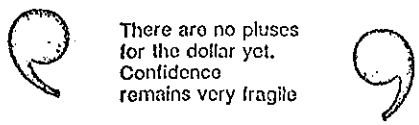
pricing oil in some or some other currency basket. I am less concerned about this because I think the oil cartel does respond to market forces, especially with this glut.

But if the oil nations say they want to get paid in currencies other than the dollar—which is very different from just pricing—then that is tantamount to saying that they want to increase the diversification of their assets. They want to get away from dollar holdings even more so than they are doing today.

If they were to make this big step and demand payments in other currencies, we would probably have another dollar depreciation. And that would tend to increase inflation here in the U. S.

How much should the U. S. rely on depreciation of the dollar to solve its balance-of-payments problem?

Devaluation is basically a way of buying time. It is not a final solution to a payments problem. The U. S. is no different from other countries like Britain, Mexico, or Turkey. If you need to depreciate your currency because of inflation or



structural factors like big oil imports, it has to be backed up by other policies. Now the U. S. does not have any backup policy to go with depreciation of the dollar.

So why doesn't the U. S. have such a policy to reinforce the dollar?

We can't even agree on the reason why the dollar has been depreciating. I am struck by the fact that whether you look at speeches from the Treasury, the Federal Reserve, or the Council of Economic Advisers, they always omit the competitive aspect when talking about the weakness of the dollar. They attribute the weakness to energy imports or cyclical growth rates among nations, but never competitiveness. No one seems to think that there is any competitive problem at all.

Would you say that the U. S. has an export policy today?

If you look at U. S. government export policy, I think we have a negative policy on exports. We frequently discourage exports. We sometimes discourage agricultural exports because of domestic price pressures; we discourage military exports for political reasons, we discourage trade with Eastern Europe, and we have the problem of the Arab boycott legislation.

This attitude is a remnant of a time of thinking when the U. S. didn't need export markets. This must change. The energy imports are a major structural change. We are buying $45 billion to $50 billion worth of oil abroad, and we should seek new export markets of $50 billion.

Can you give a specific example of how the government has discouraged exports?

Take Mexico. Mexico is going to build a pipeline to develop its natural gas, and U. S. Steel got the contract for $1.5 billion. But it depended on Export-Import Bank financing. Some senators didn't like the price of natural gas the Mexicans were asking for and discouraged Ex-Im financing. U. S. Steel lost the deal, and it has completely gone to the German and Japanese. This is something that most other industrial nations would never do.

What kind of export policy should the U. S. have?

We need a national export policy to refurbish and strengthen our industry. Through fiscal policy, we should stimulate research and development. Investment tax credit must be used in a meaningful way.

Export financing obviously has to be improved. Our export financing is certainly much less developed than in other foreign countries. We have to develop new technology and go out and sell the stuff.

What are the dangers if the U. S. does not come up with a national export policy?

Unless we do, the dollar weakness will be a recurring phenomenon. It will be interrupted if we have a good year in agricultural exports or if the rest of the world sometime grows faster than the U. S. But energy imports will be with us for many years. We can't respond to these imports in a negative way, through protectionism, but in a positive way by increasing our share of exports in the world markets.

We have to plan for the 1980s. I think the competition will be immense. Japan has a tremendous national drive to export. They will respond to the challenge. And so will the U.K.

Can the Carter Administration put a new national export policy in place?

It is still a new Administration. Don't forget, the Administration started off with the feeling that the dollar would not be a problem. We didn't have to worry about it because floating rates were supposed to do the job. It took six months to find out that this was not so. The payments problem is new. It will take time. The message has to be told; it has to be emphasized.

How high is the yen likely to rise in the year ahead?

I don't think a 220 to 225 yen [to the dollar] is unreasonable. [The yen is currently 211 to the U. S. dollar.] ■

Foreign exchange trader

	FRANCS					IN U. S. DOLLARS						
	U.S. TREASURY BILLS	CERTIFICATES OF DEPOSIT			EUROMARKET TIME DEPOSITS*	GERMAN MARK	SWISS FRANC	JAPANESE YEN	CANADIAN DOLLAR	FRENCH FRANC	BRITISH POUND	ITALIAN LIRA
		U.S.	EUROMARKET	SINGAPORE								
SPOT	x	x	x	x	x	.4743	.5110	.004141	.9000	.2047	1.9245	.001156
THREE-MONTH	6.43	6.93	7.10	7.10	7.19	.4788	.5107	.004179	.8998	.2009	1.9211	.001134
SIX-MONTH	6.73	7.28	7.50	7.50	7.63	.4846	.5274	.004245	.8993	.1981	1.9163	.001113
ONE-YEAR	6.63	7.75	7.85	7.85	7.81	.4953	.5407	.004285	.8998	.1933	1.9140	.001071

Analytical Basis
for
The University Position on H. R. 8596

February 1978

Society of University Patent Administrators

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THE UNIVERSITY POSITION ON H.R. 8596

Section 1. Optimum Patent Policy - A National Viewpoint

Objectives and Alternative Policies:

To arrive at a proper Government patent policy, one must understand the impact that alternative policies can have on various objectives that can reasonably be expected to be affected by patent policy. We believe patent policy should be judged by its impacts on the following: (1) competition, (2) innovation, (3) public health, (4) economic growth and jobs, (5) foreign competition, (6) contractor participation, and (7) the administrative costs entailed by the policy.

