel but trivial; some are uneconomic; some are innovative but represent no advance of the state of the art; some are ahead of their time, etc., etc., but I cannot accept the fact that the 20,000-30,000 unlicensed patents held by the Government are all of no value. Failure to have a clear position of ownership discourages private business from doing the development necessary to bring most inventions to the point of practical use.

My own invention, which is a hormone implant which stimulates the growth of cattle and sheep, was developed and marketed by the Commercial Solvents Corporation of Terre Haute, and is now owned by International Minerals. It is sold under the name Ralgro, and is based on a hormonal substance which we isolated from molds growing on corn. Its chemical name is Zearalenone, indicating its origin from corn. I worked with them for nearly 10 years, getting it to the point where it could be applied. The university gets two-thirds of all the royalty money.

I want to endorse the statements of Howard W. Bremer, of the Wisconsin Alumni Research Foundation. He is outstanding among university patent counsels, and highly respected.

I know that you had intended to ask our panel a number of questions which time did not permit.

1. Universities are having a very hard time keeping up with Federal regulations of all types. The confusing patent policies of the several agencies are just one example of the frustrations we have. Also, these regulations have caused us to increase our own staff of regulators, and this magnifies the problem of bureaucracy.

2. Every prospective licensee asks if the Federal Government will give us the full rights to patentable inventions. The failure to be able to make a clear commitment does scare some potential licensees at the very start. This is often true of small business. The large corporations are willing to help us fight through if they think the invention has a big potential. Federal involvement in ownership probably discourages development of useful but not outstanding discoveries.

3. My own interests have been in things related to food and health. There are so many delays in getting FDA clearance on drugs, chemicals, and health devices that lots of good ideas are never developed. The declining number of new drug introductions is clear evidence of this. If there are additional delays beyond FDA requirements, this is a serious impediment to licensing.

4. The passage of S. 414 will give us a uniform policy, and we and possible developers will know where we stand. I do agree with Ancker-Johnson and Bremer that the 5-year limitation on exclusive licenses may be too restrictive. There is a provision for a case-by-case consideration of individual inventions.

5. We cannot emphasize enough the importance of the inventor to remain involved as the invention is developed and marketed. Almost no invention is complete at the time of patenting. The practical problem is to make the invention work in the complicated world beyond the laboratory. Unless industry had cooperated because of the World War II crisis, penicillin would probably have remained undeveloped. However, as I mentioned, the discovery of penicillin opened up the way for many other antibiotics and the creation of an entirely new industry. This was especially important in Indiana because Lilly, Pfizer, and Commercial Solvents are all important producers of products by fermentation.

Thanks for your hand-written note about my testimony. I chuckled about it all the way home.

Sincerely,

F. N. ANDREWS,

Vice President for Research, and Dean.

Senator BAYH. Mr. Bremer, please go ahead with your statement.

Mr. BREMER. Thank you very much, Mr. Chairman. It is a pleasure for me to be here today and to talk in support of the University and Small Business Patent Procedures Act.

Before I begin my prepared statement, I feel compelled to qualify myself in view of Admiral Rickover's comments, and also to point out that Dr. Ancker-Johnson, who is a patent holder and also has worked in industry and in scientific laboratories, is eminently qualified to speak to this legislation.

I have been patent counsel for the Wisconsin Alumni Research Foundation for almost 20 years and have been engaged in the transfer of technology from that university, the University of Wisconsin, into industry for that period of time.

I have seen technology transfer fail miserably when the title to inventions resided to the Government, and I have seen it work beautifully, utilizing the incentives afforded by our patent system, when title resided in the university.

The general tenor of my remarks will be to that end here today and will emphasize that experience.

At the outset, I would like to state that I firmly believe that inherent in the introduction of this legislation and in its politically broad and numerically large cosponsorship is a recognition of the close link between technological progress and overall economic outlook; the recognition that the climate for innovation can and does affect the public personally; the recognition that it is more important to focus upon the benefit which would accrue to the public as a whole from technology transfer rather than upon the fear that some few would profit from such transfer; the recognition of the necessity for stimuli

to inventive activity and innovation; and the recognition that our patent system provides such stimuli through the incentives which it offers for the conversion of scientific knowledge into production benefiting human welfare.

Such recognition has been slow in coming. At the heart of the problem has been the absence of a single or overriding patent policy which addressed itself to inventions made in whole or in part through the expenditure of some Government moneys and which was cognizant of the equities of the parties and the needs of the public.

For many years the university sector has sought a uniform Government patent policy. There was general agreement within and without the Government that the primary objects of such a policy should be to:

One, promote further private development and utilization of inventions made with Government funds;

Two, insure that the Government's interest in practicing inventions for governmental purposes resulting from its support is protected;

Three, insure that patent rights in such inventions are not used for unfair, anticompetitive or suppressive purposes;

Four, minimize the cost of administering patent policies through uniform principles; and

Five, attract the best qualified contractors.

However, of all of the considerations attendant upon the establishment of a governmental patent policy only one consideration should be paramount: in whose hands will the vestiture of primary rights to inventions serve to transfer the inventive technology most quickly to the public for its use and benefit?

What is the situation that pertains when the Government takes ownership of a patent? It is in a sense an anomaly. The patent system was created as an incentive to invent, develop and exploit new technology—to promote science and useful arts for the public benefit. When the Government holds the patent under the aegis that the inventions of the patent should be freely available to all, much the same as if the disclosure of the invention had been merely published, the patent system cannot operate in the manner in which it was intended. The incentives inherent in the right to exclude conferred upon the private owner of a patent, and which are the inducement to development efforts, are simply not available.

With regard to Government ownership of patents, an interesting bit of history is presented by Marcus B. Finnegan—who, incidentally, died a short time ago of cancer—in a recent article in which he referred to the famous *United States vs. Dubilier Condenser Corporation* case in which the Court included in its original opinion a paragraph that questioned the authority of the Government to hold ownership to a patent. Subsequently, the Court on motion of the Solicitor General struck that paragraph from its opinion and thereby gave, by negative implication, judicial sanction to the Government's practice of taking titles to patents. The stricken paragraph reads as follows:

"In these circumstances no public policy requires us to deprive the inventor of his exclusive rights as respects the general public and to lodge them in a dead hand incapable of turning the patent to account for the benefit of the public."

This was obviously the dead hand to which Admiral Rickover referred.

The experience with licensing of Government-owned patents, with the Government in the main espousing a nonexclusive licensing policy, has irrefutably been one of nonuse. This has already been made abundantly clear in the record of S. 414. When title to patents is vested in the Government, one can indeed conclude that they are lodged "in a dead hand incapable of turning the patent to account for the benefit of the public."

With the fraction of R. & D. performed in this country that is Government supported now having reached about two-thirds, it is inescapable that a Government patent policy that discourages investment in the development of the inventions made during that research would have a negative effect on economic growth.

In the early 1960's when I first became involved with the questions raised by Government funding of research at universities, the Department of Health, Education, and Welfare was functioning basically as an agency having a title-with-waiver policy even though a number of institutional patent agreements (IPA's) were outstanding. In that period we encountered circumstances where requests for determinations of waiver and reminders of the running of statutory bars against patenting would go unanswered until after the bar had run. Then, too, on the very few occasions where a waiver was granted, it was so fraught with restrictive provisions that it presented an unworkable basis for transferring technology to industry. No commercial firm would accept the conditions which were imposed by the waiver.

The issuance of an IPA to the University of Wisconsin by the DHEW, with the Wisconsin Alumni Research Foundation as the designee of the University under that agreement, simplified the handling of inventions at the university. By giving the university the first option of ownership of the invention, it provided the certainty which permitted earlier patent actions to be taken and, therefore, earlier contacts with industry.

The argument made by the advocates of the title-in-the-Government policy and the title-in-the-contractor policy has gone on for some 30 years, as Admiral Rickover pointed out. For most of those years the argument tended to be rhetorical with neither proponent having at hand good and sufficient evidence in support of its position. Since the advent of the institutional patent agreements (IPA's), as between various universities and the Department of Health, Education, and Welfare and the National Science Foundation, where the universities have the first option to title to any invention made under such agreements, there has been mounting evidence that under the less restrictive policy of such agreements, more and more technology is being effectively transferred from the university into public use.

On that point let me relate to you our experience at the University of Wisconsin.

Prior to the effective date of the IPA, December 1, 1968, no inventions made at the University of Wisconsin with funds from DHEW had been licensed to industry—one invention not falling under the IPA was licensed after that date. Since December 1, 1968, the Wiscon-

sin Alumni Research Foundation has received a total of 69 invention disclosures under the Institutional Patent Agreement, has filed 79 applications on 55 of those disclosures and has had 55 U.S. patents issued.

A total of 20 licenses were issued under one or more of these patents and patent applications, 14 of which are still extant.

Senator BAYH. What was happening to those? You just didn't strike stone and ideas suddenly came out of it.

Mr. BREMER. When the Government took title, nothing was happening. They went into publications and they went into the literature, and that was the end of it.

Senator BAYH. Then it was available to the public generally in publications as Admiral Rickover was saying.

Mr. BREMER. That is right.

Senator BAYH. But none were being pursued.

Mr. BREMER. None was being pursued. They were available to the public generally though.

Senator BAYH. Excuse me. I apologize for interrupting.

Mr. BREMER. That's all right.

Senator BAYH. But to finish that though, you know the idea of something being available to the public generally, if it involves Federal research, I find philosophically very appealing.

Mr. BREMER. Oh, it is, no question about it.

Senator BAYH. The question is who benefits from it? If the public has paid for it, it is in the public weal, but if the public isn't getting the idea developed so they can use it, it seems to me like it's a big zero insofar as benefits are concerned.

Mr. BREMER. It is a zero, yes, as far as we are concerned in the United States; but it is not a zero as far as the foreign competition is concerned.

Senator BAYH. That is an excellent point. They can just pick it up.

Mr. BREMER. Yes, pick it up and use it. Because of the relationship between the governments of many countries and their industries, they are in a much better position to utilize the technology of that disclosure, translate it into a marketable product and import it into this country to compete with our own industry. That has happened on many, many occasions.

Senator BAYH. Excuse me for interrupting.

Mr. BREMER. Under the 14 license agreements still extant, four new products have been marketed with the strong promise of yet other products to be introduced after significant development work by licensees has been completed. Three of the products now in the market show significant promise for alleviating human suffering, and of becoming available for such purposes to a wide segment of the public.

Also, and importantly, numbers of foreign patents have been obtained on some of those inventions and promise to return royalties through licensing which will aid in alleviating our balance of payments deficit.

Incidentally, in relation to this point, we have a current situation in the licensing of the patents of Dr. DeLuca and his associates relating to vitamin D derivatives. DeLuca testified before you on the 16th of May—where 80 percent of the gross income generated under the licenses has been from foreign sources.

On a broader base, since 1969, when DHEW began using a less restrictive patent policy, until the fall of 1974, DHEW estimated that the rights to 329 inventions made in performance of DHEW funded research were being managed by institutions. During that period these organizations had negotiated 44 nonexclusive and 78 exclusive licenses under patent applications or patents on the 329 inventions. By the end of fiscal year 1976 the number of inventions held by such organizations had increased to 517. DHEW estimated that the risk capital generated under the licenses on various of these 517 inventions was approximately \$150 million.

This experience strongly supports the general proposition that the less restrictive the patent policy the greater is the transfer of technology. And it is significant in this regard that the major thrust of the IPA and of S. 414 is the same, namely, that the contractor has first option to title to any invention made under the contract. Moreover, in both situations the Government and the public is adequately protected through appropriate "march-in" provisions.

I submit, and firmly believe, that the policy set forth by S. 414 is wholly in the public interest. Such belief is based upon: One, the past records of many universities as successful agents for the transfer of technology.

Two, the willingness, as taught by experience, of the private business sector to deal equitably and in good faith with universities in such technology transfer endeavor.

Three, the good experience which has been enjoyed by the universities in the integrity of the technology transfer industrial "partner."

Four, the improving attitude of commercial organizations toward research at a university where a less restrictive patent policy controls as evidenced by increasing numbers of instances where companies have made contributions, in cash or in-kind to Government funded research projects where only the prospective rights to inventions, yet unmade, is involved—the certainty that the universities will have first option to title to such invention apparently being the prime motivation.

Five, the unwillingness, based upon experience, of the private business sector to become a licensee of the Government.

And, six, to the lack of successful technology transfer as represented by Government-owned patents to the private sector.

Under the accepted definition of an underdeveloped country which is one that exports raw materials to maintain its balance of payments, while it imports finished goods to maintain its standard of living we are now an underdeveloped nation. We are exporting our cotton, timber, grain, coal and other raw materials in order to pay for cameras, TV sets, radios, tools, and a host of other finished products.

We cannot afford to further weaken our economic position by weakening our patent system or the ability to extend exclusive rights to intellectual property—rights which are afforded under our Constitution.

The fact that the number of patents granted to citizens of the United States has fallen off significantly has already been made a part of this record. The statistics also indicate fewer big inventions—the rate of new drug introductions today is about one-fourth the rate of 15 or 20 years ago, and it takes longer to put them in the marketplace. In the

chemical field it averages about 7 years from the laboratory to the market; 15 years ago it took an average of 2 years.

We as a nation are spending less on research, using fewer people, and producing fewer inventions; and fewer of the inventions we do produce reach the marketplace, and it takes them longer to reach it.

In today's technologically intensive atmosphere some protection for the heavy investment required in development is more than ever necessary. The lead time given by exclusive knowledge or patents is shorter than ever before. If that lead time disappears, through a further weakening of our patent system, or weakening of the ability to extend exclusive rights to intellectual property, it may become economically sound to be second in the field.

There is already some evidence of that second-place philosophy in the medically oriented and other fields today. Further erosion of the exclusive rights to intellectual property afforded under the Constitution could lead to a second-place attitude throughout much of the U.S. industry. The next step is willingness to be a second-place nation.

We are in dire need of this legislation as a strong beginning to dismantle the roadblocks to innovation—roadblocks built upon a lack of understanding of the innovation process, the necessity for the patent system and for the functioning of the patent system in such process, political opportunism based upon outspoken but unsupported claims to the guardianship of the public interest and the self-protective caution which attends highly bureaucratic government.

We must realize that the innovative processes that brings revolutionary changes in society involve unpredictability, long gestation periods, huge sums of capital, genius, and extraordinary perseverance on the part of free individuals and organizations.

We cannot afford to continue to leave decisions on the disposition of invention rights to the discretion of Government agencies, nor can we afford to consider legislation which, as a practical matter, will do so.

S. 414 serves to functionalize a system, as represented by the Institutional Patent Agreement, which has been proven to be workable, and in my opinion, recognizes that innovation has become the preferred currency of foreign affairs.

I thank you for this opportunity to express my views on this important legislation and with your permission would also like to submit an additional paper for inclusion in the record:

Senator BAYH. We would be glad to have that. Thank you very much.

[Mr. Bremer's prepared statement and additional material follow:]

PREPARED STATEMENT OF HOWARD W. BREMER

It is a great pleasure for me to speak today in support of the University and Small Business Patent Procedure Act, S. 414. My remarks are made on behalf of the University of Wisconsin, one of the foremost research universities in the world, the Wisconsin Alumni Research Foundation, of which I have been patent counsel since 1960, and the Society of University Patent Administrators, of which I am currently the president.

The Wisconsin Alumni Research Foundation (WARF) is a nonprofit organization, incorporated in 1925, which functions as the patent administrative arm of the University of Wisconsin and is the designee of the university under the Institutional Patent Agreements between the university and the Department of Health, Education, and Welfare and the National Science Foundation. In each

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year WARF's total income is given, without restriction, to the University of Wisconsin for use in support of research.

The Society of University Patent Administrators is a professional society of individuals all of whom have some responsibility for administering inventions and patents at or in connection with some university. It currently has approximately 95 members representing about 60 universities and as one of its major intended purposes, is concerned with the education of its individual members to the techniques for accomplishing the transfer of the results of basic research conducted at the universities to the marketplace, primarily through utilization of the patent system.

At the outset I would like to state that I firmly believe that inherent in the introduction of this legislation and in its politically broad and numerically large sponsorship is the recognition of the close link between technological progress and overall economic outlook; the recognition that the climate for innovation can and does affect the public personally; the recognition that it is more important to focus upon the benefit which would accrue to the public as a whole from technology transfer rather than upon the fear that some few would profit from such transfer; the recognition of the necessity for stimuli to inventive activity and innovation; and the recognition that our patent system provides such stimuli through the incentives which it offers for the conversion of scientific knowledge into production benefiting human welfare.

Such recognition has been slow in coming. At the heart of the problem has been the absence of a single or overriding patent policy which addressed itself to inventions made in whole or in part through the expenditure of some Government moneys and which was cognizant of the equities of the parties and the needs of the public.

In considering such a policy it must be presumed that Government-research dollars are made available in the expectation of not only developing basic knowledge, but also in the expectation that the funded research will lead to products, processes, and techniques which will be useful and acceptable in all or part of our society to improve the well-being of the society in general.

In the face of this presumption it is apparent that inventions, whether made through the expenditure of private or governmental funds, are of little value to society unless and until they are utilized by society. In order to achieve such utilization it is essential that the invention be placed in a form or condition which will be acceptable and beneficial to the public. In other words, the technology must somehow be transferred to the public sector.

In a free enterprise system such transfer is normally accomplished as the result of pertinent and appropriate activities of private enterprise. Since such activities obviously entail the commitment and expenditure of substantial moneys—many times the amount needed to make the invention—adequate and appropriate incentives to such commitment and expenditures must be afforded. Consequently, and since the patent system provides such incentives and is the most viable vehicle for accomplishing the transfer of technology, full and careful consideration must be given to the making of any policy which will affect the transfer of technology that has been generated in whole or in part by Government-funded research.

For many years the university sector has sought a uniform Government patent policy. There was general agreement within and without the Government that the primary objects of such a policy should be to:

1. Promote further private development and utilization of inventions made with Government funds;
2. Ensure that the Government's interest in practicing inventions for Governmental purposes resulting from its support is protected;
3. Ensure that patent rights in such inventions are not used for unfair, anticompetitive or suppressive purposes;
4. Minimize the cost of administering patent policies through uniform principles; and
5. Attract the best qualified contractors.

However, of all of the considerations attendant upon the establishment of a Governmental patent policy only one consideration should be paramount:

In whose hands will the vestiture of primary rights to inventions serve to transfer the inventive technology most quickly to the public for its use and benefits?

What is the situation that pertains when the Government takes ownership of a patent? It is in a sense an anomaly. The patent system was created as an incen-

tive to invent, develop and exploit new technology—to promote science and useful arts for the public benefit. When the Government holds the patent under the aegis that the inventions of the patent should be freely available to all, much the same as if the disclosure of the invention had been merely published, the patent system cannot operate in the manner in which it was intended. The incentives inherent in the right to exclude conferred upon the private owner of a patent, and which are the inducement to development efforts, are simply not available.

With regard to Government ownership of patents an interesting bit of history is presented by Marcus B. Finnegan¹ in which he calls attention to the famous case of *United States v. Dubilier Condenser Corporation*. The court issued its original opinion on April 10, 1933.² Then on May 8, 1933, the court, on motion of the Solicitor General, struck from its opinion³ a paragraph which questioned the authority of the Government to hold ownership to a patent thereby giving, by negative implication, judicial sanction to the Government's practice of taking title to patents. Of importance to my remarks today and to the provisions of S. 414 is the following language from the stricken paragraph with respect to the question of whether title to the patented invention in dispute should be awarded to the Government:

"In these circumstances no public policy requires us to deprive the inventor of his exclusive rights as respects the general public and to lodge them in a dead hand incapable of turning the patent to account for the benefit of the public."

The experience with licensing of Government owned patents, with the Government in the main espousing a nonexclusive licensing policy, has irrefutably been one of non-use.⁴ This has already been made abundantly clear in the record of S. 414. When title to patents is vested in the Government one can indeed conclude that they are lodged "in a dead hand incapable of turning the patent to account for the benefit of the public."

It should be obvious that without the introduction of new products into the economy, economic growth and job expansion would come to an eventual halt. While people can disagree whether particular technological innovations are good or bad, we doubt that anyone would seriously argue that a slow-down in technological innovation would not result in slower economic growth. With the fraction of R & D performed in this country that is Government supported now having reached about two-thirds, it is inescapable that a Government patent policy that discourages investment in the development of the inventions made during that research would have a negative effect on economic growth.

In the early 1960s when I first became involved with the questions raised by Government funding of research at universities, the Department of Health, Education, and Welfare was functioning basically with a title with waiver policy, even though a number of IPAs were outstanding. In that period we encountered circumstances where requests for determinations of waiver and reminders of the running of statutory bars against patenting would go unanswered until after the bar had run. Then too, on the very few occasions where a waiver was granted it was so fraught with restrictive provisions that it presented an unworkable basis for transferring technology. No commercial firm would accept the conditions which were imposed by the waiver.

The effect of such circumstances was to completely discourage the inventor from seeking to commercialize his inventions and, in fact, of even recognizing the presence of invention—the burdens attached because of the posture and attitudes of that Department toward the transfer of technology were simply too overwhelming.

The issuance of an IPA to the University of Wisconsin by the DHEW, with the Wisconsin Alumni Research Foundation (WARF) as its designee under that Agreement, simplified the handling of inventions at the University. By giving the University the first option of ownership of the invention it provided the certainty

¹"The Folly of Compulsory Licensing," *Les Nouvelles* (Journal of the Licensing Executives Society) Vol. XII, No. 2, June 1977.

²289 U.S. 178 (1933).

³289 U.S. 706 (1933).

⁴See *Resumé of U.S. Technology Policies—Dr. Betsy Ancker-Johnson—Les Nouvelles* (Journal of the Licensing Executives Society) Dec. 1976, Vol. XI No. 4, p. 186; Statement before the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, Dec. 11, 1976. (This latter document also contrasts the experience of universities in licensing patents owned by them some or most of which may have resulted from research supported in whole or part by Federal monies).

which permitted earlier patent actions to be taken and, therefore, earlier contacts with industry.

The argument between the advocates of the title-in-the-Government policy and the title-in-the-contractor policy has gone on for some 30 years. For most of those years the argument tended to be rhetorical with neither proponent having at hand good and sufficient evidence in support of its position. Since the advent of the Institutional Patent Agreements (IPAs) as between various universities and the Department of Health, Education and Welfare and the National Science Foundation under the provisions of which the universities have the first option to title to any invention made under such agreements, there has been mounting evidence that under such less restrictive policy more and more technology is being effectively transferred from the university into public use.

Let me give you, as an example, what has happened at the University of Wisconsin.

Prior to the effective date of the IPA, December 1, 1968, no inventions made at the University of Wisconsin with funds from DHEW had been licensed to industry (one invention not falling under the IPA was licensed after that date). Since that date, WARE has received a total of 69 invention disclosures under the IPA, has filed 79 applications on 55 of those disclosures and has had 55 United States patents issued.

A total of 20 licenses were issued under one or more of these patents and patent applications, 14 of which are still extant, and under which four new products have been marketed with the strong promise of yet other products to be introduced after significant development work by licensees has been completed. Three of the products now in the market show significant promise for alleviating human suffering.

Also, and importantly, numbers of foreign patents have been obtained on some of those inventions and promise to return royalties through licensing which will aid in alleviating our balance of payments deficit.

On a broader base, since 1969, when DHEW began using a less restrictive patent policy, until the fall of 1974, DHEW estimated that the rights to 329 inventions made in the performance of DHEW funded research were being managed by institutions. During that period these organizations had negotiated 44 non-exclusive and 78 exclusive licenses under patent applications or patents on the 329 inventions. By the end of fiscal 1976 the number of inventions held by such organizations had increased to 517. DHEW estimated that the risk capital generated under the licenses on various of these 517 inventions was approximately \$150,000,000.*

This experience strongly supports the general proposition that the less restrictive the patent policy the greater is the transfer of technology. And it is significant in this regard that the major thrust of the IPA and of S. 414 is the same, namely, that the contractor has first option to title to any invention made under the contract. Moreover, in both situations the Government and the public is adequately protected through appropriate "march-in" provisions.

I submit that such first-option-in-the-contractor policy promotes the transfer of technology for the following reasons:

1. It reduces the uncertainties as to the status of invention rights and thereby permits:

(a) the prompt filing of appropriate patent applications by the contractor-grantee;

(b) an early effort by experienced technology transfer groups and patent management organizations to locate and engage private enterprise in further development of inventions;

(c) an early decision by the industrial developer that the intellectual property rights in the innovation being offered are sufficient to protect its risk investment.

2. It is a recognition by the agency that the nature of the research being supported through funding under a grant or contract is fundamental or basic and that inventions and the making of them are by-products of and not a specific object of the grant or contract.

* Science Policy Implications of DNA Recombinant Molecule Research. Hearings before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, U.S. House of Representatives, 95th Cong. 1st sess. (No. 24) p. 965.

3. It is a recognition that any invention evolved will require further development to bring it to the marketplace—development which should involve private enterprise since under our free enterprise system private parties and not the Government should engage in such activity.

4. It provides motivation for a contribution by a commercial organization, in cash or in kind, to Government-funded research projects—the certainty of the grantee (contractor) having the first option to any invention arising from such project providing the basis for this now recognized attitudinal change by industry.

5. It provides a climate which encourages the investigator-inventor's continuing participation in the transfer of his inventive technology to the public—a particularly important consideration where university-generated inventions are involved since such inventions tend to be embryonic in nature.

6. It more fairly recognized the equities and contributions of all of the parties to the inventive technology.

7. It provides the opportunity for the university-contractor to generate income as consideration for the technological innovation being offered, which income is earmarked to support further research at the university—the public thus benefits a second time.

8. It permits timely consideration to be given to foreign patent protection and thereby enhances the possibility of generating payments from foreign sources for the transfer of the patented technology under license with an attendant favorable impact upon the balance of trade.

I also submit and firmly believe that the policy set forth by S. 414 is wholly in the public interest. Such belief is based upon:

1. the past records of many universities as successful agents for the transfer of technology;

2. the willingness, as taught by experience, of the private business sector to deal equitably and in good faith with universities in such technology transfer endeavor;

3. the good experience which has been enjoyed by the universities in the integrity of its technology transfer industrial "partner;"

4. the improving attitude of commercial organizations toward research at a university where a less restrictive patent policy controls as evidenced by increasing numbers of instances where companies have made contributions, in cash or in kind to Government-funded research projects where only the prospective rights to inventions, yet unmade is involved—the certainty that the universities will have first option to title to such invention apparently being the prime motivation;

5. the unwillingness, based upon experience, of the private business sector to become a licensee of the Government; and

6. the lack of successful technology transfer as represented by Government-owned patents to the private sector.

Under the accepted definition of an underdeveloped country which is "one that exports raw materials to maintain its balance of payments, while it imports finished goods to maintain its standard of living" we are now an underdeveloped nation. We are exporting our cotton, timber, grain, coal and other raw materials in order to pay for cameras, TV sets, radios, tools, steel, clothing and a host of other finished products.

We cannot afford to further weaken our economic position by weakening our patent system or the ability to extend exclusive rights to intellectual property—rights afforded under our Constitution.

The fact that the number of patents granted to citizens of the United States has fallen off significantly has already been made a part of the record on this legislation. The statistics also indicate fewer "big" inventions—the rate of new drug introductions today is about one-fourth the rate of 15 or 20 years ago—and it takes longer to put them in the market. In the chemical field it averages about seven years from the laboratory to the market; 15 years ago it took an average of two years.

We as a nation are spending less on research, using fewer people, and producing fewer inventions; and fewer of the inventions we do produce reach the marketplace, and it takes them longer to reach it.

In today's technologically intensive atmosphere some protection for the heavy investment required in development is more than ever necessary. The lead time given by exclusive knowledge or patents is shorter than ever before. If that

lead time disappears, through a further weakening of our patent system, or weakening of the ability to extend exclusive rights to intellectual property, it may become economically sound to be second in the field. There is already some evidence of the second-place philosophy in the medically-oriented and other fields today. Further erosion of the exclusive rights to intellectual property afforded under the Constitution could lead to a second-place attitude through much of United States industry. The next step is willingness to be a second-place nation.

We are in dire need of this legislation as a strong beginning to dismantle the roadblocks to innovation—roadblocks built upon a lack of understanding of the innovation process, the necessity for and the functioning of the patent system in such process, political opportunism based upon outspoken but unsupported claims to the guardianship of the public interest or welfare, and the self-protective caution which attends a highly bureaucratic government.

We must realize that the innovative processes that bring revolutionary changes in society involve unpredictability, long gestation periods, huge sums of capital, genius and extraordinary perseverance on the part of *free* individuals and organizations.

We cannot afford to continue to leave decisions on the disposition of invention rights to the discretion of Government agencies; nor can we afford to consider legislation which, as a practical matter, will do so.

S. 414 serves to functionalize a system, as represented by the Institutional Patent Agreement, which has been proven to be workable and, in my opinion, recognizes that innovation has become the preferred currency of foreign affairs.

I thank you for the opportunity to express my views on this extremely important legislation.

PUBLIC PATENTS—PUBLIC BENEFIT SYNONYMS OR ANTONYMS?

(By Howard W. Bremer, Patent Counsel, Wisconsin Alumni Research Foundation)

Since the term "Public Patents" used in the title of this paper can mean different things to different people, it is to be understood that for purposes of this paper it means those patents to which title resides in the United States Government and under which a royalty-free nonexclusive license is generically available.

INTRODUCTION

To enable us to consider the question posed by the title to this paper we must look at the constitutional basis for patents and the development and impact of Government patent policy with regard to the allocation and disposition of property rights resulting from research and development activities sponsored and funded in whole or in part by the Government operating through various of its Agencies.

Of all the controversial subjects which have been addressed by members of Congress and discussed by newspaper editors and columnists over the years, none appears to be less understood than the policy governing the allocation and disposition of rights to inventions arising out of Government-financed research and development.

The basic issue is whether the Government should always take the commercial rights to patentable inventions generated under a Government sponsored contract or from Government-funded research or whether such rights would better be left with the contractor or fund recipient to permit him to utilize the patent system in transferring the technology developed to the public sector for its benefit.

The talent of invention—an expression of intellectual originality—must be given the maximum encouragement by providing the inventor with all necessary stimuli to inventive activity. The patent laws provide the major stimulus to such activity for they are intended to afford the inventor protection for his intellectual property.

Technological advance is essential to this country maintaining its international leadership and there can be little such advance without adequate reward for the inventive mind. Therefore, a viable and sound system of patent laws is essential to the economic well-being of this country. As Abraham Lincoln said "The patent system added the fuel of interest to the fire of genius."

CONSTITUTIONAL BASIS

As we all know, the Constitution was drafted in the context of a struggle with a Government which had abused its obligations to defend the rights of its citizens. It was no accident, therefore, that the salient portion of the Constitution drafted for the purpose of protecting your liberties, the fifth amendment, made the Government the servant and protector and not the maser of your individual rights.

The fifth amendment of the Bill of Rights provides that:

"No person shall—be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation."

Thus, the fifth amendment provides generic protection for all individual property. Since there is little doubt that the term "property" as used in the fifth amendment includes intellectual property, it would seem that the protection afforded the individual by that amendment would be adequate. Yet the framers of the Constitution felt compelled to be even more explicit about intellectual property and provided the following language in Article I, Section 8:

"The Congress shall have Power—To promote the Progress of Science and useful arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

Why this special handling of intellectual property?

There was no recorded debate in the Constitutional Convention on September 5, 1787, when Article I, Section 8, was presented and it was approved unanimously. That the products of the mind should prospectively receive legal protection, even from a centralized Government to be formed, was a principle upon which no one disagreed.

As evidenced by subsequent statement by Madison, the chief architect of the Constitution, his interest in intellectual property did not end with the Constitutional Convention. For example, in the *Federalist* on January 23, 1788:

"The utility of this power will scarcely be questioned. The copyright of authors has been solemnly adjudged, in Great Britain, to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases with the claims of individuals. The States cannot separately make effectual provision for either of the cases, and most of them have anticipated the decision of this point by laws passed at the instance of Congress."

Then later, in a letter to Thomas Jefferson on October 17, 1788, he made a more important insight:

"With regard to monopolies, they are justly classed among the greatest nuisances in Government, but is it clear that as encouragements to literary works and ingenious discoveries they are not too valuable to wholly renounced?¹ Would it not suffice to reserve in all cases a right to the public to abolish the privilege at a price to be specified in the grant of it? Monopolies are sacrifices of the many to the few. Where the power is in the few, it is natural for them to sacrifice the many to their own partialities and corruptions. Where the power, as with us is in the many, not in the few, the danger cannot be very great that the few will be thus favored. *It is much more to be dreaded that the few will be unnecessarily sacrificed to the many.*" (Italics added.)

In the above statement, and particularly in the last sentence, the answer to the need for specific protection of intellectual property, notwithstanding its inclusion in the generic term "property" in the fifth amendment, seems apparent. By use of the word "monopolies" Madison conveys that he was aware that the nature of an individual piece of intellectual property is such that it could be useful to all people and yet could be owned by one person, while diversity of ownership of all other categories of property precluded the possibility of monopoly. The strong possible argument against an indefinite monopolization of valuable intellectual property and its end product under only the fifth amendment and his recognition that "The States cannot—make effectual provision," suggests that Madison was aware that the rights of the creative few would be in danger without clarification in the Constitution. Thus, a compromise was struck:

¹ In this sentence Madison appears to distinguish between past monopolies on commodities granted as personal favors and the suggested monopoly for intellectual property.

under which intellectual property was to be owned for only a limited term during which the creator had the right to exclude others.

The power given under this clause is not general. Hence it expressly appears that Congress is not empowered by the Constitution to pass laws for the benefit of protection of authors and inventors except as a means to "promote the Progress of Science and useful arts."

Under this specific power the present patent statute, Title 35 of the United States Code, was enacted. It is significant that the face of the patent document contains the following statement:

"—these Letters Patent are to grant unto the said claimant(s)—the right to exclude others from making, using, or selling the said invention throughout the United States."

That 35 USC 261 characterizes this right to exclude as a property right.

There is little if anything in the foregoing remarks that would appear subject to question and certainly not among those of you who deal with intellectual property on a day-to-day basis. Even those who have difficulty with the intellectual property clause do not advocate its repeal. Their argument has not been directed against the Government's responsibility for protection of private property and the special reward promised by the intellectual property clause. Rather their thrust has been to erode the concept through efforts to convince that there is an immediate need to limit the reward "in the public interest" or because of some public involvement, e.g. through partial funding by Government, in the difficult and generally imperfectly understood delivery process through which intellectual property must move before reaching the public in usable form. These arguments, used in inappropriate situations are likely what Madison considered "to be dreaded" since then indeed "the few will be unnecessarily sacrificed to the many."

THE ISSUE

The issue presented by the title to this paper has become much more sharply focused because of the apparent loss of technological leadership by the United States² with its attendant negative effect upon the balance of payments and has been emphasized by the recent attack upon the dollar. How did that issue arise?

HISTORICAL

During the early history of our country very little technical development work was done by the Government and therefore, as a practical matter, the question of the Government owning a patent never arose. Gradually Federal agencies began to undertake the practical kind of development work which led to inventions. Since prior to World War II almost all Government-financed research and development work was conducted in Federal laboratories by full-time Government employees, there was a small but recurring problem of what to do with inventions resulting from such work—inventions which, if made by private parties, would have become the subject of patent applications.

This situation changed rapidly during and after World War II when the technological requirements imposed by more and more sophisticated military requirements as well as the increasing complexity of support services made it quickly evident that there were not sufficient resources within the Government to undertake all the scientific projects necessary to a winning war effort. The absolute necessity to utilize the best technical ability available, regardless of its locus, spawned a rapid proliferation of Government-sponsored and funded research and development contracts.

The proper disposition of rights to patents resulting from this work was theoretically as important then as now but was never seriously addressed as a major problem because of the exigencies of wartime needs.

Post World War II the technological strides made under the impetus of a wartime footing and the obvious necessity for continued technological superiority, at least in defense-oriented efforts, made it imperative to continue to provide

² See *Physics Today*, April 1978, p. 96—An Editorial by Betsy Ancker-Johnson, former Assistant Secretary of Commerce for Science and Industry; "The Innovation Recession," *Time*, Oct. 2, 1978; "Something's Happened to Yankee Ingenuity," *The Washington Post*, Sept. 3, 1978; "Vanishing Innovation," *Business Week*, July 3, 1978; "U.S. Losing Ideas Race—Other Nations Chip Away at America's Technology Empire," *The Atlanta Journal, The Atlanta Constitution*, May 21, 1978.

public support for science. Nor was this support limited to the military. For example, in 1950 Congress finally provided an annual budget limit of \$15 million for the National Science Foundation to conduct basic scientific research at universities.

During this same period, hundreds of millions of dollars were appropriated by the Government in the area of medical research in the beginnings on an all-out attack on disease.

With the rapid expansion of scientific projects being undertaken and supported by the Government, the same shortage of technical ability and facilities continued to prevail as it had done under the pressures of World War II. Because the Government could not do all the necessary work in its own facilities, qualified private companies, universities and non-profit organizations were sought out to perform many of the programs via contractual arrangements. And the same old problem of ownership of patent rights existed in every one of the contracts.

