It is, and has been, my desire to provide the necessary incentives for natural gas producers that will insure an ample supply of gas for the consuming public. But this measure simply would not guarantee that.

In the course of this debate, I have heard some repeat the old adage that "It's better to have half a loaf than no loaf at all." But, what if the loaf is lacking in nutritional value and would actually be unhealthy for the body as a whole? That is precisely the type of "half loaf" that this compromise report represents. It provides little nourishment to the market system and would be unhealthy for producers and consumers alike.

In addition to the extension of price controls over more of the gas industry, this bill would create a regulatory nightmare. It would establish between 17 and 23 new categories of gas to be overseen by both the Federal Energy Regulatory Commission (FERC) and the States' public service commissions.

Conflicting memoranda have surfaced from within the Government regarding the administrative feasibility of the bill. But regardless of which memorandum one believes, the fact remains that the creation of so many new complex categories of gas flies in the face of the effort to deregulate the industry. It is difficult to see how doubling or tripling the burden of paperwork and redtape imposed upon the producer, coupled with the extension of price controls to intrastate gas is going to encourage new exploration and production. Indeed, I am afraid that it will have just the opposite effect.

From the standpoint of the consumer, there is even less to be gained from the conference report. Any proposal which would increase the price of gas paid to the producer in order to encourage exploration and production is going to cost the consumer money. The question is how to devise a plan so as to maximize the increase in the discovery and production of new domestic gas reserves for every dollar increase in the consumer's fuel bill.

According to the Energy Information Agency, the bill passed by the Senate last year would have had a net cost to the consumer which was less than is now projected under the pending conference report. Moreover, it has been shown that this bill would not increase the gas supply in future years over what could be achieved by simply permitting the Federal Energy Regulatory Commission to set a new, higher price for natural gas. In other words, the conference report will cost consumers an estimated $41 billion in additional costs between now and the end of 1985, with no commensurate increase in the domestic supply.

Finally, it is worth reviewing the effect of the compromise bill from the vantage of the dollar overseas. The administration and others have argued that enactment of the bill is necessary to bolster the sagging dollar and reduce our balance of payments deficit. While I will readily concede that passage of this bill, or any other significant bill, would have a positive, and perhaps stabilizing, effect upon the dollar, I am convinced that the effect would be temporary.

While leaders of the industrialized world might be encouraged by the fact that the United States finally adopted an energy policy, I seriously doubt it would engender much confidence in the dollar once it was realized that the policy would do very little to increase the domestic supply of gas and, therefore, reduce dependence on foreign imports. Moreover, many economists and bankers believe that the problems facing the dollar abroad are not so much the result of an excessive dependence upon imported oil, but rather an inability to come to grips with the problem of inflation and Government spending. I share that view and find the arguments in favor of the conference report based upon the status of the dollar unpersuasive.

For those reasons, Mr. President, I intend to oppose the pending gas conference report and support the motion to recommit.

The merits of the motion to recommit the report with instructions are several. The intrastate market would remain free of controls, thereby creating the optimum incentive for greater gas production. In times of emergency, the President could order allocation of certain gas, and could permit sales at unregulated prices, but still under his control. Interstate and intrastate pipelines would be able to move gas for each other without bringing any new parties under general Federal regulation. The Federal Energy Regulatory Commission would set the price for interstate gas based upon 1977–78 data. And finally, retail gas pricing would be left to the State regulatory commissions.

In my judgment, Mr. President, the motion to recommit the conference report with instructions to report back with the bill just outlined is a far better way to address the energy situation confronting this country. It would maximize the increase in the supply of domestic gas at a justifiable cost to the consumer. It represents a solution that we can be proud of both at home and abroad.

ROUTINE MORNING BUSINESS

Mr. ROBERT C. BYRD. Mr. President, I ask unanimous consent that there now be a period for the transaction of routine morning business, with the statements therein limited to 5 minutes, and that the period not extend beyond 30 minutes.

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

MESSAGES FROM THE HOUSE

At 10:37 a.m., a message from the House of Representatives delivered by Mr. Berry, one of its reading clerks, announced that the House has passed the following bills without amendment:

S. 3119. An act to transfer certain real property of the United States to the District of Columbia Redevelopment Land Agency; and

S. 3120. An act to enhance the flexibility of contractual authority of the Temporary Commission on Financial Oversight of the District of Columbia.

The message also announced that the House agrees to the report of the committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 3075) to amend the Foreign Assistance Act of 1961 and the Arms Export Control Act, and for other purposes.

At 3:29 p.m., a message from the House of Representatives delivered by Mr. Hackney, one of its reading clerks, announced that the House has passed the bill S. (3375) to amend title 28 of the United States Code to make certain changes in the places of holding Federal district courts, in the divisions within judicial districts, and in judicial district dividing lines, with an amendment in which it requires the concurrence of the Senate.

The message also announced that the House has passed the following bills, each with amendments in which it requests the concurrence of the Senate:

S. 1103. A bill to permit States the reciprocal right to sue in the Supreme Court of the District of Columbia to recover taxes due the State;

S. 1895. A bill to amend the Natural Gas Pipeline Safety Act of 1968 to authorize appropriations for fiscal year 1979; and

S. 2556. A bill to change the name of the District of Columbia Bail Agency.

The message further announced that the House has passed the following bills, in which it requests the concurrence of the Senate:

H.R. 10311. An act to amend the District of Columbia Redevelopment Act of 1945, and for other purposes;

H.R. 12116. An act to amend the District of Columbia Self-Government and Governmental Reorganization Act to repeal the authority of the President to sustain vetoes by the Mayor of the District of Columbia of acts passed by the Council of the District of Columbia and repassed by two-thirds of the Council, to change the period during which acts of the Council of the District of Columbia are subject to congressional review, and for other purposes;

H.R. 12165. An act to extend until the close of June 30, 1981, the existing suspension of duties on certain metal waste and scrap, unwrought metal, and other articles of metal; and

H.R. 13243. An act to amend the District of Columbia Self-Government and Governmental Reorganization Act to authorize the Council of the District of Columbia to delegate its authority to issue revenue bonds for undertakings in the area of housing to any housing finance agency established by it and to provide that payments of such bonds may be made without further approval.

ENROLLED BILLS SIGNED

The message also announced that the Speaker has signed the following enrolled bills:

S. 3075. An act to amend the Foreign Assistance Act of 1961 and the Arms Export Control Act to authorize international security assistance programs for fiscal year 1979, and for other purposes;

S. 3119. An act to transfer certain real property of the United States to the District of Columbia Redevelopment Land Agency;

S. 3120. An act to enhance the flexibility of contractual authority of the Temporary Commission on Financial Oversight of the District of Columbia;

S. 3454. An act to amend the Act of August 29, 1974 (88 Stat. 795; 10 U.S.C. 8202 note), relating to the authorized numbers for

the grades of lieutenant colonel and colonel in the Air Force and to authorize the President to suspend certain provisions of law when he determines that the needs of the Armed Forces so require, and for other purposes; and

H.R. 13087. An act to authorize the issuance of substitute Treasury checks without undertakings of indemnity, except as the Secretary of the Treasury may require.

The enrolled bills were subsequently signed by the President pro tempore (Mr. EASTLAND).

HOUSE BILLS REFERRED

The following bills were read twice by their titles and referred as indicated:

H.R. 10311. An act to amend the District of Columbia Redevelopment Act of 1945, and for other purposes; to the Committee on Governmental Affairs;

H.R. 12116. An act to amend the District of Columbia Self-Government and Governmental Reorganization Act to repeal the authority of the President to sustain vetoes by the Mayor of the District of Columbia of acts passed by the Council of the District of Columbia and repassed by two-thirds of the Council, to change the period during which acts of the Council of the District of Columbia are subject to congressional review, and for other purposes; to the Committee on Governmental Affairs;

H.R. 12165. An act to extend until the close of June 30, 1981, the existing suspension of duties on certain metal waste and scrap, unwrought metal, and other articles of metal; to the Committee on Finance; and

H.R. 13243. An act to amend the District of Columbia Self-Government and Governmental Reorganization Act to authorize the Council of the District of Columbia to delegate its authority to issue revenue bonds for undertakings in the area of housing to any housing finance agency established by it and to provide that payments of such bonds may be made without further approval; to the Committee on Governmental Affairs.

REPORTS OF COMMITTEES

The following reports of committees were submitted:

By Mr. MUSKIE, from the Committee on the Budget, without amendment:

S. Res. 544. A resolution waiving section 402(a) of the Congressional Budget Act of 1974 with respect to consideration of H.R. 11092, a bill to amend the act of December 22, 1974 (88 Stat. 1712), relating to the Navajo and Hopi Indian Relocation Commission (Rept. No. 95-1189).

S. Res. 549. A resolution waiving section 402(a) of the Congressional Budget Act of 1974 with respect to consideration of S. 2083 (Rept. No. 95-1190).

By Mr. GLENN, from the Committee on Governmental Affairs, without amendment:

S. Res. 560. An original resolution waiving section 402(a) of the Congressional Budget Act of 1974 with respect to the consideration of H.R. 7700. Referred to the Committee on the Budget.

By Mr. GLENN, from the Committee on Governmental Affairs, with an amendment:

H.R. 7700. An act to amend title 39, United States Code, to insure the continuation of public services performed by the United States Postal Service, and for other purposes (together with additional views of the Committee on Commerce, Science, and Transportation) (Rept. No. 95-1191).

By Mr. MOYNIHAN, from the Committee on Finance, with an amendment and an amendment to the title:

H.R. 4007. An act to amend the Internal Revenue Code of 1954 to designate the home of a State legislator for income tax purposes, and for other purposes (Rept. No. 95-956).

EXECUTIVE REPORTS OF COMMITTEES

The following executive reports of committees were submitted:

By Mr. PELL, from the Committee on Rules and Administration:

John Warren McGarry, of Massachusetts, to the Federal Election Commission (together with additional and minority views) (Ex. Rept. No. 95-28).

(The above nomination from the Committee on Rules and Administration was reported with the recommendation that it be confirmed, subject to the nominee's commitment to respond to requests to appear and testify before any duly constituted committee of the Senate.)

INTRODUCTION OF BILLS AND JOINT RESOLUTIONS

The following bills and joint resolutions were introduced, read the first time and, by unanimous consent, the second time, and referred as indicated:

By Mr. DANFORTH:

S. 3495. A bill for the relief of Alexis Maria Davaraj; to the Committee on the Judiciary.

By Mr. DOLE (for himself, Mr. BAYH, Mr. CASE, Mr. DECONCINI, Mr. DOMENICI, Mr. HATCH, Mr. PAUL G. HATFIELD, Mr. GARN, Mr. MATHIAS, Mr. MARK O. HATFIELD, and Mr. METZENBAUM):

S. 3496. 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; to the Committee on the Judiciary.

By Mr. MOYNIHAN:

S. 3497. A bill to amend the Internal Revenue Code of 1954 to allow a taxpayer who does not itemize his deductions to deduct amounts paid as State and local income taxes from gross income; to the Committee on Finance.