Many of these objectives are interrelated, but each, we believe, needs to be clearly understood, recognized, and weighed in arriving at conclusions concerning proper patent policy. We hope, therefore, that we will be forgiven if in places our discussion appears repetitive.

There appear to be three major approaches to Government patent policy. These are:

(1) The H.R. 8596 Approach. Under this approach as a normal rule contractors or grantees would be allowed to retain title to inventions made under the award subject to a Government license and "march-in" rights. In individual cases, agencies could use deferred determination or other more restrictive clauses.

(2) Strict Title-in-the-Government. Under this approach, as a condition of receiving a Government research grant or contract, the contractor would have to agree to transfer rights in all inventions made under the contract to the Government. The Government, in turn, would either dedicate the inventions to the public or license them itself. Assistant Attorney General Shennefield in his testimony on December 20, 1977, before the Senate Select Committee on Small Business stated that this is the policy preferred by the Justice Department.

(3) A case-by-case approach. Under this approach individual agencies would select the patent clause to be used in each grant or contract on a case-by-case basis, and agencies would also in many cases delay the determination of whether contractors would retain rights until after inventions have been identified. Depending on the exact manner in which the policy is framed there may or may not be presumptions in favor of or against the taking of title by the Government. The recent ERDA legislation is an example of such an approach. It places the presumption in favor of the Government's taking title, but gives ERDA considerable flexibility to decide otherwise depending on ERDA's evaluation of a variety

Hold folios

of factors. In reality, this type of approach, which some claim represents a middle-ground, is not a uniform policy at all since agency practices will vary considerably depending on the predilections of agency officials involved in the process.

We have organized this discussion to first consider the impacts of the first two alternatives on the various objectives that we have listed. We believe it will facilitate understanding of the issues and the considerations involved if one first compares in isolation the differences between the H.R. 8596 approach and a title-in-the-Government approach. After this comparison, we then analyze whether the case-by-case approach has any advantages or disadvantages as compared to the H.R. 8596 approach (which our analysis shows to be superior to a title-in-the-Government approach.)

A Comparison of the H.R. 8596 and Title-in-the-Government Approaches.

Before beginning our analysis, we offer an observation that should be recognized by Government policy makers. That is, persons who favor a title-in-the Government patent policy appear to advocate this position primarily on the basis of a belief that allowing contractors to retain title will be anticompetitive. To the extent the other objectives of Government patent policy are considered, it is argued that there is no evidence to support some of the effects others consider relevant such as the impact of patent policy on innovation or contractor participation. It would thus seem that Federal policy makers should support an H.R. 8596 approach to patent policy if the contention that H.R. 8596 approach is anticompetitive can be shown either to be wrong or questionable. We believe that it can reasonably be demonstrated that every other objective of Government patent policy will be more clearly fostered by an H.R. 8596 approach than by a title-in-the-Government oriented approach. For this reason, we will begin our analysis with a review of the impact of Government patent policy on competition.

(1) The Impact of Patent Policy on Competition

In our estimation a title-in-the-Government policy would, on balance, prove anticompetitive as compared to the H.R. 8596 approach.

Before detailing our reasons for making this statement, we think it useful to emphasize that the introduction of new products and processes into the market place is a key factor in maintaining a competitive economy.

However, much of the classical economic analysis of competition is based on analysis of a static rather than a dynamic model. While such analysis is useful in many circumstances, we question whether it is the best model to use in evaluating Government patent policy. We believe that the economic health of the nation, long-term economic growth, and the maintenance of competition is much more dependent on stimulating the introduction of new products and technologies than it is on ensuring maximum competition in the manufacture and sale of a given product.

With this in mind, let us examine critically the argument, which seems to be based on the static model, that a title-in-the-Government policy will promote competition. The supposition that seems to underlie this argument is that most Government contractors are large, dominant firms and that if they are allowed to retain rights to inventions their dominance will be enhanced. 1/ Retention of "march-in" rights are apparently not deemed sufficient to prevent this. Following this approach, of course, necessitates also taking rights from smaller firms and universities that deal with the Government. However, it is argued that since these firms do a relatively small proportion of Government contracting, it is not worth worrying about the few inventions they make as compared to the great number coming out of the large firms. 2/

1/ Assistant Attorney General John Shenefield, in advocating a title-in-the Government approach in his appearance of December 20, 1977, before the Select Committee on Small Business, U. S. Senate, stated, "The competitive risk to the public in transferring title to the contractor may be especially high where transfer carries a danger of further entrenching the already strong market positions of many Government contractors."

2/ For example, Admiral Rickover, a leading proponent of the title-in-the-Government approach, in his statement of December 19, 1977, before the Select Committee on Small Business, U. S. Senate in questioning the wisdom of allowing contractors to retain rights stated, "Since large corporations get the major share of Government contracts, they would be the ones to benefit most from such a practice." Later, he claims, "Small business, for its own advantage, should be against a giveaway patent policy. The vast proportion of Government business goes to large contractors... If the rights to Government financed inventions are given away to contractors, the Government itself will be promoting the concentration of economic power in the hands of a few large conglomerates."