Since there was no single or overriding patent policy which the Government had to rely upon, each governmental Agency which supported a research and/or development effort, through either or both of contractual or grant arrangements, developed its own policy. The obvious result was that many policies evolved. At the one extreme, some of the Agencies advocated the "title" policy. At the other extreme was those Agencies advocating the "license" policy. There were also many and varied policies between those two extremes.

Governmental agencies operating under the "title" policy insisted on acquiring title to all contract-generated inventions and patents on them, including inventions which were only incidental to the major purpose of the contract, and then dedicated them to the public through publication, or by offering a license on a non-exclusive, royalty-free basis under any patents obtained to all who requested it. The argument was that all these inventions, including the incidental inventions, should be acquired because they had been "paid for" by the Government and should therefore be owned by the Government.³

Agencies which adopted the "license policy" permitted the contractor to take and keep title to inventions and patents arising under the contract, while reserving a royalty-free license in the Government to practice the invention for Governmental purposes. The theory which these Agencies applied was that inventions and patents are only incidental to the specific research or products contracted for and that equity demands nothing more than a royalty-free right for the Government to use the inventions.

Other theories and contentions made by the advocates of the two policies, each in support of its own position, tended to finally so polarize the two groups that compromise seemed impossible.

MEMORANDUM AND STATEMENT OF GOVERNMENT PATENT POLICY

In 1963, Jerome Wiesner, President Kennedy's Science Adviser, recognized a need for some guidelines to effect a more uniform Government policy toward inventions and patents on a Government-wide basis. The results of Dr. Wiesner's study culminated in the Policy Statement issued on October 10, 1963 by President Kennedy⁴ to establish Government-wide objectives and criteria, subject to existing statutory requirements, for the allocation of rights to inventions as between the Government and its contractors which would best serve the overall public interest while encouraging development and utilization of the inventions.

Since the policy, as promulgated, would most likely have to be revised after experience had been gained in operating under it, a Patent Advisory Panel was established under the Federal Council for Science and Technology to assist the Agencies in implementing the Policy, acquiring data on the Agencies' operations under the Policy, and making recommendations regarding the utilization of Gov-

³ See, *Public Citizen v. Sampson*, 379F Supp. 662 (D.D.C. 1924) aff'd, 515 F.2d 1018 (D.C. Cir. 1975); Press release by Senator Gaylord Nelson (Wis.) of the Senate Monopoly Subcommittee of the Senate Small Business Committee on Dec. 9, 1947 re the Government giving rights to inventions to contractors; Also, hearings held by Senator Nelson on GSA proposed changes in the FPR issued Mar. 18, 1978; Hearings before the Subcommittee on Monopoly and Anticompetitive Activities of the Select Committee on Small Business United States Senate, 95th Congress, 2d session on Government Patent Policies, May 22, 23, June 20, 21 and 26, 1978.

⁴ Presidential Memorandum and Statement of Government Patent Policy (FR, vol. 28, No. 200, Oct. 12, 1963).

ernment-owned patents. In December 1965, the Federal Council established the Committee on Government Patent Policy to assess how the Policy was working.

The studies and experience of the Committee and the Panel culminated in the issuance of a revised Statement of Government Patent Policy by President Nixon on August 23, 1971.⁵ The changes effected in the Nixon Policy Statement were made as a result of analysis of the effects of the policy on the public interest over the seven years from the Kennedy Policy Statement. It was stated that the studies and experience over the seven years indicated that:

(a) A single presumption of ownership of patent rights to Government sponsored inventions either in the Government or its contractors is not a satisfactory basis for Government patent policy, and that a flexible, Government-wide policy best serves the public interest;

(b) The commercial utilization of Government-sponsored inventions, the participation of industry in Government research and development programs, and commercial competition can be influenced by the following factors: the mission of the contracting agency; the purpose and nature of the contract; the commercial applicability and market potential of the invention; the extent to which the invention is developed by the contracting agency; the commercial orientation of the contractor and the extent of his privately financed research in the related technology; and the size, nature and research orientation of the pertinent industry.

(c) In general, the above factors are reflected in the basic principles of the 1963 Presidential Policy Statement.

The considerations basic to the Statement of Government Patent Policy are the following:

(a) The Government expends large sums for the conduct of research and development which results in a considerable number of inventions and discoveries.

(b) The inventions in scientific and technological fields resulting from work performed under Government contracts constitute a valuable national resource.

(c) The use and practice of these inventions and discoveries should stimulate inventors, meet the needs of the Government, recognize the equities of the contractor, and serve the public interest.

(d) The public interest in a dynamic and efficient economy requires that efforts be made to encourage the expeditious development and civilian use of these inventions. Both the need for incentives to draw forth private initiatives to this end, and the need to promote healthy competition in industry must be weighed in the disposition of patent rights under Government contracts. Where exclusive rights are acquired by the contractor, they remain subject to the provisions of the anti-trust laws.

(e) The public interest is also served by sharing of benefits of Government-financed research and development with foreign countries to a degree consistent with our international programs and with the objectives of U.S. foreign policy.

(f) There is growing importance attaching to the acquisition of foreign patent rights in furtherance of the interest of U.S. industry and the Government.

(g) The prudent administration of Government research and development calls for a Government-wide policy on the disposition of inventions made under Government contracts reflecting common principles and objectives, to the extent consistent with the missions of the respective agencies. The policy must recognize the need for flexibility to accommodate special situations.

Although there is evidence that the guidelines did bring the patent practices of the Agencies into greater harmony, divergent policies still exist and there is a strong presumption, if not evidence in terms of the transfer of technology to the public sector, that the more restrictive the policy of the Agency, i.e., the more "title" oriented the Agency is toward inventions and patents generated under its funding, the less the likelihood exists that the technology will be transferred for the public benefit.

Notwithstanding the President's Statement of Patent Policy one must remember that such Policy establishes guidelines only and that today there are as many as 19 variant patent policies among the various Government Agencies, all presumed to exist within those guidelines.

⁵ Presidential Memorandum and Statement of Government Patent Policy (F.R. vol. 66, No. 166, Aug. 28, 1971).

CURRENT AGENCY PRACTICES

A. General

Executive Agencies have traditionally interpreted the provisions of the President's Statement on Government Patent Policy, or applicable statutes, to require the use of patent rights clauses in contracts (and in grants where universities and other non-profit organizations are involved—grants are not available to commercial or profit-making organizations) to provide either title in the Government in inventions generated in the performance of such contracts (or under such grants) or a deferred allocation of patent rights, the allocation of the rights taking place after the invention has been identified.

Even when the title clause is used by the Agency, and even where the disposition of patents rights is statutorily controlled as, for example, with the National Aeronautics and Space Administration and with the Energy Research and Development Administration, the clause many times may permit the contractor or grantee to request and obtain the principal rights in the invention with the Agency's agreement after the invention has been identified.

Thus, there are three clauses which can and are used by the various agencies:

1. The license policy clause;
2. The deferred patent rights clause;
3. The title policy clause with waiver privileges.

Exemplary of patent policies of Government Agencies⁶ which provide the bulk of research and development monies are the following:

Department of Health, Education, and Welfare—deferred determination, but permits Institutional Patent Agreements under which certain grantees and contractors are afforded first option on title to inventions made during the course of a grant or contract.⁷

National Science Foundation—deferred determination, but permits the use of Institutional Patent Agreements with certain contractors and grantees.

National Aeronautics and Space Administration (NASA)—statutorily controlled; has title policy with waiver possibility.

Energy Research and Development Administration (ERDA)—statutorily controlled; has title policy with waiver possibility.

Department of Transportation (DOT)—title policy.

Environmental Protection Agency (EPA)—title policy.

Department of Defense (DOD)—deferred determination (for health-oriented inventions).

Agency for International Development (AID)—title policy with waiver possibility.

Department of Agriculture—title policy (statute interpretation by Department as permitting only the taking of title).

Veterans' Administration (VA)—title policy with waiver possibility (generally a VA employee is involved and waiver therefore difficult).

The expression of patent policy for each of the foregoing Agencies is stated not necessarily in terms of its written policy, but in terms of its practical operation under that policy and the President's Statement.

There is no real consistency among the Agencies, or even within an Agency, or even necessarily from one contract to the next within an Agency, as to what the disposition of patent rights will be. It has become apparent that decisions regarding the disposition of patent rights are often made on an attitudinal or philosophical basis, for the decisions are not a function of law but of men.

Operating under these policies, which in the main has been a royalty-free non-exclusive licensing policy, the Government has accumulated in its patent portfolio about 28,000 patents of which only about 5 percent have been licensed⁸ and

⁶ For listing of current statutes, regulations, orders manuals, memorandums and materials governing allocation of rights to inventions arising from Government-sponsored research and agency-by-agency basis see Report on Government Patent Policy by Federal Council for Science and Technology, U.S. Government Printing Office 1978—281-067-259 available from the Superintendent of Documents.

⁷ For historical interest re Institutional Patent Agreements and early DHEW practice see Report to the Congress on "Problem Areas Affecting Usefulness of Results of Government-Sponsored Research in Medicinal Chemistry" by the Comptroller General of the United States, Aug. 12, 1968.

⁸ See Resumé of U.S. Technology Policies—Dr. Betsy Anker-Johnson—Les Nouvelles (Journal of the Licensing Executives Society) December 1976, vol. XI, No. 4, p. 186; Statement before the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, Dec. 11, 1976. (This latter document also contrasts the experience of universities in licensing patents owned by them some or most of which may have resulted from research supported in whole or part by Federal monies.)

of this 5 percent only a small portion have resulted in commercial products. Thus, the economic benefits intended to be stimulated by the patent system have not been derived by the Government or the public through such licensing of Government owned patents.

An interesting comparison along these lines was made by Harbridge House in its 1968 study⁹ of Government-funded patents put into use in 1957 and 1962. It was found that contractor-held inventions were 10.7 times as likely as Government-held inventions to be utilized in products or processes employed in the private sector for the benefit of the public.

GOVERNMENT-OWNED PATENT—AN ANOMALY

What is the situation that pertains when the Government takes ownership of a patent? It is in a sense an anomaly. The patent system was created as an incentive to invent, develop and exploit new technology—to promote science and useful arts for the public benefit. When the Government holds the patent under the aegis that the inventions of the patent should be freely available to all, much the same as if the disclosure of the invention had been merely published, the patent system cannot operate in the manner in which it was intended. The incentives inherent in the right to exclude conferred upon the private owner of a patent, and which are the inducement to development efforts, are simply not available.

With regard to Government ownership of patents an interesting bit of history is presented by Marcus B. Finnegan¹⁰ in which he calls attention to the famous case of *United States v. Dubilier Condenser Corporation*. The court issued its original opinion on April 10, 1933.¹¹ Then on May 8, 1933, the court, on motion of the Solicitor General, struck from its opinion¹² a paragraph which questioned the authority of the Government to hold ownership to a patent thereby giving, by negative implication, judicial sanction to the Government's practice of taking title to patents. Of importance to the issue presented in the title to this paper is the following language from the stricken paragraph with respect to the question of whether title to the patented invention in dispute should be awarded to the Government:

"In these circumstances no public policy requires us to deprive the inventor of his exclusive rights as respects the general public and to lodge them in a dead hand incapable of turning the patent to account for the benefit of the public."

The experience with licensing of Government-owned patents,¹³ with the Government in the main espousing a nonexclusive licensing policy, has irrefutably been one of non-use. Indeed, when title to patents are vested in the Government under such a licensing policy one can conclude that they are lodged "in a dead hand incapable of turning the patent to account for the benefit of the public."

OPTIMUM PATENT POLICY PRESUMPTION

At the outset it must be presumed that Government research dollars are made available in the expectation of not only developing basic knowledge, but also in the expectation that the funded research will lead to products, processes and techniques which will be useful and acceptable in all or part of our society to improve the well-being of the society in general.

In the face of this presumption it is apparent that inventions, whether made through the expenditure of private or governmental funds, are of little value to society unless and until they are utilized by society. In order to achieve such utilization it is essential that the invention be placed in a form or condition which will be acceptable and beneficial to the public. In other words, the technology must somehow be transferred to the public sector.

In a free enterprise system such transfer is normally accomplished as the result of pertinent and appropriate activities of private enterprise. Since such activities obviously entail the commitment and expenditure of substantial monies—many times the amount to make the invention¹⁴—adequate and appro-

⁹ Harbridge House Inc., *Government Patent Policy Study for the FCST Committee on Government Patent Policy*, May 15, 1968.

¹⁰ "The Folly of Compulsory Licensing" *Les Nouvelles (Journal of the Licensing Executives Society)* vol. XII, No. 2, June 1977.

¹¹ 289 U.S. 178 (1933).

¹² 289 U.S. 706 (1933).

¹³ *Ibid.*: Resumé of U.S. Technology Policies (Note 8).

¹⁴ *Ibid.*: Harbridge House Inc. Report, May 15, 1968 (Note 9).

appropriate incentives to such commitment and expenditures must be afforded. Consequently, and since the patent system provides such incentives and is the most viable vehicle for accomplishing the transfer of technology, full and careful consideration must be given to the making of any policy which will affect the transfer of technology that has been generated in whole or in part by Government-funded research.

OBJECTIVES OF GOVERNMENT PATENT POLICY

There is general agreement that the primary objectives of Government patent policy should be to (1) promote further *private* development and *utilization* of Government-supported inventions, (2) ensure that the Government's interest in practicing inventions resulting from its support is protected, (3) ensure that patent rights in Government-owned inventions are not used for unfair, anti-competitive or suppressive purposes, (4) minimize the cost of administering patent policies through uniform principles, and (5) attract the best qualified contractors.

However, of all of the considerations attendant upon the establishment of a Governmental patent policy only one consideration should be paramount:

In whose hands will the vestiture of primary rights to inventions serve to transfer the inventive technology most quickly to the public for its use and benefit?

Recognition of this paramount consideration was plainly evident from the provisions of the National Science and Technology Policy, Organization and Priorities Action of 1976¹⁵ which directs OSTP to review current legislation and agency practices with the view of recommending and developing.

"Federal patent policies . . . based on uniform principles, which have as their objective the preservation of incentives for technological innovation and the application of procedures which will continue to assure the full use of beneficial technology to serve the public."

ALTERNATIVES

Three major approaches to Government patent policy are available and all three are currently in use by various of the Agencies of the Government as pointed out above. These are:

1. Strict title in the Government¹⁶

Under this approach, as a condition of receiving a Government research grant or contract, the contractor would have to agree to transfer rights in all inventions made under the contract to the Government. The Government, in turn, would either dictate the inventions to the public or license them itself.

2. A case-by-case approach

Under this approach individual agencies would select the patent clause to be used in each grant or contract on a case-by-case basis, and agencies would also in many cases delay the determination of whether contractors would retain rights until after inventions have been identified. Depending on the exact manner in which the policy is framed there may or may not be presumptions in favor of or against the taking of title by the Government.¹⁷

3. Title or first option to title in the contractor

Under this approach as a normal rule contractors or grantees would be allowed to retain title to inventions made under the award subject to a Government license and "march-in" rights.

¹⁵ Title I, Section 101(c)(4) of P.L. 94-282.

¹⁶ Assistant Attorney General John Shenefield, in advocating a title-in-the-Government approach in his appearance of December 20, 1977, before the Select Committee on Small Business, U.S. Senate, stated: "The competitive risk to the public in transferring title to the contractor may be especially high where transfer carries a danger of further entrenching the already strong market positions of many Government contractors."

¹⁷ The Federal Nonnuclear Energy Research and Development Act of 1974 (42 USC 590) is an example of such approach. It places the presumption in favor of the Government's taking title, but given ERDA (now DOE) considerable flexibility to decide otherwise depending on ERDA's evaluation of a variety of factors. In reality, this type of approach, which some claim represents a middle-ground, is not a uniform policy at all since agency practices will vary considerably depending on the predilections of agency officials involved in the process.

The impact which these alternative policies would have on (1) competition, (2) innovation, (3) public health, (4) economic growth and jobs, (5) foreign competition, (6) contractor participation, and (7) and administrative costs entailed by the policy are important to their assessment. Several of what are considered to be the most important of these factors will not be considered.

IMPACT OF PATENT POLICY ON COMPETITION

Since those who favor a title-in-the-Government patent policy appear to advocate their position primarily on the basis of a belief that allowing contractors to retain title will be anticompetitive, and since the Antitrust Division of the Department of Justice also espouses this view,¹⁸ it is believed to be one of the two most important considerations for discussion here.

The supposition that seems to underlie this argument is that most Government contractors are large, dominant firms and that if they are allowed to retain rights to inventions their dominance will be enhanced. Retention of "march-in" rights are apparently not deemed sufficient to prevent this. Following this approach, of course, necessitates also taking rights from smaller firms and universities that deal with the Government. However, it is argued that since these firms do a relatively small proportion of Government contracting, it is not worth worrying about the few inventions they make as compared to the great number coming out of the large firms.¹⁹

As an initial observation, it is to be noted that a substantial portion of Government R&D is conducted by universities and other high-technology commercial firms that are not dominant in any commercial markets. Even when Government prime contracts for major systems development are awarded to major corporations, some of the work is subcontracted with the result that some of the new and innovative ideas stem from lower-tier subcontractors. It is extremely unlikely that dominant firms receive even half of the total Federal extramural R&D budget.²⁰

It is also believed likely that a substantial portion of Government R&D that goes to firms that are dominant in commercial markets would be found to be with major air frame and engine manufacturers that dominate both the Government and civilian markets in this area. It appears however, to be fairly obvious that whether or not the Government takes title to the inventions of these companies the effects on competition in these capital intensive industries will be negligible. Indeed we would note that until the justice Department recently took action to end this, there was a policy of cross-licensing within that industry which made inventions generally available.²¹

¹⁸ Ibid. Remarks by Assistant Attorney General John Shenefield before Select Committee on Small Business. (Note 16)

¹⁹ For example, Admiral Rickover, a leading proponent of the title-in-the-Government approach, in his statement of December 19, 1977, before the Select Committee on Small Business, U.S. Senate in questioning the wisdom of allowing contractors to retain rights stated, "Since large corporations get the major share of Government contracts, they would be the ones to benefit the most from such a practice." Later, he claims, "Small business, for its own advantage, should be against a giveaway patent policy. The vast proportion of Government business goes to large contractors. . . . If the rights to Government financed inventions are given away to contractors, the Government itself will be promoting the concentration of economic power in the hands of a few large conglomerates."

²⁰ The NSF Surveys of Science Resources Series, NSF 77-301, Vol. XXV, "Federal Funds for Research, Development, and other Scientific Activities," estimates that out of a total Federal budget for basic, applied, and developmental extramural research in fiscal year 1977 of \$17.428 billion, 30 percent was performed by universities and other nonindustrial performers. And in the sub areas of basic and applied research the industrial share was only around one-third. These statistics do not, however, provide any breakdown between the types of industrial performers, i.e. what percentage were small businesses. A recent draft study by the Office of Federal Procurement Policy finds that in fiscal year 1975, 7.8 percent of Federal R. & D. awards to industry from major agencies went to small business. However, this study covers only prime contracts and does not indicate the percentage of prime contracts to large firms that were subcontracted to small firms. It would also seem unlikely that all of the nonsmall business industrial firms dominate or control a substantial share of their commercial markets. Hence, at a minimum around 35 percent of Federal extramural R. & D. is performed by small business and nonindustrial institutions. Thus, it would be most unlikely that dominant firms actually receive even half of the total R. & D. extramural budget.

²¹ See the well-known "smog" case (U.S. v. Automobile Manufacturers Association, Civil No. 69-75 JWC (C.D. Cal. 1969)) and the complaint against the 40-year pooling arrangement in the aircraft industry (U.S. v. Manufacturer's Aircraft Association, 5 Trad. Reg. Rep. para. 45,072 (S.N.Y. 1972)). It would appear that required nonexclusive licensing of undeveloped technology results in a "government patent pool" with the same negative effect upon innovation.

Whatever may be the exact distribution of the source of inventions made under Government contracts and grants, in the case of those inventions made by dominant firms, one would find that in the vast majority of cases those firms' positions would not be affected vis-a-vis other U.S. firms by the disposition of rights in their inventions. Patents would probably be found to be of minor consequence in the maintenance of dominance in their industries (although in some cases they may have been an important factor in the early growth of the firms.)

In most cases superior financial resources, economies of scale, access to resources, and well-developed marketing and distribution systems will be found of much more consequence to the maintenance of dominant firms' market position. These are the factors that prevent new firms from entering the market and which prevent smaller firms from effectively competing and increasing their share of the market. Even if the Government took title to inventions of dominant firms, we believe that in most cases the factors listed above would prevent smaller firms from making any effective use of the inventions, the great bulk of which, in any case, are merely minor improvements on existing technology controlled by the inventing firms.

Conversely, small firms do not enjoy the advantages described above. For such firms, patent protection is a much more significant tool. When a smaller firm makes a new invention that has the potential of being developed into a new product which might increase that firm's share of the market, patent protection may be the only defense that that firm has to prevent larger firms from undercutting its market. Without patent protection, larger firms could, because of the advantages noted above, undercut any market developed by the smaller firms.

Thus it appears that a title-in-the-Government policy will have, at most, a marginal effect on the market position of already dominant firms, but that it will almost surely destroy the competition that might result from smaller firms developing inventions coming out of Government work.

There is another major shortcoming with the proposition that taking title from dominant firms will allow other firms to use the inventions so as to increase competition. First, it seems likely that the number of inventions reported to the Government would decrease if contractors saw no advantage to reporting them. Second, it is unclear just how other firms would learn of those inventions that were reported. Typically, invention reports come in as separate items or addendums to progress reports. Nor does there appear to be any systematic publication of reported inventions, per se, by the Government, and even if there were it is doubtful that this would be an effective means of achieving technology transfer of specific inventions. The closest approach currently available is the NTIS publication of Government-owned inventions available for licensing. However, publication, unless it is combined with other techniques, is not really a particularly effective way of alerting and interesting commercial firms in inventions (even if one assumes such firms would be willing to invest without exclusive rights). Then too, such publication serves to make foreign firms and countries aware of the technology and because of the relationship and cooperation between certain governments in foreign countries and firms within that country, competition from such foreign source based on the technology published could further adversely affect the balance of trade.

Notwithstanding the use of catch-words such as "patent give-away", "windfall" and, the most appealing to the uninformed, "what the Government pays for it should own," by the proponents of title-in-the-Government, there is no hard evidence to show that the "title" policy results in the transfer of any appreciable amount of technology for the public benefit. Quite to the contrary, there is strong evidence of the poor utilization of the technology of Government-owned patents.²²

The title-in-the-Government policy rejects out-of-hand the need for the patent incentive in the contractor in all situations and also rejects continuing participation by the investigator-inventor—an imperative consideration with university-generated inventions which tend to be embryonic in nature and which almost always require additional extensive development.

The economic health of the nation, long-term economic growth, and the maintenance of competition is much more dependent on stimulating the introduction of new products and technologies than it is on ensuring maximum competition in the manufacture and sale of a given product.

²² Ibid. Resumé of U.S. Technology Policies (Note 8).

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On balance, it must be concluded that a title-in-the-Government patent policy would prove *anti-competitive* as compared to the title or first option in the contractor policy.

THE IMPACT OF PATENT POLICY ON INNOVATION

At the outset it is to be understood that innovation means the conversion of inventions made with Government support to commercial products and processes. The following remarks are to be considered in isolation from the competition objective discussed before and are intended to address *only* whether the chances of invention being developed by *anyone* will be enhanced or diminished by one policy or the other.

It should also be clearly understood that many inventions that are reported under Government grants and contracts are by-products of the research being supported. This is certainly true of almost all university inventions. Similarly, very rarely does the Government support research and development to the point where a given product intended for the commercial market has been proven both technically and economically feasible so that private firms would view investment in the manufacture and marketing of the product as virtually risk-free. And even where a Government contract does have this objective, many of the inventions reported under that contract may still be by-products of the research or may have potential uses in areas not being tested by the Government. In those few cases where the Government is supporting full development, the supporting agency should have the discretion to use a deferred determination or other more restrictive patent clause.

Given the fact that the vast majority of Government-supported inventions have not been developed beyond the laboratory stage and will not be through Government support, it should be obvious that substantial private investment will be needed to bring the invention to the market.²³ This is particularly true with regard to inventions made at universities under Government funding and it is relatively rare for a firm to be willing to invest in the development of a university invention without being afforded some exclusivity.²⁴

Similarly, in the case of inventions made directly by smaller firms under Government contracts or subcontracts, it is difficult to believe that such firms would normally be willing to invest in the further development of the invention without some exclusive rights.

In the case of larger firms the impact of the Government's obtaining patent rights to their inventions is less clear. It is certainly indisputable that many firms, especially in certain industries, would not invest without exclusive rights, and neither would any other firms with the possible exception of certain foreign firms that enjoy state-supported monopolies (having nothing to do with patents) in their home markets. On the other hand, there would undoubtedly be some cases when larger firms would work their inventions even without exclusive rights. Minor improvements might be integrated into on-going product lines, or new products might be developed by larger firms where the market potential was clear.

The conclusion that leaving title in contractors is much more likely to result in commercialization than is the Government's taking title is supported by the data developed by Harbridge House, Inc. in its 1968 study.²⁵ For example, Harbridge House examined all Government-supported inventions patented in 1957 and 1962. Of all the inventions utilized in this group, they found that the contractor held title to 203 and the Government to 7. In the total sample the Government held title to around 27% of the inventions. The Harbridge House analysis indicates that all other things equal a firm with title is about twice as likely as a firm without title to commercialize an invention. It can also be documented that in the overwhelming number of instances in which universities have obtained licenses for their inventions an agreement could only be consummated on an exclusive basis.

It thus seems clear that the result of the Government keeping title will be to deter investment (innovation) in some cases, and to have a neutral effect in others. The only question that remains is whether this might be counterbalanced by some larger firms using their patent rights to suppress or defer the development

²³ U.S. Panel on Inventions and Innovations, "Technological Innovation: Environment and Management, pp. 8-9 (Government Printing Office, January 1967).

²⁴ See Report of the University Patent Policy ad hoc Subcommittee, Appendix H, Report on Government Patent Policy referred to above.

²⁵ *Ibid.* (Note 9).

of inventions that others might have been willing to develop had the Government held title. Experience indicates that such fears are largely unfounded and that, in any case, even if the Government held title, the likelihood of other firms developing most inventions would be small without some exclusive rights. It would seem that the Government would have to do more than merely take title. It would, in turn, in most cases have to grant someone else an exclusive license. But it could be asked what advantage there is to going through the cost and effort of such an exclusive licensing effort as opposed to allowing the inventing contractor, who is intimately familiar with the invention to retain rights with appropriate march-in provisions if no work is done on the invention to commercialize it?

For a variety of practical reasons, it would be a mistake to believe that a title-in-the-Government licensing approach could be as effective in promoting utilization as leaving title-in-contractors. First, as mentioned previously, a title-in-the-Government approach might eliminate the incentive for many grantees and contractors to report inventions. In the case of the university community it is the principal investigator who normally starts the process moving by identifying inventions. Since publication, and not patents, are critical to the careers of university investigators many are not motivated to report inventions.²⁶ However, this can be overcome by aggressive programs at the university to induce reporting, especially by an active licensing program that offers some possibility of financial reward for the inventor. Such incentives to the inventor are completely lost when the Government automatically takes title. Within the business sector, a similar decrease in reporting might result, although probably for different reasons.

Secondly, the Government would be faced with an enormous increase in workload. For example, under a title-in-the-Government approach DOD would be faced with some 1500-2500 inventions a year on which a decision would have to be made concerning the filing of patents. If DOD continued to base that decision solely on potential military applications, it ought to be obvious that patent applications will not be filed on a number of inventions that have commercial potential but not military potential. Therefore, if one is to honestly argue that a title-in-the-Government approach will not have negative impacts on innovation, one must be prepared to say that DOD and other agencies must screen invention disclosures for commercial application, a task which is now done by DOD contractors who have the opportunity to elect rights (i.e. a first option on rights to inventions). However, that would require a substantial increase in DOD staff and resources devoted to such task.

To duplicate the efforts now undertaken by many contractors and a number of universities, the Government agencies would have to be prepared to discuss the inventions with various industrial experts, to run patent searches, and to undertake a substantial amount of sophisticated market and technology analysis that is beyond their normal missions and capabilities.

Thirdly, Government licensing efforts will be hampered by the fact that the Government will not have available to it the expertise and know-how of the inventor and the technical team that conceived the invention. Successful patent licensing often requires transfer of more than a bare right in a patent. Agreements to provide technical assistance may be required which the Government could not offer. Moreover, in the case of many inventions coming from the larger firms, the invention may simply be an improvement on existing technology controlled by the inventing firm. Because of the existence of dominant background patents, the invention will be of no use to anyone but the inventing corporation.

Fourth, it is not always obvious at the time an invention is made that it will ultimately have commercial importance. In many cases, it is the perseverance of the inventor or other technical personnel with the firm who foresee an invention's possibilities that persuades a company to go ahead with development.

For example, Battelle Columbus Laboratories did a study to identify the factors which influenced the movement of ten current technologies from their original conception state into actual use. They concluded:

"The technical entrepreneur, whose importance was highlighted in the study of the 'factors', is also a 'characteristic' important in nine of the ten innovations. This is the strongest conclusion that emerges from the

²⁶ In this regard it should be kept in mind that about two-thirds of the basic and applied extramural research supported by the Government is performed by universities and other nonprofit institutions.

study. In fact, in three innovations, the technical entrepreneur persisted in the face of the inhibiting effect of an unfavorable market analysis. If any suggestion were to be made as to what should be done to promote innovation, it would be to find—if one can, technical entrepreneurs."²⁷

We believe "technical entrepreneurship" will largely be lost under a title-in-the-Government approach. Accordingly, it is unreasonable to believe that Government licensing would be as effective in promoting the development of contractor inventions as leaving title-in-the-contractor.

IMPACT OF PATENT POLICY ON PUBLIC HEALTH

The following discussion provides a clear case study of the impact of patent policy since one can compare the results of the Department of Health, Education, and Welfare's (DHEW) pre-1968 title-in-the-Government oriented policy with its experience since that time when a more title-in-the-contractor oriented approach was adopted.

A significant portion of Government R&D is devoted to medical research.²⁸ DHEW, NSF, the Department of Agriculture and, to a lesser extent, other agencies such as DOD and the Veterans Administration support extramural research in the medical life sciences. Out of such research new compounds are often synthesized which may have pharmaceutical potential. Experience at NIH and studies by the General Accounting Office²⁹ and Harbridge House³⁰ clearly support the conclusion that a title-in-the-Government patent policy that did not make an exception for medical research would endanger the public health. However, proponents of a title-in-the-Government approach have never suggested that medical research be excepted from the policy. Indeed, even the President's Statement on Government Patent Policy unfortunately specifically singles out health as an area in which the Government should take title.

The GAO and Harbridge House reports noted above, which were based on extensive interviews with National Institutes of Health grantees and staff, concluded that the pharmaceutical industry would not utilize its risk capital to pursue further development of potential pharmaceutical agents generated with DHEW support without a guarantee of some patent exclusivity. (With the passage of the Medical Devices Act of 1976, which requires premarket clearance of many medical devices, it is becoming increasingly apparent that the same need for patent protection applies to the medical device area.) In some situations, the GAO discovered investigators with hundreds of compounds with potential therapeutic value on their shelves with no source to test their market potential. The GAO criticized DHEW for its failure to use its discretion to enter into Institutional Patent Agreements (which it had not done since 1954) or to make timely determinations of rights after identification of inventions.

Since 1969, when DHEW began using its discretion as suggested by the GAO, until the fall of 1974, DHEW estimates that the intellectual property rights to 329 inventions made in performance of DHEW-funded research were being managed by institutions with Institutional Patent Agreements (IPA) or by successful nonprofit petitioners for the purpose of soliciting further industrial support. During this period, these organizations have negotiated 44 non-exclusive and 78 exclusive licenses under patent applications filed on the 329 inventions. Since 1974, to the end of fiscal year 1976, the number of inventions held by such organizations has increased to 517. DHEW estimates that the risk capital generated under the licenses on these 517 inventions has been approximately \$150,000,000.³¹

An example of the stake which an innovating company has in the development of a new drug may be seen from the following. Prior to the 1962 amend-

²⁷ Battelle Columbus Laboratories, Science, Technology and Innovation, Summary Report—February 1973, p. 8.

²⁸ Over one-third of the Federal R. & D. budget for basic research in fiscal year 1977 went for the life sciences which include medical and related research.

²⁹ GAO Report B-164021, *Ibid.* (Note 7).

³⁰ Harbridge House Report, *Ibid.* (Note 9).

³¹ Science Policy Implications of DNA Recombinant Molecule Research, Hearings before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, U.S. House of Representatives, 95th Cong., 1st sess. (No. 24), p. 965. It should also be noted that over 60 percent of the inventions retained by IPA holders or petitioners have not yet been licensed and many will never be licensed or brought to ultimate use. Accordingly, the mere retention of patent rights is clearly no guarantee that commercialization will occur.

ments to the Food and Drug Laws the average cost of developing a new drug was estimated to be \$534,000.²² The development cost of a new drug in 1973 was estimated to be \$11,500,000, a figure which escalates to \$24,400,000 when the cost of research on projects which do not result in marketed drugs is included. With these figures in mind it is little wonder that the return on R&D investment in the drug industry has dropped sharply since 1960 (it is currently calculated to be 3.3 percent).²³

The May 26, 1977 testimony of the Patent Counsel of DHEW, given before the Subcommittee on Science, Research and Technology of the House Committee on Science and Technology includes examples of inventions which have been licensed by universities and nonprofit organizations that have reached or are near reaching the market place. As noted in that testimony most of the examples are pharmaceutical products and medical devices. No comparable examples were known at the time the GAO and Harbridge House ran their studies.

This experience strongly supports the general proposition that the less restrictive the patent policy the greater is the transfer of technology:

Why does such a first-option-in-the-contractor policy promote the transfer of technology:

1. It reduces the uncertainties as to the status of invention rights and thereby permits:

(a) the prompt filing of appropriate patent applications by the contractor-grantee;

(b) an early effort by experienced technology transfer groups and patent management organizations to locate and engage private enterprise in further development of inventions;

(c) an early decision by the industrial developer that the intellectual property rights in the innovation being offered are sufficient to protect its risk investment.

2. It is a recognition by the agency that the nature of the research being supported through funding under a grant or contract is fundamental or basic and that inventions and the making of them are by-products of and not a specific object of the grant or contract.

3. It is a recognition that any invention evolved will require further development to bring it to the marketplace—development which should involve private enterprise since under our free enterprise system private parties and not the Government should engage in such activity.

4. It provides motivation for a contribution by a commercial organization, in cash or in kind, to Government-funded research projects—the certainty of the grantee (contractor) having the first option to any invention arising from such project providing the basis for this now recognized attitudinal change by industry.

5. It provides a climate which encourages the investigator-inventor's continuing participation in the transfer of his inventive technology to the public—a particularly important consideration where university-generated inventions are involved since such inventions tend to be embryonic in nature.

6. It more fairly recognizes the equities and contributions of all of the parties to the inventive technology.

7. It provides the opportunity for the university-contractor to generate income as consideration for the technological innovation being offered, which income is earmarked to support further research at the university—the public thus benefits a second time.

8. It permits timely consideration to be given to foreign patent protection and thereby enhances the possibility of generating payments from foreign sources for the transfer of the patented technology under license with an attendant favorable impact upon the balance of trade.

IMPACT OF PATENT POLICY ON ECONOMIC GROWTH AND JOBS

It should be obvious that without the introduction of new products into the economy, economic growth and job expansion would come to an eventual halt. While people can disagree whether particular technological innovations are good or bad, we doubt that anyone would seriously argue that a slow-down in tech-

²² Scherer, "The Economic Effect of Mandatory Patent Licensing," p. 59, U.S. Energy Research and Development Administration, Public Meeting 11277.

²³ Schwartzmann, "Innovation in the Pharmaceutical Industry," p. 70.

nological innovation would not result in slower economic growth. Yet, the fraction of R&D performed in this country that is Government supported has now reached around two-thirds. Hence, it is inescapable that a Government patent policy that discouraged investment in the development of the inventions made during that research would have a negative effect on economic growth.

Although the relationship between innovation and long-term economic growth and job expansion are intuitively and historically obvious, several studies serve to highlight this.

A 1967 Department of Commerce study²⁴ and a more recent update of that study by John Flender and Richard Morse of the MIT Development Foundation, Inc.²⁵ lend strong support to the proposition that sales growth and job creation occurs more rapidly in innovative companies than in mature (dominant) companies. And even more significant for purposes of this analysis is the fact that job expansion at young (i.e. small) high technology companies was even more spectacular. For example, the authors found that during a five year period six mature companies with combined annual sales of \$36 billion in 1974 experienced a net gain of only 25,000 jobs during the five years, whereas five young, high technology companies with combined sales of only \$877 million had a net increase in employment of 35,000 jobs (five "innovative" companies with \$21 billion sales total had a net increase in employment of 100,000 jobs). These findings indicate that a patent policy that would deemphasize the needs of smaller firms and emphasize concerns with larger and more dominant firms could have a negative impact on job expansion.