STATEMENTS ON INTRODUCED BILLS AND JOINT RESOLUTIONS

By Mr. DOLE (for himself, Mr. BAYH, Mr. CASE, Mr. DECONCINI, Mr. DOMENICI, Mr. HATCH, Mr. PAUL G. HATFIELD, Mr. GARN, Mr. MATHIAS, Mr. MARK O. HATFIELD, and Mr. METZENBAUM):

S. 3496. 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; to the Committee on the Judiciary.

SMALL BUSINESS NONPROFIT ORGANIZATION PATENT PROCEDURE ACT

● Mr. DOLE. Mr. President, today Senator BIRCH BAYH and I and others are introducing the "Small Business, Nonprofit Organization Patent Procedures Act. This bill will not only remove an unfortunate bottleneck in the flow of technology to the public, it will also underscore the need for the public and private sectors to work in partnership on the many problems facing this Nation.

FEDERAL PATENT POLICY BOTTLES UP INNOVATIONS

Inventions developed with Government support at this country's major universities and research institutes are wasting away on the shelves of bureaucracies all across Government. The present Government policy mandates the Government to take title to all inventions it has had a hand in funding. The policy discourages participation by the private sector, with the end result being that the innovation will never be brought to the marketplace for use by the public. Inventions that could make the difference for this Nation's most pressing problems of jobs, inflation, energy, and health are being relegated to the scrap heap.

Why is the Government willing to bottle up much of this country's most important technological innovations? Rather than acknowledging the need for the public and private sectors to work in partnership on the many problems facing this Nation, we maintain policies that foster an adversary relationship between Government and private industry. I can assure you that this attitude will not encourage startups of new small businesses, nor will it enhance economic growth, nor increase employment, nor trade competitiveness, nor solve our energy shortage.

It is time we stop paying lip service to the contributions of the private sector. Although patents may be but a small factor in establishing meaningful private-public collaborations, it does provide an opportunity for the Government and private sectors to display mutual trust and willingness to work together on common problems.

To this end Senator BIRCH BAYH and I are introducing today the Small Business, Nonprofit Organization Patent Procedures Act. The bill provides to universities, nonprofit organizations, and small businesses patent rights to inventions they have made with Government grant and contract support. The intent of the bill is to provide the incentives necessary to unleash the creative energies of the private sector in tackling the societal challenges of health, energy, and urban decay.

SUPPRESSION OF TECHNOLOGY IN HEW

Nowhere are the problems raised by Government patent policy more catastrophic than in the biomedical research programs of the Department of Health, Education, and Welfare. At this moment, people are being condemned to needless suffering because of the refusal of HEW to release the rights to medical devices and pharmaceuticals developed with Government support.

For more than a year now, potentially lifesaving medical technology from the world's most renowned medical research laboratories supported by the National Institutes of Health has been shut down. HEW has decided to pull the plug on development of biomedical research, and withhold from the American public potential cures and revolutionary new diagnostic techniques for treating such diseases as cancer, arthritis, hepatitis, and emphysema.

In August when I raised this issue on the floor of the Senate, I was informed

by the General Counsel of HEW, Mr. Peter Lebassi, that the delay in the release of the more than 30 cases was only a matter of paperwork. But now another month has gone by and still nothing has been released by HEW. We are not witnessing in HEW "an unavoidable bureaucratic delay," but a calculated policy of "search and destroy" aimed at innovations from this country's scientific research programs.

THE DEMISE OF A LIFE SAVING INVENTION

Let me illustrate the attitude of some of the zealous bureaucrats in HEW who are now determining the policies for this country. Yesterday, I was informed by the legal counsel of the Weissman Institute of Israel, one of the world's most prominent medical research centers, that the petition for ownership rights submitted by its president, Professor Sella, who is a renowned scientist in cancer research, had been denied. Under a contract from NCI for an investigation of carcino-embryonic antigens (CEA) as a diagnostic marker for cancer, Dr. Sella invented a revolutionary new blood test for detecting cancer of the breast, digestive tract, and pancreas. From all indications it appears to be superior to all presently available procedures, and is especially important for postoperative followup diagnosis and prognosis of these dreaded cancers. Clinical trials of this marvelous new discovery that were to take place in collaboration with a private pharmaceutical firm have been canceled in light of the decision by HEW. I fear we will never know how many lives this invention would have saved.

What possibly could have prompted the HEW General Counsel to reach the decision to deny to Dr. Sella the rights to his own invention? I can only wonder who is served by HEW's policy? Certainly not the taxpayers who pay for this country's medical research. Certainly not Dr. Sella who has devoted so much of his life to conquering cancer. And certainly not the hundreds of thousands of us unfortunate enough to be stricken with cancer who need this technology to sustain life.

Rarely have I witnessed a more unfortunate example of overmanagement by the bureaucracy. In the anticipation of a presently nonexistent abuse, or perhaps out of a preoccupation with the rising cost of health care, HEW is willing to shut down the innovative process.

We must not allow this unfortunate state of affairs to be repeated. Legislation of a Government-wide patent policy is needed, and it is needed now.

I ask unanimous consent that the text of the bill be printed in the RECORD.

There being no objection, the bill was ordered to be printed in the RECORD, as follows:

S. 3496

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Small Business Nonprofit Organization Patent Procedures Act."

AMENDMENT OF TITLE 35, UNITED STATES CODE, PATENTS

SEC. 2. Title 35 of the United States Code is amended by adding after Chapter 17, a new chapter as follows:

Chapter 18—PATENTABILITY OF INVENTIONS 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. Background Rights.
208. Relationship to Anti-trust Laws.
209. Uniform Clauses.
210. Foreign Patent Protection and Federally Owned Patents.
211. Regulations Governing Federal Licensing and Small Business Preference.
212. Coordination of Federal Licensing Practices.
213. Restrictions on Exclusive and Partially Exclusive Licenses of Federally Owned Patents.
214. Precedence of Chapter.
215. Effective Date.

POLICY AND OBJECTIVE

SEC. 200. 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 by nonprofit organizations and small business firms; to encourage maximum participation of small business firms in Federally-supported research and development efforts; to promote collaboration between commercial concerns and nonprofit organizations, including universities; to insure that inventions made by nonprofit organizations and small business firms are used in a manner to promote free competition and enterprise; to promote the commercialization and public availability of inventions made in the United States by United States industry and labor; to insure that the Government obtains sufficient rights in Federally-supported inventions to meet the needs of the Government and protect the public against nonuse or unreasonable use of inventions; and to minimize the costs of administering policies in this area.

DEFINITIONS

SEC. 201. As used in this Chapter—

(a) The term "Federal agency" means any "executive agency", as defined in 5 USC 105, and the military department, as defined by 5 USC 102,

(b) The term "funding agreement" means any contract, grant, or cooperative agreement entered into between any Federal agency and any person for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government, such term includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as herein defined.

(c) The term "subject inventor" means any person that is a party to funding agreement.

(d) The term "subject invention" means any invention of the subject inventor conceived or first actually reduced to practice in the performance of work under a contract.

(e) The term "practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or government regulations available to the public on reasonable terms from the subject inventor or licensee or assignee of the subject inventor.

(f) The term "made" when used in relation to any invention means the conception or first actual reduction to practice of such invention.

(g) The term "small business firm" means a small business concern as defined at section 2 of Public Law 85–536 (15 USC 632) and implementing regulations of the Administrator of the Small Business Administration.

(h) The term "nonprofit organization" means universities and other institutions of higher education and organizations of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 USC 501(a)).

DISPOSITION OF RIGHTS

SEC. 202. (a) Each nonprofit organization or small business firm may, within a reasonable time, elect to retain title to any subject invention; provided, however, that each Federal agency may promulgate regulations otherwise (i) when the subject invention is made under a contract for the operation of a Government-owned research or production facility, (ii) when such election to retain title might cause disclosure of classified information or otherwise impair national security; or (iii) in exceptional circumstances when it is determined by the agency that restriction or elimination of the right to retain title will better promote the policy and objective of this Chapter. The rights of the nonprofit organization or small business firm shall be subject to the provisions of paragraph (b) of this section and the other provisions of this Chapter.

(b) The subject inventor shall disclose to each Federal agency which is a party to a funding agreement under which the subject invention was made within a reasonable time after the making of a subject invention, and in any event at least 6 months before public disclosure thereof, the subject matter of the subject invention and whether the subject inventor intends to retain title to the subject invention or to relinquish title to the Government. The subject inventor shall file United States patent applications where appropriate within a reasonable time from making such disclosure and not later than six months after filing such United States applications shall inform the Federal agency as to the foreign countries in which the subject inventor intends to file patent applications.

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

(1) The right of the Federal Government, upon request, to receive title to any subject invention not reported to the Federal agency within such times as are prescribed in Section 202(b) hereof and in the regulations promulgated hereunder.

(2) The right of the Federal Government, upon request, to receive title to any subject inventions in the United States or other countries in which the subject inventor has not filed patent applications on a subject invention within such times as are prescribed in Section 202(b) and in the regulations promulgated hereunder.

(3) The right of the Federal Government, upon request, to receive title to any subject invention in which the subject inventor does not elect to retain rights or fails to elect rights within such times as are prescribed in Section 202(b) and in the regulations promulgated hereunder.

(4) With respect to any invention in which the subject inventor elects rights, the Federal agency shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world, and may, if provided in the funding agreement, have additional rights to sublicense any foreign government pursuant to foreign policy considerations or any existing or future treaty or agreement.

(5) The right of the Federal agency to re-

quire periodic reporting on the utilization or efforts at obtaining utilization that are being made by the subject inventor or his licensees or assignees; provided that any such information may be treated by the Federal agency as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under the Freedom of Information Act.

(6) An obligation on the part of the subject inventor, in the event a United States patent application is filed by or on its behalf or by any assignee of the subject inventor, to include within the specification of such application and any patent issuing thereon, a statement specifying that the invention was made with Government support and that the Government has certain rights in the invention.

(7) In the case of a nonprofit organization, (a) a prohibition upon the assignment of rights to a subject invention in the United States without the approval of the Federal agency, except where such assignment is made to an organization having prior approval of the Federal agency which has as one of its primary functions the management of inventions and which is not, itself, engaged in the manufacture or sale of products or processes that might utilize the invention or be in competition with embodiments of the invention and provided that such assignment is made subject to regulations promulgated hereunder governing rights in inventions and assignments of subject inventions; (b) a prohibition against the granting of exclusive licenses under United States Letters Patent in a subject invention by the Contractor or by a person deriving rights directly or indirectly from 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 time before regulatory agencies necessary to date of the exclusive license excepting that obtain premarket clearance unless, on a case-by-case basis, the Federal agency approves a longer exclusive license. Exclusive field of use licenses may be granted and commercial sale or use in one field of use shall not be deemed to end the exclusive period as to unrelated fields of use; (c) a requirement that the balance of any royalties or income earned by the subject inventor with respect to subject inventions, after payment of expenses (including any payments to inventors) incidental to the administration of subject inventions, be utilized for the support of scientific research or education.

(8) If a subject inventor does not elect to retain title to a subject invention in cases subject to this Chapter, the Federal agency may consider and grant requests for retention of rights by the inventor subject to the provisions of this Act and regulations promulgated hereunder.

(9) In any case when a Federal employee is a co-inventor of any subject invention under this Chapter, the Federal agency employing such co-inventor is authorized to transfer or assign whatever rights it may require in the subject invention from its employee to a subject inventor electing to acquire rights hereunder subject to the conditions set forth in this Chapter.