As an initial observation, we note that a substantial portion of Government R&D is conducted by universities and other high-technology commercial firms that are not dominant in any commercial markets. Even when Government prime contracts for major systems development are awarded to major corporations, some of the work is subcontracted with the result that some of the new and innovative ideas stem from lower-tier subcontractors. It is extremely unlikely that dominant firms receive even half of the total Federal extramural R&D budget. 1/

We also believe it likely that a substantial portion of Government R&D that goes to firms that are dominant in commercial markets would be found to be with major air frame and engine manufacturers that dominate both the Government and civilian markets in this area. It ought, however, to be fairly obvious that whether or not the Government takes title to the inventions of these companies the effects on competition in these capital intensive industries will be negligible. Indeed we would note that until the Justice Department recently took action to end this, there was a policy of cross-licensing within that industry which made inventions generally available.

Whatever may be the exact distribution of the source of inventions made under Government contracts and grants, in the case of those inventions made by dominant firms one would find that in the vast majority of cases those firms' positions would not be affected vis-a-vis other U.S. firms by the disposition of rights in their inventions. Patents would probably be found to be of minor consequence in the maintenance of dominance in their industries (although in some cases they may have been an important factor in the early growth of the firms.)

1/ The NSF Surveys of Science Resources Series, NSF 77-301, Vol. XXV, "Federal Funds for Research, Development, and other Scientific Activities," estimates that out of a total federal budget for basic, applied, and developmental extramural research in FY 1977 of $17.428 billion, 30% was performed by universities and other nonindustrial performers. And in the sub areas of basic and applied research the industrial share was only around one-third. These statistics do not, however, provide any breakdown between the types of industrial performers, i.e. what percentage were small businesses. A recent draft study by the Office of Federal Procurement Policy finds that in FY 1975, 7.8% of federal R&D awards to industry from major agencies went to small business. However, this study covers only prime contracts and does not indicate the percentage of prime contracts to large firms that were subcontracted to small firms. It would also seem unlikely that all of the nonsmall business industrial firms dominate or control a substantial share of their commercial markets. Hence, at a minimum around 35% of federal extramural R&D is performed by small business and nonindustrial institutions. Thus, it would be most unlikely that dominant firms actually receive even half of the total R&D extramural budget.

In most cases superior financial resources, economies of scale, access to resources, and well-developed marketing and distribution systems will be found of much more consequence to the maintenance of dominant firms market position. These are the factors that prevent new firms from entering the market and which prevent smaller firms from effectively competing and increasing their share of the market. Even if the Government took title to inventions of dominant firms, we believe that in most cases the factors listed above would prevent smaller firms from making any effective use of the inventions, the great bulk of which, in any case, are merely minor improvements on existing technology controlled by the inventing firms. 1/

Conversely, smaller firms do not enjoy the advantages described above. For such firms, patent protection is a much more significant tool. When a smaller firm makes a new invention that has the potential of being developed into a new product which might increase that firms share of the market, patent protection may be the only defense that that firm has to prevent larger firms from undercutting its market. Without patent protection, larger firms could, because of the advantages noted above, undercut any market developed by the smaller firms.

Thus it appears to us that a title-in-the-Government policy will have, at most, a marginal effect on the market position of already dominant firms, but that it will almost surely destroy the competition that might result from smaller firms developing inventions coming out of Government work.

There is another major shortcoming with the proposition that taking title from dominant firms will allow other firms to use the inventions so as to increase competition. First, it seems likely that the number of inventions reported to the Government would decrease if contractors saw no advantage to reporting them. Second, it is unclear just how other firms would learn of those inventions that were reported. Typically, invention reports come in as separate items or addendums to progress reports. As far as we are aware there is no systematic publication of reported inventions, per se, by the Government, and even if there were it is doubtful that this would be an effective means of achieving technology transfer of specific inventions. The closest approach currently available is the NTIS publication of Government-owned inventions available for licensing. However, publication, unless it is combined with other techniques, is not really a particularly effective way of alerting and interesting commercial firms in inventions (even if one assumes such firms would be willing to invest without exclusive rights). In the next subsection, we also note other limitations of a Government-licensing approach.

1/ While we agree with little else that Admiral Rickover has to say on patent policy, we are in agreement with his observation in his December 19, 1977, statement to the Senate Select Committee on Small Business that "Large corporations file numerous patents that are not great new developments, but minor improvements or design features."

We would also have the reader note that even to the extent that taking title from dominant firms will increase competition, the sources of competition may turn out to be, not American firms, but foreign, state-supported corporations. This is discussed in somewhat more detail in subsection (5) below. Finally, at the risk of seeming repetitious, we remind the reader that the foregoing discussed the effect of patent policy on a static model of competition. Over the long-run innovation may be a major factor influencing competition. Accordingly, the discussion in subsection (2) is closely related to the subject of this subsection.

(2) The Impact of Patent Policy on Innovation.

Let us now consider the impact of patent policy on innovation. By innovation we mean the conversion of inventions made with Government support to commercial products and processes. In line with our attempt to consider separately each of the objectives of patent policy, the following discussion attempts to isolate the innovation objective from the competition objective. Accordingly, for the purposes of this subsection, we consider it irrelevant whether commercialization of a given invention is accomplished by one firm or multiple firms or by large firms or small firms. Instead, our analysis is intended to address only whether the chances of inventions being developed by anyone will be enhanced or diminished by one approach or the other.