The potential harm that could accrue from discounting the need to be concerned with inventions from nondominant firms is further emphasized by a study done by Gelman Research Associates. An international panel of experts selected the 500 major innovations that were introduced into the market during 1953-73 in the U.S., U.K., Japan, W. Germany, France, or Canada. Of the 319 innovations produced by U.S. industries, 24 percent were produced by companies with less than 100 employees. Another 24 percent were introduced by companies with 100 to 999 employees.

Inasmuch as it seems apparent from the foregoing discussion that a firm's option to title to inventions in the contractor is much more likely to bring about innovation, it is indisputable that it is also much more likely to encourage economic growth and job expansion.

IMPACT OF PATENT POLICY ON FOREIGN COMPETITION

American industry is in increasing competition with foreign corporations in high-technology areas and a title-in-the-Government patent policy must inevitably work to the advantage of foreign firms at the expense of American industry and labor.

The taking of title by the Government will effectively prevent the American inventing corporation from obtaining foreign patent protection. Without Government foreign filings no American firms could gain any exclusive rights in foreign markets. Moreover, historically, the Government agencies have had neither the incentive, the staff, the budget, nor sufficient knowledge of market conditions to file for foreign patents in anything more than a small number of cases.²⁶

If the Government takes title to U.S. rights in inventions and dedicates them, these inventions are equally available to foreign based firms that would export commercial embodiments of these inventions into the U.S.

If one combines these facts with the difference in the relationship between business and Government in certain foreign countries as compared to relations in the U.S., certain disturbing implications arise. In some foreign countries industry is highly socialistic and state controlled. In others, major companies may enjoy state subsidies and support. The result of all this is that the same invention that U.S. firms may not develop without the exclusivity afforded by

²⁴ Technological Innovation: Its Environment and Management. U.S. Panel on Invention and Innovation. (Washington, D.C., U.S. Government Printing Office, 1967).

²⁵ John O. Flender and Richard S. Morse. The Role of New Technical Enterprises in the U.S. Economy. M.I.T. Development Foundation, Inc., Oct. 1, 1975.

²⁶ Statistics by the Committee on Government Patent Policy show that during the period of FY 1970-75 the Government filed for foreign patents on an average of 77 contractor inventions, and the preponderance of these were by only two agencies, DOE and NASA. This is approximately one-tenth the number of contractor inventions upon which the Government filed U.S. patent applications.

patent rights may be developed by Japanese, German, or other foreign firms that enjoy monopoly advantages in their home markets through means quite apart from patents. In turn these products are exported into the United States and displace American products and American jobs.

In short, given the difference in industry-Government relations in many of the technologically advanced foreign countries as compared to the United States, a title-in-the-Government policy is most likely to favor foreign companies. The mere speculative concern that there might be a few isolated cases where leaving title in a contractor might result in activities by that contractor which are in violation of the antitrust laws should not control the whole of Government patent policy when other remedies are available through those laws. The U.S. economy does not operate in a vacuum and to formulate a policy of title-in-the-Government primarily upon hypothetical and mistaken concerns about the impact that policy will have on competition within the United States ignores the many adverse effects such policy would have.

THE CASE-BY-CASE APPROACH

Where the disposition of patent rights in inventions made in whole or in part with Federal funds is deferred until there has been an identification of the invention the certainties associated with title-in-the-contractor are lost. As pointed out before such certainty is a strong incentive to the transfer of technology.

Thus, any attempt to transfer the inventive technology would have to await the decision by the Government that title will be left with the contractor. As a consequence, valuable time will be lost in transferring the technology because it is seldom that a bureaucratic decision is made expeditiously. Moreover, the administrative and associated paperwork burden in the deferred determination approach militate heavily against the viability of this approach as a realistic alternative to the title-in-the-contractor approach. For example, a preponderance of DOD contracts now include clauses allowing the contractor to retain patent rights. As was mentioned before, it is unlikely that DOD could expeditiously process each contractor request for patent rights under a deferred determination procedure with present staffing.

Deferred determination advocates would claim that the Government can make a better judgment after the invention is identified, and that exclusivity will not always be needed. Implicit in this claim is the assumption that Government personnel will either be in a position: (i) to determine if the existence of exclusive patent rights is needed as an incentive to further development; or (ii), to find a better qualified firm to commercialize the invention through a Government licensing effort after taking title to the invention.

In regard to the question of whether exclusivity is needed for private investment to be made in an identified invention, it should be recognized that if the Government determines that exclusivity is not needed but is wrong, no further development may take place.

Moreover, for the Government to be right more often than not when making a deferred determination would require extensive technical, marketing, and economic studies of the firms, technology, industries and market involved. The cost to taxpayers of such programs could be more than any savings they would produce for consumers. This appears to be true, since in most deferred determination cases exclusivity has been deemed necessary, and the costly determination process has been engaged in simply to confirm this fact. This has been substantiated in practice by NASA, DHEW and NSF (the three agencies who have historically made the largest number of deferred determinations) by the grant of over 90 percent of the requests for "greater rights" over a period spanning ten years.

Similarly, the ability of Government personnel to decide after an invention is identified that utilization will best be promoted by the Government's taking title and offering the invention for licensing, assumes that commercial developers, other than the inventing contractor, can be found (presumably but not necessarily on a nonexclusive basis). There is really no effective means for Government personnel to ensure that other firms, whether licensed exclusively or nonexclusively, would do a better job of developing the invention than a willing contractor or a licensee of the contractor. As noted previously, other firms often lack some of the "know-how" of the contractor and will not have the inventor or co-inventors working for them.

One can be sure that in most cases the inventing organization will have little interest or incentive to transfer its know-how to another firm, possibly a com-

petitor. Moreover, the very process of attempting to find alternative developers will simply serve to delay private investment and cool the interest of the inventing contractor. It will also force the Government into the expense of filing patent applications in order to assure that a patent is available if exclusive licensing is ultimately deemed necessary.

It is important also to emphasize that a deferred determination that is truly geared to resolve the questions that trouble opponents of the title-in-the-contractor approach would be so costly, complex, and time consuming as to discourage many contractors from requesting rights in the first instance, especially small businesses and universities. They may even neglect to report the invention under such circumstances. In all likelihood, without a request for rights to trigger the deferred determination process, most agencies will have no incentive to do anything with the disclosure, and the invention will fall into the public domain to be available to all and, in most cases, practiced by one one, as seems to be the case with a very substantial portion of the 28,000 patents now in the Government's patent portfolio. Indeed, under a deferred determination approach the agencies would probably be devoting so many resources to those cases where rights were requested that they would have insufficient personnel or interest to study inventions and encourage development and marketing where rights were not requested.

SUMMARY AND COMMENTARY

It is believed apparent from careful examination of the impact of alternative patent policies on the various objectives of Government patent policy that the title or first option to title in the contractor approach is superior to any other approach on every count. Thus, public patents-public benefits are antonymous.

In reaching this conclusion it should be kept firmly in mind that we are not dealing in abstractions.

The number of patents granted to citizens of the United States has fallen off. In 1961 only 17 percent of the patents issued in the country were issued to non-Americans; currently the ratio is up to about 35 percent. The statistics also indicate fewer "big" inventions—the rate of new drug introductions today is about one-fourth the rate of 15 or 20 years ago—and it takes longer to put them in the market. In the chemical field it averages about seven years from the laboratory to the market; 15 years ago it took an average of two years.

We as a nation are spending less on research, using fewer people, and producing few inventions; and fewer of the inventions we do produce reach the marketplace, and it takes them longer to reach it.

Under the accepted definition of an underdeveloped country which is "one that exports raw materials to maintain its balance of payments, while it imports finished goods to maintain its standard of living" we are now an underdeveloped nation. We are exporting our cotton, timber, grain, coal and other raw materials in order to pay for cameras, TV sets, radios, tools, steel, clothing and a host of other finished products.

Today science is being made subservient to politics with decisions being made not on scientific facts but on political opportunity. And efforts go forward to discredit and weaken our patent system which, over the history of our country, has provided the incentive for innovation. It is indeed a noble motive to give to the people the benefits of publicly supported research and we can agree that tax dollars should not be used as a means of enriching private parties. We must, however, be vigilant, for the views on the issues involved tend themselves to emotional molding. Outspoken claims to the guardianship of the public interest or public welfare is a rich field for cultivating political power. A deadening result of political emphasis on such guardianship is the proliferation and growth of the bureaucratic maze where accountability becomes the fear. Under such conditions the atmosphere generated tends to be one of self-protective caution with the danger that operation of the system will become a disproportionate part of the objective.

Effort is fundamental to the transfer of technology to the marketplace and wherever effort is needed incentive is required. In this country the patent system has provided that incentive through its exclusion privileges and can be considered to figure prominently in the economic equation

$$E(x) = Px f(x)$$

where $E(x)$ is the expected return, Px is the probability of success and $f(x)$ is the total value of return.

The probability of success is most certainly enhanced by the existence of an intellectual property right—a patent. In today's technologically intensive atmosphere some protection for the heavy investment required in development is more than ever necessary. The lead time given by exclusive knowledge of patents is shorter than ever before. If that lead time disappears, through further weakening of the patent system, or weakening of the ability to extend exclusive rights to intellectual property, it may become economically sound to be second in the field. There is some evidence of that second-place philosophy in the medically-oriented and other fields today. Further erosion of the exclusive rights to intellectual property afforded under the Constitution could lead to a second-position attitude in U.S. industry. The next step is willingness to be a second-place nation.

Senator BAYH. Mr. Reimers, if you would proceed, please.

Mr. REIMERS. Thank you. I would like to first apologize for not having copies of my remarks which should only be about 9 or 10 minutes long. I have revised my remarks on my way here, and we will type them up and will make them available to you.

I would like to touch on some specifics to help a better understanding of this issue. At Stanford University, our office is staffed by myself, an associate, and an administrator that functions also as the secretary and bookkeeper. We also employ part-time student help, and a full-time graduate student is with us in the summertime.

Of 50 to 80 inventions disclosed per year through our office we end up with about 25 percent after a period of evaluation. Of these that are accepted we license approximately half to industry. Of those that are licensed, less than 25 percent will finally be successful in reaching the marketplace. That is, about 1 in 50 inventions that we receive ends up in a viable process or product.

The patent is rarely the most significant factor in a license agreement. It functions as a linchpin in university licensing and its absence forecloses a product development agreement when withheld by the Government. A license agreement to us represents collaboration with a company in the process of innovation. It is also important to recall that people create and make new products and processes, not patents.

If significant proprietary protection results in the form of defensible patents, that to us is icing on the cake. There are notable exceptions, such as a basic patent for a new chemical formulation which is unique and its function is of great commercial value. But, in most cases, a patent simply represents one of many ways of accomplishing an end. Every incentive is needed to encourage a company to accept for development a raw university concept to one technical alternative.

Let me go through a sample license situation. I was going to say typical license situation, but each license is unique. There is no typical license.

We receive an invention disclosure covering a method the principle of which was demonstrated in the laboratory and which invention will require further research and product and market development.

A paper describing the invention has been submitted to a journal, and is scheduled to be published within 4 to 6 months.

It is one of the 25 percent which receives positive evaluation and we decide to file just before the publication bar.

A potential licensee is targeted which has market access. Two or three missed targets later, an exclusive license to encourage capital invest-

ment is negotiated with a \$15-million-per-year company for approximately a 5-year period, after which 5-year period the technology would be licensed nonexclusively to allcomers.

An initial consideration of \$10,000 and an earned royalty of 5 percent is negotiated.

The graduate student and professor co-investors sign consulting agreements with the licensee. After the graduate student becomes a full-time employee of the licensee.

After 3 years there is, (a) a technical market decision by the licensee to drop development and terminate; or, (b) the development period is extended; or, (c) sales begin and royalties flow at \$20,000 per year.

By these remarks I simply wish to make the following points.

First. The patent covered by the legislation of S. 414, is only one part of the "deal," which deal may enable a new product or process to become available to the public. Usually not important, the patent, however, is necessary.

Second. Licensing undeveloped inventions of Government research is not easy and few reach the market.

Third. Most inventions really amount to small potatoes. We would very much like to have one of those patents mentioned by opponents of the bill which would enable huge profits. Indeed, it is the hope we may find the "big hit" invention which would give us incentive to keep mining invention disclosures received.

When we get that big hit, we would try to license as many companies as we can, possibly after a short period of exclusivity for the first licensee, and all net income will go right back into education and research with the promise of producing yet other discoveries for public use and benefit in a self-regenerative manner.

Let me turn to a specific situation. This was mentioned in garbled form in a May Newsweek article on U.S. innovation. It illustrates a current problem, underscoring the need for section 206 of S. 414, on confidentiality.

In this example, under an NSF grant, computer axial technology (CAT) was developed for which we filed three patent applications under authority of the NSF institutional patent agreement.

The technology was licensed to a local company hoping to enter the CAT market. I received a call from NSF though informing me that an attorney on behalf of a New York law firm had come in wishing to go through grant files on this work. I inquired of the NSF who the law firm represented and why they wanted this information. I was advised that it was not necessary for a freedom of information act requester to provide that information to the NSF.

In conducting our own investigation it appeared that the law firm represented the foreign and market-dominating firm in that market because they were counsel for that firm in its patent suit against the only U.S. company at that time competing in the CAT market.

We urged the NSF to withhold the documents under the exemption sections 3 and 4 of the Freedom of Information Act but the NSF refused. We are in a patent interference suit with the foreign company on the most important patent application of the three. The advantage of the foreign company having access to our records and where we don't have access to their records, is obvious.

Another situation of interest to those concerned with the matter of U.S. innovation is only partially remedied by S. 414.

The National Technical Information Service, which is charged with distribution of technology resulting from federally funded research, has found that foreign companies make greater purchases of U.S. technology in NTIS than U.S. companies. In fact, the Japanese market had been the largest a few years ago when it sharply dropped. It was learned there was substantial indirect sales of NTIS material to Japan presumably for production of materials of sales in single copies.

To remedy this problem, NTIS has arranged for a direct distribution outlet in Japan for more efficient distribution of U.S. technology. Is this in the national interest?

In the United States we find a system of "personal incentives" whereas in Japan, and certain non-free-enterprise countries, there appears to be more of a "group incentive" system. The personal incentive system more often results in a not-invented-here syndrome with respect to technology of others.

On the other hand, the group incentive system at least in Japan to my experience, is more receptive to technology of others. Thus, I suggest the strong possibility that greater use of U.S. technology is made by other than U.S. industry.

Without the ownership of patent rights afforded contractors through S. 414 in their research results, the incentive—in fact the reason—to even bother to seek out an infringer, much less enforce a patent versus a foreign competitor organization—is absent. This proposed legislation will provide the certainty of title which will provide the rationale for universities to invest in timely patent filing and aggressive marketing of the invention to industry and, by industry, the rationale to invest its risk capital in further research and development directed to innovation of new processes and products.

In the cycle of innovation, substantial taxes are generated in salaries, profits, sales taxes, et cetera. It is from these taxes which funds can be injected properly into the basic research to point the cycle of innovation. Section 204, return of Government investment, however, is a mechanism for another form of revenue to the Government and taxes and appears to me inappropriate and dangerous as a precedent.

This is only a minor quibble with the bill which, if enacted, I believe will be of great public benefit.

Thank you.

Senator BAYH. Thank you very much Mr. Reimers.

In the way universities function, of course, the income you would receive under this bill would be plowed back into what is really a public function anyway, more research. Is there a distinction between the rights that you would get under this bill, when you would own the patent, and under the plan suggested by Admiral Rickover which would allow universities to receive a 5-year license from a Government agency which would retain patent ownership? The admiral indicated in his testimony that such a plan would not only offer more protection to the public, but would also be easier to administer. How would you compare the efficiency of allowing contractors to retain title to inventions versus Admiral Rickover's plan for giving universities a 5-year license with the agency retaining title to the invention?

Could such a plan hamper your ability to deliver new products and technologies to the marketplace where they can benefit the public?

Mr. REIMERS. The bill will extend our incentive to license technology from other agencies, such as the Department of Energy. At this point, the Energy Department retains title unless a contractor successfully petitions for release. We have only received a release to one invention from DOE to bring to the public, that I can recall. In fact, the AEC now DOE policies of "tight" control of technology, I think has greatly restricted innovation in energy technology. Admiral Rickover's proposals to tightly control technology, including the 5-year limit, will also sharply limit innovation. It is unworkable in practice. DOE's control policy has also limited participation in nuclear energy to a very few companies, companies that have market position don't need patents.

Senator BAYH. Would such a distinction make a difference as far as the University of Wisconsin is concerned?

Mr. BREMER. Yes, the 5-year period that Admiral Rickover suggests is quite obviously to anyone with experience in the pharmaceutical industry, not nearly enough. Again, referring to a recent experience we have had where the invention was brought to us in 1968, only in 1978—late in 1978—did a company finally get through the Food and Drug Administration and get the product into the market. So the 5 years is completely unrealistic.

In addition, if the universities or nonprofit organizations accepted an exclusive license as opposed to title, they might be considered to be functioning as a patent brokerage house and would stand in danger of having their tax-exempt status questioned. That would certainly be a consideration for an outside patent management corporation such as a research corporation or, in my case, the Wisconsin Alumni Research Foundation.

Senator BAYH. Dr. Andrews, do you have a comment?

Dr. ANDREWS. As you know, Purdue University has a specific long, well defined patent policy. That policy is administered by the Purdue Research Foundation. I presume that is for the same reasons that the Wisconsin Research Foundation exists.

Mr. BREMER. Yes.

Dr. ANDREWS. So we operate in a similar way.

Senator BAYH. Gentlemen, I had questions that I was going to ask you but, frankly, you have answered most of them. I appreciate your taking time from your very busy schedules to be here with us.

I hope we can continue our communication as we proceed through the legislative process to see if there are other ways that we can effect improvements in this bill.

We appreciate your making the university experience in this field available to us. We are all in our own way a product of our individual experiences and there is no disputing Admiral Rickover's experience in this field of development of nuclear energy, but his experience with large corporations and contracts that are funded all the way through development seems to be quite a bit different from your experiences with inventions made under basic research where these products frequently cost 10 times as much to develop and market as they did to discover, and where the Government is not going to make this investment. It is these types of inventions that you are concerned about.

These types of experiences are so different that this could explain the differences between your and Admiral Rickover's ideas on this subject. Is this a fair assessment?

Mr. BREMER. Yes, I think that is right. I think one of the things to keep in mind is that the research conducted at the universities tends to be very basic, very fundamental in nature and as a matter of fact, therefore, the fundamental inventions that Admiral Rickover referred to are most likely to arise out of university research. Those are the ones that need the development and those are the ones that need the protection to supply the incentive for development.

In our experience it is very necessary to utilize the incentives afforded by the patent system through the mechanism of permitting the university contractor to take title to get these inventions into public use.

Mr. REIMERS. I think if Admiral Rickover, instead of a Government employee, were president of a small company with a decision to invest or not in an invention deriving from Government research, he would have a quite different viewpoint.

Dr. ANDREWS. I think we are coming into a period in the United States where it will become far more important to us than previously, regardless of how important the past technology has been, that I think we face a great deal of revolutionary possibilities. For example, that there are many, many chemical substances in the United States, including all of the antibiotics, including such common substances as vinegar, for example, and alcohol—numerous vitamins and so on which are produced by biological processes that because of the advancing state of knowledge and the changes in information available to us through biochemistry and genetics and recombinant DNA, all of which means that we have possibilities now of introducing genetics from one species to another species where it never existed before. One of those specific examples is the possibility of producing human insulin in microorganisms rather than being dependent upon it at the slaughter house from the recovery of the pancreas of cattle and sheep.

OK, our whole chemical industry, which has been largely based upon hydrocarbons from petroleum, petrochemicals, is in the process of being revolutionized by the necessity of getting those hydrocarbons from other sources particularly the biological. And if our new chemical industry is to thrive it is going to require hundreds or even thousands of new processes and molecules all of which could be protected and much of this work is indeed going to be carried out in the universities.

Senator BAYH. Thank you, Dr. Andrews and gentlemen. We appreciate very much your contribution to the committee here today.

The next witness is Mr. Julius Jancin, Jr., vice president, American Patent Law Association.

TESTIMONY OF JULIUS JANCIN, JR., VICE PRESIDENT, AMERICAN PATENT LAW ASSOCIATION, WASHINGTON, D.C.

Senator BAYH. Mr. Jancin, thank you for being with us this morning.

Mr. JANCIN. Thank you, Mr. Chairman. I realize the time of day and I will keep it short. I would like to have the APLA statement

entered into the record, and I will highlight several specific points from it.

The American Patent Law Association is a national society of lawyers engaged in the practice of patent, trademark, copyright, licensing, and related fields of law pertaining generically to industrial, commercial, and intellectual property rights. The APLA position on S. 414 was developed through the work of the Association Committee on Small Business and the Committee on Government Patent Policy.

✓ The APLA supports S. 414. We appreciated the opportunity to cooperate in the development of this legislation in the 95th Congress relative to the predecessor bill S. 3496, and we welcome the opportunity to testify today in support of S. 414.

APLA suggestions to S. 3496 were adopted in S. 414, and in the spirit of adding constructively to this legislation, additional recommendations will be offered shortly as a part of this testimony relative to S. 414.

First, however, we want to thank you, Mr. Chairman, for your recent active interest in securing adequate funding for the U.S. Patent and Trademark Office. This funding matter is directly concerned with industrial innovation generally, and has a real relevancy to the way in which university and small business-related invention rights are developed and safeguarded via the patent system.

The enactment of S. 414 should bring simplicity, rationality, uniformity, and certainty to the operation of Government patent policy regarding universities and small businesses.

The lack of such a Government patent policy impacts negatively upon industrial innovation. This is set forth in the December 22, 1978, draft report of the Advisory Subcommittee on Federal Procurement Policy of the Advisory Committee on Industrial Innovation established as part of the Domestic Policy Review. I have a quotation in my statement from that report that supports this proposition.

The APLA believes that the policies underlying S. 414 should apply to all Government contracts. Such a Government-wide policy would provide an even stronger economic and innovation-incentive stimulus than will be provided with the limitations of S. 414 to universities and small business. However, we are not urging that such an amendment be made to S. 414. The APLA is prepared to continue to work for broader legislation with the Congress, and with Senator Schmitt relative to his bill S. 1215 so as to reach an objective expressed by you, Mr. Chairman, in the May 22, 1979, Congressional Record regarding the Schmitt bill.

✓ The APLA recommends deletion of section 204 in S. 414. This is the "Return of Government Investment" provision. We recognize that it likely represents a balancing of competing interests, and that a form of Government seed-money recoupment may be a political necessity for some S. 414 support.

A principal problem with section 204 as we see it—and it is a significant one—lies with the concept as well as the draftsmanship. We submit that the Government's "investment" will be returned ordinarily in the form of taxes paid, an increase in the labor force through creation of new jobs, and the transfer of technology from a creator to a user who in building-block fashion is likely to be himself a creator in follow-on order.

If the objective is to stimulate innovation as well as the participation of firms in relatively high-risk areas which often involve creation of new products and sometimes new markets for those products, then there should be no limitation on incentive to meet this objective.

As a practical matter, the requirements for capital with respect to a high-risk venture will be so enormous that section 204 could likely detract from the availability of private venture capital and funds from creditors.

Some see section 204 as an accounting nightmare.

This is the expression used by Dr. Blumberg in his testimony before you on S. 414 on May 16, 1979. If I could speak with Dr. Blumberg, I would tell him that this might be one part in a good news/bad news story. The other part of the story resides with the interpretation applicable to language in section 204.

For example, it talks to moneys received from the licensing of any subject invention within 10 years following disclosure of the invention, and to moneys received on sales of products embodying or manufactured by a process employing a subject invention during a 10-year period commencing with commercial exploitation of the subject invention. The term "subject invention" is not a precise term. It would be preferable for purpose of clarity and definiteness to talk from the licensing of a "patent claiming a subject invention," and from sales of products or manufacturing processes covered by, or infringing, "a claim in an unexpired patent for a subject invention." A "patent claim" provides the definition that is missing from use of the term "subject invention" in a licensing context.

There is also a possibility that section 204 may place a contractor in an unfavorable competitive posture because of measuring moneys on the basis of subject invention related product sales. If that subject invention is not patented for whatever reason, it will become available to competition through reverse engineering. The competition will not have to pay royalties to the Government whereas the contractor will under section 204.

The foregoing underscores the negotiating care, and concomitant administrative burden that likely will be required of the contractor. This together with the possible detraction of venture capital could create a negative incentive situation which is why the APLA recommendations deletion of section 204.

If it does remain in S. 414 because of a policy decision, we want the subcommittee to know that the APLA is eager to assist in fine tuning this provision so that it is practical and workable.

The APLA recommends that S. 414 be amended to provide at least a nonexclusive license for the contractor. This principle as expressed below in the form of a suggested second paragraph in section 202 (c) (4) represents current Government practice. If a contractor elects not to retain title, there is no reason to preclude the contractor from the benefits of a "shop right" which is normally retained in accordance with the classic common law when the invention is made utilizing the contractor's resources. There should not be any concern about such license retention by a contractor impeding a future right by the Government to license another party because with the availability

of march-in rights, S. 414 can make the contractor's nonexclusive license revocable to the extent necessary for the Government to grant an exclusive license should the contractor or its sublicensee not be meeting its obligation to bring the subject invention to practical application.

The APLA believes that small business should be an exception to the time limit of exclusive license provision in section 202(c)(7)(B). Creating or penetrating a market may entail a heavy capital investment. Five years of exclusivity from the time the product is on the market may be simply inadequate to justify such an investment. As a result, the objective of bringing forth new technology may be stymied.

Indeed, if the licensee is a small business and it needs to raise funds so that it can make the necessary investments to promote a new product, exclusivity for only 5 years may not provide adequate time to recoup the investment.

The APLA supports a strong confidentiality provision in S. 414. This is needed to protect the patentability of subject inventions in certain absolute-novelty countries and regions of the world. Although section 206 appears to provide the basis for regulations that could offer such protection, we deem it important to comment upon this point briefly because it is not too widely understood.

We in APLA appreciate the addition of section 212(c) to S. 414. Its objective as we understand it is to make it clear in the prospective statute as well as in the S. 414 legislative history that all contractors not covered under S. 414 will continue to operate under existing agency programs.

In conclusion, the APLA support enactment of S. 414. Notwithstanding, the recommendations that have been made to clarify, strengthen, and improve S. 414. The APLA supports early favorable action by the Senate so that the House can have time during this 96th to act.

We respectfully request favorable consideration of our recommendations, and shall make our services available to the committee staff in the hopes of fine-tuning S. 414.

Thank you, Mr. Chairman.

Senator BAYH. Thank you very much, Mr. Jancin. I guess the record will show that it is not any longer true what I said to Admiral Riekofer, that I haven't had any long discussions with patent lawyers.

Mr. JANCIN. I am happy that that happening has happened.

Senator BAYH. Let me just say very candidly that I appreciate your offer to fine-tune section 204, but in my assessment, that is a rather vital part of this measure if we are going to get it passed. I hope you understand that. We hope to make this as efficient as possible, but at the same time we must maintain its general inclusion for the purposes I have described.

Mr. JANCIN. I understand.

We will strive to work with the staff and strive to make 204 a workable and meaningful section if it can possibly be such.

Senator BAYH. Mr. Jancin, there are a lot of components to making a product available to the public. I am increasingly amazed at how

complex this whole business is. And your rationale that tax dollars will be returned in the marketing and producing processes, I suppose, also would hold true if the raw material for the product was Government property. If we cut down Government timber, for example, and use that in the manufacturing of a product, the same type of argument could be made that there is a return to the Government from taxes, but I think we would all agree that some additional return to the Government is justified. A lot of people feel strongly that ideas developed through Government research is of some significant value and, thus, restitution is required, as in the timber example.

Mr. JANCIN. Yes; I understand. I believe I have a comment in my statement that refers to 204 possibly representing a balancing of interests. I understand that there are views on one end and the other end. But, at the present time 204 will be burdensome. I have no doubt about that.

Senator BAYH. Let's find a way to minimize the burden but not create a loophole that makes it possible to escape the ultimate consequences of restitution.

Mr. JANCIN. I understand.

Senator BAYH. OK?

Mr. JANCIN. Yes.

Senator BAYH. We will work with you, but I think the absence of that kind of provision has been one of the reasons that this type of legislation has not been successful in the past. We all want to move this one, and perhaps you will help us.

Again, I appreciate your taking your time to testify and giving us the benefit of your thoughts and the thoughts of the American Patent Law Association.

Thank you.

Mr. JANCIN. Thank you. I hope you get to meet more patent attorneys, too.

[Mr. Jancin's prepared statement follows:]

PREPARED STATEMENT OF JULIUS JANCIN

The American Patent Law Association (APLA) is a national society of lawyers engaged in the practice of patent, trademark, copyright, licensing, and related fields of law pertaining generally to industrial, commercial and intellectual property rights. APLA membership includes lawyers in private law firm, corporate and Government practice; lawyers associated with universities, small business and large business; and lawyers active in the international arena as well as with matters of national concern. The APLA position on Bill S. 414 was developed through the work of the Association Committee on Small Business and the Committee on Government Patent Policy.

The APLA supports S. 414. We appreciated the opportunity to cooperate in the development of this legislation in the 95th Congress relative to predecessor Bill S. 3496, and welcome the opportunity to testify today in support of S. 414. APLA suggestions to S. 3496 were adopted in S. 414, and in the spirit of adding constructively to this legislation, additional recommendations will be offered shortly as a part of this testimony relative to S. 414.

First, however, we want to thank the Chairman of the Subcommittee for his recent active interest in a review to determine adequate funding for the United States Patent & Trademark Office. This funding matter is directly concerned with industrial innovation generally, and has a real relevancy to the way in which university and small business related invention rights are developed and safeguarded via the Patent System including Patent & Trademark Office.

The enactment of S. 414 will be in the national interest. Its enactment should produce the following favorable results in addition to meeting policy objectives recited in Section 200 of the Bill:

(A) Greater and faster commercialization of inventions resulting from research, development and experimentation wholly or partly funded by the American taxpayers.

(B) A strengthening of the research & development capabilities of American universities and small business.

(C) An encouraging climate for subject invention disclosure (and thereby a form of technology transfer) because of speedier invention processing and more certain disposition of subject invention rights.

(D) Elimination of any legal uncertainty surrounding the ability of the Federal Government license patents and patent applications it owns.

In summary, the enactment of S. 414 should bring immediacy, simplicity, rationality, uniformity and certainty to the operation of Government patent policy in universities and small businesses.

The lack of such a Government patent policy also impacts negatively upon industrial innovation. The APLA subscribes to this widely recognized and generally accepted comment—E.G., as set forth in the December 22, 1979 draft report of the Advisory Subcommittee on Federal Procurement Policy of the Advisory Committee on Industrial Innovation established as part of the Domestic Policy Review instigated by The White House:

"It is becoming quite evident that existing Federal policies regulating the allocation of rights in inventions resulting from Government-sponsored contracts fail to stimulate industrial creativity innovation and technical growth. Quite the contrary, current agency policies appear to delay, and the even discourage, commercial disclosure and utilization of such inventions, thereby depriving the American consumer of the benefits of the enormous annual national investment in technology development. The United States must be able to take advantage of the technology that is being developed using Government funds and apply it to an area of the economy. It is important that full advantage is taken of the nation's investment so that the national technological lead is maintained in the world and that innovative ideas and technology are stimulated. . . . This Committee therefore urges the enactment of legislation providing a uniform Government patent policy under which normally a contractor, should he so elect, would retain title to each invention conceived or first actually reduced to practice in the course of development under a government research and development contract."

The APLA believes that such policy should apply to all Government contracts. A Government-wide policy would provide an even stronger economic innovation-incentive stimulus than will be provided with the limitations of S. 414 to universities and small business. However, we are not urging that such an amendment be made to S. 414. The APLA supports enactment of the S. 414 University and Small Business Patent Procedures Act, and is prepared to continue to work for broader legislation with the Congress and Senator Schmitt relative to his Bill S. 1215 so as to reach an objective expressed by Senator Bayh in the May 22, 1979 Congressional Record regarding the Schmitt Bill—i.e., "to enact the best possible legislation to deliver the full benefits of Government-supported research and development to the marketplace where they can benefit the public."

The APLA recommends deletion of Section 204 in S. 414. This is the Return of Government Investment provision. We recognize that it likely represents a balancing of competing interests, and that a form of Government seed-money recoupment may be a political necessity for some S. 414 support. A principle problem with Section 204 as we see it—and it is a significant one—lies with concept as well as draftsmanship. We submit that the Government's "investment" will be returned ordinarily in the form of taxes paid, and increase in the labor force through creation of new jobs, and the transfer of technology from a creator to a user who in building-block fashion is likely to be himself a creator in follow-on order. If the objective is to stimulate innovation as well as the participation of firms in relatively high risk areas which often involve creation of new products and sometimes new markets for those products, then there should be no limitation on incentive to meet this objective. As a practical matter, the requirements for capital with respect to a high risk venture will be so enormous that the imposition of Section 204 could likely detract from the availability of private venture capital and funds from creditors.

Some see Section 204 as an accounting nightmare. This is the expression used by Dr. Baruch S. Blumberg in this testimony on S. 414 last May 16, 1979. If I could speak with Dr. Blumberg, I would tell him that this might be one part in a good news/bad news story. The other part of the story resides with the interpretation applicable to language in Section 204. For example, it talks to moneys received from the licensing of any subject invention within ten years following disclosure of the invention, and to moneys received on sales of products embodying or manufactured by a process employing a subject invention during a ten year period commencing with commercial exploitation of the subject invention. The term "subject invention" as such is not a precise term. It would be preferable for purpose of clarity and definiteness to talk from the licensing of a patent claiming a subject invention, and from sales of products or manufacturing processes covered by, or infringing, a claim in an unexpected patent for a subject invention. A patent claim provides the definition that is missing from use of the term "subject invention" in a licensing context.

There is also a possibility that Section 204 may place a Contractor in an unfavorable competitive posture because of measuring moneys on the basis of subject invention related product sales. If that subject invention is not patented for whatever reason, it will become available to competition through reverse engineering—a competition that will not have to pay royalties to the Government whereas the Contractor will under Section 204.

The foregoing underscores the negotiating care, and concomitant administrative burden, that likely will be required of the Contractor. This on top of a possible detraction of venture capital could create a negative incentive situation which supports the APLA recommendation to delete Section 204. If it does remain in S. 414 as a matter of policy decision, we want the Subcommittee to know that the APLA is eager to assist in fine-tuning the provision.

The APLA recommends at least a non-exclusive license for the Contractor. This principle as expressed below in the form of a suggested second paragraph in Section 202(c)(4) represents current Government practice:

"With respect to any invention in which the Contractor does not elect rights, the Contractor shall have a nonexclusive, paid-up license to practice or have practiced such invention throughout the world, and shall include the right to grant sublicenses of the same scope."

If a Contractor elects not to retain title, there is no reason to preclude the Contractor from the benefits of a shop right which is normally retained in accordance with classic common law when the invention is made utilizing the employer's (i.e., Contractor's) resources.

Comptroller General Elmer B. Staats made the following statement in his testimony before this Subcommittee on May 16, 1979:

"But it has been the experience of agencies with policies of granting title to the Contractor that a willing Contractor-inventor is more likely to expeditiously commercialize an invention than a Government-licensee."

We in the APLA find this statement to be applicable to the wisdom of leaving the Contractor with a subject invention license and right to sublicense.

There should not be any concern about such license retention by a Contractor impeding a future right by the Government to license another party because, with the availability of march-in rights, S. 414 can make the Contractor's non-exclusive license revocable to the extent necessary for the Government to grant an exclusive license should the Contractor or its sublicensee not be meeting its obligation to bring the subject invention to practical application.

The APLA believes that small business should be an exception to the time limit of exclusive license provision in Section 202(c)(7)(b). This provision reads in pertinent part as follows:

"(7) In the case of nonprofit organization, . . . (b) a prohibition against the granting of exclusive licenses under United States Patents or Patent Applications in a subject invention by the contractor for a period in excess of the earlier of five years from first commercial sale or use of the invention or eight years from the date of the exclusive license, except if the licensee is a small business, and excepting . . ." (APLA recommends adding the underlined language)

Creating or penetrating a market may entail a heavy capital investment, and five years of exclusivity from the time the product is on the market may be simply inadequate to justify such an investment. As a result the objective of bringing forth new technology may be stymied. Indeed, if the licensee is a small business and it needs to raise funds so that it can make the necessary invest-

means to promote a new product, exclusivity for only five years may not provide adequate time to recoup the investment. The S. 414 legislation should not be so worded on the one hand as to seek to help and encourage the growth of small business as well as its utilization of inventions, while on the other hand frustrating that growth with inappropriate limitations.

The APLA supports a strong Confidentiality provision in S. 414. This is needed to protect the patentability of subject inventions in certain absolute-novelty countries and regions of the world. Although Section 206 appears to provide the basis for regulations that could offer such protection, we deem it important to comment upon this point briefly because it is not too widely understood. A subject invention disclosed in technical data reported to the Government must be viewed in the context of availability under the Freedom of Information Act, and unless protected from further disclosure under the Act by trade secret or the like, may preclude the obtaining of patents in such absolute-novelty countries as France and such regions as the new European Patent Convention. A strong and clear Confidentiality provision is necessary to protect patent rights in these areas for the Government and its Contractors.