MARCH-IN RIGHTS

SEC. 203. With respect to any subject invention in which a small business firm or nonprofit organization has acquired title under this Chapter, the Federal agency under whose funding agreement the subject invention was made shall have the right, in accordance with such procedures as are provided in regulations promulgated hereunder to require the subject inventor, an assignee or exclusive licensee of a subject invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are resonable under the circumstances, and if the contractor, assignee or exclusive licensee refuses such request, to grant such a license, itself, if the Federal agency determines either—

(a) That such action is necessary because the subject inventor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use; or

(b) That such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the subject inventor, assignee, or their licensees; or

(c) That such action is necessary to meet requirements for public use satisfied by the contractor, assignee, or licensees.

RETURN OF GOVERNMENT INVESTMENT

SEC. 204. (a) If a nonprofit organization or small business firm receives $250,000 in after tax profits from the licensing of any subject invention, in a period of ten years following reporting of the invention the United States shall be entitled to a share, to be negotiated, of up to 50 percent of all net income during said period from licensing received by contractor above $250,000; provided, however, that in no event shall the United States be entitled to an amount greater than that portion of the Federal funding under the funding agreement under which the subject invention was made which was expended on activities related to the making of the invention.

(b) In addition, if a nonprofit organization or small business firm receives after tax profits in excess of $2,000,000 on sales of products embodying or manufactured by a process employing a subject invention, during a period of ten years commencing with commercial exploitation of the subject invention, the Government shall be entitled to a share, to be negotiated, of all additional income accruing from such sales up to the amount of the portion of the Government funding under the contract under which the invention was made which was expended on activities related to the making of the invention less any amounts received by the Government in accordance with paragraph (a) of this section 204.

(c) The Director of the Office of Federal Procurement Policy is authorized and directed to revise the figures of $250,000 and $2,000,000 in paragraphs (a) and (b) of this section at least every three years in light of changes to the consumer price index or other indices which he considers reasonable to use.

PREFERENCE FOR UNITED STATES INDUSTRY

SEC. 205. (a) Notwithstanding any other provision of this Chapter, no small business firm or nonprofit organization which receives title to any subject invention and no person which receives an assignment of the subject invention shall assign the right to practice such invention in the United States or grant an exclusive license to practice the invention in the United States to any foreign corporation or any other organization substantially owned or controlled by foreign interests. However, in individual cases, this restriction may be waived by the Federal agency under whose funding agreement the invention was made.

(b) Notwithstanding any other provision of this Chapter, no small business firm or nonprofit organization which receives title to a subject invention and no person which receives an assignment of the subject invention from them shall assign the right to practice the invention outside the United States or grant an exclusive license to practice the invention outside the United States to any foreign corporation or any other organization substantially owned or controlled by foreign interests unless it shall have first undertaken reasonable efforts, as defined by regulations promulgated pursuant to this Chapter, to interest domestic, United States organizations or corporations in such foreign rights.

CONFIDENTIALITY

SEC. 206. Any report of a subject invention under this Chapter may be treated by the Federal agency as a record exempt from disclosure pursuant to 5 USC 552 (b) (4) unless (i) a United States patent application describing the invention has been filed (provided that copies of the actual patent application may be treated by the Federal agency as records exempt from disclosure pursuant to 5 USC 552 (b) (4)), (ii) a description of the invention has been published elsewhere by the inventor, (iii) the subject inventor has not elected to retain title and/or a subject inventor or inventor has not requested the retention of title or other commercial rights, or (iv) the subject inventor has not elected to retain title and/or the Federal agency has denied the request of the subject inventor to retain title or other commercial rights.

BACKGROUND RIGHTS

SEC. 207. Nothing in this Chapter shall be deemed to preclude a Federal agency from obtaining rights in any background invention of a subject inventor or other contractor.

RELATIONSHIP TO ANTI-TRUST LAWS

SEC. 208. Nothing in this Chapter shall be deemed to convey to any person immunity from civil or criminal liability, or to create any defenses to actions, under any antitrust law.

UNIFORM CLAUSES

SEC. 209. The Office of Federal Procurement Policy, after receiving recommendations of the Office of Science and Technology Policy, may issue regulations which may be made applicable to Federal agencies establishing standard funding agreement provisions required under this chapter.

FOREIGN PATENT PROTECTION AND FEDERALLY OWNED PATENTS

SEC. 210. Each Federal agency is authorized to—

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

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

(3) grant nonexclusive, exclusive, or partially exclusive licenses under federally owned patent applications, patents, or other forms of protection obtained, royalty-free or for royalties or other consideration, and on such terms and conditions, including the grant to the licensee of the right of enforcement pursuant to the provisions of chapter 28 of title 35, United States Code, as determined in the public interests;

(4) make market surveys and other investigations for determining the potential of inventions for domestic and foreign licensing and other forms of utilization, acquire technical information, and engage in negotiations and other activities for promoting the licensing and for the purpose of enhancing their marketability and public utilization;

(5) withhold publication or release to the public information disclosing any invention in which the Federal Government owns or may own a right, title, or interest for a reasonable time in order for a patent application to be filed;

(6) undertake all other suitable and necessary steps to protect and administer rights to inventions on behalf of the Federal Government either directly or through contract;

(7) transfer custody and administration, in whole or in part, to the Department of

Commerce or to another Federal agency, of the right, title, or interest in any invention for the purpose of carrying out the provisions of paragraphs (1) through (4), without regard to the provisions of the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471); and

(8) designate the Department of Commerce as recipient of any or all funds received from fees, royalties, or other management of federally owned inventions authorized under this Act.

REGULATIONS GOVERNING FEDERAL LICENSING AND SMALL BUSINESS PREFERENCE

SEC. 211. The Administrator of General Srevices is authorized to promulgate regulations specifying the terms and conditions upon which any federally owned invention may be licensed on a nonexclusive, partially exclusive, or exclusive basis. First preference in licensing federally owned inventions shall go to small business firms.

COORDINATION OF FEDERAL LICENSING PRACTICES

SEC. 212. The Secretary of Commerce is authorized in cooperation with other Federal agencies to—

(1) coordinate a program for assisting all Federal agencies in carrying out the authority set forth in section 210;

(2) publish notification of all federally owned inventions that are available for licensing;

(3) evaluate inventions referred by Federal agencies, and patent applications filed thereon, in order to identify those inventions with the greatest commercial potential and to insure promotion and utilization by the public of inventions so identified;

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

(5) accept custody and administration, in whole or in part, of the right, title, and interest in any invention for the purposes set forth in paragraphs (1) through (4) of section 210, with the approval of the Federal agency concerned and without regard to the provisions of the Federal Property and Administrative Service Act of 1949 (40 U.S.C. 471);

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

(7) undertake such other functions directly or through such contracts as are necessary and appropriate to accomplish the purposes of this title.

RESTRICTIONS ON EXCLUSIVE AND PARTIALLY EXCLUSIVE LICENSES OF FEDERALLY OWNED PATENTS

SEC. 213. (a) (1) Each Federal agency may grant exclusive or partially exclusive licenses in any invention covered by a federally owned domestic patent or patent application only if, after public notice and opportunity for filing written objections, it is determined that—

(A) the interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;

(B) the desired practical application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(C) exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(D) the proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public.

(2) A Federal agency shall not grant such exclusive or partially exclusive license under paragraph (1) of this subsection if it determines that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws.

(b) After consideration of whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced, any Federal agency may grant exclusive or partially exclusive licenses in any invention covered by a foreign patent application or patent, after public notice and opportunity for filing written objections, except that a Federal agency shall not grant such exclusive or partially exclusive license if it determines that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws.

(c) The Federal agency shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

(d) Any grant of an exclusive or partially exclusive license shall contain such terms and conditions as the Federal agency determines appropriate for the protection of the interests of the Federal Government and the public, including provisions for the following:

(1) periodic written reports at reasonable intervals including, when specifically requested by the Federal agency, the extent of the commercial or other use by the public that is being made or is intended to be made of the invention;

(2) a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for the Federal Government the licensed invention throughout the world by or on behalf of the Federal Government (including any Federal agency), and the additional right to sublicense any State or domestic local government or to sublicense any foreign government pursuant to foreign policy considerations, or any treaty or agreement if the Federal agency determines it would be in the national interest to retain such additional rights;

(3) the right of the Federal agency to terminate such license in whole or in part unless the licensee demonstrates to the satisfaction of the Federal agency that the licensee has taken effective steps, or within a reasonable time is expected to take such steps, to accomplish substantial commercial or other use of the invention by the public; and

(4) the right of the Federal agency, commencing three years after the grant of a license, to require the licensee to grant a nonexclusive or partially exclusive license to a responsible applicant, upon terms reasonable under the circumstances to terminate the license in whole or in part, after public notice and opportunity for a hearing, upon a petition by an interested person justifying such hearing, if the Federal agency determines, upon review of such material as it determines relevant and after the licensee or other interested person has had the opportunity to provide such relevant and material information as the Federal agency may require, that such license has tended substantially to lessen competition or to result in undue concentration in any section of the country in any line of commerce to which the technology relates, or to create or maintain other situations inconsistent with the antitrust laws.

PRECEDENCE OF ACT

SEC. 214. This Chapter shall take precedence over any other act which would require a disposition of rights in subject inventions in a manner that is inconsistent with this Chapter, including but not necessarily limited to the following:

(1) Section 10(a) of the Act of June 29, 1935, as added by Title 1 of the Act of August 14, 1946 (7 USC 427l(a); 60 Stat. 1085);

(2) Section 205(a) of the Act of August 14, 1946 (7 USC 1624(a); 60 Stat. 1090);

(3) Section 501(c) of the Federal Coal Mine Health and Safety Act of 1969 (30 USC 951(c); 83 Stat. 742);

(4) Section 106(c) of the National Traffic and Motor Vehicle Safety Act of 1966 (15 USC 1935(c); 80 Stat. 721);

(5) Section 12 of the National Science Foundation Act of 1950 (42 USC 1871(a); 82 Stat. 360);

(6) Section 152 of the Atomic Energy Act of 1954 (42 USC 2182, 68 Stat. 943);

(7) Section 305 of the National Aeronautics and Space Act of 1958 (42 USC 2457);

(8) Section 6 of the Coal Research Development Act of 1960 (30 USC 666; 74 Stat. 337);

(9) Section 4 of the Helium Act Amendments of 1960 (50 USC 167b; 74 Stat. 920);

(10) Section 32 of the Arms Control and Disarmament Act of 1961 (22 USC 2572; 75 Stat. 634);

(11) Subsection (e) of section 302 of the Appalachian Regional Development Act of 1965 (40 USC App. 302(e); 79 Stat. 5);

(12) Subsection (a)(2) of section 216 of title 38, United States Code;

(13) Section 9 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 USC 5901; 88 Stat. 1978);

(14) Section 3 of the Act of June 22, 1976 (42 USC 1959d, note; 90 Stat. 694);

(15) Subsection (d) of section 6 of The Saline Water Conversion Act of 1971 (42 USC 1959(d); 85 Stat. 161);

(16) Section 303 of the Water Resources Research Act of 1964 (42 USC 1961c-3; 78 Stat. 332);

(17) Section 5(d) of the Consumer Product Safety Act (15 USC 2054 (d); 88 Stat. 1211);

(18) Section 3 of the Act of April 5, 1944 (30 USC 323; 58 Stat. 191); and

(19) Section 8001 of the Solid Waste Disposal Act (42 USC 6981; 90 Stat. 2829).