It should be clearly understood that many inventions that are reported under Government grants and contracts are by-products of the research being supported. This is certainly true of almost all university inventions. Similarly, very rarely does the Government support research and development to the point where a given product intended for the commercial market has been proven both technically and economically feasible so that private firms would view investment in the manufacture and marketing of the product as virtually risk-free. And even where a Government contract does have this objective, many of the inventions reported under that contract may still be by-products of the research or may have potential uses in areas not being tested by the Government. In those cases where the Government is supporting full development, H.R. 8596 would leave the agency with the discretion to use a deferrad determination or other more restrictive patent clause.

However, in the great bulk of cases, H.R. 8596 would result in agencies allowing contractors to retain rights. In such cases will allowing contractors to retain rights more effectively stimulate innovation than a title-in-the-Government policy? We believe the answer is clearly "Yes."

Given the fact that the vast majority of Government-supported inventions have not been developed beyond the laboratory stage and will not be through Government support, it should be obvious that substantial private investment will be needed to bring the invention to the market. One estimate made several years ago was that the cost of bringing an invention to the market entailed, on the average, about 10 times the cost of inventing it. 1/ Experience at many universities bears this out. The amount of Government support actually involved in a grant or series of grants that lead to an invention is usually small in comparison to the estimated costs that licensees would have to invest to develop the invention to the point of commercial application. It has also been our experience that it is relatively rare for a firm to be willing to invest in the development of a university invention without being afforded some exclusivity. We would bring your attention to the report of the Ad Hoc Subcommittee on University Patent Policy (copy attached) which develops more fully than we will in this paper why this is the case.

Similarly, in the case of inventions made directly by smaller firms under Government contracts or subcontracts, we find it difficult to believe that such firms would normally be willing to invest in the further development of the invention without exclusive rights.

In the case of larger firms the impact of the Government's obtaining patent rights on their inventions on their willingness to invest in the development of those inventions is less clear. It is certainly indisputable that many firms, especially in certain industries, would not invest without exclusive rights, and neither would any other firms with the possible exception of certain foreign firms that enjoy state-supported monopolies (having nothing to do with patents) in their home markets. On the other hand there would undoubtedly be some cases when larger firms would work their inventions even without exclusive rights. Minor improvements might get integrated into on-going product lines. And new products might be developed by larger firms where the market potential was clear.

1/ U.S. Panel on Inventions and Innovations, "Technological Innovation: Environment and Management, pp. 8-9 (GPO, Jan. 1967).

Our conclusion that leaving title in contractors is much more likely to result in commercialization than is the Government's taking title is supported by the data developed by Harbridge House, Inc. in its 1968 study. For example, Harbridge House examined all Government-supported inventions patented in 1957 and 1962. Of all the inventions utilized in this group, they found that the contractor held title to 203 and the Government to 7. In the total sample the Government held title to around 27% of the inventions. Harbridge House also found, "Of all the factors patent rights and prior experience show the strongest association with commercial utilization." The Harbridge House analysis indicates that all other things equal a firm with title is about twice as likely as a firm without title to commercialize an invention. It can also be documented that in the overwhelming number of instances in which universities have obtained licenses for their inventions an agreement could only be consumated on an exclusive basis.

It thus seems clear that the result of the Government keeping title will be to deter investment (innovation) in some cases, and to have a neutral effect in others. The only question that remains is whether this might be counterbalanced by some larger firms using their patent rights to suppress or defer the development of inventions that others might have been willing to develop had the Government held title. We believe such fears are largely unfounded and that, in any case, even if the Government held title the likelihood of other firms developing most inventions would be small. Even if the Government held title in the invention, it can be questioned why other firms would be willing to invest in the invention without exclusive rights. For the reasons previously discussed, it does not follow that the taking of title from large firms will lead other firms to invest in the invention. The large firm still has other advantages that would deter such investment. It would seem that the Government would have to do more than merely take title. It would, in turn, in most cases have to grant someone else an exclusive license. But it could be asked what advantage there is to going through the cost and effort of an exclusive licensing effort as opposed to allowing the inventing

contractor, who as required under H.R. 8596 has represented that he intends to work the invention, the exclusive rights.

It would furthermore appear that if, under an H.R. 8596 approach, an inventing contractor obtains title with the real intent not to work the invention, the "march-in" rights left to the Government would be sufficient to remedy such a situation.

Furthermore, without getting too deeply into the even more arcane subject of patent law, per se, we note that just because a firm has a patent does not necessarily guarantee that others will not be able to work the invention. The courts have discretion whether they will grant injunctive as opposed to monetary relief. It is highly unlikely that the courts would grant injunctive relief in the case of inventions that are critical to public health, safety, or other national needs, where the patent owner is not working the invention. Accordingly, even aside from Government "march-in" remedies it is unlikely that a really critical invention could be suppressed by a Government contractor or any other patent owner.

Moreover, for a variety of practical reasons, it would be a mistake to believe that a title-in-the-Government licensing approach could be as effective in promoting utilization as leaving title-in-contractors. As mentioned previously, a title-in-the-Government approach might eliminate the incentive for many grantees and contractors to report inventions. In the case of the university community it is the principal investigator who normally starts the process moving by identifying inventions. Since publication, and not patents, are critical to the careers of university investigators many are not motivated to report inventions. 1/ However, this can be overcome by aggressive programs at the university to induce reporting, especially by an active licensing program that offers some possibility of financial reward for the inventor. Such incentives to the inventor are completely lost when the Government automatically takes title. Within the business sector, a similar decrease in reporting might result, although probably for different reasons.