We appreciate the addition of Section 212(c) to S. 414. Its objective as we understand it is to make it clear in the prospective statute as well as in the S. 414 legislative history that all Contractors not covered under S. 414 will continue to operate under existing Agency programs. The absence of such assurance could create a question about Congressional intent in areas outside the scope of S. 414.

In conclusion, and to repeat, the APLA does support enactment of S. 414. Notwithstanding the recommendations that have been made to clarify, strengthen and improve S. 414, the APLA does support early favorable action by the Senate so that the House can have time during this 96th Congress to act upon corresponding legislation. We respectfully request favorable consideration of our recommendations, and shall make our services available to the Subcommittee Staff in the hopes of fine-tuning S. 414.

Senator BAYL. Our next witness is Mr. Eric P. Schellin, Chairman of the Board of Trustees, National Small Business Association.

TESTIMONY OF ERIC P. SCHELLIN, CHAIRMAN OF THE BOARD OF TRUSTEES, NATIONAL SMALL BUSINESS ASSOCIATION, ARLINGTON, VA.

Senator BAYL. It is good to have you here this morning, Mr. Schellin.
Mr. SCHELLIN. It is good to be here, sir. As you indicated I am Eric Schellin, chairman of the board of trustees, the National Small Business Association. I am also executive vice president of the national patent council. The council was founded by a Hoosier, John W. Anderson, of the Anderson Co. back in 1945, and Ed Larson, who is the former chairman of the board at the Anderson Co. is on my board of trustees and he sends his greetings; as does Louie Jenn of Jenn-Air in Indianapolis. They are both on the board and both are interested in what you are doing and commend you very highly for that effort.

The National Small Business Association is also within an umbrella organization called the small business legislative council. The national small business legislative council has reviewed S. 414 and has come to the conclusion that it is very useful legislation.

The small business legislative council represents 4 million small businesses in the United States, 4 million of 14 million. So you see that you have today with you a good representation.

We also appreciate the fact that on numerous other occasions you have gotten or received testimony from some of our people. The last time Patty Iannada was here; Dr. Syanati was also here, and, therefore, I won't bring up any of the normal anecdotal matters or so called horror stories that people have talked about before.

What I will do is just reach a few highlights of the testimony today because it is already into the afternoon, of course, and time is going so let me share just a few of those points.

These points have been covered with considerable degree of particularity with the board trustees and the executive committee of the small business legislative council.

They have approved formally by a formal vote the viewpoints we express today.

First of all, we would like to point out that sure there is an expenditure of public funds for R. & D. when Government underwrites it. There is no question about that, in order to do some types of research.

In fact some of our people have entire businesses devoted just to doing R. & D. work for the Government. They have absolutely no interest in commercializing such inventions that may or may not result from that kind of work.

We also have a group of small business people that would do R. & D. work for the Government if they in fact obtained a certain degree of exclusivity for that kind of research work. They refuse to take that kind of contract because they don't get exclusivity. They are in the business of commercializing inventions very much like the university group that goes out and licenses them.

Now, what kind of money is used by the small business person for R. & D. work? If it is Government work, of course, then it is a substitution for extremely hard money to obtain from a private investor. It should be pretty obvious that if you just had the idea and you go out to an investor and you try to interest that investor you are not going to get many people to put up money at that point.

Front money, that is seed money, that is what is needed. You will get it later on downstream if you have proof of something, but generally not before.

A small business person can go to the Government, for instance, and undertake research projects to prove the idea if the idea comes across to the Government contracting officer as being worthy of putting money into it.

At that point then they want to know, or you have to decide, what do we do with it? You put it on the shelf as Admiral Rickover said, or it may not be worthwhile. But look at the track record of small business. You yourself have written on this on a number of occasions, Senator. I was on the Domestic Policy Review as a nongovernment person representing small business. There was a recently completed report on that. It was well discovered that small business has a fantastic and credible track record. There was an article in the Washington Star recently that you may have seen illustrating once again that small business in the last 10 years is the place where you look for new jobs, that anyone interested in new jobs—and I am sure we all are—you will get it from one place, and apparently one place only—unless there is a complete turnaround—and that will be with small business.

So you have to do something to get small business going into an area after having accomplished the noncommercial efforts, which may be the R. & D. work for the Government, then we can interest private investors to go the next step.

Now, the private investors are going to put up more than 10 times the amount of money the Federal Government will ever put up. There is evidence to show that.

I can share that with you some other time.

But more than 10 times of the money must come from the private investor before the commercialization of any invention—whether it comes from the Government or anywhere else—is going to be made.

So to summarize, we appreciate the fact that the Government does incur expenses in achieving R. & D. and using small business is one significant way to do that, and we admit it, we are indebted to the Government for that, many of us are.

Now, why does the Government do it? The Government may do it just to learn something. Again, basically research that is funded generally goes to the university level or to the small business groups. The larger corporations are generally going to be doing research work, if they are, in regard to an entire mission oriented concept. Small business and the universities spend more time with respect to the basic concepts.

Now, having done that, can we in fact say that the investor at the R. & D. level—and if you identify that investor to be the taxpayer—then does that taxpayer-investor get a return on the money if that invention is not commercialized?

The answer, of course, is self-evident. The taxpayer-investor—and we are all also those—we did not get our return on our money invested. That is the point I wanted to share with you.

Now, with respect to my point three here, I read recently where someone said that this would, this bill would be a vast giveaway. "Vast?"

Small business gets 3.5 percent of the R. & D. money from the Federal Government. I would envisage that the inventions coming from 3.5 percent—if they elected to take title—would only be in that miniscule amount.

I think the problem really is—and I am very excited about that and we have gone on record on this several times—that 3.5 percent is just not enough. Be that as it may, for this purpose, we are talking about very few inventions really that will go back to the small business contractor or the university level.

Now, is it a giveaway? Hardly.

Someone just mentioned section 204 and that was discussed at length. Section 204 is something that the small business people would want. In fact, they would insist upon it. Small business is used to paying its own way. It is used to sharing with other investors. If the Federal Government is deemed a partner as a result of the investment for R. & D. then small business is willing to pay its own way without question.

Now, with respect to certain facets of section 204 that may or may not be difficult to administer—I don't know. I say let's find out.

There is no track record on section 204. Let's find out what happens. We can always go back and do it over again. But we do insist on paying our own way. No question about that.

Now, the National Small Business Association and the Small Business Legislative Council has gone on record several times and we

have generated a great number of reports and you have been recipient of some of those reports, Senator, that in essence we are for a two-tier policy on all regulatory matters, all tax matters, and this particular bill recognizes a two-tier policy. You might say well, it's discrimination. It may be, but we are different. Small business is different from big business. There is no question about that. Big business in all events does business in a different way. Small business does it in a different way.

So some people have criticized this bill as not being broad enough by saying, well, big business ought to be included. Well, somebody called your attention to section 212(c) which statutorily recognizes the patent policy of the Government agencies with regard to doing business with big business. The fact of recognition as a statutory matter I would wonder about the fact that perhaps now it was being immunized, for instance, against attack by some of the public interest groups with regard to licensing exclusively certain inventions to big business.

There are other areas, of course, where large businesses can also participate with regard to Government-owned inventions where if the small business after having the preference handed to them, resists that preference and then large businesses can still do business, and also you have to recognize that a great many university inventions will be licensed to big business, and hopefully also, of course, to small business.

What we found particularly interesting is the fact that the proposed statute specifically hones in on the concept of title and the election at a time when the contract is being written.

In other words, statutorily it recognizes that the small business, who is contracting with large Government, with that contractor, is not put in a subservient supplicant way with the contractor, the Government.

There has always been a problem with my constituency that they have a great deal of problems and difficulties in dealing with a Government contractor who is dealing with the XYZ small business company as opposed to one of the giants of the aerospace industry as an example.

As a result of that, they always feel that they come out at the short end, so to speak. So by putting in this statutory language that the funding agreement is written in this fashion, I think then small business can face up to the Government contractor eyeball to eyeball, which it should, because of the track record as mentioned in the above.

Now, there are a couple—three to be exact—small points I would like to go into momentarily that are of concern to my people.

One, the bill seems to be silent on background rights, the proprietary rights that the small contractor already has. So as part of the testimony that was submitted a few days ago, which is being made a part of the record, I hope, we have suggested that some additional language be incorporated under section 202 as a new paragraph (g) to indicate that the background rights will not go to the Government but will be retained by small business contractors unless of course it proves really to be necessary.

In other words, we can certainly envisage within the public interest, that the public must be served and on occasion the background rights

will have to go to the Government. We are perfectly willing to go along with that. But we don't want it to be dealt with at the contractor level in the Government, we want it to go to higher echelons because then the glare of publicity will be there and we can make our own statement and someone will pay attention to us as opposed to the Government contractor at the lower level.

Another area that was mentioned by Mr. Jancin of the American Patent Law Association was of course the concept of small business receiving a license only for a short period of time, 5 to 8 years depending upon the situation.

There, too, we concur in that strenuously and feel that 5 to 8 years is virtually meaningless what with overcoming Government regulatory problems and all. I think that 5 to 8 years in this situation is going to be virtually diminimus. Something on the order of a full lifetime of the patent or 10 to 15 years, something of that nature, because that is something that can be negotiated depending again with an eye to our track record.

Finally, some of our people were quite concerned with regard to 202(d) where if the small contractor doesn't elect then the inventor working for the contractor can in fact receive the rights, sort of residual rights that might be made available.

At first blush, how can this be? The guy works for us, why should he get the rights?

On second blush, the public interest and all the good things that small people stand for and are good about, they say in that interest, if the technology is in fact surplus to us can we really stand in the way of even one of our valued employees or associates spinning off with a new idea to start a new company, a new business, because after all, how many of us who are small businessmen started in exactly that fashion as spinoffs from big business, or small business, or Government—you name it and that's where we all came from. We feel that's fine, let's encourage people to in fact start new businesses and continue as we have in our type of economic system.

I will be happy to entertain some questions, Mr. Chairman, at this time.

Senator BAYH. Thank you, Mr. Schellin. Let me just ask you a general question. Several of us have been concerned for some time about the small percentage of Government research that ends up in the hands of small business.

Senator Kennedy has introduced legislation that requires each agency to give small business a certain percentage of its research and development contract awards.

Some of the small business representatives who have testified indicated that they avoid getting involved in research when they feel the Government might end up with the rights to whatever idea is developed.

Thus, I wonder, does the guarantee of a quota system alone accomplish what we are after? Or, do you need a quota system plus, something that deals with the problem of patent ownership as in this bill if the quota system is to have real meaning?

We need to make sure that there are enough small business people who are willing to become involved in Government research and development programs.

What are your thoughts on that?

Mr. SCHELLIN. Well, that has been considered by us, too. As I indicated, we have some members who are contractors whose sole function is to serve the Government in R. & D. So with a larger budget, such as Senator Kennedy has proposed for that, that would be no problem. They could gear up to do more R. & D. work. Probably some new small businesses would evolve and also do more R. & D. work. But that is only the beginning of the cycle.

We have the vast majority of our members who are kind of—well, don't want to do Government work because of the taint involved; and fine, the Government R. & D. work is contracted out but if that is all that happens, then the cycle toward innovation, toward commercialization, toward utilization, stops at that point.

So you need not only Senator Kennedy's proposition which is very salutary, but we also need S. 414, this particular bill, to assist in completing the cycle. I can assure you that small business will continue to complete the rest of the cycle.

Senator BAYH. It just seemed to me that the two bills were very compatible.

Mr. SCHELLIN. They are, yes.

Senator BAYH. Yes, OK.

Mr. SCHELLIN. You are talking about S. 1074, sir?

Senator BAYH. Yes, Senator Kennedy's bill.

Well, Mr. Schellin, I won't hold you further. We will put your entire statement in the record.

Mr. SCHELLIN. I appreciate that. Thank you.

Senator BAYH. We appreciate your help and we will continue to work with you here.

[Mr. Schellin's prepared statement and additional material follow:]

PREPARED STATEMENT OF ERIC P. SCHELLIN

Mr. Chairman and Members of the Committee: My name is Eric Schellin. I am Chairman of the Board of Trustees of the National Small Business Association (NSB), a multi-industry trade association representing approximately 50,000 small business firms nationwide. I am also Executive Vice President of the National Patent Council.

I am also appearing today on behalf of the Small Business Legislative Council (SBLC), an organization of national trade and professional associations whose membership is primarily small business. SBLC focuses on issues of common concern to the entire small business community. The SBLC membership and their affiliates represent approximately four million small business firms nationwide. The SBLC list of members who have endorsed a policy position paper entitled "An Equitable Policy for Small Business Patents on Inventions made with Federal Assistance" is attached. This position paper and list of associations appear as Attachments B and C.

We commend the committee for the opportunity to address the issue of underutilization of the results of Government-financed Research & Development, especially to complete the innovation process by making available to all of us alike the benefits resulting from such R&D endeavors.

The United States has been the leading innovative nation and has created many new industries. One need only look at the major new industries started within the last fifty years, such as those involving electronics, lasers, antibiotics, synthetic fibers, instant photography and xerography. Most of these industries began as small businesses. There is still room for further innovation and it will continue, especially by small business, if provided with a proper environment. Such an environment existed for years and produced outstanding results. Our patent system contributed significantly to an environment which promotes innovation.

Unfortunately, there have been disturbing recent indications that there has been a decrease in the rate of innovation and in that portion of the R&D investment devoted to new product lines and basic research. It is incumbent on all of us to look everywhere to identify sources for innovation. One area not yet properly exploited is the arena of Government-financed R&D. Today, as is known, there are as many Government patent policies as there are Government agencies. It is submitted that S. 414 is progressive in that it makes sense in establishing uniform policies, at least where small business is concerned. Therefore, we fervently endorse S. 414, commend the many distinguished Senators for their support of S. 414 and look forward to early enactment.

Much has been written pertaining to the background of S. 414. Testimony that has already been heard and will be heard demonstrates this fact. Consequently, no purpose would appear to be served to provide testimony that would be merely cumulative. Therefore, permit us today to share with you certain highlights and then pinpoint areas of concern to us.

A. It is admitted that the expenditure of public funds for R&D is in effect a government underwriting of the risk of the research effort. When big business commits its own funds for R&D, it does so by allocating only a small part of monies earned in the normal course of business. On the other hand, small business to commit funds for R&D must do so by employing hard to get investor-generated funds. Early on R&D must occur before a new product or process can be identified, but the period in the innovation cycle when this occurs is at a time when investor funds are most difficult to obtain.

B. Federal Government R&D is supported to learn something that we do not know. If that is all that is supposed to be accomplished then this can be accomplished by diffusing such gained new knowledge by publication. It seems, however, that we should make use of what we learn. Like any other type of investment, R&D is expected to yield returns. In the case of Government-financed R&D the question arises: Are the investors getting full and timely return? Are the results of federally funded R&D finding their way into the market? There is much evidence to demonstrate that current Government patent policy isolates inventions from normal risk-taking and pursuit.

C. Some opponents of this Bill have stated that it is designed to be "a vast giveaway." The way the Bill is presently constructed it is neither "vast" nor is it a "giveaway."

1. It will be remembered that only 3.5 percent of the total Government R&D budget is allocated to small business. Therefore, it can be safely assumed that this Bill will apply to only about 3.5 percent of the inventions resulting from Government R&D funded efforts. Therefore, vastness is not a problem.

2. The Bill, by having a built in recoupment factor to recover the Government-risked money, denies the pejorative term of "giveaway." Small business finds in the concept of recoupment a worthy principle. Furthermore, small business by undertaking the usual and necessary steps leading to commercial fruition commits ten times any amount the Government may have advanced. A recent study initiated by the President has confirmed this view. History has shown that there will be many more losers than winners in the endeavor to commercialize.

D. NSB and SBIC have gone record on many occasions as favoring a government-wide two-tier treatment to differentiate between small business and big business on the valid premise that small business is in fact different from big business. While this Bill possesses salutary features which will benefit small business, it should be pointed out that there is much that will benefit all others not coming within the purview of the Bill. Section 212(c) will recognize statutorily operating procedures established by the various Government agencies which favor big business. By including language of the kind found in its section, it is believed that such procedures will be immunized from attack by public interest groups. Furthermore, as big business is the major recipient of technology transfer from university-developed inventions, big business will continue to be a major participant in Government-financed R&D through participation as a licensee from universities coming within the purview of this Bill just compensation."

E. It is axiomatic that the investment of money and effort will occur where there is the possibility of the greatest return. A corollary, even more important to the axiom, is the need for small business to minimize initial risk by possessing a modicum of exclusivity for a successful commercial venture. While

the degree of market success cannot be predicated in absolute terms; in an arena without patent protection a market can be directly measured by the success of acceptance of a new product or process as success by the innovator brings in market entrants. Therefore, when entertaining a new venture—capital or energy will flow to the development of ventures of equal potential where proprietary rights to the invention are available. It is worthwhile to note that the Bill is designed to reject the concept of permitting the Government to make a determination of rights after an invention is made. The Government lacks the ability to take into consideration market forces that form the basis for a rational business decision.

SPECIAL AND SPECIFIC POINTS

1. It is believed that the Bill does not address the problem of background patent and proprietary rights. Small business takes cognizance that on some occasions it will have to divest itself of such property to achieve a common good. Unfortunately, many agencies treat small business and big business differently; arbitrarily demanding all background rights when dealing with small business while only negotiating such rights with awe and deference when dealing with big business. Therefore, we propose amending the Bill to include Section 202(f), as annexed hereto, which is designed to make it possible for any Government agency to obtain background rights but on the premise that the need for such rights will be seldom required puts the decision level at the top echelons of the agency. By this method, the need when it arises will be satisfied, but such need will have to be validly demonstrated.

2. It is noted that under Section 202(c) (7) (b) a nonprofit organization may not grant exclusive licenses on subject invention "for a period in excess of the earlier of five years from first commercial sale or use of the invention or eight years from the date of exclusive license . . ." We believe that this limitation is not sufficiently long with regard to small business. Creating a market may entail a large capital investment. Five years of exclusivity from the time the product is commercialized is inadequate to justify such an investment. It is recognized that the purpose of the time limitations on exclusivity is to prevent a large company from gaining a dominant position. Where the licensee is a small business, there should be no objection to granting a longer period of exclusivity. Small business will require additional time to raise the funds and to recoup the investment made in achieving commercialization.

3. Initially some of our constituents were concerned at the possible implications of Sec. 202(d) which may arrange for development of the rights to the inventor in the event the contractor does not elect to retain title. It was thought some contractors would be forced to elect to retain title and to follow through by obtaining patent protection and by undertaking to complete the other prerequisites to retain title. Upon further reflection it was realized that many of the businesses of our constituents began as spin-offs from other business enterprise and oftentimes were based on surplus technology. Therefore, we would be remiss in being a barrier in achieving a public good. Technology that may be surplus to the contractor may be the underpinning for a new enterprise; the only real regret being the loss of valued associates and employees. We recognize that providing for the birth of new enterprises is quintessential to the American business system.

In conclusion, when the Small Business Act was passed it was stated therein that "It is the declared policy of the Congress that the Government should aid, counsel, assist and, protect, insofar as is possible, the interests of small business concerns in order to preserve free competitive enterprise . . ." Those words of a previous Congress was a promise. The enactment of this Bill is a promise kept!

Thank you.

ADDENDUM

Add the following to section 202:

(f) No funding agreement with a small business firm shall contain a provision allowing the Federal Government to require the licensing to third parties of inventions owned by the small business firm that are not subject inventions unless such provision has been approved by the head of the agency and a written justification has been signed by the head of the agency. In no event shall the Government require the licensing of others under any such provision unless the head

of the agency determines that the use of the invention by others is necessary for the practice of a subject invention made under the funding agreement or for the use of a work object of the funding agreement and that such action is necessary to achieve the practical application of the subject invention or work object; and any such provision shall clearly state whether licensing may be required in connection with the practice of a subject invention and/or specifically identified work objects. Any such determination shall be on the record after an opportunity for a hearing. Any action commenced for the judicial review of such determination shall be brought within sixty days after notification of such decision.

ATTACHMENT B

The position paper—*An Equitable Policy for Small Business Patents on Inventions Made with Federal Assistance*—is supported, as of this date, by 31 members of the Small Business Legislative Council:

American Association of Nurserymen, Washington, D.C.
 Association of Diesel Specialists, Kansas City, Missouri.
 Association of Physical Fitness Centers, Bethesda, Maryland.
 Automotive Warehouse Distributors Association, Inc., Kansas City, Missouri.
 Building Service Contractors Association International, McLean, Virginia.
 Business Advertising Council, Cincinnati, Ohio.
 Direct Selling Association, Washington, D.C.
 Eastern Manufacturers and Importers Exhibit, Inc., New York, New York
 Furniture Rental Association of America, Washington, D.C.
 Independent Bakers Association, Washington, D.C.
 Independent Business Association of Washington, Bellevue, Washington.
 International Franchise Association, Washington, D.C.
 Institute of Certified Business Counselors, Lafayette, California.
 Machinery Dealers National Association, Silver Spring, Maryland.
 Manufacturers Agents National Association, Irvine, California.
 Marking Device Association, Evanston, Illinois.
 National Association for Child Development & Education, Washington, D.C.
 National Association of Brick Distributors, McLean, Virginia.
 National Association of Floor Covering Distributors, Chicago, Illinois.
 Nationally Family Business Council, West Bloomfield, Michigan.
 National Home Improvement Council, Washington, D.C.
 National Independent Dairies Association, Washington, D.C.
 National Independent Meat Packers Association, Washington, D.C.
 National Office Machine Dealers Association, Zanesville, Ohio.
 National Paper Trade Association, Inc., New York, New York.
 National Parking Association, Washington, D.C.
 National Council, Inc., Arlington, Virginia.
 National Small Business Association, Washington, D.C.
 National Tool, Die & Precision Machining Association, Washington, D.C.
 National Wine Distributors Association, Chicago, Illinois.
 Printing Industries of America, Inc., Arlington, Virginia.

ATTACHMENT C

AN EQUITABLE POLICY FOR SMALL BUSINESS PATENTS ON INVENTIONS MADE WITH FEDERAL ASSISTANCE

One of our nation's greatest problems is the decline in the rate of productivity growth, and a major factor in this decline has been the discouragement of innovation at the small business level. Less than 5 percent of all federal research and development dollars go to small business, yet both a Department of Commerce study in 1966 and an Office of Management and Budget study in 1977 showed that small business accounted for more than half of all scientific and technological developments since the beginning of this century. A National Science Foundation study for the period between 1953 and 1973 found that small firms produced 4 times as many innovations for every research and development dollar as medium sized firms and 24 times as many as the largest firms.

It has become increasingly evident that many small innovative companies are avoiding the federal research grant process simply because of the uncertainty over whether or not they will be allowed to retain patent rights on inventions made under research sponsored by federal funds. This is a problem which appears

to have a fairly simple solution—allowing small businesses to obtain limited patent rights on discoveries they have made with federal money.

Experience has shown that unless the private sector (including universities, individual inventors, and non-profit organizations) is given sufficient incentive to bring new innovation to the marketplace, the development of new technologies will decline. Given the rapid drop in U.S. productivity increases over the past few years, it is apparent that new technology development in the U.S. must be encouraged.

The federal government itself is a prime disincentive for innovation development—inventions made under various agency grants have been allowed to waste away in government storerooms benefiting no one. The Departments of Energy and Health, Education, and Welfare, for example, often take months and in some cases years to review petitions for patent rights on inventions developed with federal grants. And, when the government decides to retain patent rights on these inventions, there is little chance that they will ever be developed. Of the 30,000 patents that the government presently holds, less than 4 percent are ever successfully licensed. This is very little return on the billions of dollars that are spent every year on research and development.

Small businesses should be allowed to obtain limited patent protection on discoveries they have made under government-supported research if they provide the additional resources needed to successfully commercialize the product. This change would provide the American marketplace with additional innovative product developments and remove the disincentive to many small companies from participation in the federal R&D process. The benefit is not only for small business, but the American economy, as well, since small firms have been the greatest source of new jobs in the past decade.

Under present practice, the government lets an R&D contract to a small business having the expertise as evidenced by background know-how. The patents devolve to the government, but when it comes to supplying the hardware, the conventional practice is for government to go to larger business, who can manufacture with impunity, in derogation of the proprietary rights of the small business contractor. This should be changed by legislation stating that no funding agreement with a small business firm shall contain a provision allowing the federal government to require the licensing to third parties of inventions owned by the small business firm which were not conceived in the performance of work under a federal R&D grant. The only exception would be that such a provision had been approved by the head of the agency and a written justification had been signed by the head of the agency. Such action by the agency head should be subject to judicial review.

Resolved

The Small Business Legislative Council urges and supports changes in current government patent policy to allow small businesses patent protection on inventions made under government-sponsored research, provided that allowance is made to permit the government to recoup its initial funding under certain circumstances. Small business innovations developed under federal contract should be patentable by the contractor, allowing that business a reasonable time to develop the new idea commercially. Failing that, the government should provide exclusive license to such innovations, with preference to small business. These actions will provide an increased incentive to the traditionally innovative small business sector to seek R&D contracts and to commercialize new and beneficial products for the marketplace.

SMALL BUSINESS VIEWS WITH REGARD TO INVENTION AND INNOVATION

(By Eric P. Schellin, Esq.)

James Ronaldson, the first President of the Franklin Institute, wrote in 1833: "The objects of the Franklin Institute are to develop the resources of our country; to throw all the light possible on the processes of industry; and to make the bringing of the products into market as simple as the nature of the case will admit; to cultivate whatever is calculated to make a demand for labour, and the employment of all according to their respective capacities and means, to the end that there should be none who shall not be in enjoyment of the necessities and comforts of life." (Emphasis supplied.)

The above quotation clearly demonstrates that creative invention and the follow up innovation have long been desirable achievements in our industrialized society.

Facilitating the bringing of new products to market simply and efficiently concerns small business in this report. While the act of creating an invention is of great importance, it constitutes only ten percent of the effort to bring new products to market. The other ninety percent constitutes the efforts to achieve innovation. As Edison observed, bringing a new product or process to commercial fruition is one part inspiration and ninety-nine parts perspiration.

In mid-1978 President Carter ordered a thorough review of the impact of policies of the federal government upon industrial innovation. The President directed Secretary of Commerce Juanita Kreps to supervise this study, and she in turn appointed an Industrial Advisory Committee to work under the direction of Dr. Jordan Baruch, Assistant Secretary for Science and Technology. This Advisory Committee of more than one hundred business executives was divided into seven subcommittees to analyze specific areas of federal policy and their impact on private-sector decision-making relative to innovation.

It was unfortunate that most members of the subcommittees were from large, well-established corporations. At least, to the credit of the selectors, each group included at least one individual from small business who participated actively in the work of each subcommittee and made contributions to the reports that have now been produced. Of course, the exceptions to this, as would be expected, were the subcommittees of Labor and the Public Interest.

Upon completion of the reports of the several subcommittees, many of the small business representatives agreed that an additional report should be prepared. The purpose: to incorporate in a more positive manner those recommendations of small business and include those recommendations that had been ignored in the reports partly due to under-representation by small business on the various subcommittees. That is not to say that small business is in disagreement with most of the subcommittee conclusions. On the contrary, small business is in agreement with most of the conclusions and recommendations of the seven subcommittee reports. Nevertheless, it is our conclusion that we would be remiss to the small business community to bypass the opportunity to provide our carefully formulated recommendations. The following statement is not a minority position to express disagreements with any of the subcommittee reports, but is designed to prioritize some of the recommendations according to the small business view and to serve as a supplement to address the unique role and unique problems of small innovative enterprises in America.

It has always been a policy of government to achieve a societal impact by means of legislation and application of government to accomplish a perceived goal. Therefore, tax laws are extant that not only provide for the functioning of government but also undertake the redistribution of wealth for the benefit of a defined class. Tariff laws are designed to assist individual industries. In agriculture, laws have been conceived and applied to provide underpinnings to particular farmers. These and many other governmental incursions for the benefit of an identified group are said to formally benefit all of society.

Until the passage of a graduated corporate income tax in 1978, there had been little recognition of small business as a defined class. Yet, as will be discussed hereinafter, small business has been recognized to be the cutting edge of competition, at the forefront of innovation, and a sane counterweight to the competing forces between big business, big labor and big government. To achieve increased market entry, increased innovation, and catch-up growth, there should be absolutely no question that a two-tier policy must be a societal goal, *in which small business is treated differently than big business*. There should also be no question that an applied two-tier policy will achieve beneficial societal growth.

A TWO-TIER POLICY PROVIDES A FAVORABLE SOCIETAL IMPACT

Inflation has become our most crucial domestic problem. Inflation is believed by the small business community to be not only the result of a number of conditions but also a direct result of a major decline in private sector innovation over the past decade. The driving force to real economic growth is innovation that results in increased process productivity and in the introduction of new products and services to the economy. Without innovation, economic stagnation occurs. With vigorous innovation, there is an increase in real income; job opportunities are expanded; exports are increased; our currency is strengthened; productivity is increased; and, as a long-term result, there is more opportunity to finance achievements in such qualities of life as education, health care,

longevity and leisure. Furthermore, to a large extent, small business believes that ambitious social goals of Americans can be obtained only from real economic growth that in turn can only occur as a result of vigorous private sector innovations.

In support of our conclusions, we will examine three premises:

A. Small businesses make a disproportionately large contribution to innovation.

B. Small innovative businesses create jobs at a more rapid rate, thereby increasing tax revenues.

C. The creative process in small business is highly sensitive to governmental policies.

A. Small businesses make a disproportionately large contribution to innovation

The economic history of the United States is replete with examples of the small business innovator making a major contribution. A recent study conducted for the National Science Foundation concluded that firms with less than one thousand employees in the post-World War II period were responsible for approximately fifty percent of the "most significant new industrial products and processes," and firms with one hundred or fewer employees produced twenty-four percent of such innovations. In addition, it has been discovered that the cost per innovation in a small firm is about one-half that in a large firm. This does not mean that small, innovative businesses should be expected to do everything—there is much innovation that only can succeed in large companies. However, in many cases, small firms are more adventuresome and willing to take on greater risks; in other cases, they, because of their flexibility, are able to be more responsive and use resources more efficiently. It is small business' contention that there is something fundamental and basic about the unusual ability of small firms to innovate that must be preserved for the sake of healthy economic and social growth.

An examination of American business history from the late 1700s through 1970 shows that a major source of technological advancement has resulted from the work of individual inventors and individual entrepreneurs working independently of big business. This is particularly true where radically new concepts have been invented and introduced. The great inventors in American history were also innovators.

In 1793, we had Eli Whitney with his cotton gin, and Robert Fulton with the steamboat in the 1800s. We all know that these two innovations had an enormous impact on young America. Later came the railroads. Next, in telecommunications, we had Morse and Bell, whose contributions greatly accelerated the growth of our economy. Similarly, the Wright brothers, McCormack, Edison, Westinghouse, Ford and DeForest made introductions that laid the foundation for further economic advances. This is obviously only a partial list. All of these innovators were entrepreneurs.

The same trend continued after World War II with the success stories of Edwin Land at Polaroid and Watson at International Business Machines. During the 1960s we saw the emergence of companies such as Xerox, Control Data, Digital Equipment and Hewlett-Packard, each beginning as individual small business entrepreneurs with their small companies who were unfettered at that time and therefore able to innovate. In addition to these better known names, there were thousands of small, lesser known, high-technology companies spawned during the 1950s and 1960s that have created real growth in our economy and increased the quantity and quality of employment.

B. Small innovative businesses create jobs and taxes at a more rapid rate

The role of small innovative businesses in stimulating economic growth also can be seen from two recent independent studies on employment. The first, by the Massachusetts Institute of Technology Development Foundation, shows compounded average annual growth from 1969 to 1974 for the following three groups of companies:

[In percent]

	Sales	Jobs
Mature companies	11.4	0.6
Innovative companies	13.7	4.3
Young high-technology companies	42.5	+40.7

In this study, mature companies were Bethlehem Steel, DuPont, General Electric, General Foods, International Paper and Procter & Gamble. Innovative companies were Polaroid Minnesota Mining and Manufacturing, International Business Machines, Xerox, and Texas Instruments. Young high-technology companies included Data General, National Semiconductor, Compugraphics, Digital Equipment, and Marlon Laboratories.

The Massachusetts Institute of Technology report states:

"It is worth noting that during the given year period the six mature companies with combined sales of \$38 billion in 1974 experienced a net gain of only 25,000 jobs, whereas the five young, high-technology companies with combined sales of only \$857 million had a net increase in employment of almost 35,000 jobs. The five innovative companies with combined sales of \$21 billion during the same period created 106,000 jobs."

It should be noted that the House Small Business Committee in its 1978 report on "Future of Small Business in America" stated that small business between 1969 and 1976 "accounted for what can be considered virtually all the new private sector employment in this country." The companies in the "Fortune 1000" contributed less than 2 percent of the growth in new jobs.

Similar conclusions emerged from a study of 269 firms by the American Electronic Association. In February of 1978 Dr. Edwin V. Zschau of the AEA presented the conclusions of that study to the Senate Select Committee on Small Business. The report showed the following growth of employment for newly-established firms as contrasted to more mature companies:

Stage of development		Employment growth rates in 1976, percent
Years since founding:		
20-plus	Mature	0.5
10 to 20	Teenage	17.4
5 to 10	Developing	27.4
1 to 5	Startup	57.7

Dr. Zschau also reported that annual benefits to the economy realized in 1976 for each \$100 of equity capital that had been invested in start-up companies founded between 1971 and 1975 were:

	Dollars per year
Foreign sales	70
Personal income taxes	15
Federal corporate taxes	15
State and local taxes	5
Total taxes	35

This data shows that the benefits of investment in small innovative ventures are large (e.g., a new \$35 per year flow in tax revenues for each \$100 initial investment) and that this flow of benefits starts soon after the investment. These benefits are large and powerful.

The benefits from a climate for favorable small business innovation is apparent from this review of the contributions to the past and recent economic growth of our country by individual entrepreneurs in their small companies. If we are to continue to enjoy the benefits of innovation, then individual entrepreneurs and their small businesses must be able to carry a very large share of the burden of innovation.

Unfortunately, the climate today for the formation and nurturing of small innovative businesses is not good. Although there is not a concise index of innovation, particularly innovation by individuals and their small businesses, we are certain that such an index would show a substantial drop in innovative contributions of small business over the past ten years—probably a decline to a level of ten percent of the average from 1950 to 1970, if not lower. Furthermore, if one takes as a parameter of innovation the factor of unassigned patents and excludes assigned patents to big business, it is quite obvious that the proportion of patents going to individuals and small business is declining.

C. The creative process in small business is highly sensitive to governmental policies

Creative processes in small business have many dissimilarities with the creative processes in large corporations. The first step involves the use of knowledge (market, scientific, sociological, etc., alone or in combination) to conceive a new product or service. The second step is to reduce this conception to practice through the construction of a first prototype (or some other form of initial trial), often on a small scale in the laboratory. If technically and economically promising, the new product or service is put into initial full-scale production and distribution. With success, production is expanded until the firm and its market matures, and significant employment and tax revenues are then generated.

Until successful production is achieved, the process is usually a struggle for the entrepreneur manifesting itself in a number of ways:

A struggle to obtain adequate capital; a struggle to make the technical breakthroughs that are necessary to overcome the seemingly never-ending emergence of unexpected obstacles; a struggle to keep development costs and initial production costs low; a struggle to collect amounts receivable and other payments in time to meet the next payroll; and a struggle to acquire and motivate capable scientific, engineering, production and management talent.

Outside factors, such as government interference and delays, substantially compound these roadblocks, decrease creativity, and increase the risk of failure. With increased risk, capital allocation decisions are made in favor of alternate, safer investments, often of a short term nature; entrepreneurial motivation is demoralized; and many innovative ventures are not undertaken. This unwillingness to undertake is of great concern to small business, and must be to our entire economy, as well.

The availability of initial "seed" capital (for making the concept a reality), start-up capital (for the first production), and capital for expansion is an essential and often limiting link in the small business creative process. Federal tax and security exchange policies are major determinants throttling this flow of capital to small business investors.

The impact of such federal policies is widespread. In addition to limiting the availability of capital, the federal tax structure is a major determinant in the ability of young companies to retain sufficient earnings to finance early growth. Regulatory policies detract from the creative entrepreneurial process and lessen the chance of success.

Federal research and development policies, and procurement policies, can either stimulate or inhibit the small business innovative process, and patents and other policies providing exclusivity can provide the struggling entrepreneur with the necessary protection to put inventive technology into profitable production.

SOME GENERAL CONCLUSIONS

From participation in this study of industrial innovation, several general conclusions have been drawn by small business:

1. Innovation by independent entrepreneurs and their small businesses is essential for healthy economic growth, since a large contribution is made by small innovators.

2. A wide range of federal policies are having serious deleterious impacts upon the ability of small businesses to innovate, to begin operation and to survive.

3. The fundamental reason for the decline in small business innovation is the failure of government policy makers and administrators to recognize that small firms, particularly small innovative firms, cannot accommodate governmental burdens as readily as can large companies. The burden of government interference on small innovators is disproportionately large and often overwhelming.

4. Until government recognizes the critical nature of this overwhelming burden, and until adequate amendments to domestic policies are accomplished, it is believed that innovation by small enterprises will continue to be strangled. These amendments to domestic policies must establish and implement a two-tier system for dealing with small business in a different manner of procedure and substance, than with big business.