The Act creating this Chapter shall be construed to take precedence over any future Act unless that Act specifically cites this Act and provides that it shall take precedence over this Act.

EFFECTIVE DATE

SEC. 215. This Chapter shall take effect 180 days after the date of enactment of this Chapter, except that the regulations referred to in Section 209, or other implementing regulations, may be issued prior to that time.●

● Mr. BAYH. Mr. President, I am pleased today to join in introducing the University and Small Business Patent Procedures Act. This bill is the result of a substantial amount of investigation and consultation involving both Senator DOLE and his staff and me and my staff. I am pleased to join in the leadership of this bipartisan effort with my distinguished colleague from Kansas, and

I am pleased also that our colleagues, Senators MATHIAS, DECONCINI, PAUL HATFIELD, GARN, HATCH, MARK HATFIELD, METZENBAUM, and DOMENICI have joined us as cosponsors.

The bill addresses a serious and growing problem: Hundreds of valuable medical, energy, and other technological discoveries are sitting unused under Government control, because the Government, which sponsored the research that led to the discoveries, lacks the resources necessary for development and marketing purposes, yet is unwilling to relinquish patent rights that would encourage and stimulate private industry to develop discoveries into products available to the public.

The cost of product development exceeds the funds contributed by the Government toward the initial research by a factor of at least 10 to 1. This together with the known failure rate for new products, makes the private development process an extremely risky venture, which industry is unwilling to undertake unless sufficient incentives are provided.

The problem is substantial in HEW, the Department of Defense, the Department of Agriculture, and the National Science Foundation. But nowhere is the patent situation more disturbing than in the biomedical research programs. Many people have been condemned to needless suffering because of the refusal of agencies to allow universities and small business sufficient rights to bring new drugs and medical instrumentation to the marketplace.

For example, Department of Energy and Department of Health, Education, and Welfare procedures of reviewing all of the requests for patent rights from universities are resulting in delays of almost 2 years. In many cases these inventions could make significant contributions to the health and welfare of the American people, but are being frustrated by this present patent policy.

The bill that we are introducing today strikes a careful balance between the rights of the Federal Government to use for itself and the public good inventions arising out of research that the Federal Government helps to support, and the equally important rights of the inventor and the public to see that the inventions receive their full potential in the marketplace and reach the people they may benefit. This bill will allow universities, nonprofit organizations, and small businesses to obtain limited patent protection on discoveries they have made under Government-supported research, if they spend the additional private resources necessary to bring their discoveries to the public. Our experience has shown that unless inventors, universities, small businesses, and the private sector generally are given sufficient incentives to work together and bring inventions to the public, new technology is likely to languish.

This bill addresses part of a larger problem that I find very disturbing, namely, that America seems to be falling behind in technological innovation and inventiveness.

In a two-part series which appeared in the Washington Post on September 3, and September 10, 1978, Mr. Bradley Graham pointed out a number of indicators that something is going wrong with American industry's long-recognized ability to lead the world in technological developments. Mr. Bradley mentions several troubling statistics:

The number of U.S. patents issued per year to U.S. inventors reached a peak in 1971 and has declined steadily since. But the number granted to foreign inventors has increased steadily since 1963. In 1977, foreigners claimed 35 percent of all patents issued in the U.S. across a broad range of fields.

The U.S. balance of trade has worsened, due not only to increased oil imports, but also to more imports of foreign manufactured goods.

Productivity, which is partly a function of technological innovation, has slumped severely. In the past decade, the rate of growth in U.S. productivity has averaged only half of what it was the previous 20 years. In contrast, productivity growth rates in Europe and Japan have been on the rise.

From 1953 to 1966, U.S. investment in research grew at an impressive rate of 10 percent annually in inflation-adjusted dollars. However, investment in research by all sectors in the U.S. over the past 10 years has shown essentially no growth in constant dollars. Further, a number of major U.S. corporations have announced recently they intend to spend even less on long-term basic research and more on development of short-term, quick-profit products.

There are, of course, a number of theories which have been offered to explain this situation. Some observers have cited the dropoff in Government supported research, the nature of the modern corporation, changes in lifestyle, the entrance into the work force of inexperienced workers, and overregulation of businesses by the Government. Others have said that this technological lag is merely a misperception, and that new technological developments are being made, but that they are of necessity not as exciting as the unprecedented technological breakthroughs that followed World War II.

I do not wish to speculate on these theories beyond saying that many of our prominent scientists, educational leaders and businessmen believe that this problem is a very real one, one in fact so serious that it strikes at the traditional heart of the American economy—our ability to adapt to a changing world.

A September 4, 1978 column by Jack Anderson and a July 3, 1978 article in Business Week discuss the unique problems facing small businesses with respect to our declining national role in technological innovation. I ask unanimous consent that all four of these articles be printed at the conclusion of my remarks.

It is time that we start identifying the causes of this troubling trend, and seek solutions. One such area where I am confident progress can be made immediately is with inventions arising from federally supported university and small business research. That is why we are introducing the University and Small Business Patent Procedures Act. In many cases research efforts of small businesses and universities are being frustrated by the policy of the Government of retaining patent rights in most cases, on inventions arising out of research funded in whole or in part by the Federal Government. Small businesses and our universities have been among the most innovative sectors of our economy and have a proven capacity to develop the sort of bold, new inventions that our country needs to maintain its leadership in the world economic community.

The University and Small Business Patent Procedures Act is designed to meet this aspect of the larger problem of lagging technological innovation.

Mr. President, I would like to outline some of the important sections of the bill. I would particularly like to draw the attention of my colleagues to section 204 which provides that if the invention achieves a certain level of success payment must be made back to the Government until this payment equals that amount invested in the invention by the Government.

Section 202 provides that each nonprofit organization (defined in the bill to include universities) and small business shall have a reasonable amount of time to elect to retain title to subject inventions. The federal agency may retain title if the invention is made under a contract for operation of a government owned research or production facility, might cause the disclosure of classified information or imperil national security, or if granting patents would not be in the public interest in terms of the purpose to be served by this legislation.

Section 202(c) provides that each funding agreement shall contain provisions to: (1) insure the right of the federal government to receive title to any subject invention not reported to it within the prescribed times of the contract; (2) insure the government's right to receive title to inventions when the inventor does not intend to file for patent rights; and (3) provide that the agency shall have a nonexclusive, nontransferable, paid-up license to use the invention.

Section 202(c)(7) prohibits nonprofit institutions from assigning rights without the approval of the federal agency; prohibits granting such rights in excess of the earlier of 5 years from the date of first commercial use or 8 years from the date of invention, whichever comes first; and provides that all proceeds shall be used to support scientific research or education.

Section 203 gives the federal agency the right to require the subject inventor or his assignee to grant additional licenses if the agency feels that sufficient steps are not being taken to achieve commercialization. Additional licensing may also be required to alleviate health and safety needs, or under provisions for public use as specified by federal regulations.

Section 204 provides that if the patent holder receives $250,000 in after tax profits from licensing any subject invention during a ten-year period, or receives in excess of $2,000,000 on the sales of products embodying or manufactured by a process employing the subject invention within the ten-year period, that the government shall be entitled to collect up to 50% of all net income above those figures until such time as the amount of government research money has been repaid.

Section 205 specifies that no foreign owned or controlled firm shall be eligible to receive patent rights under this Act unless the federal agency determines that this is the only available means of achieving commercialization; a similar provision covers licensing the invention outside the U.S.

Section 210 will allow federal agenceis to grant exclusive, partially exclusive, or nonexclusive licenses on government owned patents to achieve commercialization; the De-

partment of Commerce is authorized to receive patents held by other agencies and to make the necessary steps to determine the market potential of the patent and to receive any fees or royalties due to the government.

Section 211 authorizes the Administrator of GSA to issue regulations regarding such licenses and gives first preference in licensing federal patents to small businesses.

Section 213 specifies that federal licenses be issued only after public notification and opportunity for filing objections and that exclusive or partially exclusive licenses not be granted if the result would be a lessening of competition; the agency has the right to require more licensing if it feels that this is necessary after three years and to require periodic written reports on progress toward commercialization.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

[From the Washington Post, Sept. 3, 1978]

SOMETHING'S HAPPENED TO YANKEE INGENUITY

(By Bradley Graham)

It's been 89 years since Angus Campbell put the first automatic cotton picker to work, 70 years since Henry Ford gassed up his first Model T, 39 years since Du Pont introduced a super fiber called nylon and 30 years since Edwin H. Land marketed the first instant picture camera.

All of which helps recall a time America's inventive spirit seemed unbounded and unceasing. Ideas flowed to the marketplace as fast and furious as mountain rapids flow downhill.

But what was once thought to be an endless stream of U.S. inventions has of late been trickling out less startling and less competitive products. Meantime, adding pain to the drain, the inventive powers of foreign nations have been in ascendance. The question, once raised in a whisper, is now asked in loud and urgent tones. Has American enterprise lost its innovative touch?

Consider the facts.

The number of U.S. patents issued per year to U.S. inventors reached a peak in 1971 and has declined steadily since. But the number granted to foreign inventors has increased steadily since 1963. In 1977, foreigners claimed 35 percent of all patents issued in the U.S. across a broad range of fields.

The U.S. balance of trade has worsened, due not only to increased oil imports, but also to more imports of foreign manufactured goods.

Productivity, which is partly a function of technological innovation, has slumped severely. In the past decade, the rate of growth in U.S. productivity has averaged only half of what it was the previous 20 years. In contrast, productivity growth rates in Europe and Japan has been on the rise.

From 1953 to 1966, U.S. investment in research grew at an impressive rate of 10 percent annually in inflation-adjusted dollars. However, investment in research by all sectors in the U.S. over the past 10 years has shown essentially no growth in constant dollars. Further, a number of major U.S. corporations have announced recently they intend to spend even less on long-term basic research and more on development of short-term, quick-profit products.

In a world where power and progress are often measured in terms of technological breakthroughs and scientific prowess, such trends are indeed disturbing.

For a nation that has always prided itself on its tinkerers—on those lone souls who brought forth from their garages and basement labs such revolutionary devices as power steering, the office copier and the zipper—they are downright depressing.

From boardroom to research lab, there is a deepening sense that something has happened to the once unchallengeable Yankee ingenuity. Just what, though, no one quite knows.

Some insist it is in rapid decline, choked by an unfavorable economic climate, government regulation and, perhaps, by the lethargy and shortsightedness of big business. Others say it has simply taken new forms, becoming more subtle and incremental in nature than grand and revolutionary. Either way, the country's genius for invention does not appear, at least, to be what it once was.

Alarm bells are going off all over. First, Michael Boretsky, a senior policy analyst in the Commerce Department: "All the indicators imply that the rate of U.S. innovation is measurably down. It's very disconcerting."

Next, Dr. Alden Bean, director of research for the National Science Foundation: "There's no solid evidence to suggest that the U.S. is going to hell in a handbasket in science and technology. But there is serious cause for concern about some trends we've seen."