1/ We would remind the reader that about two-thirds of the basic and applied extramural research supported by the Government is performed by universities and other nonprofit institutions.

Second, the Government would be faced with an enormous increase in workload. For example, the Defense Department receives some 1500-2500 invention disclosures a year from its contractors. In the great bulk of these the contractor has the right to elect rights. It appears that they do so in about one-third to one-half of the cases and that DOD now examines those inventions in which contractors do not claim rights and file patent applications on perhaps 35-50%. DOD's basis for filing, as we understand it, is the potential application of these inventions to military programs and DOD's desire to guard against future royalty claims on such inventions. They do not analyze these inventions for commercial potential, although it may well be a safe assumption that if a contractor did not request rights that the commercial potential is low. There is, in effect, a screening process performed by DOD's contractors as well as those of other agencies. Under a title-in-the-Government approach this screening would not take place. Thus, under a title-in-the-Government approach DOD would be faced with some 1500-2500 inventions a year on which a decision would have to be made concerning the filing of patents. If DOD continued to base that decision solely on potential military applications, it ought to be obvious that patent applications will not be filed on a number of inventions that have commercial potential but not military potential. Therefore, if one is to honestly argue that a title-in-the-Government approach will not have negative impacts on innovation, one must be prepared to say that DOD and other agencies must screen invention disclosures for commercial application. However, that would require a substantial increase in agency staffs and resources devoted to such tasks. To duplicate the efforts now undertaken by many contractors and a number of universities, the Government agencies would have to be prepared to discuss the inventions with various industrial experts, to run patent searches, and to undertake a substantial amount of sophisticated market and technology analysis that is beyond their normal missions and capabilities. It is unlikely that many agencies would be willing to expand their staffs to undertake such efforts. We think it equally unlikely that the Congress would provide them with the funds necessary to undertake such a program. It is one thing to say that the Government should take title and license inventions, and quite another to obtain the staff and funds to do this effectively.

Third, Government licensing efforts will be hampered by the fact that the Government will not have available to it the expertise and know-how of the inventor and the technical team that conceived the invention. Successful patent licensing often requires transfer of more than a bare right in a patent. Agreements to provide technical assistance may be required which the Government could not offer. Moreover, in the case of many inventions coming from the larger firms, the invention may simply be an improvement on existing technology controlled by the inventing firm. Because of the existence of dominant background patents, the invention will be of no use to anyone but the inventing corporation.

Fourth, it is not always obvious at the time an invention is made that it will ultimately have commercial importance. In many cases, it is the perserverence of the inventor or other technical personnel with the firm who foresee an invention's possibilities that persuades a company to go ahead with development.

For example, Battelle Columbus Laboratories did a study to identify the factors which influenced the movement of ten current technologies from their original conception state into actual use. They concluded:

> "The technical entrepreneur, whose importance was highlighted in the study of the 'factors', is also a 'characteristic' important in nine of the ten innovations. This is the strongest conclusion that emerges from the study. In fact, in three innovations, the technical entrepreneur persisted in the face of the inhibiting effect of an unfavorable market analysis. If any suggestion were to be made as to what should be done to promote innovation, it would be to find--if one can, technical entrepreneurs." 1/

We believe "technical entrepreneurship" will largely be lost under a title-in-the-Government approach. Accordingly, it is unreasonable to believe that Government licensing would be as effective in promoting the development of contractor inventions as leaving title-in-the-contractor.

1/ Battelle Columbus Laboratories, Science, Technology and Innovation, Summary Report - February 1973, p. 8.

We will next discuss the impact of alternative patent policies in the area of health-related inventions. This provides a clear case study, since one can compare the results of DHEW's pre-1968 title-in-the-Government oriented policy with its experience since that time when a more title-in-the-contractor oriented approach was adopted.

(3) Impact of Patent Policy on the Public Health.

A significant portion of Government R&D is devoted to medical research. DHEW, NSF, the Department of Agriculture and to a lesser extent other agencies such as DOD and the Veterans Administration support extramural research in the medical life sciences. Out of such research new compounds are often synthesized which may have pharmaceutical potential. Experience at NIH and studies by the General Accounting Office 2/ and Harbridge House 3/ clearly support the conclusion that a title-in-the-Government patent policy that did not make an exception for medical research would endanger the public health. However, proponents of a title-in-the-Government approach have never suggested that medical research be excepted from the policy. Indeed, even the President's Statement on Government Patent Policy unfortunately specifically singles out health as an area in which the Government should take title.

The GAO and Harbridge House reports noted above, which were based on extensive interviews with National Institutes of Health grantees and staff, concluded that the pharmaceutical industry would not utilize

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1/ Over one-third of the federal R&D budget for basic research in FY 1977 went for the life sciences which include medical and related research. See Report, supra note 1, p. 24. Similarly, one-third of the federal applied research budget was devoted to the life sciences, ibid, p.29. These percentages cover both in-house and extramural research, and the exact percentages of extramural, life science obligations may vary from these figures.

2/ GAO Report B-164031 (2), August 12, 1968, "Problem Areas Affecting Usefulness of Results of Government-Sponsored Research in Medicinal Chemistry."