SPECIFIC RECOMMENDATIONS

There are four broad scope areas of policy recommendations which have been developed specifically for small business. These recommendations are identified as follows:

1. Capital acquisition and retention.
2. Regulation.
3. Federal procurement and R&D.
4. Technology transfer and patents.

CAPITAL ACQUISITION AND RETENTION

The availability of seed, start-up, and expansion capital for small innovative enterprises is a major factor determining the rate of innovation. Unfortunately, significant changes have occurred during the past decade in taxation policy, security exchange and pension regulations, and in investment management policy that are inhibiting the flow of capital into new, innovative businesses. It is hoped that the following group of recommendations will be implemented to provide incentives to small local inventors throughout America, and to again provide seed and start-up capital to promising innovative ventures by 1) ameliorating tax and security inhibitions; and 2) providing tax incentives for such investments that are similar to those now available for competitive opportunities in retirement savings plans and real estate.

Issue No. 1—Tax code now favors spending rather than saving.

It is believed that the removal of disincentives to savings and investment should be the primary purpose of tax policy designed to encourage innovation. Tax policy is the only means at the disposal of the government that can have anywhere near the required impact. In the process of debating the last federal tax reform bill, the Congress and the Executive Branch considered several different policies, each of which would have this effect. Among them were allowing for more rapid recovery of capital through depreciation, lowering corporate income tax rates, enhancing the investment tax credit in numerous ways, and lowering rates of taxation on capital gains. Rapid recovery of capital through depreciation would be the most cost-effective way of encouraging innovation and its application by newly established industries. Such measures as elimination of the double taxation of corporate dividends and lower taxes on capital gains would provide more incentive to savings by individuals.

Recommended action

Increase overall incentives for savings by individuals and investment to be established through use of the tax code.

Issue No. 2—Providing for immediate write off of all R&D expenditures.

Present law permits salaries, wages, material and supplies in R&D to be deducted as incurred, even though the benefit of such expenditures may only be realized at some time in the future. Many western countries, including Canada and W. Germany, currently allow expenditures for the equipment and facilities used by these workers to be immediately written off as well. Permitting this practice in the U.S. would not only increase corporate cash flow and improve the incentive to make such expenditures, but it would also make R&D capital expenditures relatively more attractive than other capital expenditures, thereby providing an incentive for corporations to channel a larger proportion of their investment dollar into R&D activities.

Additionally, by increasing for small business the investment tax credit, there would be a channelling of a larger portion of the small business investment dollar into R&D capital equipment by creating a greater incentive in that area. It would be particularly helpful to small businesses for which research expenditures form a substantial portion of the annual budget, and would thereby provide the largest portion of its benefits to firms engaged in disproportionately large amounts of innovation.

Recommended action

Allow the immediate write off of all R&D expenditures, properly defined, including those for facilities and equipment. Failing that, allow a three or a five

year write off for facilities and equipment, comparable to the special depreciation rules now being applied to capital expenditures for pollution control facilities. In addition thereto, a larger investment tax credit should be permitted for those capital expenditures that are research related and there should be permitted a research tax credit for those research related expenditures not now eligible for the investment tax credit, allowing for appropriate carry back and carry forward provisions.

Issue No. 3—It is difficult for small technically-oriented businesses to retain key personnel.

It has been noted with small, highly technically oriented businesses that it is a problem and a struggle to retain key personnel. It is believed that this problem will become exacerbated as the American economy enters a period of scarcity in trained and competent engineers. Frequently, the only material incentive that a small business can offer to the would-be inventor or would-be participating entrepreneur, either to the founder or a key member of the team, is the promise of wealth through a substantial multiplication in value of the stock of the company.

Recommended action

For small businesses, which spend more than an established percentage of revenues on research and development, allow more favorable stock option incentives to founders and key personnel by (a) increasing the qualified options time from the current five to ten years and (b) postponing the tax on income derived from the exercise of non-qualified options until the shares have been sold rather than paying the tax at the time the option is exercised.

Issue No. 4—Tax consequences of withdrawing investments in small business enterprises are formidable.

These consequences are now so severe that many potential investors stay away from investing in the first place, believing that the risks of such investment are not justified by the potential after-tax reward. The net effect is, of course, to discourage the number of investors interested in such high-risk investments. There should be a tax-free rollover provision which would eliminate this difficulty, permitting capital to move from one small business as it matures to another without adverse tax consequences. Another method of attracting new capital to investments in small or new venture companies would be to permit immediate write-off of initial capital investments to zero even though it would result in a larger capital gains tax eventually. The appeal of such immediate "tax shelter" to individual investors has been well demonstrated.

Recommended action

Permit tax-free rollover of equity investments or—alternatively—immediate or accelerated deductibility of initial investments in small businesses, which spend more than a given percentage of revenues on research and development.

Issue No. 5—New small businesses typically are characterized by substantial losses in their early years of operation.

Sec. 1244 of the Internal Revenue Code and Subchapter S laws allow losses in businesses covered by these laws to be passed through to investors, thereby making these businesses more attractive to those investor who are in a position to sustain losses on their investments as an offset to other income. The qualifications for Subchapter S treatment, however, are such that few ventures qualify. The treatment afforded under these provisions of the tax law should be more generally available. In the same context it should be made easier to buy and sell corporate tax losses. In recent years IRS rulings have made it increasingly difficult for tax losses resulting from an unsuccessful venture to be used by a more profitable acquiring company. The effect is to deprive the investors in the unsuccessful venture of their right to recoup some of their losses through sales to a more profitable company.

Recommended Action

Allow start-up operating losses to flow through to founding investors in small businesses which spend more than a certain percentage of revenue on research and development.

Issue No. 6—If the tax free rollover provisions on the exemption of small business investments from capital gains taxes cannot be achieved, consideration should be given to reduced or zero tax rates for investors who invest in small or venture capital businesses over long periods of time.

Incentives to long-term investing are especially desirable in financing new ventures which require long term horizons to reach fruition. Under an appropriate plan, capital gains taxes on sales of small business investments would gradually decrease to zero over a period of time, perhaps five years.

Recommended action

Create a sliding scale tax rate for longer term investments in those small businesses which spend more than a given percentage of revenues on research and development.

Issue No. 7—ERISA and various state regulations have had the broad effect of making institutional managers of fiduciary capital even more conservative by requiring that prudent man concepts guide each individual investment decision.

It should be within reason for a "prudent man" to invest a small but meaningful portion of his investment portfolio in venture capital enterprises. Amending the definitions of "prudent man" embodied in various regulations in such a way as to allow institutions to apply it to their overall portfolio instead of to each investment would encourage investment in small growth companies and venture capital. Likewise, regulations and legislation affecting banks, insurance companies, savings and loans, state credit unions, and state retirement systems all tend to restrict rather than enhance the availability of venture capital.

Recommended action

Modify the concept of the "prudent man" that has been embodied in government regulations so as to allow institutions to hold a certain percentage of this investment portfolio in small business venture capital. Also encourage states to liberalize the investment restrictions on state-regulated pools of capital so as to allow investment of some portion of these funds in equity positions or venture capital firms specifically for small business.

Issue No. 8—Regulations regarding private placement of small investments and the size of Regulation "A" placements are too restrictive.

In April 1974 the SEC adopted Rule 146 under the Securities Act of 1933, in an effort to reduce and clarify the nature of the requirements for the private placement of small investments of the kind that are typical of venture capital opportunities. That rule has not achieved the goals intended. Additionally, Reg. A imposes a flat dollar limit on the amount of money that can be involved in an offering without becoming subject to all of the limitations imposed by the regulation. This limit is in need of further upward adjustment in order to take into account the effects of inflation over time. It would be salutary to widen the availability of start-up losses of small innovative business to be used as deductible expenses to investors.

Recommended action

Simplify the regulations regarding the private placement of small investments and increase the SEC's Regulation A limits on the size of investment offerings.

REGULATION

During the past decade, a new regulatory environment has emerged to fulfill a variety of social "mandates." This new regulatory environment includes agencies such as OSHA, EPA, CPSC, NTSB, and EEOC, in addition to expanded jurisdictions of existing agencies or departments such as FDA, U.S. Corps of Engineers, SEC, FTC, Justice Department and others involved in the regulation of business in one way or another. The mission of each of these agencies is well intended and, if only one (or a few) of them were impacting upon small innovative businesses their impact could be absorbed within the creative process. Unfortunately, for many small businesses there is involvement with a wide range of agencies and, in some cases, the laws and regulations enforced were intended for some other purpose than the new field being pioneered by the innovator. There are even cases of conflicting regulatory authority and requirements.

This emergence of widespread regulation requires a major drain of time, capital and energy. It contributes to a substantial interruption of the creative process and an increase in the risks of undertaking new ventures. It causes diminished market penetration. As a result, the economic make-up of the U.S. is being distorted in favor of those fields where regulation is minimal. Entrepreneurial involvement in those fields where regulation is diverse and intense is greatly reduced and innovation, therefore, is diminished.

It is unfortunate that this adverse regulatory environment has caused many small innovators to consider the federal government to be an alien power committed to their destruction.

Issue No. 9—Lack of predictability of regulation reduces innovation.

Changing objectives or uncertain standards of regulation, as well as uncertainty in the methods for measuring compliance, act as barriers to innovation. Small business is especially vulnerable when regulation by the same or different regulatory agencies is contradictory or when standards or methods of measuring compliance are not stabilized for a sufficient period of time. Thus a great many small businesses are not willing or able to accept the risk of committing limited resources on an innovation. The result is a reduction of competition.

Recommended action

1. Each regulatory agency should issue a long range statement of regulatory intent that could serve as guidelines for both the agency and the regulated. Such a statement of intent should take into consideration whenever applicable any special circumstances found in regard to small business.

2. Whenever two or more agencies are developing regulations or policy on a single issue or interdependent issues, an interagency coordinating committee should be formed to assure consistency. Whenever possible, there should be a consolidation of regulation to prevent over-regulation (especially of small business) so that only one single agency carries out the regulatory function.

Issue No. 10—Innovation is stifled by regulating the means rather than the results.

Regulations resulting from the adoption of new social enhancement regulations have too frequently not been goal-oriented. Rather than requiring a specific defined output in a manufacturing plant's effluents, for instance, the regulations control the industrial processes themselves. Such regulations on processes prohibit innovation as a means of achieving the required goals. Importantly, such so-called input regulations inhibit competition and maintain the status quo of industry structure as small business is thwarted in attempting to penetrate and develop a market.

Recommended action

Regulations promulgated to achieve desired social goals should be limited to output performance. They should not dictate the processes used by industry to achieve the standards. Such a refocusing of regulations would foster innovation both in meeting the standards and would encourage entry of additional businesses into the market, especially by small businesses who would approach compliance in a creative manner.

Issue No. 11—Regulation of price and entry impedes innovation.

Price-controlled corporations, which are almost always large businesses, whose prices and entry are regulated by government, have no incentives for departing from the status quo, thus retarding innovation and thereby entry by new small businesses. Government price and entry controls distort market forces and hence influence both industry structure and competition. Private corporations which operate in competitive or potentially competitive markets where prices are controlled by government are insulated from the innovation-encouraging pressures of marketplace price competition. The nation and the consumer would be better served if price and entry regulation of competitive industries were removed so that market oriented innovations, which are the natural result of competitively-determined market prices, could flourish.

Recommended action

Governmental price and entry controls of products or services provided in competitive markets should be rapidly eliminated. Where such controls are required by legislation, initiatives to modify the legislation to eliminate governmental control should be introduced and actively pursued. Entry to potentially competitive markets should be de-regulated, thereby providing a favorable climate for small business expansion.

Issue No. 12—Unconsidered economic impact of regulation impairs industry viability and weakens world market positions.

Governmental regulatory agencies are not presently required to account for the effect of their regulations on the competitive position worldwide of the industry being regulated. In addition, the government's role vis-a-vis industry, especially small business, should be examined. Government repeatedly demon-

strates a lack of knowledge of the nature and problems of small business, in contrast to the cooperation between government and industry evidenced in Europe and Japan.

Recommended action

In considering and establishing regulations, policies, and even legislation, U.S. government agencies should be required to study the impact of their actions upon the worldwide competitive posture of U.S. industry. A non-adversary approach should be encouraged via directives to the regulatory agencies to increase industry participation in regulation or de-regulation development.

Issue No. 13—Costs of regulation lead to increased market concentration.

Smaller firms, historically the source of significant contributions to innovation, suffer disproportionately greater injury from the overall costs of regulations than do larger firms. Hundreds of smaller firms have had to close due to costs of compliance with new regulations and, as a result, larger firms once dependent upon them as suppliers have been forced to either enlarge their existing operations, or integrate vertically. The natural growth objective of big businesses, compounded by the effects of inflation and the double tax on dividends, creates a demand for performance which, in many cases, can only be met by supplementing their core business growth with acquisitions.

Recommended action

New economic incentives are needed to offset the cost of capital investments required for regulatory compliance. Such incentives are needed not only to inhibit the unintended destruction of small innovative firms but to encourage the establishment of new small businesses.

To correct the present inequities of the costs of compliance with regulations imposed on smaller business, it is recommended that all rule-making bodies review present regulations, as well as to incorporate in all new regulations a consideration of different levels of business size. While substantive requirements should ordinarily be uniform for all size levels, procedures and paperwork required for compliance should take into account these variations in business size.

Issue No. 14—When safety regulation in small business is accomplished with a heavy hand it defeats the market entry at a time when small business is particularly vulnerable.

Due to the large role that small business has played in innovation some special attention should be given to small business which by its very nature will be facing new situations on workplace safety, environmental effects and product safety.

Accordingly, it would be wise to provide for workplace relief from inspections which would be based on an inspection scheme that emphasized self-development of safe practices. Once an emerging business category was fixed, it would be excluded from usual treatment until a significant deviation from inter-industry norms developed or probable cause has been observed. Size should be fixed by firm demographics in the industry, but critical size would be larger than the ten person level considered but not enacted in the last Congress. It should be noted that the concept does not mandate exceptions but does require a show-cause approach.

Also, consideration should be given to providing funds for compliance tests and liability insurance. The latter may be achieved sometimes by providing tax relief on the funds set aside by way of self-insurance. If regulatory practice, in effect, establishes barriers to market entry as has frequently occurred, then some remedy should be available. This would necessitate for expansion of the present small business loans program or, as an alternative, outright grants.

In view of the recognized need for compliance, small business today is faced with many more expense hurdles than heretofore. Therefore there ought to be an opportunity to expense venture expenditures in the year they occur. An established company can expense its expenditures against sales and must therefore be supported out of capital. To encourage venture investments, the residual owner shares of these expenditures should be made allowable tax deductions.

Another area should be the provision that a small business impact statement be issued when new regulations are proposed, and that such impact statements be subject to administrative fact-finding and judicial review before their adoption. It is especially important that attention be given to this area by study before implementation of the regulation, as opposed to after.

Recommended action

Due to the potentially large role that small firms have in innovation, a package should be assembled which permits workplace safety regulation relief, financing

for compliance tests and liability protection, and specialized tax and impact analyses in regard to new regulations.

Issue No. 15—Antitrust policies can inhibit innovation.

It is recognized that the antitrust laws do not directly address innovation. Rather innovation is generally stimulated by competition. It may be postulated that antitrust policies which foster competition tend also to promote innovation. Insufficient attention, however, has been given by the Congress, the antitrust enforcement agencies and the courts to the converse proposition: antitrust policies which discourage innovation are, to that extent, inherently anti-competitive.

Innovation itself is inherently a high risk proposition: the costs are substantial, the prospects uncertain; by definition, it involves the unknown. When other risks (such as the risk of provoking antitrust actions) are superadded to the equation, or when the prospect of reward is unduly circumscribed, the scales may tip toward the safer course of risk-avoidance. Moreover, because the antitrust rules are imprecise, plus the fact that they are unfairly applied predominantly against smaller business as being more easily intimidated defendants, the business decision-maker has difficulty in assessing the likelihood of adverse action or the magnitude of exposure.

Recommended action

While the conduct of research projects on an individual firm basis, or among firms which are not competitors, is ordinarily to be preferred, the Department of Justice should explicitly recognize that there are certain areas in which joint or cooperative research and commercialization among small businesses should be encouraged. This is especially true in the case of high-cost, high-risk "break-through" oriented projects. The generally procompetitive long-term effects of major innovation should ordinarily be given great weight. Also in such cases, the participants should be permitted wide latitude in allocating the intellectual property rights and other benefits which are the products of the research, where such allocations are in fact ancillary to, and supportive of, the legitimate purposes of the research.

FEDERAL PROCUREMENT AND R&D

The federal government is a huge purchaser of goods and services. The rules and regulations by which procurement occurs affect the ability and incentives for government contractors to innovate. Changes should be initiated to encourage greater participation by the highly innovative small business sector.

Issue No. 16—Procurement of innovative common use items.

On the surface it would appear neither logical nor reasonable to advocate that the federal government play a leading role in the development of new technology for common use or consumer type items. However, it is entirely sensible to suggest that the federal government—as a major purchaser—should be supportive of small innovative businesses and their products. Much that occurs in the federal government's current procurement practices suggest that their role is exactly the opposite.

The innovation that occurs in the portion of the economy concerned with the production of common use items is generally stimulated by the commercial marketplace. A company develops new technology and products because of its desire to maintain or increase market share and profitability. Despite the magnitude of the federal market, it is rarely available for innovative new products. Unfortunately, the cost of development of the new technology in the early years of an innovative product life cycle must be supported solely by the commercial market.

A prescriptive specification in a low bid procurement is the present method used by most contracting officers to reduce risk. It generally prevents the proper evaluation of new products and their subsequent purchase by federal government agencies. This methodology stifles innovation and creativity on the part of successful contractors.

Recommended action

Federal procurement should be approached whenever possible with regard to common use items from a functional standpoint.

Issue No. 17—Small business continually feels frustrated in dealing with Federal Government contractors.

There is little question that big government prefers to work with big business. Big business has the ability to amortize the cost of understanding federal gov-

ernment regulations connected with major contracts over long periods of time. The federal government prefers dealing with someone who understands the regulations and is aware as to how to go about conforming to them. The average small business is naive about the demands of the regulations and is not consistently available for contracts. As a result the average small business builds up little expertise; nor can it easily afford to purchase such expertise on the possible premise of obtaining a government contract.

Most small businesses have experienced a tilt in favor of big business as evidenced by an inability to discover necessary information to enable small business to bid, thereby being excluded from large areas.

Recommended action

A separate simplified set of Federal Procurement Regulations should be developed to apply to small business. Similarly no agency should be permitted to exclude an equal opportunity for small business to submit proposals for consideration on a merit basis in any significant program or area.

Issue No. 18—Small business does not obtain anywhere near its proportionate share of Federal R&D funds.

The federal government has a major commitment to non-defense research and development that is conducted at federal laboratories, at universities, and in the private sector. In many cases, this commitment to the development of scientific knowledge has made substantial contributions to technological innovation. As stated at the outset and by many others, small business enterprises have historically made a disproportionately large contribution to innovation and such contributions are often at substantially lower costs. Due to the proven effectiveness of small businesses to innovate when provided with the proper incentives, and because of the proven low cost of small business innovation, it is appalling that greater use is not made of this effective and efficient sector of the research community.

Recommended action

Each federal agency should be required to allocate at least 25 percent of its R&D funds to small business. A clear federal policy should be established and enforced to prohibit federal agencies from engaging in and supporting research and development projects that are competitive with or duplicative of private sector technological developments.

TECHNOLOGY TRANSFER AND PATENTS

The importance of information that is technological in nature and the transfer thereof as a driving force in innovation is well known. Knowledge provides the basis for invention and innovation; information is knowledge communicated, and it follows that information about processes, science, technology markets, etc., is the stimulant for innovation. One of the principal roles of government in this age of electronics, computers, and space exploration has been to help tap the reservoir of scientific and technical information available worldwide and deliver it to scientists, innovators and small business entrepreneurs, directly and with the aid of the private sector. It is not surprising that there is no shortage of the raw materials that make up the information stream. Patents, data, documents and literature are superabundant. It is more than likely that the documents containing the results of this intellectual effort do not reach the total audience that can capitalize on the contents. In the absence of such communication, innovation is hobbled. Besides the purely scientific aspects, it is equally important that businesses, especially small businesses, and governmental agencies, especially at the local level, have access to information about managerial and procedural innovation which may be simply new and better ways of doing things.

In the context of information, the patent system in this country serves two broad purposes. First, it spurs invention by protecting the intellectual property of the inventor who has hopes of economic rewards; and second, it requires disclosure of inventions and so diffuses information. However, it is important to note that the patent system includes only a portion of the inventions that might give rise to innovation. It omits an increasing number of important developments, either because they are not patentable or because the inventor has lost confidence in the patent system and chooses not to obtain patents. Furthermore, the system does not cover trade secrets, systems innovations, marketing innovations, or innovations in management organization and implementation, all of which have important implications for the innovative process.

Issue No. 19.—The Federal Government as a result of contracts with private companies possesses a great number of patents that may have commercial application.

Experience has shown that the government, as a purchaser or consumer of goods and services, is not in a position to take advantage of its ownership of patents to promote enterprise. Private companies, on the other hand, who are in a position to utilize the patent grant are ordinarily unwilling to take a non-exclusive license under a government-owned patent and commit the necessary funds to develop the invention, since it has no protection from competition. This is a major reason that over 90 percent of all government patents are not used.

The idea that what the government pays for belongs to the people is not only appealing, it is true. The question is: What instrumentalities can be brought to bear to maximize the possibilities that the people will indeed have available the fruits of their government's expenditures? Nonexclusive licenses to *undeveloped* inventions, offered by the government or anyone, have few takers, whereas patent ownership or exclusive licenses of sufficient duration are much more likely to attract the money and talent needed to make and market real products to meet consumer needs.

If the results of federally-sponsored R&D do not reach the consumer in the form of tangible benefits, the government has not completed its job and has not been a good steward of the taxpayers' money. The right to exclude others conferred by a patent, or an exclusive license under a patent, may be the only incentive great enough to induce the investment needed for development and marketing of products. Such commercial utilization of the results of government-sponsored research would insure that the public would receive its benefits in the form of products and services, more jobs, more income, etc. The cost of government funding will be recovered from the taxes paid by the workers and their companies, especially with regard to small business, which has demonstrated an excellent track record.

Recommended action

Legislation should be passed to give title to an invention to a government contractor, with the provision that commercialization of the invention be undertaken in a reasonable time. If such commercialization is not undertaken, the title should revert to the government, and the government should offer exclusive licenses, giving small businesses preference. Likewise, with regard to inventions made in the national laboratories, the government should preferentially license small business.

Issue No. 20.—The patent system provides both the encouragement to disclose innovative ideas by, in return, providing the innovator with temporary exclusivity to make, use or sell, and importantly, also provides the source material for technology transfer.

There is a consensus that in general the patent system has served the country well. However, the most serious problem with the patent system is the uncertainty about the *reliability* of the patent grant. Before granting a patent, the Examiner in the Patent and Trademark Office undertakes a search through the prior publications available in order to determine whether the same or like invention has been disclosed. These prior publications consist of over 4,000,000 U.S. patents, a like number of foreign patents and an untold number of literature references. Including cross-references, there are close to 20 million documents. The prior art thus available constitutes the world's greatest source of technology and is a repository for almost all scientific knowledge. However, this body of knowledge is only useful when it is available, i.e., not misplaced or missing and means are provided for ready accessibility both for the Examiner and outside innovators.

If in the course of the search for pertinent prior art the Examiner does not find art that is said to anticipate the claimed invention, the Examiner will permit the application to issue into a patent. However, if the art is not available to the Examiner because it is missing or the repository is not sufficiently extensive, a good prior art reference may have been overlooked. Should a patent get into litigation, the party opposing the patent holder will usually authorize a very extensive search to redo what the Examiner has done in an attempt to obtain better prior art. It is sad to note that most of the time better art will be discovered. As a result, the exclusivity afforded by the patent grant is ephemeral; that is what is meant by unreliability.

The Patent and Trademark Office realizes that it does not, due to budgetary restraints, possess the proper resources to provide the requisite information to its own examining corps nor does it possess sufficient information to engage in a good technology transfer program. As a result, the Patent Office has consistently put more and more of the examination process on the applicant and, when it is small business, it is that segment that can least afford it. The office has degenerated into a de facto registration patent system where the patent holder obtains a patent of questionable validity and merely possesses a license to sue.

One of the ways to encourage investment to complete the innovation process by commercializing inventions is by reducing the risks involved in decisions to commercialize. The risks of commercializing inventions can be reduced if the inventions are the subject of reliable patents and if uncertainties relating to the utilization of patent rights can be resolved quickly and inexpensively. Also, the availability of reliable patents encourages decisions to disclose inventions through the patent system; and, disclosure of inventions in patents exerts a stimulative effect on competitive R&D.

Recommended action

First of all, the Patent and Trademark Office must be upgraded by being provided with more funds than presently allocated so that a proper job can be done both as to examination and technology transfer. If re-examination of patents is instituted, it should be mandatory that a litigant who raises a defense of invalidity of a patent based on newly found heretofore unconsidered prior art should first test the assertion of invalidity in the Patent and Trademark Office, where the most expert opinion exists at a much reduced cost.

Secondly, the patent laws should be amended to recognize that reliability of patents is a keystone in the commitment of funds to carry out the commercialization of a patented invention, and that incontestability should be mandated after a period of time so as to result in absolute reliability, except in cases of fraud.

Thirdly, a viable technology transfer system should be implemented, based on expanded technology maintained in the Patent and Trademark Office with delivery thereof to small business enterprises from regional units in much the same way that the agricultural extension service operates. As part of such a program small business should be able to obtain a compulsory license through suitable proceedings in cases where uncommercialized patents block entry into new markets.

Issue No. 21—Technological innovation is the principal, and perhaps only, source of economic growth in advanced industrial societies, according to the noted economist Schumpeter. However, there must be an adequate supply of innovators, that is, people who have the requisite capability to generate and synthesize information relating to needs, opportunities, and knowledge in a form that can be empirically demonstrated.

It should be realized that people are innovators. Institutions do not create; companies, big or small, do not create. Individuals create. Yet there does not seem to be a recognition of the need to teach innovation nor alas, is proper recognition accorded creators, especially employed inventors. Ayn Rand, speaking through her protagonist in *The Fountainhead*, said:

"Men have been taught that the highest virtue is not to achieve, but to give. Yet one cannot give that which has not been created. Creation comes before distribution, or there will be nothing to distribute. The need of the creator comes before the need of any possible beneficiary. Yet we are taught to admire the second-hander who dispenses gifts he has not produced above the man who made the gifts possible. We praise an act of charity; we shrug at an act of achievement."

Recommended action

Attitudinal changes in favor of small business just now beginning must be encouraged, by providing for identification of individuals having innovation abilities, teaching innovation, and providing whatever follow-up support system necessary. There should also be established a program of insuring financial rewards to employed inventors and, very importantly, a program of tangible awards to small business innovators and to those contributing to the well being of small business.

CONCLUSION

Small business has taken very seriously President Carter's request that the climate for invention and innovation be investigated. Having identified the salient fact that invention and innovation were on a downward trend in the U.S., the National Small Business Association has undertaken a policy analysis of the institutions of government and the statutes and regulations that have a bearing on invention and innovation. Having accomplished a policy analysis, there must now follow a policy synthesis. The twenty-one recommendations presented herein for consideration when taken together and implemented are submitted to constitute that policy synthesis that will achieve increased invention and innovation overall and at the same time give a two-tier purview whereby small business is accorded special recognition due it for its past exemplary performance.

Senator BAYH. The last witness this afternoon is Mr. Howard Rose, of the Institute of Electrical and Electronics Engineers.

TESTIMONY OF HOWARD ROSE, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, WASHINGTON, D.C.

Mr. Rose. Mr. Chairman, you have met another patent lawyer.

The Institute of Electrical and Electronics Engineers, Inc., IEEE, was founded in 1884, and is the world's largest technical professional engineering society with over 190,000 members worldwide, of which 150,000 members reside in the United States.

In 1973, the Institute established the United States Activities Board, a mechanism through which the IEEE provides its perspectives to the Administration and the Congress on professional and technical concerns for its members in the United States.

The USAB is in complete sympathy with and supports the philosophy underlying S. 414, although it recommends a few changes to certain of its specific provisions.

It is the position of the USAB that the best interests of the general public, as well as the avowed Government intent of strengthening our universities and small business enterprises, can best be achieved by allowing title to inventions to rest with the entity responsible for the development, whenever the expertise, personal interest and profit motive exist in unison in that entity.

It is believed that the bill S. 414 to a large extent promotes the above policy and to that extent has the backing of USAB.

We recommend that some provisions of the bill be changed, however.

First, the statement in subsection 202(a) (ii) permitting the Government to retain title in exceptional cases is too loosely defined.

The bill should clearly state the intention of this subsection, so that relatively uniform results are achieved. Please note that the language of Executive Order 10096 governing the rights of Government employees in their inventions resulted at one time in the Navy Department—and I think it was in 1952 or 1953 when I was in the Government—retaining title to less than 10 percent and the Interior Department to over 90 percent of their respective employees' inventions. We suggest modification of section 202(a) (ii) as follows:

Replace “* * * in exceptional circumstances * * *” with “* * * in circumstances relating to the national security, the perpetuation of a monopoly, or after conclusion that the contractor is not appropriate for commercialization of the invention, and * * *”.

The "march-in" rights in section 203, as presently proposed, raise questions on the same grounds as set forth relative to subsection 202(a) (ii). The language is sufficiently vague and broad so that the intent of Congress could readily be subverted.

We suggest that the implementation regulations for this section be carefully drafted to increase its specificity and to reflect the legislative intent. We are, however, in full agreement with the general principle of such rights by the Government in order to insure that patents created in this manner are ultimately converted to a product or system for the benefit of the general public, while creating new jobs, providing additional tax income and improving our competitiveness in world trade.

Some of the provisions in section 204 relating to "Return of Government Investments" are considered unnecessary and counterproductive when applied to universities. It would appear that the Government should make every effort to provide financial assistance for institutions of higher learning for whom such sums may be significant. We, therefore, recommend: to insert in line 17, page 11, section 204, the words " * * * except institutions of higher learning * * * " between the words "organization" and "or."

The provisions permitting the funded organization to elect to retain title to inventions, to obtain patents and to grant licenses under appropriate circumstances are fully supported.

However, USAB endorses the provision requiring the employer-inventor of non-profit organizations to share in the royalty income only for the case of institutions of higher learning because of the lower salary levels of most university personnel.

Please insert: On page 9, line 11, section 202(7) (c) the words "applicable only to institutions of higher learning" between the words "requirement" and "that."

Salary levels of other nonprofit organizations are usually quite competitive with industrial salaries for research activities, and therefore, do not require such a subsidy.

Otherwise, this might create undue competition with industrial employers, possibly resulting in inflationary pressures on salaries.

I would like to explain this latter portion here in the following light: The IEEE is interested in seeing a policy adopted by the Federal Government that at least somewhat parallels that being used in Germany today which requires employees of companies regardless of whether they are government contractors or not, to share in the profits of inventions. ✓

Our basic objection here is that the bill singles out a very narrow group for such treatment and leaves the rest of the industry alone, and, therefore, at a competitive disadvantage. This fact is particularly onerous to small corporations or small businesses which are always struggling in competition with the larger corporations and some of the nonprofit organizations for competent employees.

With your permission, Mr. Chairman, I would like to read into the record excerpts of a letter I wrote to the Honorable Gaylord Nelson in May 1978 concerning the activities of the Monopoly and Anticompetitive Subcommittee amendment No. 187 to the Federal Procurement Regulations. That amendment was intended to accom-

plish many of the things that this present bill is attempting to accomplish and Senator Nelson asked that the implementation of the regulations be held in abeyance until he could hold hearings on the bill.

I became acquainted at the time with Mr. Gerald Sturgis of the staff of his subcommittee and I wrote this letter basically at his request.

I don't intend to read it all but I would like to read certain excerpts if I may.

Mr. Rose. I indicated that the IEEE has become increasingly concerned in recent years with the decline in technological growth of this country and loss of preeminence in the field of science. The Institute has thus taken an increasingly active role in supporting programs and policies which are calculated to restore a fertile climate for innovation in this country and which in fact will accelerate the base on which technology is developed. In support of this effort, the Institute has supported programs that it believes will promote such goals as well as opposing programs believed to hamper them.

The Institute believes that the source of all creativity is the individual and that the individual will disclose and develop his or her inventions if sufficient benefit can be determined.

Thus, the Institute supports programs that reward inventors, and which leave avenues of financing open for development of their ideas. In this latter context it is essential to destroy the myth that important inventions result substantially only from the efforts of big business, and that the retention of rights by Government contractors and inventions made under Government contracts will only benefit such companies usually at the expense of the public. Such a philosophy in effect denies Federal funding of inventions to individuals, universities, and small business.

As indicated above, the Institute is concerned with increasing the rewards received by individual inventors as a result of their creativity. This concern is shared by many highly placed individuals both in and out of Government.

Reference is made to testimony by Admiral Rickover before the 87th Congress wherein he stated that one of the two major problems facing the patent system is how to increase incentives for inventors who get no benefit whatever out of the patent system as it has evolved. We might well consider whether we ought not go back to the original intent of the Constitution and devise some reward for inventors whether they are Government or industry employees. If the Government acquires title to inventions as a result of federally-funded R. & D.—about \$26 billion in 1978—a large segment of Americans are henceforth denied any opportunity to participate in the rewards of their inventiveness. The contractor receives no reward for inventions so nothing is available to pass on to the inventor. Both the inventor and the contractor lose interest in disclosing inventions.

In this context, it should be noted that over the period 1970 through 1976 total invention disclosures to Government agencies from Government contracts fell 30 percent from a high of 7,900 in 1970 to 5,500 in 1976.

This is an interesting number. If you take the 1978 number of \$26 billion and discount it for 2 years of inflation by 15 percent you are

still well over \$20 billion spent for R. & D. in 1976 which produced a disclosure to the Government of only approximately 5,500 inventions.

There are roughly 50,000 patents issued in the United States each year and yet we have a return on one-half of the total R. & D. funds, expended in this country each year of only 10 percent of the number of patents issued. This fact can only mean one thing, the contractors are not disclosing their inventions to the Government.

The above figures also raise another point, and I refer to Admiral Rickover's reference to patent attorneys. It would be far simpler for us to raise our fees 10 percent than to come down and battle Congress for the 10 percent of the inventions acquired by the Government. I don't think that we have that much of an ax to grind here.

Continuing, it is well-known fact that the United States has fallen to sixth in the number of patent applications filed by its nationals on a per capita basis. The reasons for this are not fully understood but the decline in U.S. preeminence in technology is apparent. It is clear that closing the door on the hopes of the engineering and scientific community of acquiring greater benefits from its labors will only further exacerbate an already potentially dangerous situation.

I would like to get just one more paragraph in here from this letter. Much of the opposition to contracts requiring title to inventions to rest in the Government results from the assumption that the policy inherent therein, returning the rights to the business, is good for big business and detrimental to small business. The essence of this thesis is that most inventions are derived from big business and that small businesses do not contract with the Government.

As to the first point, such recent major inventions as computers, xerography, the instant pictures, optical character recognition, magnetic core memory, lasers, penicillin, jet engines, zippers, preshrunk fabric, color photography, bakelite, cellophane, cross-section X-ray, foam rubber, mercury dry cells, just to mention a few, were inventions either of private individuals or universities. Most of these or many of these certainly ended up as big corporations, but they started with inventions of individuals or universities.

The fact is that big business will tell you they are no longer in basic research and are interested in new products only after they show promise. The new work is coming from small business to a very large extent and from individuals. But I think that in that context it might be very interesting to have a panel here of Admiral Rickover and a man by the name of Jacob Robinson who is a very prolific inventor holding in the neighborhood of 210 to 220 patents in his own name, and who has made a fortune in his own right with his patents as an individual and in companies he has formed.

They are directly opposite to one another in their total view of what an exclusive right in a patent can do and what the patent system can do for an individual for small business.

The one aspect of Government contracting which is not in the bill and which frankly I had hoped would not be raised relates to background patents. Many small businesses will not go to the Government, not so much because they can't get rights in what they do for the Government but because of the tremendous fear that they have spent x number of years and y number of dollars in developing a proc-

ess or product and that the Government will obtain rights thereto. If the Government gives them a contract to develop this idea process, product, etc. and takes title to the invention or even leave it with the company but acquires rights in their background patents a competition has been established.

Very often you don't want to license; you want exclusivity. You do not want to give anyone the right to come in. We have a lot of problems today in the small business community, and I represent mostly small businesses, in raising money. Increasingly, we have to go abroad to get money. Increasingly, foreign corporations and individuals are acquiring control over some of these small technology companies.

The investment capital in this country has to a great extent dried up. However, when you do find it, one of the first things these people ask you is, "Do you have exclusive rights to your patents?" There are many things that can be developed, no question about it, without the exclusive rights, but if you have something worthwhile that will take a good deal of money to develop, the exclusive rights are important.

The backers, the investment community, want to see those rights. Senator BAYH. Thank you very much.

Mr. ROSE. I will be happy to answer any questions you may have.

Senator BAYH. You said that you represent a great number of small companies.