After several years of arm-waving and shouting about waning U.S. innovation, the nation's research establishment finally caught the ear of the White House. Several months ago, the Carter administration launched a major policy review of things to be done to foster innovation in private industry. The study is being coordinated by the Commerce Department and involves more than 15 agencies. A final report, including recommendations for the president, is expected by April.

But many experts say another study is hardly necessary. The worrisome state of innovation in America has been assessed and reported on many times since the first major policy review conducted by Commerce in 1967. In the interim, the problems only have become more obvious.

For one, the economic climate for innovation is poor. The financial incentives that in the past encouraged the rich and the bold to risk their money on slim-chance projects no longer exist, thanks to increases in the capital gains tax and tighter rules on stock options. Inflation, too, has put the squeeze on capital investment by existing corporations.

Also, with the winding down of space and defense programs, government support of industrially performed research has diminished. Throughout the 1950s, the government annually supported more than one-third of industrial research activity. This level of support reached almost 40 percent in 1962, but has been falling consistently and is 25 percent today.

Increased government regulation, too, has increased operating costs and shrunk the share of profits formerly available for research. So has the higher cost of energy.

Together, these developments have forced a shift in industrial research activities from the offensive to the defensive. "Major effort is being diverted into defensive research," said Howard Nason, president of the Industrial Research Institute in St. Louis. "Much more emphasis is being placed on short-term cost reductions than on long-term product and process improvements."

But as important as such external economic factors may be in explaining the innovation slump, there are certain features about the internal structure of corporate America today which some say have had a debilitating effect on innovation.

Writing in the July-August issue of the Harvard Business Review, Alfred Rappaport, professor of business at Northwestern University, blames the research lag on the increasing emphasis American business places on short-term results. Rappaport asserts that management incentive programs are biased toward quick profits at the expense of perhaps smarter long-term investment.

"American business would do well to reexamine its own self-administered incentive systems," Rappaport concludes.

Industrial research today is dominated by a small number of very large corporations. The top 10 percent of those firms doing R&D in 1976 performed almost 70 percent of the total U.S. R&D effort. Ten firms accounted for more than 36 percent of all expenditures that year. This concentration may itself work against innovation.

"A large part of the blame for the lack of innovation lies with the oligopoly nature of American industry," said Mark Green, director of Ralph Nader's Congress Watch. "Big companies get habituated to their products and there is a reluctance to break through. If you already dominate an industry, where is the incentive to take a chance on a new and costly approach?"

But the history of innovation in America is ambiguous on this point. Studies done on whether big business or little business is more inventive have come to no conclusive end as a whole.

Certainly, many major innovations have come from outside an established industry. The ballpoint pen, for instance, was invented by a sculptor, the dial telephone by an undertaker. It took an electrical engineer employed by a shipbuilding firm in the 1930s to develop the automatic transmission, called by some the last major innovation of the auto industry. IBM's disk memory unit, the heart of today's computer, was not the logical outcome of a decision made by IBM management—rather, it was developed in one of its labs as a bootleg project, over the stern warning from management that the project had to be dropped because of budget difficulties.

At the same time, certain large firms in the fields of electronics, pharmaceuticals, telecommunications and computers have been highly innovative.

In their seminal study in 1958 on the sources of invention, Harvard professor John Jewkes and his colleagues said they could not conclude that inventions flow primarily from any one source. When the study was revised in 1969, the authors stated only the obvious; that inventions can come from firms of varying size.

Business leaders, of course, refute the charge that they are less innovative today than in the past. "There's no lack on the part of big business to be innovative," said General Motors Corp. Chairman Thomas Murphy in a phone interview. "It's a big country, so we have to be big. We couldn't do all of the things we do if we weren't as large as we are."

To the public, a car may still look like a car. But auto officials say the changes which have taken place inside during the past five years have been as revolutionary as anything which has come before.

"There's a perception problem," said Thomas J. Feaheny, the man in charge of car engineering for Ford Motor Co., where "better ideas" were once not only a management dictum but a successful ad slogan. "We've never been as innovative as we are now. But the things we're doing aren't as glamorous and aren't noticed much by the consumer."

Critics note, however, that what the auto industry heralds as advances in development (the catalytic converter, on-board use of minicomputers to govern fuel efficiency and control pollution, greater use of aluminum and other lightweight durable materials) are, in fact, only more logical applications of off-the-shelf technologies rather than breakthroughs in the state of the art.

Of even greater concern, though, than what has or hasn't happened is the prospect for the future. Many major corporations have tailored research budgets to yield more practicable and immediate results. In 1958, industry allocated as much as 38 percent of its R&D dollar to the "R" part. By last year, this had dropped to 25 percent.

Corporations say the reasons for this shift from research into development have noth-

ing to do with being too big or too comfortable. The reasons, basically, are greater pressures from government regulators to meet health, safety and environmental standards as soon as possible, and greater uncertainty about the likely profitability of longer-term, riskier ventures.

"It used to be much easier to bring new products to market," said Du Pont Chairman Irving Shapiro in an interview. "If you hit something, you'd have more time to develop it. Now it's more difficult.

"Also, the pot of gold at the end of the rainbow just isn't there. The economic environment has changed. Our thinking has had to change, too. It's become more short range."

Added Richard Hechert, Du Pont's senior vice president for R&D: "We're not exploring wholly new areas. We're concentrating instead on opportunities for research in established areas. . . . We are less able to take risks. We have to concentrate on surer projects."

The degree of such thinking does vary from company to company and industry to industry. Certain high-technology fields (instrumentation, computers and electronics) remain rooted in innovation and continue to churn out impressive new products. In other industries, though—particularly those most apt to be subject to regulation and high energy costs (steel, chemicals, paper, packaged goods and autos)—product innovation has levelled.

Part of the difficulty in deciding what to do about the innovation lag is figuring out how to define it. To begin with, innovation defies measurement.

"There are no indicators which you can look at to measure the advancement of knowledge," said NSF's Dr. Bean. "Some people count patents, but that's unreallable in part because some firms don't like to patent things and would rather rely on trade secrets rather than disclose important discoveries. Others count citations in the research literature, but that's unreliable, too."

But even without sure data, many have not hesitated to push the panic button. "You can't use statistics to say there's a problem," said Jordan J. Baruch, the assistant Secretary of Commerce who is directing the government's innovation policy review. "But you'd have to be blind not to see it."

Urgency about the problem is all the greater because America seems uniquely stricken. Western Europe and Japan grow more inventive, or so it appears, while U.S. firms age. Examples abound of foreign firms taking the lead in both new and traditional product areas. The Japanese, for instance, totally eclipsed the American communications industry in the development of video tape recorders. The Germans and Swiss now set the pace in textiles. Inventiveness in the steel industry has centered in Belgium and Austria. Some U.S. cities are even going abroad to scout for new ways to handle old problems. (The Council for International Urban Liaison here publishes a monthly newsletter called Urban Innovations Abroad that goes to 5,000 city officials in the U.S.)

Moreover, U.S. productivity rates have been in a rut for a decade—and that has serious consequences for everyone's real income and for the nation's overall standard of living. Of course, technological change by itself does not make or break productivity. There are other contributing factors, most important among them being capital investment and improved labor skills. But technology is an important ingredient in the mix.

With industry's current bent toward the here and now, there is concern that the U.S. may be cutting its innovative bridges. Some economists, notably Charles P. Kindleburger at MIT, have drawn disturbing parallels between the way U.S. firms are responding to America's battered competitive leads and the responses of British firms in the twilight of the English empire. British firms, just as American firms now, became defensive—that is, rather than redoubling efforts to generate innovations, they curtailed investment and demanded government protection against imports.

Does the current emphasis on small, incremental kinds of advances rather than on big breakthrough threaten the dominant position the U.S. still holds?

No one is sure. Despite all the studies of innovation and productivity, no one can say whether there is an optimum rate of invention a society should adhere to, or how much innovation is enough.

There does seem to be general agreement, though, on this. The rapid technological growth which th U.S. experienced during the first two decades after World War II was unusual and is not likely to be repeated.

"We made an enormous investment in the war, made some great technological advances during it, and came out of it with a great belief in the power of technological progress," said J. Herbert Hollomon, director for the Center of Policy Alternatives at MIT. "We also were handed an accidental lead, in having survived the war better than anyone else. But one of the things that is increasingly going to be the case is that new technological innovations are going to happen outside the U.S."

Holloman said that American business has in the past displayed an NIH (not-invented-here) complex, meaning that U.S. managers have been arrogant toward anything not thought up first in America and slow to embrace it. This is one of the things that he said will have to change if American firms hope to continue to compete in world markets. American businesses must learn to be quick to adapt, to exploit foreign inventions as well as their own, he warned.

"The problem is not with basic science," Holloman said. "The problem really is how effective we can be in adjusting and adapting."

Some have argued that U.S. multinationals may themselves have hastened this competitive bind on America by transferring their best technologies to foreign markets in recent years. Those who say this also urge legislation that would restrict further transfers of technology.

But most who have studied the innovation problem say the solution lies in fostering a innovation at home—through more liberal tax policy, a relaxed regulatory policy, less aggressive antitrust practices and, in general, a more cooperative spirit between business and government such as exists in Japan and the leading Western European countries.

And above all, they argue for greater certainty in government policy. "I think that more than an increase in government support of R&D or a reduction in regulation, what private industry people are interested in is a reduction in uncertainty about government action," said Dr. Bean. "Look, there's enough economic uncertainty in the R&D process without the government."

[From the Washington Post]

U.S. PRODUCTIVITY: GOLDEN DAYS OVER

(By Bradley Graham)

(NOTE.—This is the second of two articles discussing whether, as is widely perceived today, the dynamic vitality of the American economy is faltering. Last week's piece examined the lag in U.S. innovation. This week's describes the forces behind the nation's productivity slump.)

Like a movie that changes from fast- to slow-motion and then gets stuck on a single frame, America's productivity rate is creeping closer and closer to a dead stop.

For two decades following World War II, the productivity in the U.S. sprinted up the growth charts untiringly. Spurred by a labor force anxious to get back to peaceful industrial employment and by a string of technological breakthrough that gave the U.S. a commanding lead in product markets around the world, the American economy seemed unfailing and unstoppable.

But the rise began to slacken about a decade ago. In the past 10 years, productivity gains averaged 1.6 percent a year, only half the rate of the golden-growth days. This year, productivity has taken an even sharper turn for the worse, showing almost no increase at all.

Barry Bosworth, director of the President's Council on Wage and Price Stability, told a congressional committee recently: "We're turning into the British situation of the early '70s when they had almost no productivity growth." Calling the slowdown "a real puzzle," Bosworth said the U.S. has practically stopped showing gains in output per hour worked.

Moreover, the slump has been widespread. About two-thirds of the 67 industries regularly surveyed by the government have registered productivity declines. What makes the slowdown even more critical is that while productivity has been falling in the United States, it has been rising in Europe and Japan. Since 1967, the productivity rate has surged ahead 105 percent in Japan, 54 percent in Italy and France, and 39 percent in Canada. Even Great Britain topped America, edging past the U.S., 25 percent to 24 percent.