3/ Harbridge House, Inc., Government Patent Policy Study for the FCST Committee on Government Patent Policy, May 15, 1968, Vol. II, Parts II and III.

its risk capital to pursue further development of potential pharaceutical agents genrated with DHEW support without a guarantee of some patent exclusivity. With the passage of the Medical Devices Act of 1976, which requires premarket clearance of many medical devices, it is becoming increasingly apparent that the same need for patent protection applies to the medical devise area. In some situations, the GAO discovered investigators with hundreds of compounds with potential therapeutic value on their shelves with no source to test their market potential. The GAO criticized for its failure to use its discretion to enter into Institutional Patent Agreements (which it had not done since 1958) or to make timely determinations of rights after identification of inventions.

Since 1969, when DHEW begain using its discretion as suggested by the GAO, until the fall of 1974, DHEW estimates that the intellectual property rights to 329 innovations made in performance of DHEW-funded research were being managed by institutions with IPA's or by successful non-profit petitioners for the purpose of soliciting further industrial support. During this period, these organizations have negotiated 44 nonexclusive and 78 exclusive licenses under patent applications filed on the 329 innovations. Since 1974, to the end of fiscal year 1976, the number of inventions held by such organizations has increased to 517. DHEW estimates that the risk capital generated under the licenses on these 517 inventions has been approximately $150,000,000. 1/

The May 26, 1977, testimony of the Patent Counsel of DHEW, given before the Subcommittee on Science, Research and Technology of the House Committee on Science of Technology includes examples of inventions which have been licensed by universities and nonprofit organizations that have reached or are near reaching the market place. As noted in that testimony most of the examples are pharmaceutical products and medical devices. No comparable examples were known at the time the GAO and Harbridge House ran thier studies.

1/Science Policy Implications of DNA Recombinant Molecule Research. Hearings before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, U.S. House of Representatives, 95th Cong., 1st Sess. (No. 24), p. 965. It should also be noted that over 60% of the inventions retained by IPA holders or petitioners have not yet been licensed and many will never be licensed or brought to ultimate use. Accordingly, the mere retention of patent rights is clearly no guarantee that commercialization will occur.

(4) The Impact of Patent Policy on Economic Growth and Jobs.

The subject of this subsection is to some extent merely an extension of the discussion in subsection (2) on innovation. In subsection (2) we argued that innovation is better achieved under the H.R. 8596 approach than by the Government taking title to inventions. We have also noted that the innovation process is a prime ingredient in maintaining competition. The purpose of this subsection is primarily to emphasize and explain some aspects of why innovation is essential for economic growth. It should be obvious that without the introduction of new products into the economy, economic growth and job expansion would come to an eventual halt. While people can disagree whether particular technological innovations are good or bad, we doubt that anyone would seriously argue that a slow-down in technological innovation would not result in slower economic growth. Yet, the fraction of R&D performed in this country that is Government supported has now reached around two-thirds. Hence, it is inescapable that a Government patent policy that discouraged investment in the development of the inventions made during that research would have a negative effect on economic growth.

Although we believe the relationship between innovation and long-term economic growth and job expansion are intuitively and historically obvious, several recent studies which are cited below serve to highlight this.

A 1967 Department of Commerce study 1/ and a more recent update of that study by John Flender and Richard Morse of the MIT Development Foundation, Inc. 2/ lend strong support to the proposition that sales growth and job creation occurs more rapidly in innovative companies than in mature (dominant) companies. And even more significant for purposes of this

1/ Technological Innovation: Its Environment and Management, U.S. Panel on Invention and Innovation. (Washington, D.C., GPO, 1967).

2/ John O. Flender and Richard S. Morse, The Role of New Technical Enterprises in the U.S. Economy, M.I.T. Development Foundation, Inc., October 1, 1975.

analysis is the fact that job expansion at young (i.e. small) high technology companies was even moire spectacular. 3/ These findings indicate that a patent policy that would deemphasize the needs of smaller firms and emphasize concerns with larger firms could have a negative impact on job expansion.

The potential harm that could accrue from discounting the need to be concerned with inventions from nondominant firms is further emphasized by a study done by Gelman Research Associates. An international panel of experts selected the 500 major innovations that were introduced into the market during 1953-73 in the U.S., U.K., Japan, W. Ger., France, or Canada. Of the 319 innovations produced by U.S. industries, 24% were produced by companies with less than 100 employees. Another 24% were introduced by companies with 100 to 999 employees.

Therefore, to the extent we are correct in asserting, as we did in subsection (2) that the H.R. 8596 approach is much more likely than a title-in-the-Government approach to bring about innovation, it is indisputable that the H.R. 8596 approach is also much more likely to encourage economic growth and job expansion.

(5) The Impact of Government Patent Policy on Foreign Competition.

Our discussion in subsection (1) of the effect of Government patent policy on competition alluded to the fact that title-in-the-Government advocates may have reached their conclusions through the use of a static rather than a dynamic model of competition. We think their analysis also almost totally ignores the fact that the U.S. economy does not operate in a vacuum. American industry is in increasing competition with foreign corporations in high-technology areas. But a title-in-the-Government patent policy must inevitably work to the advantage of foreign firms at the expense of American industry and labor.

3/ The authors found that during the 5 year period of 1969-70 "six mature companies with combined sales of $36 billion in 1974 experienced a net gain of only 25,000 jobs, whereas the five young, high technology companies with combined sales of only $857 million had a net increase in employment of 35,000 jobs.