Mr. ROSE. Yes.

Senator BAYH. What has been your experience with small companies becoming involved with Government research and development programs?

How would you advise one of your clients if he asked you whether under the present patent policies he should seek a Government contract?

Mr. ROSE. Well, the companies that have truly an innovative concept, I have always strongly advised to stay away from Government contracts. I have discouraged it and have used every influence I have to keep them out of Government contracting until they have sufficiently developed the product that they were able to get into the market on their own. At that point, taking a Government contract is not that detrimental, but never—if they can possibly afford it—never take a Government contract while the project is still in the development state.

Senator BAYH. Why?

Mr. ROSE. Because of just this sort of thing. If you take a Government contract and you happen to make a significant invention, and you are much more likely to make a significant invention before you have gotten the product to the market, then the Government takes title or has march-in rights.

They then acquire your background patents and you may have put \$500,000, \$750,000 or more into the technology which resulted in these background patents.

You do not want anyone licensed under those patents, but under the Government background right, you can—a competitor can acquire a license under the regulations as they are now drawn.

Senator BAYH. Do you have specific examples where this has happened, where it has been detrimental to small businesses?

Mr. ROSE. Yes, I had one with a company up in Long Island where they had spent quite a bit of money of their own, well over \$1 million, and then took a Government contract and we suddenly found the machine at Livermore—one of our machines that they had built with the information they had acquired from us during the contract—and there was the machine. They had acquired the information under the data clause and this, of course, is the other aspect of it, the data aspect. We did acquire a one-shot royalty out of them under the patent, but the data was out and they had it and used it.

We received a small return at a time when the company was having financial troubles, and the order for that machine would have made a great deal of difference.

I have had other companies that have run into severe financial trouble because of Government contracts, but that is basically a different story and is not directly related to the patent aspect.

Senator BAYH. Well, Mr. Rose, I appreciate your testimony and the interest shown by the IEEE. I hope that we can rely on your personal experiences and the experiences of your members to try to work on this legislation and move through the Congress with a bill that will be the best possible piece of legislation.

Mr. ROSE. We are available at any time, Mr. Chairman.

[Mr. Rose's letter to Hon. Gaylord Nelson previously referred to follows:]

MAY 15, 1978.

HON. GAYLORD NELSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR NELSON: Reference is made to a recent conversation between Mr. Gerald Sturgess of your staff and Ms. Dorothy Bomberger, Program Manager, United States Activity Board, of the Institute of Electrical and Electronic Engineers (IEEE) concerning hearings to be held by your Monopoly and Anti-competitive Activities Subcommittee on Amendment No. 187 to the GSA Federal Procurement Regulations. This letter is written in response to Mr. Sturgess' suggestion that the Institute submit its views on the rights of Universities in inventions made pursuant to research funded by the Federal Government.

The IEEE has become increasingly concerned in recent years with the decline in the technological growth of this country and its loss of preeminence in the field of science. The Institute has thus taken an increasingly active role in supporting programs and policies which are calculated to restore a fertile climate for innovation in this country and which in fact will accelerate the pace at which technology is developed.

In support of this effort the Institute has supported programs that it believes will promote such goals as well as opposing programs believed to hamper them. The Institute believes that the source of all creativity is individuals, and that the individual will disclose and develop his or her inventions if he or she can benefit from such. Thus, the Institute supports programs that reward inventors for their inventions and which leave all avenues of financing open for development of their ideas. In this latter context, it is essential to destroy the myth that important inventions result substantially only from the efforts of big business and that the retention of rights by Government contractors in inventions made under Government contracts will only benefit such companies usually at the expense of the public. Such a philosophy in effect denies federal funding of inventions of individuals, universities and small business.

RIGHTS FOR INVENTIONS

As indicated above the Institute is concerned with increasing the rewards received by individual inventors as a result of their creativity. This concern is shared by many highly placed individuals both in and out of Government. Refer-

ence is made to testimony by Admiral Rickover before the 87th Congress wherein he stated:

"... one of the two major problems facing the patent system is how to increase incentives for employed inventors who get no benefit whatever out of the patent system as it has evolved. We might well consider whether we ought not to go back to the original intent of the Constitution and devise some reward for inventors whether they are government or industry employees."

If the Government acquires title to all inventions stemming from federally funded R & D, about \$26 billion in 1978, a large segment of the Institute's members are henceforth denied any opportunity to "participate in the rewards of their inventiveness." The contractor receives no award for inventions so that nothing is available to pass on to the inventor. Both the inventor and the contractor lose interest in disclosing inventions. In this context it should be noted that over the period 1970 through 1976, total invention disclosures to Government agencies from Government contractors fell 30% from a high of 7,896 in 1970 to 5,537 in 1976. However, the invention disclosures in which the Government acquired only a license fell from 1279 in 1970 to 1115 in 1976, a decrease of only 15%.

It is a well known fact that the U.S. has fallen to sixth in the number of patent applications filed by its nationals on a per capita basis. The reasons for this phenomena are not fully understood but the decline in U.S. pre-eminence in technology is quite apparent. It is believed that closing the door on the hopes of the engineering and scientific community to acquire greater benefits from its labors will only further exacerbate an already potentially dangerous situation. Men have not, so far as this writer is concerned, changed their views concerning their rights in property since 1795 when Mr. Justice Patterson of the United States Supreme Court stated "Men have a sense of property . . . The preservation of property . . . is a primary object of the social compact."

THE PRIVATE INVESTOR—TECHNOLOGICAL BREAKTHROUGHS

Much of the opposition to the Regulations results from the assumption that the policy inherent therein is good for big business and is detrimental to small business. The essence of this thesis is that (1) most important inventions are derived from big business and (2) small businesses do not contract with the Government. As to the first point, such recent major developments as xerography, instant pictures, optical character recognition, magnetic core memories, vacuum tubes, F.M. radio, lasers, penicillin, jet engines, pre-shrunk fabrics, zippers, color photography, bakelite, cellophane, foam rubber, cross-sectional X-ray imaging apparatus (CAT), mercury dry cells (later perfected under Government funds) to name a few, were the inventions of private individuals or universities. Many of the individuals founded small companies to develop their inventions. A large number of the above listed inventions were developed to some extent or another with the use of Government funds with the patents remaining with the contractors. Would these individuals have sought Government money if all of the resulting patents had been assigned to the Government? And if not, how many years would the public's benefit from the inventions have been delayed?

To deny any institution, company, group or individual, regardless of circumstances, the rights to their Government funded inventions is a drastic measure which will stultify the development of inventions. Regardless of statements to the contrary, the significant inventions are the work of small companies and individuals. The large corporations have abdicated this role to a great extent; they have publically stated that they no longer do research and only step in when a product has shown promise.

True, each of the aforementioned products has produced or ended up in a large corporation, but one must wonder what would have happened to those inventions if patent protection were not available. Would an individual dedicate five, ten or more years to a product if others could reap the benefits of his efforts and sacrifices. As a very recent example, the presently most effective oil slick pick-up apparatus is the work of one man who dedicated seven years of his life before he realized a profit.

As to other products actually developed and introduced by small companies, massaging showers were introduced to the market place by a very small company that developed considerable know-how in the field of fluid technology under gov-

ernment contracts. High powered machines for commercial irradiation of plastics and for sterilization of medical supplies were developed by a small company partly with government contract funds.

It is believed that the above facts go a long way to refute Admiral Richover's statement to this subcommittee that "most of the major advances in technology in the past 20 years have come in areas where Government invested heavily, such as space, defense, and nuclear energy". It would appear more appropriate to say that most of the advances in hardware, of the type in which essentially only the Government has any interest, has been funded by the Government. This is as it should be, but even then the Government usually buys its hardware from the contractor who did the R & D. Yet, much of the opposition to the Regulations on Capital Hill and elsewhere appears to stem from the belief that the Regulations go too far in the direction of allowing profit-making firms to benefit from federally funded research. However, only profit motivated companies will bring the results of such research to the general public. Well known instances of federally funded R & D benefiting the public through the auspices of the Government contractor are: Corning ware through Corning Glass, massaging showers, aircraft in general, airport ground control, computer industry through UNIVAC, atomic energy through Westinghouse, radio through RCA which started as a Government laboratory in World War I, magnetic seals on refrigerators and many, many more.

LICENSING

Numerous representations have been made for and against the necessity to grant exclusive licenses to insure the development of a product in this country. In the twenty-four years that this writer has been actively engaged in licensing inventions, he has encountered many instances where non-exclusive licenses were quite saleable and many others where only exclusive licenses could be sold. The type of license that can be sold in any given situation is determined by many factors, including the funds required to be invested in developing or marketing the product and the ease with which the product can be copied. The larger the monetary requirements and the more readily the product can be copied, the greater the pressure for exclusivity. Further, in such cases the cost of bringing the product to the market place to the Company that did the ground work in the particular area involved may well be less than to others in the field. It would appear that the prime concern to the Government should be to have the invention reach the market place at the least possible cost to the public which, after all, pays all the bills in the long run.

BALANCE OF PAYMENTS

The above statements, as indicated, apply to the U.S. They do not apply, however, to foreign countries. Companies in Western Europe, in particular, require exclusivity. They want exclusive use of know-how and exclusive rights under patents. Without these they will for the most part go their own way which often includes using U.S. inventions not covered by foreign patents. With the balance of payments of the U.S. constantly running in the red, large losses of foreign source income resulting from reduced sale of technology abroad only adds to the problem. Foreign companies are willing to pay large sums for U.S. know-how and inventions. A very small company of which the writer is aware is presently engaged in preliminary discussions with a European company concerning transfer of exclusive rights to know-how and European patents rights for a single product having a sale price to the user of about \$3,500. The payment for such rights will include an initial payment in the neighborhood of \$2 million, plus a royalty on sales. Without the foreign patent rights this sale could not be consummated.

It is believed that by forever denying inventors, institutions and companies any opportunity to benefit from inventions made under Government contracts the U.S. decline in technology will be accelerated and one of his countries major exports will be seriously impaired. It must be remembered that if the U.S. is not exporting technology, it is importing it.

It is requested that this letter be spread on the record of the aforesaid hearings.

HOWARD L. ROSE,
Task Force Leader—Patents,
U.S. Activity Board, IEEE.

Senator BAYH. Thank you for taking your time to be with us today.
We will recess our hearings at this time.
[Whereupon, at 1:13 p.m., the subcommittee was adjourned, subject
to the call of the Chair.]

APPENDIX

PART 1. ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

STATEMENT OF THE TASK FORCE ON PATENT LEGISLATION OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, NATIONAL ASSOCIATION OF MANUFACTURERS

The National Association of Manufacturers (NAM) is a voluntary membership organization of more than 12,000 companies and is affiliated with an additional 158,000 businesses through the National Industrial Council encompassing all sizes and classifications of industry in every state. Together these companies which NAM represents produce approximately 80% of the goods manufactured in the United States. Among NAM memberships, some 80% can be classified as small businesses.

Most of our members use and rely on patents in one form or another, and the NAM has long had an official written policy on patents, which reads as follows:

"The patent laws of the United States have contributed greatly to the high standard of living of our people and to our world leadership in modern technology. The incentives of our American system of patents are vital to our continuing industrial growth as well as to the establishment and success of new ventures. The property represented by a valid patent should stand before the law on a par with other property and should be accorded the same legal protection. In keeping with these principles, and in order to encourage prompt use of worthwhile inventions, the rights of patent owners to license their patents in whole or in part, for specified territories, times, amounts or uses, must be preserved in the public interest, but we are opposed to compulsory licensing as destructive of the "exclusive right" which is the entire property secured by a patent under the Constitution."

Thus, the NAM, as the leading association of manufacturing companies, is unequivocally supportive of the patent and its owner(s).

In considering the whole area of patents—and cutting through the sometimes intractable legal technicalities that often attend the matter—we are impelled to go back to the 1966 Report of the President's Commission on the Patent System, "To Promote the Progress of . . . Useful Arts—In an Age of Exploding Technology." The phrase "to promote the progress of . . . useful arts" is of course derived from the great Constitutional mandate concerning patents. That is undisputed. And we cannot but be even more aware today that if 1966 was "an age of exploding technology," then surely we are now in an era in which that phrase has taken on more force than ever over the past 20 or more years.

Yet, as we read that Commission report then, and again as we read it today, there is one phrase therein that seems to have an almost prescient connotation. On page 2 of that Commission report, we read:

"The members of the Commission unanimously agreed that a patent system today is capable of continuing to provide an incentive to research, development, and innovation."

We would draw that conclusion today more emphatically than ever—surely, we are more seriously and urgently faced with a need to stimulate and encourage invention and innovation to meet national and international needs. We are more than ever pressed to improve our productivity from inventions so that we can maintain—let alone improve the standard of living for everyone, and, even more urgently to control and dampen inflation. Since publication of the Commission's report on patents, there have been many attempts to legislate a general revision of the patent law.

In light of the need for certain revisions of Section 35 of the U.S. Code, we applaud in general the bill (S. 414) that you have introduced as seeking to address a specific and continuingly controversial issue.

We have noted that of the 28,000 to 30,000 patents owned by the Federal government, something less than 4% (according to some reports) have been

licensed to private producers. This represents an unacceptable stagnation of undeveloped technology in a nation in which there is an apparent slowdown in innovation. It is especially serious when there is extensive evidence that U.S. manufacturing industry, and particularly its small elements, have proven capability to move quickly and very creatively in successfully innovating.

Many studies have been completed which underline how successfully small companies can contribute their innovative capabilities to social and economic benefits to the nation. In a report, entitled "Small Firms and Federal R&D," by the Office of Federal Procurement Policy Interagency Task Force, Office of Management and Budget (1977), several conclusions were drawn that are worth considering:

Small firms have compiled a striking record of innovation in the private sector. Firms with less than 1000 employees accounted for almost one half of major U.S. innovations during the period 1953-1973.

The ratio of innovations to R&D employment is four times greater in firms with less than 1000 employees than in larger firms.

The total cost per R&D scientist or engineer is almost twice as great in firms of more than 1000 employees than in smaller firms.

Yet, as the report says, in spite of that record in innovation and lower cost, small business received only 3.5% of total Federal R&D.

Reaffirming such conclusions about the efficiency and effectiveness of small companies in innovating is a finding from "Science Indicators, 1976," published by the National Science Board. In its chapter on "Industrial R&D and Innovation," the report states:

"[The small high technology] group of research-based enterprises accounts for a small portion of total industrial R&D spending. However, they are responsible for a substantial contribution to science and technology and are considered by many to be more efficient performers of research and development than large companies.

"Moreover, there is some evidence that such companies are also more effective in producing new jobs. A sample group of five 'young high-technology companies' was found to increase its aggregate sales at a rate of 43% compounded per year, from 1969 to 1974. In the same interval, six 'mature companies' increased their sales by 11% per year. However, employment in the young companies increased by 41% per year during that time, while that in the mature companies increased only 1%."

Of course, such figures are not fully conclusive of any dominant role of small companies in the technological process. Science Indicators finds that "large companies" (those with 10,000 or more employees) produced the greatest proportion of major innovations, followed by firms in the two smallest size categories (up to 100, and 100 to 1000 employees). The data also show that the number of innovations from large companies has increased over time, in both absolute and relative terms. On the other hand, if all firms with up to 1000 employees are called "small firms," then small firms produced more major innovations than large firms in the 1959-59 and 1960-66 periods, and an equal number in the 1967-73 period. *Overall, however, the distribution of innovations by company size does not change greatly from one time period to another.* (Emphasis added.)

It is worth stating here that innovation does not derive from research and development alone. Innovation requires much more—beginning with the recognition of a marketable product, followed by the decisions to begin the processes of tooling, manufacture, and finally marketing. It is the decision to go forward with these processes that requires the commitments of large sums of money. As "Science Indicators" rightly points out, "It is conceivable that larger firms have fewer major innovations per R&D dollar because they produce the more expensive ones. It may also be that larger firms tend to produce minor rather than major innovations, e.g., small improvements that reduce the cost of high-throughput manufacturing processes rather than completely novel products."

Finally, the Comptroller General of the United States, Elmer B. Staats, who is examining what improvements could be made in the climate for innovation, took patents as an example of whether Federal funds are being spent wisely in the public interest, such as to stimulate innovation. "Some government officials," Mr. Staats says, "believe that patents derived from federally funded R&D must be owned and controlled by the Government. However, in most cases, the public interest may best be served when private industrial contractors, with a few provisos, are granted exclusive licenses for commercial development."

The NAM concurs in many of these findings and conclusions. In fact, the NAM's patent policy further states concerning patent rights under government research and development contracts:

"The incentives of the American system of patents are vital to our continuing industrial growth and leadership in modern technology. Consequently, it should be the basic policy of the Federal Government as to its contracts for research and development that the contractors should retain the commercial and foreign rights in inventions made in the performance of the contract subject to a royalty-free, non-exclusive license to the Government for governmental purposes; provided that any such license not convey any right to the Government to manufacture or use any invention for the purpose of providing services or supplies to the general public in competition with the contractor or the contractor's commercial licenses in the licensed field."

While the NAM notes the very important contribution that small companies can and do make to innovation, our policy concerning patent rights under government research and development contracts makes no distinction between large and small companies.

Consequently, we feel that S. 414 does not go far enough when it limits its provisions to universities and small business. Many of the provisions of Sec. 200. ("Policy And Objective") of S. 414 state objectives that would be no less encouraging and applicable to companies larger than those defined in section 2 of Public Law 85-536 (15 U.S.C. 632) and the implementing regulations of the Administrator of the Small Business Administration.

We would certainly concur with the objective "to encourage maximum participation of small business firms in federally supported research and development efforts", but the exclusive of larger companies from such policies and objectives of the bill as: to promote collaboration between commercial concerns and nonprofit organizations, including universities; to promote the commercialization and public availability of inventions made in the United States by industry and labor; would seem to us to be too narrow an objective when larger companies have the capability for successfully furthering such laudable objectives. In the 95th Congress, then Congressman Ray Thornton introduced a bill—H.R. 6249, "The Uniform Federal Research and Development Utilization Act of 1977"—which took a much broader approach to the need for commercialization of the results of federally sponsored scientific and technological research and development. We would tend to favor legislation that incorporates many of the policies and objectives of S. 414 but that would extend their applicability beyond small business and universities to include all companies—whatever their size.

In the recent Domestic Policy Review of Industrial Innovation instigated by President Carter and conducted by the Department of Commerce, seven issues were addressed as having an impact on innovative processes. Among those seven issues was patent policy. The Draft Report (dated December 20, 1978) of the Advisory Subcommittee on Patent and Information Policy of the Advisory Committee on Industrial Innovation, established as part of the Domestic Policy Review, draws some important conclusions about transfer of commercial rights to government-sponsored research to the private sector. In proposal V of that document, the following is stated:

"The idea that what the government pays for belongs to the people is not only appealing, it is true. The question is: What instrumentalities can be brought to bear to maximize the possibilities that people will indeed have available the fruits of their government's expenditures? Nonexclusive licenses to *undeveloped* inventions, offered by the government or anyone, have few takers, whereas patent ownership or exclusive licenses of sufficient duration are much more likely to attract the money and talent needed to make and market real products to meet consumer needs." [Emphasis in original.]

Further, the report stated that:

"If the results of federally sponsored R&D do not reach the consumer in the form of tangible benefits, the government has not completed its job and has not been a good steward of the taxpayer's money. The right to exclude others conferred by a patent, or an exclusive license under a patent, may be the only incentive great enough to induce investment needed for development and marketing of products. Such commercial utilization of the results of government-sponsored research would insure that the public would receive its benefits in the way of products and services, more jobs, more income, etc. The cost of government funding will be recovered from the taxes paid by the workers and their companies."

Thus, all members of the Advisory Subcommittee on Patent Information Policy "recommend transferring the patent rights on the results of government sponsored research to the private sector for commercialization." We might note here that the Advisory Subcommittee not only make proposals that very closely parallel many of the provisions of S. 414, but the Subcommittee makes no distinction among members of the private sector as to size. It is not inconsistent with the basic objectives of NAM policy on this score.

What may eventually be a subject of considerable controversy in S. 414 are the provisions in Sec. 204. ("Return Of Government Investment.") These provisions would require payments back to the government by the contractor for amounts of money that the government initially invested through the contract. The contractor is permitted a certain level of commercial success before the payments have to be made to the federal government.

We can understand that these provisions may represent an attempt to counteract the inevitable charges of critics of such proposals as are contained in S. 414 that conveying to contractors patents rights in federally funded projects are no more than a "give-away" of government property.

The intent of NAM policy would generally conflict with such a "payback" provision. We would see such payments as not only a penalty against the party willing to invest in and commercialize an invention but could well discourage the considerable effort and cost and risk involved in bringing inventions to the marketplace. We would hope that the reason for the original government contract had been justified for the benefits received under the contract itself and therefore, the government should not need the additional benefits from that contract represented by the return of investment in subcontract to an innovator who would use the inventions. The real payback is the Federal income tax automatically levied on the profits attributable to the invention.

SUMMARY

In summary, the NAM would generally support the University and Small Business Patent Procedures Act (S. 414) as we favor any sound legislation that is aimed, even in part, at bringing about a coordinated, and unified government-wide policy.

We would strongly support legislation that seeks to bring patents derived from federally-sponsored research and development programs into the private sector so that they can be commercialized to the benefit of our society as a whole.

However, we respectfully urge you to broaden the provisions of S. 414 to encompass all business enterprises, whatever their size. And, we would recommend that the provisions for return of government investment be reconsidered as being counterproductive to the laudable policies and objectives of the legislation.

IMPROVING INNOVATION IN THE UNITED STATES: A SMALL BUSINESS VIEWPOINT

(A Statement to the Conference on Small Business and Industrial Innovation: Federal Policy Priorities, Held Jan. 4-5, 1979, by Harold K. Lonsdale, President, Bend Research, Inc.)

The success of the American economic system is due in large part to the incentives and rewards the system provides. Evidence for this abounds: a comparison of the standard of living in the United States with that in relatively incentiveless Russia provides an excellent example. Yet, the incentive system in our country is on the wane. We seem to be following the pattern established in England wherein incentive is giving way to security. Most American industries now provide to all of their employees what once would have been considered cradle-to-grave security: Medical plans, pension plans, and the like. While there is much to be said for such security, it does not breed the adventuresome spirit that got us where we are today. Without reducing our security, we should restore and strengthen the incentive system.

A real bastion of incentive in our country is the small, new business, particularly the new high technology company. Our innovators frequently start or are drawn to these businesses. And until recent times at least, these businesses have been inordinately successful, in part because of the direct relationship between

effort and reward. The so-called Charpie Report¹ is replete with examples illustrating the fact that independent inventors or small R and D firms have led to a highly disproportionate share of the important innovations of the 20th century. This is almost uniquely an American phenomenon. It is exceedingly difficult to begin high technology companies almost anywhere else in the world. We can safely conclude that there is a strong correlation between the strength of new, high technology companies and innovation in our country.

Since the Second World War, the genesis and growth of these new companies followed a similar pattern: the inventor envisioned some new product, process, or service. Until the early 1970's the inventor could interest investors in his idea, raise capital by giving up some equity in the new enterprise, and be on his way. However, three factors have completely altered this situation in recent years: changes in tax laws, changes in SEC regulations governing the sale of shares in new issues, and inflation. It is now virtually impossible to find venture capital, and it is frequently necessary for the inventor to relinquish control of his company to acquire the necessary capital, thus reducing his incentive.² Increasingly, therefore, these entrepreneurs are turning to the U.S. Government for contract R and D funds in order to sustain their organizations while they try to develop their ideas internally. At best, this is a much slower path to success. But the probability of success is also diminished, because the Government usually insists on obtaining background patent rights before a contract award is made.³ In trading away these patent rights, the high technology company suffers a serious blow to its incentive. Vesting the rights in the Government seems to do no one any good. Where does this leave us? Consider our firm, Bend Research, as an example.

Bend Research was started in 1975 as a contract R and D company. We did not start with a single new product/process/service to offer, but rather with a number of ideas in several areas. One of these is a new method for recovering and concentrating metal ions from solution, a process expected to find application in extractive metallurgy, pollution control, and elsewhere. We call this process "coupled transport". A second area in which we are in the early stages of innovation is controlled release" formulations of biologically-active agents: pesticides pheromones, pharmaceuticals, and other agents. Despite being highly undercapitalized, we have experienced a 40% annual growth rate, typical of young, high technology companies.⁴ Our principal client is the U.S. Government, but we are supported by private industry as well, by firms in the United States, Japan, Germany, England, and elsewhere.

Consider the "coupled transport" process. This idea was conceived of by us independently, but to obtain Government support for its development we assigned our rights to U.S. patents to the Government. We were granted foreign rights. Now, after three years and several hundred thousand dollars of R and D effort, the process is approaching practical reality. We have explored commercialization with more than ten U.S. companies, most of them in the mining industry. Not one expressed strong interest, principally because we could not offer them exclusive rights. We have found one interested firm: in Japan. We are in position to offer them patent rights in their country, and they have taken a favorable aggressive position in their pursuit of commercialization.

If this case can be taken as representative, it would appear that the present U.S. system encourages export of our technology, with its probable ultimate return under a foreign label. There is a straightforward solution to this problem: grant to the inventor some form of exclusive U.S. rights, perhaps in exchange for a royalty. The inventor can then offer exclusivity to U.S. firms or pursue the development independently with venture capital. This would keep the innovation here in the United States.

¹ "Technological Innovation: Its Environment and Management," Department of Commerce, 1967, Report of the Panel on Invention and Innovation.

² "Brother, Can You Spare \$100 Million," *Forbes*, Nov. 15, 1975, p. 22.

³ "Report of the SBA Task Force on Venture and Equity Capital for Small Businesses," U.S. Small Business Administration, Jan. 1977, p. 13.

⁴ An encouraging exception to this rule is the recently introduced Small Business Innovation Program of the National Science Foundation. Small, technological companies awarded grants under this program were allowed to retain patent rights on their inventions in order to attract outside capital.

⁵ "The Role of New Technical Enterprises in the U.S. Economy," A Report of the Commerce Technical Advisory Board to the Secretary of Commerce, January 1976, p. 2.

On the other side of the coin, the policy of vesting patent rights in the Government is clearly ineffective. Shown in the attached figure is a plot of the number of Government-owned U.S. patents available for licensing, and the number licensed, vs. time.⁶ Utilization of this patented technology has been minuscule. Less than 5% of the patents available for licensing have been licensed, and the number of U.S. patents licensed did not increase in the twelve year period 1963-1975, even though the number available for licensing doubled in the same period. These facts were no doubt instrumental in the current attempts in the U.S. Congress to drastically alter our patent policy. We refer here to the so-called Thornton-Teague bill, H.R. 6249, and the bill introduced by Senators Dole and Bayh,⁷ both introduced in the 95th Congress. U.S. Patent policy is also one of the subjects being taken up by the Committee on Intellectual Property and Information of the Federal Coordinating Council for Science, Engineering, and Technology. We feel that it is best to vest patent rights in the hands of investors and developers, those people who have labored with the idea from the beginning and who will best champion its further development and commercialization.

There are other ways in which the necessary incentives to the entrepreneurs could be established and strengthened. Some of these are amply described in the "Norris Report."⁸ Our own list of recommendations of aids to the innovative small business includes the following:

(1) Make venture capital easier to get. We have briefly touched on this subject and it is fully explored and several useful remedies are proposed in the Norris Report.

(2) Reduce the number and complexity of government regulations that small businesses must deal with. The Norris Report also treats this matter, in a creative way. As noted there, these regulations do sap our valuable management time, and we can ill afford to create a government affairs office. (At Bend Research, we were in business for three years before the number of our employees exceeded the number of regulatory posters on our bulletin board.) Dr. Jerome Wiesner, president of M.I.T., summarized the situation nicely recently: "What we need, and what the country now needs, is regulation of regulation."⁹

(3) Allow us to make a reasonable profit on Government contracts. Government agencies typically permit 7 percent of the price of a contract as a "fixed fee" or profit on R and D contracts. They do not pay for interest on borrowed money. However, it is necessary to borrow money because the Government pays in arrears, by anything from 30 to 80 days in our experience. With bank interest rates now well in excess of 10 percent, we are left with precious little profit after servicing our debt and after other necessary but unallowable expenses are paid.

(4) All of the above issues combined, however, are not equal to our need for U.S. patent rights. Granting us these rights need not be the "federal giveaway" program that has been charged.¹⁰ A royalty arrangement could be worked out whereby the Government is ultimately reimbursed for its investment. Why does the Government support R and D in the first place? Excluding our defense requirement, it does this presumably to strengthen the American economy through the development and introduction of new technology. The principal return to the Government should come from the income taxes paid by the new industries it helps to create. There is no reason, however, why royalties could not be paid to supplement this internal balance of payments. The alternative to allowing small innovative businesses greater patent rights, in our opinion, is continued flight of new technology away from its inventors and their principal supporter (Uncle Sam) and to our foreign economic competitors.

⁶ "Report on Government Patent Policy," Combined Dec. 31, 1973 through Dec. 31, 1976, Federal Council for Science and Technology, U.S. Government Printing Office, Washington, D.C., p. 405.

⁷ Science, vol. 201, Sept. 29, 1978, p. 1194.

⁸ "Recommendations for Creating Jobs through the Success of Small Innovative Businesses," a report to the Assistant Secretary of Commerce for Science and Technology, December, 1978.

⁹ Chemical and Engineering News, Dec. 11, 1978, p. 34.

¹⁰ Chemical and Engineering News, Jan. 2, 1978, p. 15.

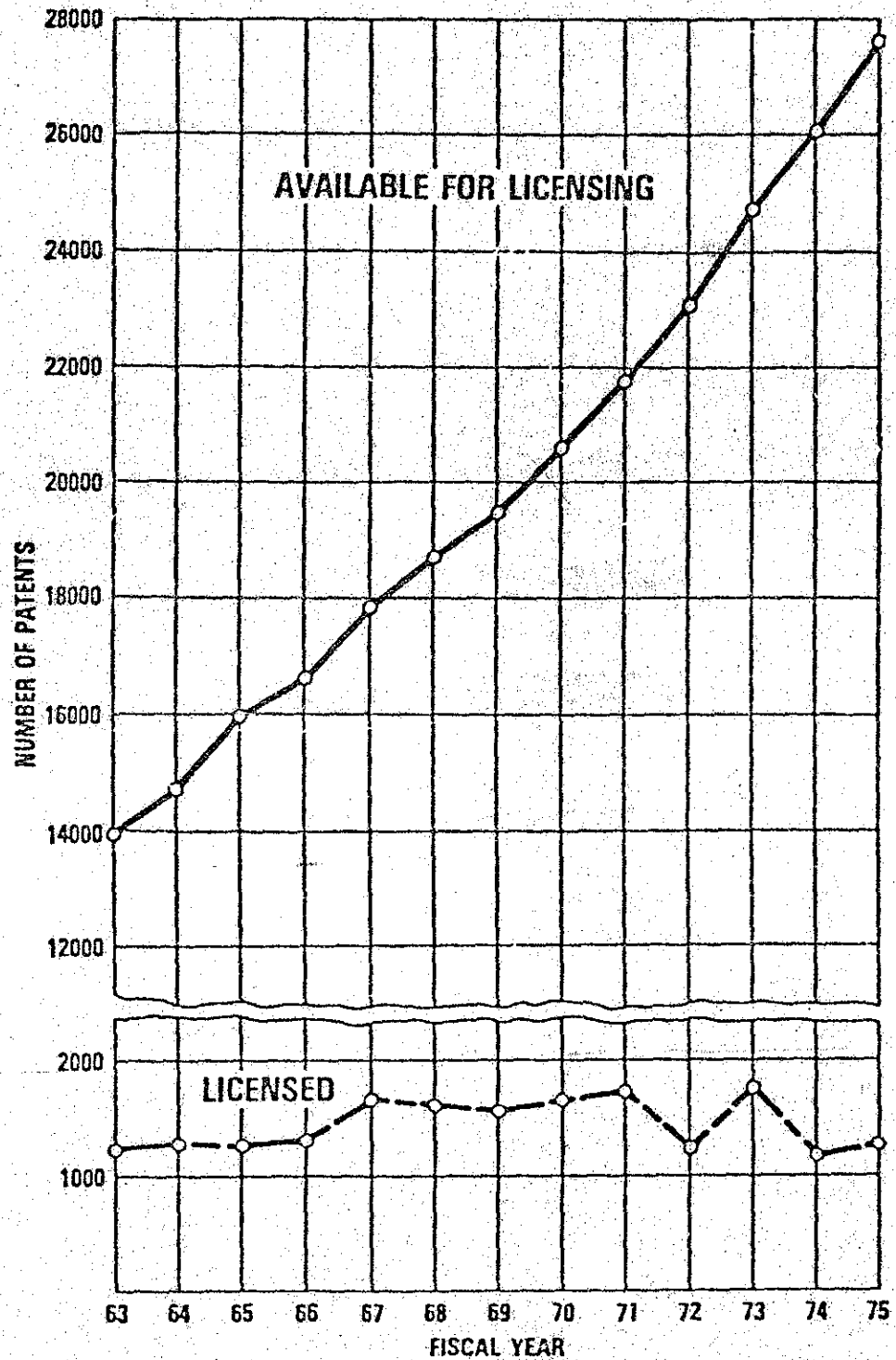


FIGURE 10. Government-owned unexpired U.S. patents available for licensing, and number licensed, at end of fiscal years 1963-75 (derived from Table I, Section VI.A.).

TECHNOLOGY CHANGES IN INDUSTRY

(By Walter Larke Sorg, President, The Xelacomm Group)

I greatly appreciate the invitation to be your guest today. For a great many years the Bell System has been one of the most important and respected innovators of technology. Its contributions in the field of communications are legendary.

There is general agreement that the greatest domestic challenge facing our nation is inflation. There is further agreement that the principal causes of inflation are 1. undisciplined federal spending and 2. underproduction of the goods and services necessary to sustain real economic growth. My purpose today is to discuss a partial solution to one of the inflationary causes—underproduction.

Reversing the decline of our nation's productivity will require a thorough overhaul of our regulatory system. This does not mean that we should abandon many worthy purposes served by creative regulation. Cleaning up our environment, insuring high standards of plant safety, protecting the consumer from harmful foodstuffs, drugs and the like, assuring opportunities for fair employment . . . these need not be abandoned. But rationality must prevail to protect the American people and their industries from excessive regulation.

Reversing the decline of our nation's productivity requires an overhaul of our tax system. A creative taxing system is necessary to encourage investment in American enterprise.

Reversing the decline of our nation's productivity also requires a creative approach to better utilization of American technology. It is this aspect of productivity which is most readily soluble and the subject of today's discussion.

By almost any standard of economic measurement the United States is in serious trouble—and economists forecast a worsening economic malaise.

Item. World GNP real growth will decrease slightly from 4.3 percent in 1978 to 3.9 percent in 1979 and 1980 according to a recent study by the U.S. Chamber of Commerce. The same study predicts the U.S. growth in GNP will decline to 2.8 percent and 2.2 percent in 1980. The more pessimistic economists are predicting that the United States will experience zero growth in 1980.

TABLE I

	GNP (trillions) ¹		Percent Increase	Merchandise exports (billions)		Percent Increase	Balance of payments (billions)	
	1968	1978		1968	1978		1968	1978
United States.....	\$1.337	\$1.762	32	\$34.6	\$143.7	315	+\$3.02	-\$32.03
Germany.....	.333	.468	41	21.9	142.3	471	+2.63	+9.88
Japan.....	.297	.578	95	12.97	97.7	653	+2.04	+5.95

¹ Expressed in 1975 prices.

A comparison of the U.S. position vis-a-vis its principal free market competitors, Germany and Japan, should give us pause for some concern.

With reference to Table I we can see that these two countries have proportionately out-performed the United States over the past ten years to a considerable degree. Their GNP and exports have risen at consistently higher rates.

In relation to Balance of Payments their outperformance of the U.S. is startling. Theirs have risen substantially. Ours have taken a nosedive from a positive \$3 billion in 1968 to a woeful *negative* balance of \$32 billion in 1978.

TABLE II.—OIL IMPORTS

	Barrels/day (millions)		Percent Increase	Cost (billions)		Percent Increase	As percent 1978 GNP ¹
	1968	1978		1968	1978		
United States.....	2.7	7.8	189	\$2.86	\$33.01	1,054	1.57
Germany.....	1.9	2.7	42	2.01	9.70	333	1.49
Japan.....	2.8	5.3	89	2.96	24.3	721	2.43

¹ Expressed in 1978 prices.

Table II pinpoints a basic problem with which we are all too familiar. Here again the United States suffers from an unfavorable comparison. It is interesting to note that the percentage rise in consumption of oil by Germany and Japan over a ten year span closely parallels their rise in GNP. (Table I). On the other hand, while the U.S. was experiencing a GNP rise of 32%, its oil imports rose 189% and cost of that oil rose to a staggering \$33 billion in 1978, slightly higher than its deficit balance of payments of \$32 billion. If the United States was totally self-sufficient we can see that in 1978 we would have recorded a modest balance of payments surplus of about \$1 billion. But even then our balance of payments during the decade would have declined by approximately \$2 billion. This suggests that it is too simplistic to attribute all of our present economic difficulties to the oil crisis. At least some of the answers lie elsewhere.