The meaning of all this is simple enough—and deeply disturbing. Without a gain in productivity:

Inflation will be more difficult—probably impossible—to control.

America's ability to compete in world markets will continue to weaken.

Real wealth in America will shrink effectively strangling the campaign against poverty and eroding everyone's standard of living.

But what is behind the slump is much less simple and less certain. Some say it is the result of basic shifts in the economy—we have been transformed, so the story goes, from a nation of industrial workers to one of lawyers, insurance agents and real estate brokers. Others blame the lag in productivity on environmental and safety rules which have redirected business investment into less productive (though perhaps more socially desirable) ends. Still others cite a change in both worker and management attitudes—people, they say, don't want to work as hard as they used to, and corporate managers have lost the sense of adventure and the willingness to take risks that was once their mark in trade.

In any case, the sense of desperation mounts as productivity indicators slide. The national doomsayers club has never had so many illustrious members.

"America's economic survival will depend on its ability to increase its rate of productivity advance to former levels," General Motors Corp. Chairman Thomas Murphy said in a recent interview, "That is no exaggeration."

"You've got to be worried," said Irving Shapiro, chairman of Du Pont. "You can't be comfortable about the future, you can't be sure your earnings will be real earnings without gains in productivity."

The term "productivity" has different meanings to different people. It is often associated with other words like "efficiency," "automation" and "hard work." In some minds, it conjures up images of a production line running faster and faster.

But basically the productivity rate is a measurement of outputs divided by inputs, computed quarterly by the Bureau of Labor Statistics. It is, simply, what you can get out (automobiles, ice cream cones and so on) for what you put in (labor, capital and other resources).

Despite all the fuss over what's happened to U.S. productivity, no one on the national level appears to be doing much to meet the

emergency. The one federal agency specifically charged with attacking the problem is going out of business at the end of this month. Established in 1970 to find ways of improving productivity, the National Center on Productivity and the Quality of Working Life runs out of money on Sept. 30, with both Congress and the White House content to see it go. Underfunded and politically orphaned from the start, the center was ruled ineffective and expendable in a General Accounting Office report this year.

George Kuper, the center's director, calls it a mistake to eliminate the center without providing something in its place. "Productivity growth is not automatic," Kuper said. "In view of the dismal productivity record of the American economy over the past ten years, there is an urgent need for a concerted effort to bolster the forces that sustain productivity growth."

But administration officials contend that the productivity problem is not something the government can solve by creating a center. "The best thing we can do for productivity is to create a healthy climate for private investment," said one administration official. "In the final analysis, productivity is basically the responsibility of the private sector."

A few businesses and industries have made encouraging efforts to spur efficiency on their home turf. Methods tried range from streamlining production lines and reorganizing work teams to fattening up compensation plans and instituting so-called "flextime" programs that allow employes some lattitude in setting working hours.

On the whole, though, the self-help record of American industry on this score is sadly deficient. Spoiled by the ease with which productivity gains flowed during in the early postwar period, managers have been slow to respond to the current crisis.

"They figured it was something that would always be there," said C. Jackson Grayson, former business school dean and head of the wage and price council during the Nixon administration. "Managers have ignored productivity and played the game of money and demand management. Most companies have no explicit program to improve productivity."

To foster greater national awareness of the problem, and to help corporations establish their own productivity improvement programs, Grayson last year set up his own center on productivity in Houston founded on $8.5 million contributed by more than 80 companies.

But the reason for management's sluggishness in tackling this issue may have more to do with a lack of inspiration than with any lack of awareness. The mood of the American business community today is characterized more by despair than by diligence, and the sense of malaise is worsening.

Surveys by the Conference Board, a New York-based economic research group, show business confidence in the economy has declined steadily since the surveys began two years ago. This lack of faith has translated into a reluctance on the part of many managers to invest in new equipment and larger plants. Termed by some a "capital strike," such lag in investmnet has been a major contributor to the slowdown in productivity growth in recent months.

The malaise feeds on itself because, without new investment, business processes age, productivity declines, profits shrink and industries grind to a halt. It is true that unemployment has dropped to record lows in recent months. But what this suggests is that output has been increased by putting more people on payrolls, not by improving each person's capacity to produce. This can go on only so long.

What accounts for management's depressive state of mind? "A heritage of economic trauma of the past decade," said Edgar Fiedler, director of research for the Conference Board, who proceeded in an interview to tick off a list of economic jerks and jolts that have shaken the confidence American managers once had in their economic machine, leaving members of the business community scurrying or their security blankets.

His list included the acceleration of inflation, the erosion of profits, the aid to the old international exchange rate system, shortages of goods and resources, the first peacetime wage and price controls, the oil embargo and two recessions. "Little wonder that everyone is feeling shaky about the future," Fiedler concluded.

But sagging confidence and a falloff in capital investment only go part way in explaining what might be behind the slump in productivity. A good bit of the slowdown, say the experts, may have been inevitable.

Edward Denison, a Brookings Institution economist and one of the nation's leading authorities on productivity, says some of the steam was bound to run out of the U.S. economic engine. He notes two forces—the migration of farmers to factory jobs and the mass education of society—that initially powered America's postwar industrial drive have now run their course. Also, he says, the influx of relatively inexperienced teenagers and women into the work force has acted as a productivity depressant, albeit a temporary one.

Beyond these, Denison blames the growth of government regulation for squeezing out much of the productive energy that was left.

Of course, productivity alone neither makes nor breaks a nation. It is just one element—although an important one—in the overall growth equation. Other factors include a nation's resource base, its entrepreneurial spirit, and its rate of savings and investment.

Also, in weighing political choices, a nation often finds itself balancing certain quality-of-life goals such as cleaner air and guaranteed safety against the moneyed concerns of efficiency and economic growth. To the extent American industry's slower growth is the natural outcome of ensuring greater health and safety for consumers, it is plainly and simply the peoples' choice.

Denison, however, is worried that the trade-off might have tilted too far, particularly in recent months. "The outlook is extremely uncertain," he said. "I've never seen a period like this before."

Part of the uncertainty reflects not only confusion about the source of the downward trend, but also misgivings about the numbers themselves. The situation may not be as alarming as the figures suggest.

This is because the methods used to collect national input/output data leave room for inaccuracies. Also, the traditional way of measuring productivity ignores many social welfare gains and only incompletely accounts for improvements in quality.

Still, the figures always have been subject to such qualifications. Many experts say what counts in the current debate is not so much the accuracy of the measurements but their startling, stubborn slide relative to the way they always have been computed.

In any case, there is cause for hope. As the negative effect of the influx of unskilled workers reverses itself, and as industry becomes accommodated to regulatory standards, U.S. productivity should climb again. The Bureau of Labor Statistics estimates that it will be back to about the 2.5 percent rate by the early 1980s.

But few experts believe America will return to its postwar rate of more than 3 percent. As Denison put it, "In the long sweep of history, the high postwar rate is an aberration."

Many businessmen tend now to write off the economy's stumbling performance during the Seventies as a costly learning experience, a period of expensive adjustment from which American managers soon will emerge with renewed vigor and a stronger sense of direction. "The Seventies had an enormously revolutionary impact," said Du Pont's Shapiro. "It's been one of those periods. Now we have a whole new ball game."

With the old forces that propelled America's postwar blastoff now on the wane, the nation's productive future rests on two principle factors: the ability to innovate and, as it has been put, the ability to "work smarter."

Innovation will cue off of an improved economic climate for risk capital, though not everyone agrees on how best to achieve this. Business is arguing for lower taxes and less regulation. Labor says that if tax cuts go anywhere, they should go to consumers to spur spending and, in that way, improve general business conditions. Congress and the White House are debating what the mix should be.

There also is no easy way to get people to "work smarter." Observers note that U.S. business generally has been good at harnessing intelligence.

Much of the internal challenge that corporations faced in the last decade concerned adjusting to a change in employee attitudes toward work and the work place. The robot theory of mass production is out; in its place has risen the "quality of worklife" program, stressing teamwork and giving workers a greater voice in determining what they do and how they do it.

Such changes can lead to a happier, more productive plant. But movement here generally has been sluggish, slowed both by management resistance and union reluctance.

"You can't do the things you did before," said GM's Murphy of the change in labor-management relations. "It's not enough today to follow the old Army tradition of 'do as we say and don't ask questions.' But what do you do? It's always been a difficult thing to find the better way."

[From the Washington Post, Sept. 4, 1978]

SMALL FIRMS STINTED ON RESEARCH

(By Jack Anderson)

Following their ephochal 1903 Kitty Hawk flight, the Wright brothers got a five-year runaround from Washington before receiving any government financial help to pursue their aeronautical research. Small-time inventors and innovative businessmen today are getting the same short shrift, even though billions are being doled out by the federal government for research and development.

Butter-fat corporations lap up the cream from the research subsidies, even though they're interested more in profits and cost-cutting than new inventive breakthroughs. Small companies with fewer than 1,000 employees get skim milk from the federal churn.

Yet the little enterprising businesses rather than the corporate giants have been responsible for such developments in this country as insulin, zippers, power steering, ball point pens and self-winding watches. This was in keeping with the tradition of individual inventive geniuses symbolized by the Wright brothers, Alexander Graham Bell, Samuel Morse and Thomas Edison.

The superiority of small business research has been cited in a study which the Office of Management and Budget strangely never published. The study credited firms having than 1,000 employes with almost half of the industrial innovations between 1953 and 1973.

According to the study, 16 small technology firms created 25,558 jobs for American workers during the 20-year period because they came up with new ideas. Yet the budget office was advised that small firms were drawing inadequate funding from the government, getting less than 4 percent of the research and development layouts.

Spurred by the report, the budget office drafted a memo intended for all federal agencies, urging vigorous efforts to channel more of the research to small businesses "which are having difficulty in competing in the big leagues."

The memo added, "there is considerable evidence that the small proportion of federal research and development work that is being awarded to small technologically based firms is contributing to a serious loss of high technology capabilities in our nation. It is important that we see some real progress within the first 18 months of the administration."

This ringing call for a new deal was never sent to the agencies. Les Fettig, head of the office that was supposed to be directing the crusade, said the report and the memo were news to him until we asked what happened. He explained that the documents "fell through the cracks" during the transition period between the Ford and Carter administrations.

Fettig said his office is alert to the problem and is taking steps to make it easier for small businesses to get research and development help.

Footnote: Investigation shows that the Energy Department under James Schlesinger has been perhaps the worst offender in government in encouraging research at the Little League level. The department claimed it awarded 10.3 percent of its research contracts to small operators in the 1977 fiscal year. The General Accounting Office has challenged the statistic. GAO auditors found the amount was about 2.6 percent, because the Energy Department has counted subcontracts that trickle down from the big corporations.

[From Business Week, July 3, 1978]

VANISHING INNOVATION

A grim mood prevails today among industrial research managers. America's vaunted technological superiority of the 1950s and 1960s is vanishing, they fear, the victim of wrongheaded federal policy, neglect, uncertain business conditions, and shortsighted corporate management. They complain that their labs are no longer as committed to new ideas as they once were and that the pressures on their resources have driven them into a defensive research shell, where true innovation is sacrificed to the certainty of near-term returns. Some researchers are bitter about their own companies' lax attitudes toward innovation, but as a group they tend to blame Washington for most of their troubles. "[Government officials] keep asking us, 'Where are the golden eggs?'" explains Sam W. Tinsley, director of corporate technology at Union Carbide Corp., "while the other part of their apparatus is beating hell out of the goose that lays them."