The taking of title by the Government will effectively prevent the American inventing corporation from obtaining foreign patent protection. And without Government foreign filings no American firm could gain any exclusive rights in foreign markets. But historically the Government agencies have had neither the incentive, the staff, the budget, nor sufficient knowledge of market conditions to file for foreign patents in anything more than a small number of cases. 1/

Secondly, if the Government takes title to U.S. rights in inventions and dedicates them, these inventions are equally available to foreign based firms that would export commercial embodiments of these inventions into the U.S.

If you combine these facts with the difference in the relationship between business and Government in certain foreign countries as compared to relations in the U.S., certain disturbing implications arise. In some foreign countries industry is highly socialistic and state controlled. In others, major companies may enjoy state subsidies and support. The result of all this is that the same invention that U.S. firms may not develop without the exclusivity afforded by patent rights may be developed by Japanese, Germany, or other foreign firms that enjoy monopoly advantages in their home markets through means quite apart from patents. In turn these products are exported into the United States and displace American products and American jobs.

In short, given the difference in industry-Government relations in many of the technologically advanced foreign countries as compared to the United States, a title-in-the-Government policy is most likely to favor foreign companies. We would emphasize that we in no way mean to imply that the United States should abandon its antitrust policies. Instead, we believe that the existence of the antitrust remedies makes it extremely foolish for the United States Government to fashion its patent policy primarily on hypothetical and we believe mistaken concerns about the impact that policy will have on competition within the United States while ignoring the many adverse effects that a title-in-the-Government policy would have. If, in a few isolated cases leaving title with Government contractors is found to be a contributing factor to a course of conduct or a monopolistic position that is in violation of the antitrust laws, then the Government should seek to remedy such abuses through antitrust laws.

1/ Statistics by the Committee on Government Patent Policy show that during the period of FY 1970-75 the Government filed for foreign patents on an average of 77 contractor inventions, and the preponderance of these were by only two agencies, DOE and NASA. This is approximately one-tenth the number of contractor inventions upon which the Government filed U.S. patent applications.

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The existence of the antitrust remedy would seem to lessen the need to be concerned over occasional anticompetitive situations that theoretically might emerge from a title-in-the-contractor policy.

(6) The Impact of Government Patent Policy on Contractor Participation.

The issue of whether Government patent policy affects the willingness of potential contractors to participate in Government R&D efforts is again tied in, to some extent, with the arguments in the previous subsections. However, it also constitutes a separate subject and does represent an important impact of Government patents policy. Apparently, this consideration has been the primary one that has influenced the Defense Department to adopt a title-in-the-contractor oriented policy.

Because of obvious detrimental effect a title-in-the-Government patent policy could have on the national defense effort if, indeed, such a policy would have negative impacts on contractor participation, title-in-the-Government advocates have generally gone to great efforts in their presentations to discount this possibility. They often claim that there is no evidence to support the contention that taking title will deter firms from participation. They will also enumerate various advantages to taking Government contracts which they claim will lead firms to accept Government work regardless of the patent terms. 1/

1/ Assistant Attorney General Shenefield made the following statement in his testimony of December 20, 1977, to the Select Committee on Small Business, U.S. Senate: "We are not aware of any convincing showing that exclusive rights in government-financed inventions need be granted to contractors in order to induce them to accept government R&D contracts, which themselves confer many benefits beyond the simple contract price. Among these benefits are the opportunity to traing key personnel, expand research facilities, develop know-how--all with government aid--and apply these assets to further the contractors' own commercial objectives. These contractors may also receive government data and know-how inaccessible to their competitors. As a result, contractors participating in government-funded research programs can acquire a long and significant lead over their actual or potential competitors.

See, also, the testimony of Admiral Rickover before the same committee on December 19, 1977.

No one denies that in many instances a firm will accept Government work regardless of the patent terms, often for the reasons given by title-in-the-Government advocates. However, there is ample evidence that there are cases when patent provisions will affect the willingness of firms to accept Government research grants or contracts. The DHEW experience with the pharmaceutical industry in connection with its cancer chemotharapy drug research program in the 1950's is a clear cut example of firms refusing to participate in Government programs without patent rights.1/ Harbridge House, in its 1968 study of Government patent policy, concluded that there were a number of situations in which a title-in-the-Government approach would affect contractor participation. They, of course, also noted that in many cases it would make no difference. We believe numerous Government procurement officers and attorney's could provide anecdotal evidence of instances in which particular contracts would not have been consumated if the Government had insisted on obtaining rights to inventions. In short, the arguments of the title-in-the-Government advocates concerning contractor participation contradict actual experience.

As is discussed later in Section (2), many universities have found that concern over Government patent policy often deters private industry from supporting university research in areas where related Government work is being performed. It seems obvious that those same concerns would affect a firm's willingness to do work for the Government that parallels its private research efforts. While undoubtedly DOD would have little trouble getting prime contractors for major systems development contracts regardless of patent terms, the same could not be said of many potential subcontractors under those contracts. It should not be lost sight of that while a major weapons system may not have a commercial counterpart, many of its subsystems or components have commercial markets or are improved versions, with perhaps higher performance characteristics, of commercial items. Their commercial equivalents may be proprietary or covered by patents. We believe that it would be naive to believe that if the Defense Department attempted to flow-down a title-in-the-Government clause through the numerous tiers of its subcontractors that major problems would not emerge.

1/ In 1958, the Public Heath Service was forced to amend its regulations to allow commercial concerns to retain rights to inventions made under contracts under this program in order to get the pharaceutical industry to accept contracts.