The hard fact facing us is that the oil crisis is *not* going to disappear. Both consumption and the price we pay to OPEC are predicted to rise in the foreseeable future, notwithstanding conservation measures which the Administration is trying to effect. All things being equal our negative balance of payments will continue to escalate, further contributing to the instability of the dollar both at home and in world markets. We cannot continue on this present course very much longer without courting economic disaster. The United States must begin to take measures which will result in balancing its trade accounts in world markets.

TABLE III

	GNP (trillions)		Population (millions)		Productivity per unit of population		Percent increase
	1968	1978	1968	1978	1968	1978	
United States.....	\$1,337	\$1,762	200.7	218.2	\$8,662	\$8,064	21
Germany.....	.333	.462	59.5	61.3	5,596	7,537	35
Japan.....	.297	.578	101.3	114.9	2,932	5,030	72

U.S. productivity has risen about 2% a year since 1968 (Table III). Equating this increment with a population growth averaging less than 1% tells us that each American is somewhat better off today than he was in 1968. Taken in isolation this could be viewed as a modestly healthy sign. However, when we compare our productivity gains with our competitors we again find that we are not doing very well. For example, Japan's population rose 1.3%. Its productivity increase averaged 7.2%.

In summary our economic posture as measured against productivity is not good and is destined to worsen unless we take corrective actions to stimulate increased production—and soon.

TABLE IV.—RESEARCH AND DEVELOPMENT

	GNP (trillion)		(billions)		Percent increase	As percent of GNP	
	1968	1978	1968	1978		1968	1978
United States.....	\$1,337	\$1,762	\$37.44	\$40.53	8.25	2.8	2.3
Germany.....	.333	.462	6.66	10.76	61.56	2.0	2.3
Japan.....	.297	.578	5.05	11.56	128.91	1.7	2.0

From 1968 to 1978 the United States invested \$390 billion in Research and Development. This contributed to a GNP growth of a little more than \$425 billion, (from \$1,337 trillion to \$1,762 trillion). During the same period German investment in R & D approximated \$87 billion. Its GNP rose \$135 billion. Japan's R & D investment was about \$87 billion. Its GNP increase was \$281 billion.

Although admittedly a very crude measurement, it is not unrealistic to look upon R & D costs as the investment and the increase of GNP ten years later as the return on investment. Here we find that for every dollar of U.S. investment in R & D over the past ten years its return is 9 cents, for Germany 55 cents, and for Japan \$2.31. A return of 9 cents on the dollar from a country which generated the technology for the moon shot! Clearly something is wrong. The problem, in my opinion, does not lie in the amount of money we are investing in R & D. Each

of the countries studied invests approximately 2 percent of its GNP in R & D. Nor does the problem lie in the relative amounts being spent for basic research as suggested by a recent article in Newsweek magazine. Nor is the U.S. spirit of adventure and creativity drying up, as suggested by Senator Adlai Stevenson. I am personally convinced that the U.S. problem lies in its *inability to exploit technology*. We are simply not getting as big a bang for our buck as we should.

Under present law all patent rights of inventions resulting from federally funded research are assigned to the government. The reasoning behind this policy is that the economic benefits resulting from inventions generated by the expenditure of public tax monies should enure to the benefit of the public and not be directed to the benefit of singular parties.

Patent rights so assigned fall into the public domain. The concept has a nice ring. Inventions developed with the public monies, we are told, should be owned by the public and the financial rewards shared by the public. There is only one hitch to this concept. It hasn't worked. According to Senator Birch Bayh: "Approximately 28,000 patents are now sitting on government shelves collecting dust. Untold thousands of other developments have not been patented by the government, but rather have gone unused or underutilized simply because no exclusive rights could be obtained during the critical developmental period." The major stumbling block is current federal patent and licensing policies. A second problem is that these agencies have no experience or capability to identify potential entrepreneurs. Though the public has invested billions of its tax dollars in the development of new or improved technologies, the public benefits derived have been minimal. Our present policy was built on a myth. It is time to shatter that myth.

Federally funded research produces many products and potential products which never reach the marketplace because there are not adequate incentives to the inventors and the federal agencies involved to see that such technology commercialization occurs.

During the first week of June hearings were held on a very important piece of legislation. It is known as the University and Small Business Patent Procedures Act. If passed in Congress and signed into law by the President it will, in all likelihood, receive scant attention from the media.

The Bill, S. 414, is designed to remove the constrictions which prevent the granting of patent rights on inventions which have resulted from federally-funded research. In a broader sense it signals the recognition that the United States, as a matter of national policy must address the need to exploit technological innovation which will otherwise lie dormant in the "think tank" computers of the federal establishment.

The general purpose of the Bill is to provide a uniform federal patent procedure that will allow small businesses, universities and non-profit organizations to more readily gain patent rights to inventions that have resulted from federally funded grants and contracts.

I find the positive thrust of the legislation particularly appealing. For example:

Section 202 states that "Each non-profit organization or small business firm may, within a reasonable time . . . elect to retain title to any subject invention." The option of development, financing, manufacturing and distribution resides with the inventor—not with the Federal government.

Paragraph (5) of the same section requires periodic reporting on the utilization being made by the contractor, licensees or assignees. "Provided, that any such information . . . is "not subject to disclosure under the Freedom of Information Act." This addresses a heretofore important concern, particularly of investors, who otherwise abstain from venture capital investments in products emerging from government funded research simply because they are provided no immunity from the public disclosure of manufacturing processes, marketing techniques and other data which are critical to introducing the product to the public. In this regard it is interesting to note how the Freedom of Information Act is abused by our foreign competitors. The National Technical Information Service maintains files on virtually all innovations developed with the help of Federal grants. At nominal cost Japan and Germany, among others, buy NTIS reports, analyze new technologies, make adaptive refinements and then proceed to manufacture new or refined products and sell them to the U.S. consumer.

Section 203 of the Bill sets up procedures for abrogating the rights of a contractor or assignee to retain title if effective steps to achieve practical application are unsatisfactory. In other words the holder of title must "fish or cut bait"—or relinquish that opportunity to someone who will.

Section 210 sets up a coordinating unit within the Department of Commerce and establishes procedures for developing a technology commercialization process. Although I would strongly argue in favor of setting up independent entity within Commerce and providing it more muscle to enforce coordination, this section sets the stage for the development of an effective Technology Commercialization Center.

I would prefer a somewhat stronger bill. Our Counsel, Samuel Sherer, has made specific recommendations to the Senate Subcommittee which is authoring the legislation. Notwithstanding, I can fully support the bill in its present form, believing it to be a critical first step in developing a process to commercialize federally financed technology discoveries. I believe it is enormously important to you, as businessmen, and to the American economy. I hope you will read copies of the Bill which I have brought with me. If you support the Bill please get involved and make your interest known to your Congressman and Senators.

And that brings me to the final part of my talk.

"Technology transfer," "technology utilization" or "technology commercialization" are buzz words which conjure up images of long-haired professors doodling with abstract equations that stretch the outer limits of scientific thought— $E=mc^2$. That was certainly my reaction when, in 1972, NASA came to me (I was then with the office of Minority Business Enterprise) with a proposal to make their stored technologies available to the minority business community. I just couldn't see a fit and was inclined to do a bureaucratic shuffle with NASA—and probably would have except for a fortuitous happenstance. A talented associate of mine, Theodore Lettes, had just completed a lengthy assignment and was available to study the proposal. In relatively short order he learned that many stored technologies developed during the space program at billions of dollars of cost, could, through adaptation, be converted into marketable products, and manufactured simply and inexpensively. At that point we felt we might have a tiger by the tail and set about the task of developing a process to commercialize technology. At that time we did not realize that we were the only highly industrialized country which does not have an efficient process for merging federally developed technology with private industry. We did not realize that OMBE was then the only agency that had the authority to pull public and private agencies together in the manner required for a technology commercialization program. We did not then realize that we were pioneering an effort, the need for which was and is so obvious.

Technology commercialization requires the establishment of a five component, flexible pool of resources which will respond to the requirements of individual business opportunities. These five components are access to sources of technology, markets, financing, adaptive engineering, and management and technical assistance as required by the client firm.

Each of the five component resources is available from both government and industry who must creatively come together as partners to effectively and expeditiously commercialize technologies. The program that OMBE developed was able to effectuate such a partnership under the authority of its Executive Order. Active members of the five resource pools included federal agencies, major national corporations, banks, universities, venture capital sources, and a national network of individual participants who provided particular skills.

A Technology Commercialization Center is essentially a clearinghouse. Information acquired is retained by the clearinghouse in such form as to be systematically retrievable. The data system must be designed to track each project and provide ready access to each resource element.

Aside from legal restrictions, which are being addressed by the Bayh-Dole Bill, federally developed technology is often underutilized because it is mission oriented. Having served its purpose there is no incentive to explore secondary uses. Further, federally developed technology is often developed to the point of proof of a concept and not to the point of identifying its usefulness as a product. The identification of potentially commercial end-products would become the responsibility of the clearinghouse.

For any of four reasons private sector technology often remains idle after development by private industry. These are (1) the end-product market is too small in comparison to the size of the company which developed the technology (2) the technology is unsuitable to the company's product line (3) the product line for which the technology was developed is discontinued (4) a corporate division is unwilling to make the capital investment to commercialize the technology because it will negatively impact on the division's current profits.

Seeking licensing and royalty arrangements with other companies is time consuming and generally not undertaken except in unusual situations. This is a logical function of the clearinghouse which would have ready access through its resource pools.

After testing the technology commercialization concept on an ad hoc basis over a two-year period OMBE issued a contract to establish the first Technology Commercialization Center on a pilot basis in order to gain empirical experience. We learned that the resources in the pool are the driving forces in the development of a project. The forces are:

1. Markets looking for new products.
2. Existing companies seeking to expand into new markets.
3. Sources of financing looking for investments.
4. Technologies available for commercialization through licensing by the federal government or private industry.
5. Individual investors or small firms attempting to enter a market.

We found that brokering and technical evaluation were interlocking and inseparable functions which had to be performed by the center. The brokering function brought together (1) a technology (2) a potential market (3) product adaptation (4) competent and qualified firms to produce the product and (5) private financing.

The technical evaluation determines whether the end-product can perform as claimed.

Though limited in scope and, perforce of circumstances, narrowly focused on minority businesses the test vehicle established by OMBE has proven to be effective. A significant amount of federally (and privately) stored technology is being adapted to the marketplace. A number of end-products are either in manufacture or being geared up for manufacture.

With the passage of enabling legislation to facilitate the flow of technology to the marketplace and the establishment of a Technology Commercialization Center, creatively and cooperatively managed by the public and private sectors, I believe we can begin to reverse the economic tide which is damaging our world posture.

Although better managed technology is no panacea to all of the problems which presently inhibit our ability to more aggressively flex our productive muscles it is one answer whose time has come. Can we afford to ignore it? I think not.

Thank you very much.

PART 2. LETTERS SUBMITTED FOR THE RECORD

MARCH 12, 1979.

Mr. PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: I have received a copy of your letter of January 23, 1979 to Mr. Neils J. Reimers regarding implementation of the General Services Administration's Institutional Patent Agreement regulations by the various federal agencies. I would very much like to receive a copy of the agency responses to the questions that you set forth in your letter to them later January 23, 1979.

I have attached copies of the letters for your information, and appreciate your cooperation.

Sincerely,

BIRCH BAYH,
U.S. Senator.

Enclosures.

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., March 30, 1979.

Senator BIRCH BAYH,
U.S. Senate, Committee on the Judiciary, Subcommittee on the Constitution,
Washington, D.C.

DEAR SENATOR BAYH: Thank you for your March 12, 1979, letter to Mr. Philip G. Read, Director, Federal Procurement Regulations (FPR) Directorate, regarding Institutional Patent Agreements (IPAs).

Most of the agencies contacted have responded to Mr. Read's inquiry concerning agency implementations of the FPR Amendment 187 on IPAs. Copies of the letters received are enclosed, as requested. An enclosure contains a list of the agencies that responded and the information furnished by telephone.

We appreciate the opportunity to provide this information.

Sincerely,

DALE R. BABIONE.

Enclosures.

Subject: Responses to the January 23, 1979, letter to agencies regarding Institutional Patent Agreements.

LETTERS RECEIVED

Department of the Air Force
 Department of the Army
 Central Intelligence Agency
 Department of Commerce
 Defense Logistics Agency
 Department of Energy
 Environmental Protection Agency
 Department of Health, Education, and Welfare
 Department of the Interior
 National Science Foundation
 Department of the Navy
 Department of State
 Department of Transportation

TELEPHONE RESPONSES

Department of Agriculture

No IPA's per telephone conversation with Howard Silverstein on February 8, 1979.

Nuclear Regulatory Commission

No IPA's per telephone conversation with Jerry Cook on March 23, 1979.

National Aeronautics and Space Administration

No IPA's per telephone conversation with Bob Kempf on March 21, 1979. Kempf stated that NASA has no authority under Section 305 of the Space Act to enter into IPA's.

DEPARTMENT OF TRANSPORTATION,
 OFFICE OF THE SECRETARY OF TRANSPORTATION,
 Washington, D.C., February 1, 1979.

Mr. PHILIP G. READ,
 Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR PHIL: This is in reply to your letter of January 23, 1979, asking for information on the use of the Institutional Patent Agreement permitted by FPR Amendment 187 of January 27, 1978. The Department of Transportation has not entered into any IPAs, and currently does not contemplate doing so.

Sincerely,

HAROLD P. DEELEY, Jr.,
 Patent Counsel.

DEPARTMENT OF THE NAVY,
 OFFICE OF NAVAL RESEARCH,
 Arlington, Va., February 1, 1979.

Mr. PHILIP G. READ,
 Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR PHIL: In response to the questions asked in your letter of January 23, 1979, the Department of the Navy has not entered into any Institutional Patent Agreements (IPAs) since July 18, 1978. In fact, we have received no letters or inquiries from anyone since July 18, 1978 concerning IPAs, and so there is no

question as to whether we are or are not following the FPR procedures concerning IPAs. During the moratorium on IPAs prior to July 18, 1978, we did receive one request from a university for a Department of Defense IPA; however, to the best of our knowledge, that university has taken no action since July 18, 1978 to indicate they are still interested in a Department of Defense IPA. Thus, the Department of the Navy is aware of only one premature request for an IPA.

We in the Government patent family are a fairly close-knit group, particularly through the Government Patent Lawyers Association, and we assume knowledge of important personnel changes travels quickly, but our assumptions are not always correct. Bill Queensberry retired on December 31, 1978 and I have been selected to replace Bill officially once the paper work has been approved. I intend to continue providing our assistance and cooperation on FPR patent matters to you and other interested Government agencies so that some time in the future people will no longer be able to comment that there are well over 20 patent policies of various Government agencies.

Sincerely yours,

A. F. KWITNIESKI,
*Acting Assistant Chief for Patents,
Patent Counsel for the Navy.*

DEPARTMENT OF STATE,
AGENCY FOR INTERNATIONAL DEVELOPMENT,
Washington, D.C., March 23, 1979.

PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisitions Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: This will respond to your letter of January 23, 1979 concerning the Agency for International Development's use of Institutional Patent Agreement.

To date we have no Institutional Patent Agreements, so the answer to the three questions posed in your letter is no.

Last summer MIT approached us about establishing an Institutional Patent Agreement, but did not follow through on their initiative for unknown reasons.

If I can be of further assistance in this matter please do not hesitate to ask.
Very truly yours,

RALPH C. OSER,
Attorney Advisor.

NATIONAL SCIENCE FOUNDATION,
OFFICE OF THE GENERAL COUNSEL,
Washington, D.C., March 21, 1979.

Mr. PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: This is in response to your request for information regarding the National Science Foundation's policies and practices of awarding Institutional Patent Agreements.

To assist you in your survey, I am pleased to provide the following information, in response to the three questions posed regarding the IPA's. Since July 18, 1978, the Foundation has entered into two Institutional Patent Agreements in accordance with its published regulations appearing in Title 45 CFR, Part 650. We have at the present time two additional applications for IPA's that we are about to execute and four agreements that will be executed to renew some that have or are about to expire.

We have examined FPR Amendment 187, compared it to our own regulations and find that they are nearly identical in coverage, scope, and requirements. The only significant difference that we have noted is the length of the exclusive licenses that may be awarded by the institution. The NSF regulations allow for exclusive licenses for three years from the date of first commercial sale or eight years from date of the exclusive license, whichever occurs first. The FPR allows for five and eight years respectively. Otherwise, the treatment of the Institutional Patent Agreement is substantially identical.

Although these similarities exist between the FPR's and the NSF regulations, it is our position that we have considerable flexibility in the award of Institu-

tional Patent Agreements when we are dealing with universities and non-profit organizations in the conduct of research under grants and other assistance awards. In almost every instance where NSF provides funds to universities and non-profit organizations to conduct research, it does so under the authority of its own statute, National Science Foundation Act of 1950, as amended, rather than the Federal Property and Administrative Services Act, since these activities are not procurement related and the awards are exempt from the coverage of the Federal Procurement Regulations in general.

We intend to continue accepting applications for Institutional Patent Agreements and awarding them where the institutions meet the necessary criteria spelled out in 45 CFR, 650. We fully anticipate that these regulations will remain closely parallel to the FPR requirements as the philosophy is the same in both cases.

I hope this information will be of assistance to you. If you have any further questions, do not hesitate to contact me. I can be reached at 632-5837.

Sincerely yours,

MARTIN LEFCOWITZ,
Assistant to the General Counsel.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SOLICITOR,
Washington, D.C., January 30, 1979.

PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: To date the Department of the Interior has not entered into any institutional agreements under FPR Amendment 187, January 29, 1978, which prescribe Institutional Patent Agreement (IPA) policies and procedures.

Many of our bureaus and offices are precluded by statute (as interpreted by the Department's Solicitor's Opinion M-36637 of May 7, 1962, 69 ID 54) from entering into such agreement. Examples of specific prohibitive legislation are the Federal Coal Mine Health and Safety Acts of 1969, Public Law 91-173; the Surface Mining Control and Reclamation Act of 1977, Public Law 95-87, among others.

In those instances where R&D is not carried out under specific legislation governing patent policy, we follow the Federal Procurement Regulations 41 CFR 1-9.1—Patents, 40 F.R. 19314, May 7, 1975, and 40 F.R. 28067, July 3, 1975, which are based on the Presidential Memorandum of Government Patent Policy of August 23, 1971, 36 F.R. 16887, August 26, 1971.

Having consulted with your office when FPR Amendment was implemented and been advised that compliance therewith was permissive and not mandatory, and in view of the interim status of the implemented regulations pending on-going legislative and executive review of Government patent policy, we have recommended to the Solicitor that those bureaus which could follow FPR Amendment 187 should decline to do so as a matter of Department policy. There are a number of additional reasons why we have not entered into any institutional agreement as a matter of policy which we will be pleased to discuss at your convenience.

We trust that this responds adequately to your letter of January 23, 1979. However, if you have need for additional information, please contact us at your convenience.

Sincerely yours,

DONALD A. GARDNER,
*Assistant Solicitor, Branch of Patents,
Division of General Laws.*

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
OFFICE OF THE SECRETARY,
Washington, D.C., February 2, 1979.

MR. PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: This refers to your January 23 letter regarding the use of Institutional Patent Agreements in this Department.

Specifically, you asked whether we have entered into any IPA's since July 18, 1978. We have not. The remainder of your questions were all contingent on an affirmative response to your initial question.

If I may be of any further assistance, please let me know.

Sincerely,

LEROY B. RANDALL,
Acting Chief, Patent Branch.

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF GENERAL COUNSEL,
Washington, D.C., January 31, 1979.

PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy.

DEAR PHIL: In response to your letter of January 23, 1979 regarding Institutional Patent Agreements (IPA), this is to advise that we have entered into no IPA's either before or since July 18, 1978.

Quite a long time ago our R&D program personnel indicated a lack of enthusiasm for the IPA concept. Thus, since § 1-9.107-4(a) (6) of the FPR appeared to make use of IPA's optional, we elected not to enter into any IPA's.

If you do not agree with our interpretation of 1-9.107-4(a) (6), please let me know. In the meantime I will again submit this issue to appropriate EPA personnel.

Sincerely,

BENJAMIN H. BOCHENEK,
Patent Counsel, Contracts & General Administration.

DEPARTMENT OF ENERGY,
Washington, D.C., February 14, 1979.

Mr. PHILIP G. READ,
Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR PHIL: This is in response to your letter of January 23, 1979, in which you ask three questions concerning this Department's implementation of FPR Amendment 187 on Institutional Patent Agreements (IPA).

Your first question asks whether DOE has entered into any Institutional Patent Agreements (IPA) since July 18, 1978, the effective date of the FPR amendment concerning IPAs. DOE has not entered into any IPAs either before or since that date. Under the two statutes which define DOE's patent policy, the Atomic Energy Act of 1954, as amended, and the Federal Nonnuclear Energy Research and Development Act of 1974 (Nonnuclear Act), DOE does not have specific authority to grant IPAs.

As you know, under the FPR amendment, when an agency approves the technology transfer program of "a university or a nonprofit organization", the institution or organization thereafter is automatically entitled to the provisions of the IPA in all R&D contracts (except operating contracts) with the agency.

The FPR amendment presents two statutory problems for DOE. Neither the Atomic Energy nor Nonnuclear Acts mention IPAs. Section 9(d)(11) of the Nonnuclear Act provides that where a "nonprofit educational institution" has a DOE-approved technology transfer program, such program may be considered as a substitute for the marketing and manufacturing capabilities of industry as one of eleven statutory considerations to be weighed in granting a waiver at the time of contracting. An approved technology transfer program is not stated as being the basis for granting an IPA however.

The second problem is that the FPR authorizes IPAs for "nonprofit organizations." Aside from the point that DOE is not specifically authorized to grant IPAs, DOE is not permitted under its statutes to grant advance waivers to "nonprofit organizations" based on the consideration of an approved technology transfer program. In other words, the consideration in Section 9(d)(11) of the Nonnuclear Act does not apply to "nonprofit organizations" but instead applies only to "nonprofit educational institutions".

Your second question asks whether, in granting IPAs since July 18, 1978, DOE has followed the FPR procedures. While, as explained above, DOE does not grant IPAs, DOE, in addition to following its own statutory patent policy, follows FPR procedures and criteria for approving technology transfer programs.

Your third question asks for reasons why the FPR procedures have not been followed since July 18, 1978. As you can see from the above explanation, DOE's statutory provisions do not encompass IPAs. It has been argued that DOE should interpret Section 9(c) of the Nonnuclear Act (which authorizes grant of waiver to a class of persons) as a means to effectively grant IPAs to universities. However, such an interpretation would violate the statutory ground rules for granting waivers because the waiver would have been based on only one consideration to the exclusion of the other ten considerations spelled out in Section 9(d) of the Act. In addition, the Conference Report for the Act provides legislative intent requiring universities be treated essentially like industrial firms in regard to weighing considerations for waivers.

The above discussion has concerned comparison of IPAs with DOE waivers granted at the time of contracting as affected by DOE-approved technology transfer programs. With respect to waivers requested by universities for inventions identified after the time of contracting, if the university has a DOE-approved technology transfer program, then, under Section 9-9, 109-6(h)(5) of DOE patent regulations, the university is presumed to have met the other statutory criteria (i.e., considerations). This means that grant of a waiver for an invention identified after contracting is virtually automatic unless it is indicated that under one or more of the criteria the presumption is inapplicable.

I hope the above information is of help to you. If you have any questions, please contact me on 353-4018.

Sincerely,

JAMES E. DENNY,
Acting Assistant General Counsel for Patents.

DEFENSE LOGISTICS AGENCY,
HEADQUARTERS, CAMERON STATION,
Alexandria, Va., January 31, 1979.

Re institutional patent agreements—FPR amendment 187, January 20, 1978.

Mr. PHILIP G. READ,

Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: In reply to your letter of 23 January 1979, this Agency has not entered into any institutional patent agreement (IPA) either before or after 18 July 1978 primarily because this Agency enters into very few R & D contracts.

Sincerely,

MAXWELL C. FREUDENBERG,
Patent Counsel.

GENERAL COUNSEL OF THE
U.S. DEPARTMENT OF COMMERCE,
Washington, D.C., March 1, 1979.

PHILIP G. READ,

Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR PHIL: In response to your letter of January 23 this Department has not entered into any IPA's since July 18, 1978. However, we do expect to enter into one or two during the next few months. If we do we will follow the FPR procedures.

With best regards,

ROBERT B. ELLERT,
*Assistant General Counsel
for Science and Technology.*

CENTRAL INTELLIGENCE AGENCY,
Washington, D.C., March 12, 1979.

Mr. PHILIP G. READ,

Acting Director, Federal Procurement Regulations, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR MR. READ: In preparing a response to your letter inquiring as to our Agency's use of Institutional Patent Agreements (IPAs), an informal survey

of Agency licensing procedures was made. Based on this survey, we offer the following answers to your questions:

1. Have you entered into any IPAs since July 18, 1978, the effective date of the FPR Amendment concerning IPAs?

No, we have not.

2. Regarding IPAs entered into since July 18, 1978, have you followed FPR procedures?

Not applicable because we have not entered into any IPAs.

3. If the FPR procedures were not followed since July 18, 1978, please indicate the reasons.

Not applicable since the Agency follows the FPR procedures as closely as is practicable.

It appears from the informal survey of our negotiators that the institutions themselves prefer the standard long and short forms for patent rights currently found in the Regulation. There is no hard evidence of the above comment, but it remains the visceral expression of our line negotiating officials.

I hope our responses will be sufficient to assist you in formulating your reply to Mr. Reimers.

Sincerely,

MATTHEW F. JODZIEWICZ,
Office of General Counsel.

DEPARTMENT OF THE ARMY,
OFFICE OF THE JUDGE ADVOCATE GENERAL,
Washington, D.C., January 31, 1979.

Mr. PHILIP G. READ,

Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR Mr. READ: Reference is made to your letter of 23 January 1979 regarding our activity with Institutional Patent Agreements (IPA's). It is our understanding that IPA's are to be incorporated into Basic Agreements with appropriate educational and nonprofit institutions. The Office of Naval Research is assigned the duty of negotiating such agreements under DAR 4-118.5.

Assuming you have sent a similar letter to Mr. Kwitneski at ONR, his response should apply to all DoD activity.

Sincerely,

WILLIAM G. GAPCYNSKI,
Chief, Intellectual Property Division.

DEPARTMENT OF THE AIR FORCE,
HEADQUARTERS, U.S. AIR FORCE,
Washington, D.C., February 2, 1979.

Mr. PHILIP G. READ,

Acting Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy, General Services Administration, Washington, D.C.

DEAR Mr. READ: This is in response to your letter of January 23, 1979 regarding implementation of FPR Amendment 182 relating to Institutional Patent Agreement (IPA) policies and procedures. The answers to your specific questions are:

1. No.

2. Not applicable.

3. There are a number of reasons as discussed below.

The apparent reason that the FPR IPA procedures are not followed in the Air Force is because this Department is guided by the Defense Acquisition Regulation (DAR), and the FPR IPA procedures have not been implemented in the DAR. However, we do not view this as an obstacle to entering into an IPA should the appropriate occasion arise.

The primary reason that the Air Force has not used the IPA procedures is that there has been no need. The IPA procedures were developed primarily to satisfy a desire of title policy agencies to qualify under the "exceptional circumstances" provision of the presidential policy statement. The Air Force has few contracts which fall within this situation and, since July 18, 1978, none in which an IPA was either requested or considered to be appropriate. Air Force contracts with universities and nonprofit institutions normally include either the "Retention by the Contractor" clause or the "Deferred" clause, depending upon whether or not

the contractor has an effective program for transfer of technology as by the licensing of inventions, as set forth in DAR 9-107.3(a) (3) (iii). The Air Force maintains a list of contractors considered to have such a program and uses the "Retention by the Contractor" clause in those contracts. No Air Force institutional contractor has yet requested an IPA; in fact, some have even expressed a preference for the "Deferred Short Form" clause over the "Retention by the Contractor" clause, and have asked not to be included on the list.

Under these circumstances, it was not considered necessary to implement the IPA procedures in the DAR.

Sincerely,

JOSEPH E. RUSZ,
Chief, Patents Division,
Office of the Judge Advocate General.

MASSACHUSETTS TECHNOLOGY DEVELOPMENT CORP.,
Wakefield, Mass., March 27, 1979.

Senator BIRCH BAYH,
U.S. Senate, Committee on the Judiciary, Subcommittee on the Constitution,
Washington, D.C.

DEAR SENATOR BAYH: Thank you for your letter and the enclosures describing your "University and Small Business Patent Procedures Act." We at the Massachusetts Technology Development Corporation (MTDC) are particularly interested and supportive of your efforts. The MTDC was established by the state legislature in July, 1978. It functions to provide both management assistance and direct financial assistance to early-stage, technology-based small businesses in Massachusetts. We are, therefore, supportive of your efforts to foster the development and commercialization of R & D activities, getting patents off of the government shelves and into the marketplace where they belong.

The significant economic benefits derived from technology-based, small businesses—primary job creation, tax revenues, innovations, and exports—have been well-documented: in the U.S. Senate Select Committee Report on Small Business, *Small Business and Innovation*. However, the problem that remains is to reverse the interdependent array of federal laws, policies, and programs that have inhibited the formation and development of technology-based, small businesses.

As your proposal bears out, federal patent policy is certainly one problem area in need of revision. Yet, more attention might be focused on the fact that technology-based, small businesses are finding it increasingly difficult to obtain the start-up and expansion capital that is crucial to their viability. Simply put, patents will remain "patents" and not *products* unless technical entrepreneurs and small companies have access to capital. It has been our experience at the Massachusetts Technology Development Corporation (MTDC) that although profit potential, entrepreneurship, and technological capability are major components of business success, the *crucial* element is the availability of "high risk" capital. We have found that capital is precisely the "mortar" that binds these other elements together.

This fact does not seem to be recognized by the federal government, even though various programs do exist for the purpose of making capital available to small businesses. But these programs have had only a marginal impact on stimulating technological innovation. For example, the SBA is the largest public source of financing for small businesses. But, the *type* of financing that SBA provides, principally debt capital is, very much unsuited to the needs of start-up and expanding technology-based, small businesses. Especially in their early stages of growth, these businesses require capital investments that will not increase the probability of problems or even default. Often, debt service requirements can place such an added burden on these firms.

Regarding the direction of its R & D funding, the federal government has been slow to realize the advantages of providing R & D funds to small companies. First, the federal commitment to total R & D has declined from 2.2 percent of GNP in 1964 to just 1.2 percent in 1978. Considering the enormous role that R & D plays in stimulating new jobs, products, and exports, 1.2 percent of GNP seems especially low. It is even more distressing to learn that out of this 1.2 percent total, only 3 percent of federal R & D funds are allocated to *small* businesses.

Small companies are simply not receiving a "fair share" of federal R & D funding. We propose that as an initial step, 10 percent of all federal R & D funds be set aside for small companies and implemented in the same manner as the National Science Foundation's Small Business Innovation Research (SBIR) program.

The NSF/SBIR program, which provides early stage funding to innovative small businesses in conjunction with private capital sources, is a rare example of a federal program that has the potential to effectively facilitate the process of turning pure R & D into viable commercial enterprises. Unfortunately, the National Science Foundation is conducting this program on an extremely small scale.

The notion of "fair share" brings up another issue: the passive allocation of federal tax revenues. It is our contention that certain federal tax policies are actually undermining the formation and development of technology-based, small businesses. For example, although such tax incentives as investment tax credits and accelerated depreciation schedules apply to *all* companies, the volume of these foregone public tax revenues are captured by large companies, not small. Small firms, especially in their yearly years of operation, rarely make enough profits to utilize such incentives. By the same token, the preferential tax treatment of capital gains "across-the-board" has done very little, if anything, to encourage investment in small companies.

We do not advocate *more* programs or still *more* tax incentives to stimulate the small business sector. Rather, we feel that *existing* tax revenues could be far more effectively utilized. The federal government must recognize that tax incentives withdraw millions of public dollars that could be more efficiently invested in small companies. And, if a sliding-scale tax treatment of capital gains was instituted, as advocated by the Carter Administration, private investment in small firms would be encouraged. At present, it is not. Again, it is these companies, not large established ones, that have the most to offer in the way of jobs, tax revenues, innovations, and exports.

If the federal government has been slow to react to the problems of technology-based, small businesses, the State of Massachusetts has begun to act in a positive manner. This past July, the Massachusetts Technology Development Corporation was established to provide both management assistance and direct financial assistance to entrepreneurs and technology-based, small businesses. As a development finance mechanism, MTDC has the unique capability to directly stimulate the flow of high risk capital to innovative growth companies. MTDC has been designed with the following point in mind: new enterprise development cannot be done by the private sector alone, nor by the public sector alone, but through a collaborative effort that levels off the strengths of both sectors. We anticipate that the small portion of public dollars that MTDC puts out will be repaid many times over—in the form of increased primary employment, tax revenues, innovations and exports. Dollar for dollar, a development finance mechanism of MTDC's type should prove to be a workable model for other states and federal programs. Hopefully, federal dollars will be allocated to support such endeavors.

We applaud your efforts to implement a more rational federal policy for patents. Hopefully this same rationale will lead to other reforms that are necessary to stimulate technology-based, small businesses, competition, and the American economy. Should you require any additional information, testimony, or whatever, we at MTDC would be happy to oblige.

Sincerely yours,

PAUL KELLEY.

MICHIGAN TECHNOLOGICAL UNIVERSITY,
Houghton, Mich., May 1, 1979.

Mr. JOHN E. MOGK,
President, Michigan Energy & Resource Research Association,
Detroit, Mich.

DEAR JOHN: The University and Small Business Patent Procedures Act was reintroduced on February 9, 1979, by Senators Birch Bayh and Bob Dole. It has numerous co-sponsors, and broad bipartisan support in the Senate. A companion bill has been introduced in the House by Representative Peter Rodino; it, too, has widespread support. Very simply, this proposed legislation will allow uni-

versities, non-profit organizations and small businesses to retain patent rights on inventions made under federally-supported research.

We have discussed this pending legislation at length, and have individually and collectively sought support for it from amongst our colleagues and our representatives on the Washington scene. There is no doubt that enactment will enhance the utilization of new technology which, although paid for by the taxpayer, now reposes on musty library shelves because incentive for utilization is lacking. As you know, Michigan Technological University has an aggressive patent and licensing program for its proprietary technology, and we have been singularly successful in the discovery and disclosure of new knowledge and in the encouragement of its use. We hope that enactment of this new legislation will permit us to extend our program to include licensing the fruits of the government-sponsored research.

Let me recount for you a tale (not yet ended) which illustrates the necessity for this legislation, and which helps to explain why the United States is losing its reputation as the leader in world technological innovation:

"In 1977, MTU entered into a subcontract with Holley, Kenney, Schott, Inc. (now Babcock Contractors, Inc.) to perform research and development on the pelletizing and drying of lignite, under U.S. Bureau of Mines Contract #J0377003. Michigan Tech was chosen as the subcontractor for this work because of our extensive knowledge and experience in the field of pelletizing. Our principal investigator, in fact, had long ago (June, 1966) conceived several novel approaches to lignite pelletizing which induced the U.S. Bureau of Mines to contract for the project with Holley, Kenney, Schott, Inc. The proposal to BuMines broadly disclosed the invention.

"The invention was reduced to practice on September 15, 1978, at Michigan Tech, during our work for the contractor; the BU Mines contract had been taken over by DOE with a new designation: ET-77-C-01-9143. We recognized the potential technological and economic values represented by this invention, which could ultimately be used to treat more than one-quarter of all U.S. coal resources (lignite is 28% of the total resource). Accordingly, an invention disclosure was prepared by the inventors on September 25, 1978, and a "Contractor's Invention Disclosure" was prepared on October 6, 1978. The DOE contracting officer was notified on November 9, 1978, and Michigan Tech requested greater rights in the invention at that time.

"The University has received no reply to its request for patent rights as of this date. In the meantime, the prime contractor has published the technical data related to Michigan Tech's invention and reduction to practice. Patent rights have already been lost in many countries of the world, and with these rights has gone the incentive for full commercial development by private enterprise. Today, U.S. rights are within six months of being forfeited, too. At this point it is hard to predict whether any company will be willing to make the investment in development and commercialization of this process which could make available in a relatively short time a substantial portion of U.S. coal reserves. It is much easier and much less risky for a company to invest in known technology than to try new, unprotected, processes.

"If Michigan Tech had unequivocal rights under this contract, a patent application would have already been filed and the process might well have been licensed for commercial use by now. Instead, all is in limbo. It is questionable whether the American public will ever benefit from this invention."

Although the lignite pelletizing saga underscores the lengthy delays and indecisiveness of government in bringing federally-sponsored research results to fruition, another factor is constantly at work reducing the effectiveness of technological advances from government-sponsored research. It, too, can be practically eliminated if the University and Small Business Patent Procedures Act becomes law. There is absolutely no incentive for university or small business researchers on government projects to report inventions made when the federal government owns all rights and provides no share of prospective royalties to the inventors. Hard numbers cannot be obtained to quantify unreported inventions from government-sponsored research, but it is my personal observation that for every invention reported there are three more which go unreported and are thus either lost to the public or are arbitrarily dedicated to the public domain by inventors' publications. The U.S. Government currently owns 28,000 patents, of which less than 4% are being used in commerce. If the inventors on federal projects had an incentive to report new and useful ideas conceived, that 28,000

patents would be at least 100,000! The inventiveness is there, but incentive to disclose new knowledge (and thus turn it into useful products and processes) is utterly lacking. The Bayh/Dole bill would, at least in the universities, bring forth much inventiveness which now goes unreported because filling out the government forms is a waste of time.