That message—and its implications for the overall health of the U.S. economy—is starting to get through. Following months of informal but intense lobbying led by such executives as N. Bruce Hannay, vice-president for research and patents at Bell Telephone Laboratories Inc., and Arthur M. Bueche, vice-president for research and development at General Electric Co., the White House has ordered up a massive, 28-agency review of the role government plays in helping or hindering the health of industrial innovation. "Federal policy affecting industrial R&D and innovation must be carefully reconsidered," wrote Stuart E. Eizenstat, the White House's domestic policy adviser, in a recent memo outlining the review's intent.

One thing that the study clearly will not accomplish is a quick fix for the deepening innovation crisis. The problem is regarded as immensely complex by the Administration, and is inextricably tied to other economic dilemmas now facing Carter's White House.

"Historically, the government's role has been to buy more science and R&D," says Martin J. Cooper, director of the strategic planning division at the National Science Foundation (NSF). "Now maybe we better go with investment incentives." Says Jordan J. Baruch, Assistant Commerce Sesretary for science and technology, who will be the review's day-to-day manager: "This study developed in an environment of people concerned about economics, business, and technology."

The Administration's concern is underscored by the fact that it is organized as a domestic policy review, the highest sort of attention a problem can receive within the executive branch. Among its objectives, such a review must produce options for corrective action by the President. According to Ruth M. Davis, Deputy Under Secretary of Defense for research and development, "this is the only such review at the policy level in 20 years that transcends the interests of more than one agency."

The White House also seems determined not to conduct the study in a governmental vacuum. Baruch is soliciting input from groups such as the Industrial Research Institute (IRI), the Business Roundtable, and the Conference Board. "We want both CEOS and R&D vice-presidents," says a White House official. Labor groups have been asked to participate, too, along with public-interest groups. Congressional leaders such as Senator Adlai E. Stevenson (D.-Ill), chairman of the Senate subcommittee on science, technology, and space, have been brought into the early planning. And the 28 agencies involved extend beyond obvious candidates, such as the Environmental Protection Agency, to the Justice Dept. and even the Small Business Administration.

The study's scope is so sweeping, in fact, that some Federal officials are talking about a "thundering herd" approach to policymaking. But one government science manager demurs. "It beats having one guy write a national energy program in three months," he sniffs.

Philip M. Smith, an assistant to Presidential science adviser Frank Press and an early organizer of the study, concedes that "a lot of people have told us that we are likely to fail." But such skepticism, he believes, does not take into account the considerable clout of those involved in the effort. Commerce Secretary Juanita M. Kreps, for example, is chairing the study, and she heads a coordinating committee whose members include Charles L. Schultze, chairman of the Council of Economic Advisers, Administration inflation fighter and chief trade negotiator Robert S. Strauss, and Zbigniew Brzezinski, Carter's national security adviser. Even more important is the support of Eizenstat, who, says Smith, "is very interested in this particular review."

FINDING "NEW DIRECTION"

On the other hand, there is already grumbling within the Agriculture Dept., which was left off Krep's committee. "We are red-faced," says a high-ranking Agriculture official. "We are out of the project because this Administration and those before it do not place any priority on agricultural reesarch." However, Jordan Baruch insists that the department will play a role in the study. Agriculture experts point out that farm commodity exports of over $24 billion play a key role in the U.S. balance of payments. They note also that superior technology is the basis of the commanding American position among world food exporters.

Whatever its outcome, the White House policy review is being undertaken at a time when, as Frank Press puts it, "we badly need some new directions." Many experts view with alarm the declining federal dollar commitment to R&D, which has dropped from 3% of gross national product in 1963 to just 2.2% this year. For its part, industry as a whole has more or less matched the inflation rate and then some with its own spending. But such macroscale indicators do not tell all. "We've got to find out what the story is sector by sector, because each industry is going to be different," says Press. "We also have to find out what's going on abroad."

Better data on the relationship between industrial innovation and the health of the economy are becoming available. According to a 1977 Commerce Dept. report, for instance, technological innovation was responsible for 45% of the nation's economic growth from 1929 to 1969. The study went on to compare the performance of technology-intensive manufacturers with that of other industries from 1957 to 1973, and found that the high-technology companies created jobs 88% faster than other businesses, while their productivity grew 38% faster.

The numbers help to establish the central role of industrial innovation in stimulating economic development, but they also are beginning to reveal the changing character of industrial research. The amount of basic research that industry performs, for instance, has dropped to just 16% two years ago from 35% of the national total in 1955.

And a new IRI survey of member companies for the National Science Foundation demonstrates how federal policy has directly altered the nature of the research effort in another way, making it more and more defensive. The study shows that surveyed companies increased R&D spending devoted to proposed legislation by a striking 19.3%, compounded annually, from 1974 to 1977. And the rate was 16% a year for R&D devoted to Occupational Safety & Health Administration (OSHA) requirements. "When overall R&D spending is not growing nearly this fast," note the survey's authors, George E. Manners Jr. and Howard K. Nason, "other categories of effort—especially research—must be suffering."

Other observers compare the viability of industrial innovation in the U.S. with that of foreign countries. One expert is J. Herbert Hollomon, director of the Center for Policy Alternatives at Massachusetts Institute of Technology. According to Hollomon, a reason the U.S. is losing its leadership is that "we're arrogant—we have an NIH [not invented here] complex at the very time a majority of technological advances is bound to come from outside the U.S." Consequently, he argues, the U.S. has not organized itself to capitalize on these advances, as foreign countries have done for years with American knowhow. Since as much as two-thirds of all R&D is now conducted by foreign laboratories, Hollomon says, it should be no surprise that they have taken the lead in such technologies as textile machinery and steel production.

"We essentially prohibited West Germany and Japan from defense and space research," says Hollomon. "So it's no accident they concentrated on commercial fields." He adds: "I believe other nations better understand that the innovation process is important."

Says a research director for one high-technology company: "For a country like ours, the technology leader of the world, what has been happening is downright embarrassing." Indeed, even the presumed sources of strength in a consumer-oriented society are today under intense pressure. "Our experience with Japan in the consumer electronics industry—namely televisions, radios, audio, and transceiver equipment—shows some of our weaknesses," testified Gary C. Hufbauer, a Deputy Assistant Treasury Secretary, before a congressional subcommittee. In 1977, he said, "we had a $3.6 billion trade deficit with Japan in high-technology goods, and

about two-thirds of this was accounted for by imports of consumer electronic goods."

THE ROLE OF REGULATION

The cumulative response to these developments has been alarm. "The system has now sharpened its pencils in a way that discourages changes that are major," worries Robert A. Frosch, head of the National Aeronautics & Space Administration. "We have been so busy with other things that we may have inadvertently told the people who think up ideas to go away."

Even labor unions, which historically have left R&D decision-making up to corporate board rooms, now are complaining about lack of innovation. "Having helped to develop and pay for this technology," says Benjamin A. Sharman, international affairs director of the International Association of Machinists, "American workers have a right to demand government responsibility for using it to create new products, more jobs, better working conditions, and general prosperity." And Charles C. Kimble, research director of the Electrical, Radio & Machine Workers union, goes so far as to suggest that labor should now have a say in how industrial research money is spent.

Among research managers themselves, excessive or contradictory federal regulatory policy is the single greatest complaint. Hannay of Bell Labs points to Food & Drug Administration requirements as a case in point. According to one study, says Hannay, a 1938 application for adrenaline in oil was presented to the FDA in 27 pages. In 1958, a treatment for pinworms took 439 pages to describe. "By 1972," he says, "a skeletal muscle relaxant involved 456 volumes, each 2 in. thick—76 ft. in total thickness and weighing one ton."

Regulation, says Tinsley of Union Carbide, has put a bottleneck on new-product development in the chemical industry and has so added to the cost of getting any new chemical approved that only those targeted at a vast, assured market are attempted today. Food and drug industry researchers echo that complaint. "Today," says Al S. Clausi, director of technical research at General Foods Corp., "our industry does work that is fostered by unreal and invalid public concerns."

But regulation can have less obvious impacts, such as forcing an industry to stick with old technology rather than to experiment with new approaches to problems. "The overall effect of regulations on the auto industry has been to build an envelope around the internal-combustion device and the whole car structure," says Harvard Business School Professor William J. Abernathy, who specializes in technology management. "'Don't do anything really new, don't change.' That's what these regulations say." Paul F. Chenea, vice-president for research at General Motors Corp., agrees. "You just don't have time to explore wild new ideas when a new rule is so closely coupled to your current business," he says.

"THE SCIENCE OF THE MATTER"

In Congress, where the regulatory laws are written, such thinking has so far found a small audience. "A great number of the regulations that we would call environmental . . . may actually be self-defeating," muses Harrison H. Schmitt, the former astronaut from New Mexico who is the ranking Republican on Stevenson's Senate subcommittee. "Instead of looking at pollution controls, if we were looking at building a more efficient and therefore less-polluting engine, we would not only be solving our environmental problems, but we would be producing a new thing for export."

Schmitt is one of only three federal legislators with the semblance of a science background. "We probably have exercised very poor judgment in the past," he says, "because the Congress overall—members as well as staff—have not been able to understand what is possible technologically and what is not, and therefore not been able to relate the costs [of legislation]."

Jason M. Salsbury, director of the chemical research division at American Cyanamid Co., pleads, "Before the lawyers write the legislation, let them know the science of the matter." Not only may some mandates be beyond what industry can legitimately perform, he says, but the rules force a conservative approach to science. One key indicator of this trend is the increasing number of toxicologists now employed in chemical company research labs. "Toxicologists don't innovate," notes Frank H. Healey, vice-president for research and engineering at Lever Bros. Co.

Then there is the regulatory bias against new ideas. In the EPA's grant programs for waste-water treatment at the municipal level, for instance, equipment specifications must be written so that gear can be procured from more than one source. That means a company with a unique process is discriminated against. What is more, the mandate for cost effectiveness precludes trying out innovative approaches whose value can only be measured if someone is willing to gamble on them.

If the domestic policy review is to solve such questions, it will depend in large part on the willingness of regulators to see matters in a new light. According to Philip Smith, there is "a sense that people like [EPA Administrator] Doug Costle and [FDA Administrator] Don Kennedy want to work with industry, and they don't want to fight all the time. I think we have a team of people now in government that may be able to do something."

THE INVESTMENT CLIMATE

But industry should not expect a major overhaul of regulatory practices to emerge from the study. EPA Administrator Douglas M. Costle concedes "a tremendous growth in the last decade in health and safety regulations—13 major statutes in our area alone." Though Costle agrees that the economic impact of such rules should be more closely quantified, he contends that "this rapidly widening wedge of regulation has been a response to a massive market failure—failure of the marketplace to put an intrinsically higher value on pollution-free processes."