I hope that the recounting of our latest invention incident and the observation regarding unreported invention during federally-sponsored research will give you some insight into the kinds of problems which this pending legislation can alleviate. I urge you to continue your efforts to ensure passage.

Sincerely,

THOMAS P. EVANS,
Director of Research.

THE AMERICAN SOCIETY OF INVENTORS,
King of Prussia, Pa., June 4, 1979.

Re S. 414, the University and Small Business Patent Procedures Act.

BIRCH BAYH,
Chairman, U.S. Senate Committee on the Judiciary, Subcommittee on the Constitution, Washington, D.C.

DEAR SENATOR BAYH: Representing the American Society of Inventors, and also that group's forming coalition, the National Congress of Inventor's Organizations (NCIO), I wish to state that our position favors enactment of this bill for the sound reasons stated in its objectives, particularly with respect to provisions thereof applicable to small business, entrepreneurial innovation, and the encouragement of investment by the private sector.

We support the views to be stated by Eric Schollin of the National Small Business Association, and we ask that such support be made of record.

Respectfully,

HAROLD E. McKEEVER,
Executive Secretary.

GENERAL ELECTRIC CO.,
Fairfield, Conn., June 19, 1979.

Hon. BIRCH BAYH,
*U.S. Senate,
Washington, D.C.*

DEAR SENATOR BAYH: You wrote to me on April 11, 1979 about the possibility of testifying in respect to the University and Small Business Patent Procedures Act, S. 414. We appreciated the opportunity of consulting with your staff, particularly concerning the predecessor Bill, S. 3496, and as I told Mr. Joe Allen, we were quite willing to testify if so invited. Our support is, of course, based in some significant measure on the language in Section 212(c) of S. 414, which, as you introduced it, recognizes the circumstance of contractors other than universities, small businesses, and non-profit organizations. This part of the Bill is very important, and we were most pleased to have had a role in improving it in this respect.

I would like to return, however, to our earlier suggestion in respect to Section 204 of S. 414. This provision relates to "Return of Government Investment", and we still believe that this section would be better deleted from S. 414 as being counterproductive to the primary objectives of S. 414. This suggestion continues to be our strong recommendation. If it develops that some provision within the spirit of Section 204 is to be inevitably in S. 414, then we believe that the following principles should be considered, and we would welcome the opportunity to talk to your staff about developing specific language.

1. Section 204 would base the return of Government investment on licensing of subject inventions or the sale of products embodying or manufactured by a process employing a subject invention. Where a subject invention has not been patented but finds its way into commerce through licensing or direct product sales, our experience is that such a subject invention quickly enters the public domain. In the absence of a patent protecting the subject invention, the result is that the contractor originating the invention finds itself obligated to make payments to the Government for something which any third party can freely appro-

priate to its own use. Thus, we believe that it is only equitable that any requirement to refund money to the Government be conditioned on the subject inventions being patented.

It might be thought that changing Section 204 so that it applies only to patented subject inventions might give the contractor a "loophole" to freely use Government-sponsored inventions simply by not seeking patent protection. The answer to this, it seems to us, is that the Government itself has a right to file patent applications where the contractor elects not to do so. While we have questioned the desirability of the Government filing patent applications solely for its own defensive purposes, it would seem that the Government filing patent applications to protect significant inventions would be another matter. Thus, we believe that limiting Section 204 to patented inventions is necessary if the organization originating the inventions, albeit on Government funds, is to be treated fairly, and it seems to us that there is a full answer to the only question that might be raised about the making of such a change.

2. On some occasions, it might be expected that a subject invention would alone be the object of a licensing contract or that it would alone constitute essentially all of a commercial product. Likely, however, it will be far more common to find that the subject invention is a minor part, perhaps less than 1%, of a licensing program or commercial product. Section 204 in its present form would not reflect the relative importance of the subject invention but, on the contrary, would call for a refund based upon all net income from a licensing program involving a subject invention, or all income accruing from sales of products embodying or manufactured by a process employing a subject invention. For example, if the subject invention were a new welding technique applicable to the welding of radiators in automobiles, the refund would be based not upon the relative contribution of the invention but rather upon income received from the sale of the entire automobile. Thus, if only this one subject invention were to be incorporated in an automobile, the manufacturer thereof would have a strong incentive not to commercialize the subject invention in this way because, in not so doing, a possibly significant refund to the Government could be avoided. Thus, Section 204 would be providing a strong disincentive in the very heartland of its intended objectives. We believe that Section 204 should be amended so that the amount of refund is qualified in accordance with the contribution made by a subject invention to a given license program or commercial product. In other words, an invention affecting only a small portion of the product or program should not call for a refund base equal to the total licensing income or the total product or program sales.

3. The amount of the Government investment which was returned would probably be tax-deductible by a small business as an ordinary and necessary business expense; however, that may not be entirely free from doubt. While the optimum solution would be an amendment to the Internal Revenue Code, it is believed a provision added to Paragraph 204(c) would be appropriate, indicating that payments made under Sections 204 (a) or (b) would be business expenses for Federal income tax purposes.

4. Section 204(a) would limit the Government's share to 50 per centum of licensing income. We believed that this number should be substantially lower and that there should be a corresponding express cap on the Government's maximum share in Section 204(b). Also, since the maximums refer to one subject invention and many subject inventions might be involved in any given licensing program or commercial product sales, it should be made clear that the individual maximums for a number of subject inventions are not cumulative. The per centum stated should be for the total product, no matter how many inventions or funding agreements are involved. Otherwise, the disincentive may be oppressive.

5. The return of Government investment in Section 204 would be based upon net income which may be a particularly complex base to establish, requiring highly-trained accountants in both small business and the Government for administration. This is a difficult problem area in which answers are unclear to us. Perhaps, the contractor should be given the option of making a single payment to the Government, refunding that part of the Government contract money devoted to generating a subject invention which is used through licensing or product sales. Another option might be to make progress payments based upon total revenue received from licensing or product sales, until the Government had been repaid for its contribution.

To a large degree, the difficulties noted above reflected why we sought earlier to have Section 204 deleted. We harbored more hope than that this result would take place than we have reason to have now. That is why our comments in respect to Section 204 earlier were somewhat brief and this is the reason why we now believe that we should explain in more detail, as we have done above, what problems we foresee and offer our constructive assistance to you once again.

Thanks again to you and your staff for listening to us before, and we hope you will not hesitate to call upon us again.

Very truly yours,

H. F. MANBECK, Jr.

AMERICAN CHEMICAL SOCIETY.
Washington, D.C., June 21, 1979.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Constitution, Committee on the Judiciary,
U.S. Senate, Washington, D.C.

DEAR SENATOR BAYH: The American Chemical Society appreciates this opportunity to comment on S. 414, the "University and Small Business Patent Procedures Act." It is appropriate for the Society to submit this statement since its National Charter imposes obligations on the Society to provide assistance to the Government in matters of national concern related to the Society's areas of competence; and also, in the broadest and most liberal manner to work for the advancement of chemistry, and the promotion of research in chemical science and industry, "thereby fostering public welfare and education, aiding the development of our country's industries, and adding to the material prosperity and happiness of our people."

Founded in 1876, the American Chemical Society was chartered as a nonprofit, scientific and educational organization by an act of Congress which was signed into law on August 25, 1937. Current membership in the Society is approximately 110,000 individual chemists and chemical engineers, reflecting a broad spectrum in academic, governmental, and industrial professional pursuits. Chemical or other companies are not eligible for membership. About 60% of our members are employed by industry, 25% by academic institutions, and 15% by government and nonprofit institutions.

The Society, primarily through its Joint Board-Council Committee on Patent Matters and Related Legislation, monitors legislation and federal agency regulations relating to ownership of inventions and patents as well as policies and procedures pertaining thereto.

It is the position of the ACS that technological innovation underlies and supports modern society. Strong and continuous efforts to enhance and expand technological innovation result in high standards of living as exemplified by the history of the United States. Every effort should be made to encourage and strengthen technological innovation so that these standards are maintained and expanded. Continued innovation must be a national policy if we are to find solutions to ever more complex social, economic, and environmental problems.

Any national policy to encourage innovation must make it as easy as possible to invent, to perform research and development on inventive ideas, to demonstrate the commercial feasibility of these ideas, and to diffuse new products and processes embodying the ideas throughout the marketplace for the benefit of the general public.

In the real world, implementation of these steps is hindered by many factors—technological, economic, environmental, the mere resistance of humans to change, to mention only a few.

One important factor which encourages innovation, however, is a strong patent system. In the United States we have been fortunate that our forefathers laid the foundation for such a system in our Constitution. Over the years the U.S. patent system has been a strong positive influence in the economy of the country.

Nevertheless, certain good features inherent in the patent system have become eroded through court actions, or have been made less effective through the enactment of legislation or by the administrative actions within the federal government. An important area where administrative action has been inhibitory results from a lack of uniformity of patent policy between federal agencies. Procedures currently being used differ markedly between agencies in their implementation of the patent laws, particularly with respect to the determination of ownership

of patents. This is a most important point, because it follows that if the ownership of a patent is in doubt or if the activities of an owner are too restricted relative to the development of a patent, the invention covered by the patent will often lie fallow and be of no use to the public. This situation represents at best an unnecessarily long delay, or even perhaps a complete loss of innovative benefits to all citizens whose taxes may have supported the original research.

This issue has been debated for decades both within and outside the Government, but final resolution has been elusive. The Society now believes that legislation is necessary to resolve this problem. Since S. 414 addresses itself to the issue of establishing a uniform federal patent procedure for small businesses and nonprofit organizations, and to the creation of a consistent policy and procedure concerning patentability of inventions made with federal assistance, the Society has examined the content of the bill and wishes to comment on several of its provisions.

The consensus of the Society is that in many, but not all, instances the grant of exclusive rights to patents is required to induce industrial companies to undertake commercialization of inventions. It is gratifying, therefore, to note that Section 202(a) of S. 414 provides that nonprofit and small business organizations may elect to retain title to inventions resulting from federally-supported research and/or development performed by such organizations. The ability to retain title to such inventions is particularly important to nonprofit organizations as it will enable them to obtain patent protection at the very outset, when inventions are embryonic and fragile and need all the protection they can get. In most instances the federally-funded research performed by these organizations is scientifically oriented or is in the area of basic research; and any inventions or practical applications that might result are unexpected fall-out. Almost always such inventions require much further investment of time and money before viable commercial products can result. And almost always, the return on such investment is small or non-existent for years. With retention of title and authorization to grant limited-time exclusive licenses, as set forth in Section 202(c) (7), universities will be in a strong position to expedite the broad use of federally-assisted inventions.

If this bill is enacted, the Society believes that the establishment of monopoly positions by universities or their licensees, or by small businesses is very remote, if not nonexistent. In any event, the proviso in Section 202(c) relating to the Government's power to retain title under exceptional circumstances would effectively prevent such monopoly control by a contracting organization, assuming this power is conscientiously exercised. Review of the need for this safeguard is provided in Section 202(b) where either the Comptroller General of the United States or the Chief Counsel for Advocacy of the Small Business Administration is charged with certifying that such determinations are in compliance with the provisions of the bill.

The Society believes that nonprofit and small business organizations which have been granted rights to inventions resulting from federally-assisted research are accountable for their activities directed towards the development of such inventions for public benefit and use. Suitable annual reports to the respective funding agencies should be required; and, the Government should have the ability to regain rights to the invention whenever the nonprofit or small business organization cannot or does not show satisfactory performance. The safeguards provided to assure accountability, Section 202(c), are considered appropriate, workable procedures which do not impose burdensome or costly reporting requirements upon either nonprofit or small business organizations. In fact, the procedures outlined in the bill closely follow those currently in satisfactory use under the Institutional Patent Agreements between the Department of Health, Education, and Welfare, or the National Science Foundation, and many universities. The Society finds Section 203, which provides for Government march-in rights as an additional safeguard, to be reasonable.

The ACS agrees that the Government should recoup funding costs through the sharing of income accruing to nonprofit or small business organizations having title to inventions resulting from federally-assisted research or which are being licensed under patents covering such inventions. Section 204 sets forth a procedure for accomplishing this. However, this procedure as written appears difficult, if not nearly impossible to, administer fairly and equitably without a considerable amount of negotiation between the government agencies and the rights holders. It is very difficult to determine accurately after tax profits on sales of specific products, as specified in this section of the bill. A more easily used accounting base

for determining recoupable income would be gross royalty income or actual sales. A percentage of this base, to be determined through negotiation between the parties, could start with the first commercial sale and continue until the Government's predetermined financial support for the research leading to the invention had been recovered. A reasonable percentage of gross royalty income might be 15 to 20%; a corresponding percentage of actual sales might be 0.75 to 1.0%. These percentages should be applied only after a certain amount of royalties or actual sales were realized, as is set forth in Section 204, instead of from the start of income production.

Mutual agreement as to the amount to be recouped should be obtained at as early a date as possible so that the rights owner knows the total liability to the government from the start. Determination of this amount may present difficulties, which perhaps could be resolved by settling on a mutually agreeable percentage of the amount of the original contract without attempting a detailed accounting. Delaying the determination of the amount to be recouped until assured markets are an actuality, sometimes 10 or more years after the invention is made, could lead to serious disagreements and unnecessary expense resulting from the unavailability or inadequacy of early records.

S. 414 does not deal directly with ownership rights relating to foreign patents that correspond directly to patents covering inventions resulting from federally-assisted research. However, if universities and small businesses have obtained rights to such inventions, the presumption is that these rights extend to any foreign patents. The Society believes that foreign patents should belong exclusively to the organization, which will then have the right to use or license them at its discretion. It would seem that this understanding is implicit in the provisions of Section 202 taken *in toto*.

Section 206 refers to the confidentiality of proprietary data, and requires that data concerning inventions in which the Government owns or may own a right, title or interest be kept confidential only until patent applications are filed. The Society believes strongly that confidentiality should be extended, without time limit, to *all* proprietary data, engineering know-how and other intellectual property developed by and belonging to licensees or organizations which may have obtained rights in inventions resulting from federally-assisted research. Such information may well have been submitted by nonprofit and small business organizations to federal agencies in the original proposal for grant in support of their requests to retain title to such inventions, or may have been disclosed in reports to the agencies during the course of the research work which led to the invention. Such property would include background inventions, know-how, trade secrets and patents developed by these organizations with their own funds prior to obtaining federal funding. If the background property is needed in the practice of inventions resulting from federally-assisted research, it should be made available to the Government on a purchase or license basis at a reasonable fee.

The Society views S. 414 as a desirable first step in solving the problems that nonprofit organizations and small business have encountered due to the lack of a uniform federal government patent policy. However, the ACS believes the next step in this process should be the extension of these provisions across the board to those organizations that do not fall under the definition of small businesses or nonprofit organizations. In conclusion, the Society firmly believes that enactment of this legislation, with modifications as suggested in this statement, would result in increased productivity and would aid the United States in reasserting its technological leadership in the world.

Sincerely yours,

GARDNER W. STACY.

RESEARCH CORP.,
New York, N.Y., September 5, 1979.

Hon. BIRCH BAYH,
U.S. Senate, Russell Office Building, Washington, D.C.

DEAR SENATOR BAYH: This letter is in reference to the University and Small Business Procedures Act S. 414 about which you recently requested my opinion. You will recall that on June 14, 1979, I addressed a letter on this subject to Senator Gaylord Nelson in which, at his request, I analyzed and contrasted S. 414 with last year's version (S. 3496, 95th Congress). A copy of this letter was sent to you for your information and use.

BEST COPY AVAILABLE

In the letter to Senator Nelson I responded to several of his specific questions about the bill and made a number of general comments about several of the bill's provisions. I discussed specifically the problem of confidentiality of background rights and proposed what I believe to be a reasonable approach to a workable resolution to this issue. I also expressed opinions about the provisions in Section 202(a), 202(b), 202(c), 203, 205, 209 and 211. I did not, however, address comments to Section 204.

Since the June 14 letter, hearings have been held on S. 414 and a number of written statements have been submitted by various organizations interested in the bill's provisions. One of the written statements was submitted over the signature of the President of the American Chemical Society. This statement resulted from an intensive study of the bill by the ACS Committee on Patent Matters and Related Legislation of which I am Chairman. In general, I endorse the statement.

Since all of the statements, both oral and written which I have seen, in toto, present all the major arguments for and against the various provisions in S. 414, I am limiting my further comments to two features which I believe have considerable importance and which have not been dealt with adequately heretofore. One of these areas involves Section 204, Return of Government Investment, and the other is a perspective view of just how S. 414 fits in the innovation process, based on my experience working at Research Corporation over the past 12 years during which inventions developed under both the petition and the Institutional Patent Agreement procedures were handled.

SECTION 204, IN S. 414

In a letter dated March 27, 1979, addressed to both you and Senator Dole, I indicated my concern that Section 204 would be almost impossible to administer and suggested an alternative procedure. After having given this matter additional thought I feel that this Section could be considerably simplified, yet accomplish the objective of recouping the government's investment in the research leading to an invention, while at the same time, minimizing accounting needs and not unfairly or unduly penalizing the contractor financially. A mark-up of this section of the bill is enclosed herewith for your consideration and possible use. ✓

GENERAL PERSPECTIVE ON S. 414

Much has been made in the many oral and written presentations on S. 414 of the need to expedite the bureaucratic processes of the various government granting agencies. S. 414 addresses this problem by providing for a uniform government patent policy to be used by these agencies. In accomplishing its purposes, S. 414 basically does two things: it explicitly states that the so-called "title policy" shall be used by the granting agencies, whereby title to inventions resulting from federally-supported research is to reside in the contractor; and it sets forth regulations to be followed by all granting agencies, specifying how nonprofit organizations and small business may be permitted to exploit federally funded inventions and authorizing this to be done under a blanket authorization by the specific funding agency, rather than requiring such authorization to be obtained on a case-by-case basis. S. 414 thus resolves in a most constructive manner two major long-standing, costly, and controversial issues.

However, it should not be expected that resolution of these two issues will result in an immediate and obvious quickening of the innovation process as related to federally funded inventions arising at nonprofit organizations and small businesses. The reason for this is that innovation is a series of usually complicated steps starting with invention itself.

THE INNOVATION PROCESS AND S. 414

Inventions first have to be made, identified, disclosed and evaluated for their potential before patenting can take place or patent ownership decided. After inventions are made, they can remain unidentified, undisclosed or lie fallow for lack of adequate evaluation. If evaluation of such inventions is favorable and a decision to patent is made, patent costs are necessary and licensing programs need to be devised and carried out. S. 414 provides only that title to any patents may be retained by the contractor, and does not provide means or incentives to enhance the bringing of inventions to the patenting stage. Thus, the time and

effort required to bring inventions from birth to patent remains the same as before. Whether legislation is needed to enhance this part of the innovation process for federally funded inventions has not yet been addressed in Congress, but, perhaps, should be if the entire process is to be expedited.

The argument is made that by settling on the "title policy" contractors will be encouraged to pay more attention to the prepatent part of the innovation process since, with title, the contractor has a greater potential for profit. This may be true in a few specific cases, but generally speaking, I believe the perception of an increased profit will not occur most of the time; additional incentives need also to be provided.

A second argument is made that, with title in the contractor, more inventions will be identified. This, too, may well be a specious argument, since the identification of an invention usually rests with an employee of the contractor, not the contractor himself. This is particularly true in the case of educational institutions. The contractor, however, may be stimulated to designate a person or persons to help develop and enhance a patent awareness at the inventor level, since, under present circumstances, this would have to be done at the contractor's expense, some financial return on this investment would be needed. S. 414 does not address this issue.

Academic inventors, particularly, need to be educated about inventing, the marketplace and the proper use of the patent system. Such inventors are often the last to recognize what inventions are useful to the general public. They are science-oriented, and, frequently, not knowledgeable in the marketplace. Their useful inventions are mostly fall-out from their scientific investigations. Most of the time they do not invent to fulfill a perceived need. Parenthetically, I believe that this accounts in large measure for the large number of unlicensed government-owned patents. Inventions were made during the course of federally funded research, evaluation of the inventions for commercial usefulness was not made but patent attorneys were put to work to file and prosecute patents for a purely defensive reason—to prevent a citizen from possibly making great profit from exploitation of government-owned property. But most of these patents cover inventions of no use to the general public since they fill no real public needs. Hence, they remain unlicensed, a monument to a misunderstood process of invention and innovation, and to suspicion and wariness.

CASE-BY-CASE WAIVERS VERSUS IPA

In setting the pattern of regulations to be followed by contractors having title, S. 414 follows closely the procedures already worked out over a ten-year period by the Department of Health, Education, and Welfare, and adopted in modified form by the National Science Foundation. These procedures have been embodied in Institutional Patent Agreements (IPAs) which have been concluded with a relatively large number of DHEW and NSF contractors, primarily universities and scientific research institutions. These agreements are intended to reduce the paperwork and administrative detail, thus saving time and money, as compared with handling federally funded inventions on a case-by-case waiver basis. (The latter procedure is made available where an IPA does not govern.)

In practice there is not necessarily any appreciable difference between using the case-by-case route since both procedures are essentially the same, with one exception. This exception involves the necessity for formulating a Request for Determination of patent rights in the case-by-case situation; this is not required if an IPA exists. Having to develop such a request is not necessarily a bad thing since it requires the contractor to study both the technology and the potential markets more carefully and enables him to make a more considered judgment as to whether he really intends to and can develop the commercial market. Nor is the cost for making such a study very large—usually under a thousand dollars.

The main problem with the case-by-case procedure is that much time can elapse between filing the Request and obtaining a decision from the contracting agency. Unless the requestor, at his expense, proceeds promptly with preparing, filing and prosecuting patent applications while the Request is being prepared and under study, patent protection may well be lost. If the waiver decision is unfavorable to the contractor, of course, he will have to turn any patent rights back to the government, with reimbursement of his costs possible, but not assured.

With an IPA this uncertainty is eliminated and the patenting process is expedited.

The provisions in S. 414 relating to annual reporting, march-in rights, licensing terms and the like apply equally whether inventions were acquired by contractors on the case-by-case waiver procedure or under an IPA. The contractor will operate in an identical fashion to fulfill the requirements of these provisions. Thus, after the contractor has obtained title to an invention, S. 414 does nothing to alleviate the administrative burden of the contractor nor does it provide any incentives to help reach the market sooner or in a more comprehensive fashion. Basically, the government's same defensive attitude still exists after title has been vested in the contractor. It is for this reason that I advocate the introduction of additional bills into Congress which will provide incentives to contractors to expedite the further development, manufacture and marketing of federally funded inventions. S. 414 does not address itself to these parts of the innovation process, nor does it provide appreciable relief from what I believe to be overly restrictive and unnecessary reporting back procedures based on a highly defensive attitude.

RESEARCH WITH CASE-BY-CASE WAIVERS AND UNDER IPA

To illuminate this discussion it might be helpful to summarize the experience Research Corporation has had over the years working with federally funded inventions arising at educational institutions under both IPA and case-by-case procedures. These results are summarized in the attached tables.

Research Corporation first became involved in evaluating, patenting and licensing federally supported inventions in the early 1960s. The foundation provided advice based on its early experiences to the Department of Health, Education, and Welfare in the original drafting of the guidelines used in the HEW Petition for Determination waiver procedure which later evolved into the HEW Institutional Patent Agreement. As shown in Table III the foundation has accepted for handling 100 federally supported inventions from academic institutions and has used both the case-by-case petition waiver procedure and the IPA route.

Based on Research Corporation experience, as shown by the tabulated information and accompanying conclusions enclosed herewith, some generalized conclusions can be drawn which should be helpful in drafting legislation. Some of the more pertinent observations are:

1. There is a long time lag, often five years or more, between disclosure of an invention and the first sale of licensed products based on the invention.
2. Probably less than 10 percent of federally funded academic inventions disclosed will result in marketable products.
3. Probably less than 5 percent of federally funded academic inventions will result in sales of licensed products amounting to more than \$1,000,000 annually.
4. In the case of federally funded academic inventions, normal business profits will accrue to the licensee and the institution and inventors will share only in royalties paid by the licensee. Under these circumstances the chance for so-called "windfall profits" to any party is vanishingly small.
5. Using the time it takes to get federally funded academic inventions to market as the criterion of judgment, it makes little difference whether the case-by-case petition waiver procedure or the IPA route is used.

In view of these conclusions and observations, much more attention needs to be paid than has been done heretofore to the steps in the innovation process following the disclosing of federally funded inventions. These steps in sequence include:

Evaluation of the inventions for both patentability and commercial potential.

Preparation, filing and prosecution of patent applications only on those inventions which have at least marginal commercial potential, and the subsequent development and carrying out of appropriate licensing programs.

Finding and inducing industrial companies to undertake further research and market development, the design, and building of manufacturing facilities, the obtaining of government clearances, and the production of saleable products.

Monitoring of all of these activities to prevent monopolistic practices, the receipt of undue profits and other possible abuses.

While these steps are not addressed in S. 414 some of them are in Senator Schmitt's bill S. 1215 and additional ones in Senator Stevenson's bill S. 1250, both

recently introduced into the 96th Congress. On further study additional bills may well be needed to aid in enhancing the total innovation process. A concerted and integrated endeavor to arrive at a coordinated approach is long overdue, and I strongly urge you to give further consideration to this suggestion.

If you feel I can be of further assistance to you or your staff as S. 414 progresses through the legislative process, or if you have specific questions relating to the enhancement of the innovative process, particularly as it is practiced using federally funded academic inventions, please do not hesitate to call on me.

Sincerely yours,

WILLARD MARCY.

Enclosure.

17 "SEC. 204. RETURN OF GOVERNMENT INVEST-
 18 MBNT.—(a) If a nonprofit organization or small business firm
 19 receives ^{royalties} ~~\$250,000 in after-tax profits~~ from the licensing of
 20 any subject invention ~~within a period of ten years following~~
 21 ~~disclosure of the invention~~, the United States shall be entitled
 22 to a share, ^{15 per} ~~to be negotiated~~, of up to 50 per centum of all net
 23 ~~income during said period from licensing received by the con-~~
 24 ~~cern above \$250,000.~~ Provided, however, That in no event
 25 shall the United States be entitled to an amount greater than

1 that portion of the Federal funding under the funding agree-
 2 ment under which the subject invention was made which was
 3 expended on activities related to the making of the invention.

4 If
 4 ~~"(b) In addition,~~ if a nonprofit organization or small
 5 business firm receives after tax profits in excess of
 6 \$2,000,000 on sales of products embodying or manufactured
 7 by a process employing a subject invention, during a period
 8 of ten years commencing with commercial exploitation of the
 9 subject invention, the Government shall be entitled to a
 10 share, to be negotiated, of all additional income accruing
 11 from such sales up to the amount of the portion of the Gov-
 12 ernment funding under the funding agreement under which
 13 the invention was made which was expended on activities
 14 related to the making of the invention less any amounts re-
 15 ceived by the Government in accordance with paragraph (a)
 16 of this section 204.

17 ~~"(c) The Director of the Office of Federal Procurement~~
 18 ~~Policy is authorized and directed to revise the figures of~~
 19 ~~\$250,000 and \$2,000,000 in paragraphs (a) and (b) of this~~
 20 ~~section at least every three years in light of changes to the~~
 21 ~~Consumer Price Index or other indices which he considers~~
 22 ~~reasonable to use.~~

23 "SEC. 205. PREFERENCE FOR UNITED STATES INDUS-
 24 TRY.—Notwithstanding any other provision of this chapter,
 25 no small business firm or nonprofit organization which re-
 CONCLUSIONS BASED ON STATISTICS PRESENTED IN ACCOMPANYING TABLES AND
 GRAPHS

1. Time from acceptance to first license ranged from less than 1 year to 8 years, the median being about 2½ years.
2. Time from first license to first sale of licensed products ranged from less than 1 year to 6 years, the median time being about 1 year.

3. Time from acceptance to first sale of licensed products ranged from 1 to 9 years, the median time being about 4½ years.

4. In the last 15 years about three-fourths of the inventions (96 out of 133) handled under Department of Health, Education, and Welfare guidelines involved case-by-case Petitions for Determination waivers and one-quarter (37 out of 133) were handled under Institutional Patent Agreements (IPA). Since 1975 the IPA route has been used more frequently and the Petition route has been used less frequently.

5. In the last 15 years all of the inventions (a total of 14) handled under National Science Foundation guidelines have been handled by the case-by-case Petition for Determination waiver procedure, none by the IPA route.

6. All inventions (a total of 13) handled for granting agencies other than DHEW and NSF have been handled by the case-by-case waiver procedure.

7. DHEW denied the Petition for Determination in 5 cases out of 133 total (3.8 percent).

8. NSF denied the Petition for Determination in 2 cases out of 14 total (14.3 percent).

9. Marketing of licensed products was accomplished for ten DHEW inventions out of 128 administered by Research Corporation. Of these ten, six were handled using the petition procedure and four were handled via the IPA route.

10. Total approximate sales through December 31, 1978 of all DHEW inventions was \$25,000,000, of which Research Corporation received about \$1,350,000. This amount was distributed among the inventors and their institutions (about \$900,000), and the remainder (about \$390,000) was retained by Research Corporation to support its evaluation, patenting and licensing program and for its other charitable purposes.

11. Only one NSF invention has reached the marketplace during the last 15 years. This invention has produced sales of about \$400,000 through December 31, 1978. Royalties on these sales have approximated \$20,000 of which about \$12,000 was distributed to the inventor and his institution.

12. Only one invention from granting agencies other than HEW and NSF has reached the marketplace in the last 15 years. This invention was supported by funds from the Agency for International Development. It has enjoyed total sales of about \$220,000 through December 31, 1978. Royalties have approximated \$12,000 of which about \$7,000 was distributed to the inventor and his institution.

13. Twenty-two inventions have been licensed but sales of licensed products had not yet occurred as of December 31, 1978. Nineteen of these were HEW supported, two were supported by NSF, and, one by the Department of Defense. The time from acceptance has varied from ten to two years.

TABLE I.—TOTAL SALES, ROYALTIES RECEIVED, AND DISTRIBUTION OF ROYALTIES FROM SALE OF LICENSED PRODUCTS

[Through Dec. 31, 1978; dollar amounts in thousands]

	Agency	Waiver or IPA	Time from acceptance by Research Corp. (years)	Time on market (years)	Total sales by licensee	Royalties received by Research Corp.	Royalties distributed to institutions and inventors by Research Corp.
Antibacterial burn ointment.....	HEW	Waiver	12	5	\$20,000	\$1,055.0	\$790
Analytical reagent.....	NSF	do	12	9	400	20.0	12
Macrocyclic chemicals.....	HEW	do	11	6	1,000	51.0	29
Platinum antitumor compounds.....	HEW	IPA	10	<1	650	45.0	32
Phrenic nerve stimulator.....	HEW	Waiver	10	6	1,000	49.0	28
Amine protective compound.....	HEW	do	8	<1	10	5	3
Codling moth sex attractant.....	HEW	IPA	8	3	105	22.0	13
Ion selective electrode.....	HEW	Waiver	8	1	80	4.0	2
Contraceptive device.....	AID	do	6	3	220	12.0	7
Polymeric photo sensitizers.....	HEW	do	6	2	2	1	.06
Heart pacemaker telemetry system.....	HEW	IPA	5	3	950	47.0	27
Knee joint prosthesis.....	HEW	IPA	4	3	800	39.0	22
HEW.....					24,637	1,314.0	943
NSF.....					400	20.0	12
AID.....					220	12.0	7
Total.....					25,257	1,346.0	162

Code: HEW = Department of Health, Education, and Welfare, NSF = National Science Foundation, AID = Agency for International Development, IPA = Institutional Patent Agreement.

TABLE II.—TOTAL SALES, ROYALTIES RECEIVED, AND DISTRIBUTION OF ROYALTIES FROM SALE OF LICENSED PRODUCTS

(Through Dec. 31, 1978; dollar amounts in thousands)

	Total sales by licensee	Royalties received by Research Corp.	Royalties distributed to institutions and inventors by Research Corp.
By waiver.....	\$23,752	\$1,193	\$858
By institutional patent agreement.....	2,505	153	94
Total.....	25,257	1,346	952

TABLE III.—NUMBER OF INVENTIONS ACCEPTED BY RESEARCH CORP. BY YEAR OF ACCEPTANCE

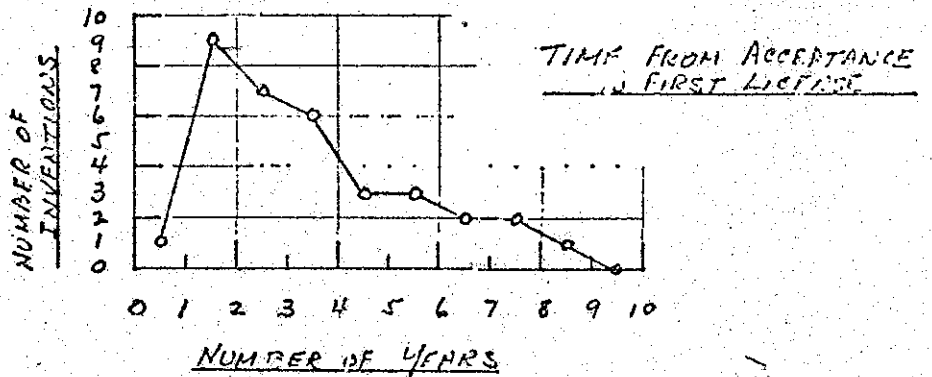
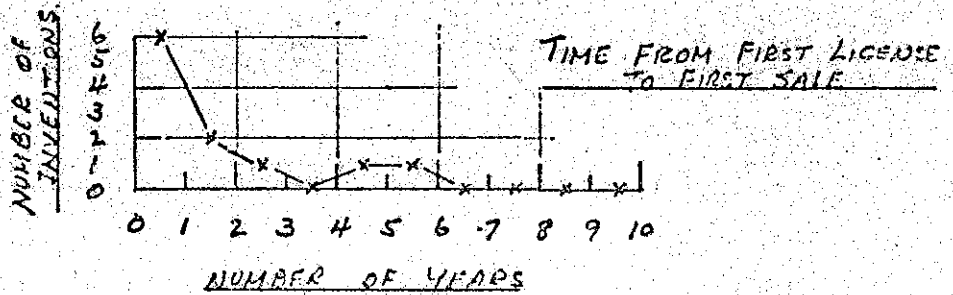
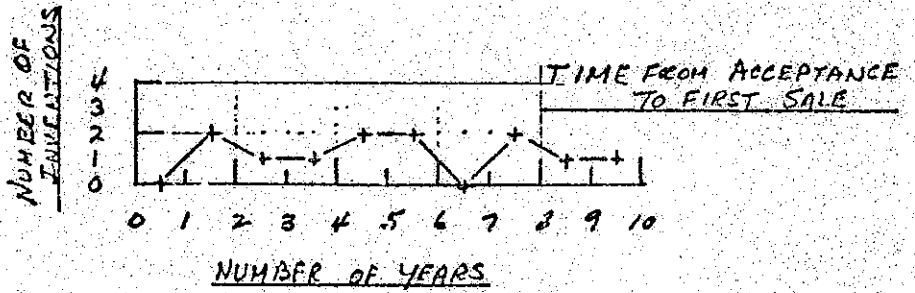
	HEW			NSF			Other agen- cies	Producing royalties by Dec. 31, 1978		
	Total	Waiver	IPA	Total	Waiver	IPA		HEW	NSF	Other agencies
Pre-1967.....	6	6	0	1	1	0	0	0	0	0
1967.....	4	4	0	1	1	0	2	1	1	0
1968.....	7	7	0	1	1	0	1	1	0	0
1969.....	11	9	2	2	2	0	0	3	0	0
1970.....	12	(1)9	2	0	0	0	0	0	0	0
1971.....	13	(2)9	2	4	(1)3	0	0	3	0	0
1972.....	12	(1)11	0	0	0	0	1	4	0	0
1973.....	10	8	2	0	0	0	4	2	0	1
1974.....	9	7	2	3	3	0	2	2	0	0
1975.....	9	5	4	1	1	0	0	2	0	0
1976.....	13	7	6	1	(1)	0	1	2	0	0
1977.....	15	6	9	0	0	0	1	1	0	0
1978.....	12	(1)3	8	0	0	0	1	0	0	0
Total (denied).....	133	(5)91	37	14	(2)12	0	13	21	1	1
Percent:										
Waiver.....		68.4			85.7					
IPA.....		27.8			0					
Denied.....		3.8			14.3					

: Other agencies use waiver procedure only.

TABLE IV.—INVENTIONS ACCEPTED BY RESEARCH CORP. PRODUCING ROYALTIES BY DEC. 31, 1978

	Number	Percent of accepted inventions
Health, Education, and Welfare:		
Waiver.....	15	11
IPA.....	6	5
National Science Foundation:		
Waiver.....	1	7
IPA.....	0	0
Other agencies.....	1	8

ELAPSED TIMES ON HANDLING
FEDERALLY FUNDED INVENTIONS



LWM 8/30/79