Most regulators agree that not enough research has been done on the true nature of the environmental problems they are empowered to combat, but they also argue that regulation has led to cost-saving practices, especially in the area of resource recovery, where closed-cycle processes now help capture reusable material. OSHA officials also cite examples where the agency has laid down rules that have led to cost-cutting innovations. But Eula Bingham, the OSHA administrator, emphasizes that the "legislatively determined directive of protecting all exposed employees against material impairment of health or bodily function" requires tough regulation without quantitative weighing of costs and benefits. "Worker safety and health," she insists, "are to be heavily favored over the economic burdens of compliance."

Bingham and her boss, Labor Secretary Ray Marshall, may represent an increasingly isolated view, however. Economic issues have come to dominate thinking within the Carter Administration, and it is precisely these questions that industry has stressed in its discussions with science adviser Press and other White House officials. Just over a month ago, Treasury Secretary W. Michael Blumenthal told a meeting of financial analysts in Bal Harbour, Fla., "We are now devoting a very sizable chunk of our private investment to meeting government regulatory standards . . . and in some of these areas we may well be reaching a breaking point." Blumenthal also noted: "Our technological supremacy is not mandated by heaven. Unless we pay close attention to it and invest in it, it *will* disappear."

A month before the Blumenthal speech, GE's Bueche suggested to an American Chemical Society gathering that "we step back and look at R&D for what it really is an investment. It is an investment that, like more conventional investments, has become increasingly less attractive."

Bueche, along with most other research managers, rejects the idea of direct federal subsidies to industrial R&D. Instead, he points out that "perhaps 90% of the total investment required for a successful innovation is downstream from R&D [and thus] it becomes . . . clear why we must concentrate on the overall investment climate." Bueche attacks Administration proposals to eliminate special tax treatment of long-term capital gains, plumps for more rapid investment write-offs, and says "it is extremely important to provide stronger incentives for technological innovation by making permanent and more liberal the 10% investment tax credit."

CRITICS IN INDUSTRY

Bueche's arguments suggest the broad—yet often indirect—way in which federal policy runs counter to the best interests of innovation. Fear of antitrust moves from the Federal Trade Commission or the Justice Dept., for instance, has prevented many companies from sharing research aimed at a problem common throughout an industry—including new technology aimed at solving regulatory questions. At General Electric, the legal staff must now be notified if a competitor visits a company research facility, even if no proprietary material is involved.

For their part, Justice Dept. trustbusters claim that fears that their policies stifle innovation are not justified. They say they are flexible enough to recognize the differences in the pace of innovation from industry to industry, and that is why they allow a fair number of mergers among electronics companies. "That's an industry where you don't have to worry about someone cornering the market," says Jon M. Joyce, an economist in the Justice Dept.'s antitrust division. "There's just a lot of guys out there with good ideas."

Industry further claims that the inability to secure exclusive licenses on government-sponsored research leaves much good technology on the shelves, while federal attempts to market new products are often silly at best. Richard A. Nesbit, director of research at Beckman Instruments Inc., recalls a government circular that waxed rhapsodic over the federal commitment of billions of dollars to R&D. Included with the letter was a syringe for sampling fecal matter, and the suggestion that Beckman might want to license the technology. "I wondered if they spent billions to develop that," Nesbit recalls. "The contrast was ludicrous."

Even national accounting procedures draw criticism from industry. A major target is the 1974 ruling by the Financial Accounting Standards Board that stipulated that R&D spending could no longer be treated as a balance sheet item, but must be listed as a direct profit or loss item in the year spent. R. E. McDonald, president and chief operating officer at Sperry Rand Corp., recently told an executive management symposium, "The ramifications of that rule change are quite complex, but the next effect has been to dry up a lot of potential venture capital investments. . . . I can say quite candidly that Univac would not be here today if we had not had the advantage of the old rule for so many years."

The shortage of risk capital has had a tremendous impact on small, technology-oriented companies trying to arrange new

public financing. According to a Commerce Dept. survey, 698 such companies found $1.367 billion in public financing in 1969. In 1975, only four such companies were able to raise money publicly, and their numbers rose to just 30 in 1977. Equally ominous is the experience at Union Carbide, which, according to Tinsley, has not been able to compete for venture capital and has thus canceled plans to start a number of small operations buit around interesting new technology. Years ago, says Tinsley, Carbide was reasonably successful at getting such funding. "And you must remember that these ideas are perishable," he says. "They don't have much shelf life."

The Treasury Dept., in fact, has an ongoing capital-formation task force that will be integrated into the policy review under the direction of Deputy Secretary Robert Carswell. Carswell notes that "you can't draw a clear line" between R&D support and investment in general, but "if it turns out that we find some form of capital formation gives the economy a greater multiplier effect than another form, we at the Treasury would not shy away from whatever policy would help most."

WASHINGTON'S CHANGING ROLE

Even as it has pursued policies detrimental to industrial R&D, the federal government has withdrawn as a major initiator of innovation. Research managers generally believe that companies are better equipped than government to bring new technology to society because they are more attuned to market pull. But Lawrence G. Franko of Georgetown University, an international trade expert, recently pointed out to a congressional committee that the U.S. government has in the past played an important role "as a source of demand for new products and processes, and as a constant, forbearing customer in computers, semiconductors, jet aircraft, nuclear-power generation, telecommunications, and even some pharmaceuticals and chemicals. . . ."

According to the Defense Dept.'s Davis, both Defense and NASA "have faded" in this role, the result of the Vietnam war and concerns over the military-industrial complex. "The consumer marketplace and other government agencies have not been able to pick up where DOD and NASA left off," she says. "The Department of Energy should be able to help with this, but it hasn't yet. And the Department of Transportation just never blossomed in this role." An unreleased IRI study for the Energy Dept. summed up industry's views. The company officers interviewed said government could spur industry's energy R&D only by creating a national energy policy, increasing its managerial competence, and offering financial incentives rather than massive contracts.

On the other hand, there have been some recent, notable government efforts to spur the innovation process. "We've talked to the leading semiconductor companies about our hopes for their innovation," says Davis. She says that the Defense Dept. expects to program $100 million over the next five years for industrial innovation in optical lithography, fabrication techniques involving electron-beam technology, better chip designing and testing to meet military specifications, and system architecture and software implementation.

At the Transportation Dept., chief scientist John J. Fearnsides wants to involve the private sector much earlier in the government's R&D process, thereby allowing industrial contractors to develop technology alternatives instead of having to cope with rigid specifications at the outset. Such a policy, some believe, might have resulted in major savings for the Bay Area Rapid Transit system, for instance. "It is more expensive to fund a wider range of choices, but only at first," says Fearnsides.

The NSF also has announced a new industry-university grant program for cooperative exploration of "fundamental scientific questions." The aim is to make "a long-term contribution toward product and/or process innovation."

THE FAILURES OF BUSINESS

While agreeing on the need for federal policies that bolster innovation, those knowledgeable about industrial research think that the companies themselves share some of the blame for stagnation and must be willing to examine their practices critically. Alfred Rappaport, a professor of accounting and information systems at Northwestern University's graduate school of management, believes that one reason the U.S. lags in R&D is that the incentive compensation systems that corporate executives live under tend to deter intelligent risk-taking. "Incentive programs are almost invariably accounting-numbers oriented and based on short-term earnings results," he says. "That puts management emphasis on short-term business considerations." Another criticism has been of the haphazard way in which companies have launched new R&D programs. In essence, industry should try to learn how to weed out bad ideas early on, say the detractors. To that end, Dexter Corp. has instituted an eight-factor "innovation index" approach to research management that weighs questions such as effectiveness of communications, competitive factors, and timing, and comes up with an "innovation potential" for new ideas. At Continental Group Inc., D. Bruce Merrifield, vice-president of technology, says that "constraint analysis" of new ideas now means that eight of 10 projects that survive the review will generate cash flow within two to four years. That contrasts with accepted estimates that only one in 50 ideas that come out of research labs even generates cash flow, and not for seven to 10 years.

Large companies often fail to exploit their own resources effectively. In the 1950s and 1960s, some companies set up centralized research facilities, but many of these did not yield the hoped-for synergism—in many cases, apparently, because the different parts of the company were in businesses too unrelated to one another.

On the other hand, Raytheon Co. was highly successful in transferring its microwave expertise to its newly acquired Amana appliance subsidiary in 1967, resulting in the counter-top microwave oven. That was done through a new-products business group set up specifically for such purposes. And more recently, this group, headed by Vice-President Palmer Derby, brought the company's microwave talent to bear on its Caloric subsidiary's product line, resulting in a new, combination microwave-electric range.

In such ways, industry can maximize its potential for innovation in the most adverse environment. But the future health of the nation's economy, many experts believe, requires a much more benign environment for industrial R&D than has existed over the past decade. And Jordan Baruch, the enthusiastic leader of the multi-agency federal study, believes that such an environment is likely to emerge as a result of the Administration's concern.

"We may have bitten off more than we can chew," notes Frank Press, "and it may be that we can't get much done in a year. But even if it takes three or five or 10 years, I think it is historically very important." ●

● Mr. MATHIAS. Mr. President, I welcome the opportunity to join Senator DOLE, Senator BAYH and others in introducing the "University and Small Business Patent Procedures Act."

The patent system has served this country well since the beginning of the Republic. It protects and nurtures the creative genius of our inventors, and accounts in great measure for the industrial might of the country. Not only does it give the inventor a chance to make a profit from his discoveries, but it gives his competitors a chance to "invent around" his discovery—refining it, improving it, even making it obsolete.

Abraham Lincoln observed that the patent system "added the fuel of interest to the fire of genius." Our bill will restore the fuel that the Department of Health, Education, and Welfare has cut off.

I say this because of the freeze the Department has imposed on the granting of greater rights in inventions that were made under Department-funded grants and contracts to universities that do not hold Institutional Patent Agreements with the Department.

Specifically, I have been informed that the Johns Hopkins University petitioned the Department for greater rights in two such inventions over a year ago and that, to date, no determination has been made. One of the inventions is a pharmaceutical composition that is contemplated to be useful in the treatment of various liver disorders. In fact, related drugs invented under Department-funded grants by the same investigator have been licensed in a number of countries and are already being marketed in Europe. The Johns Hopkins University is apprehensive that failure to obtain greater rights in the invention could jeopardize efforts to commercialize the drug, resulting in loss of its benefit to the public.

Our bill will solve this problem by allowing universities, nonprofit organizations, and small businesses to obtain limited patent protection on discoveries they have made under Government-supported research if they spend the additional private resources necessary to bring their discoveries to the public. It will restore that "fuel or interest" that Abraham Lincoln thought so important.

The bill is a good one, Mr. President, and I urge all of our colleagues to support it. ●

By Mr. MOYNIHAN:

S. 3497. A bill to amend the Internal Revenue Code of 1954 to allow a taxpayer who does not itemize his deductions to deduct amounts paid as State and local income taxes from gross income; to the Committee on Finance.

Mr. MOYNIHAN. Mr. President, I am today introducing a bill which addresses a problem of great seriousness to millions of taxpayers—the problem of ever-increasing State and local income taxes.

State and local income taxes have more than doubled as a percentage of personal income in the last two decades, and have risen much more quickly than Federal income taxes. Since the inception of the graduated income tax in 1913, State and local taxes have been deductible from income for Federal tax purposes. However, as the zero bracket amount has risen, fewer and fewer taxpayers find it advantageous to itemize deductions. As a result, fewer and fewer Americans are in fact able to deduct State and local in-