The effects of the refusal of certain potential contractors to participate in particular contracts or subcontracts would seem to be the following:

1. Procurement costs might increase in cases where firms with proprietary interests refused to participate since the actual contractors would probably have to duplicate much of the research already performed by the more advanced nonparticipants.

2. The quality of the final product might be lower, a perhaps unacceptable risk in the arena of military procurement.

3. Government procurement might become increasingly concentrated in larger, more dominant firms. That is, it would seem to us that large, dominant firms would be more willing to accept Government awards even without guarantees of patent rights than will small and mid-sized firms that have more need for these rights to protect and improve their position. As a result more and more Government work, at the prime and subcontractor levels will be performed by fewer and fewer firms.

In summary, there is absolutely no question that a title-in-the-Government policy would have an adverse affect on contractor participation. The only real unknown is the precise parameters of the problems in this area that such a policy would create.

(7) The Cost of Administering Alternative Patent Policies.

Somewhat related to the contractor participation issue is that of the administrative costs and burdens entailed by alternative policies. It should be obvious that the H.R. 8596 approach would minimize administrative costs or burdens, since negotiations with contractors and processing of waiver requests would be unnecessary. Similarly, if the Government adopted a hard and fast, take it or leave it, title-in-the-Government policy, these costs would also be minimized. However, assuming such a policy was combined with an active Government licensing program, the administrative costs would be much higher than an H.R. 8596 type policy. (See our earlier discussion in subsection (2) on innovation.) It seems fairly obvious, however, that a complete take it or leave it title-in-the-Government policy is not possible. The result will be requests by numerous potential contractors and subcontractors for more liberal terms. Many of these requests will have to be considered if Government programs are to proceed on a timely basis. Thus, it seems clear that the taxpayer will pay more for the administration of a title-in-the-Government patent policy than they will for the administration of an H.R. 8596 approach.

A Comparison of the H.R. 8596 Approach with the Case-by-case Approach.

Our preceding discussion has been limited to a comparison of the H.R. 8596 approach with a title-in-the-Government approach to Government patent policy. We think that discussion and analysis leads to the conclusion that a title-in-the-Government approach is a totally unrealistic way of formulating a uniform Government patent policy. Conversely, the H.R. 8596 approach is a feasible one which would promote the various objectives that can be influenced by Government patent policy. The question remains whether a case-by-case approach would be superior or inferior to an H.R. 8596 approach. This section is devoted to this question, and we will again consider the different impacts of the two policies in each of the seven areas discussed previously. Our conclusion is that the H.R. 8596 approach is superior to a case-by-case approach.

We would remind the reader, as stated at the beginning of this paper, that the case-by-case approach can encompass a number of variations. It might, as is currently normally the case, assume that agencies would select in individual cases among title-in-the-Government, title-in-the-contractor, or deferred determination clauses. Or it could assume that only deferred determination clauses would be used. Depending on how the policy is stated, it might have a presumption in favor of title-in-the-Government or title-in-the-contractor. It might or might not be accompanied by the assumption that the Government would undertake to license inventions to which it obtained title. Where these differences are relevant to our analysis, we attempt to account for them.

One point we would also emphasize is that one who advocates a case-by-case approach presumably should have the specific variation which he would choose in mind. We would make the observation that while the choice of one specific variation may help to mitigate what we might argue are the adverse effects of a case-by-case policy on a specific objective, it may well turn out to compound the problem with respect to another objective. In short, we caution that it is not appropriate to shift from variation to variation depending on the objective that is being discussed.

(1) Administrative Costs. A case-by-case approach would be substantially more costly to administer than the H.R. 8596 approach. Agencies might have to establish an internal process to decide which clause to place in each grant or contract. It can be expected that in numerous cases where other than a title-in-the-contractor clause is proposed negotiations will have to be undertaken. The agencies may even find themselves forced to negotiate subcontract provisions even in cases where the prime contractor is willing to accept a title-in-the-Government or deferred determination clause. The Government will also have to process numerous requests for deferred determinations that would not have had to be processed if the contractor had been allowed rights at the time of contracting. Finally, depending on which variation of the case-by-case approach was adopted, a Government licensing program might be required.

(2) Contractor Participation. It should be obvious that a case-by-case approach, at best, could only equal the H.R. 8596 approach in terms of its impact on contractor participation. That is, the contractor participation problem occurs in situations where contractors are not guaranteed rights at the time of contracting. The use of deferred determination clauses does not overcome this problem. The contractor participation problem could only be successfully alleviated under a case-by-case approach if the Government used a title-in-the-contractor clause in each instance when contractor participation was a problem. However, there is no way the Government could identify such situations in advance, and the Government would certainly find it difficult to determine just which firms were bluffing and which were not. Moreover, if the solicitation went out with a title-in-the-Government or deferred determination clause, some firms might simply refuse to bid knowing that they would have to go through a hassle over patent rights. Hence, we believe that H.R. 8596 is clearly superior to a case-by-case approach in avoiding contractor participation problems.

(3) Foreign Competition.

The problem of foreign competition cannot be dealt with under a case-by-case approach to Government patent policy. This is because while one can predict that in some cases if the Government takes title to inventions and makes them freely available foreign corporations will benefit, one cannot identify, in advance, in which cases this effect will occur. There appears to be no rational way in which Government decision makers could be expected to have sufficient facts and understanding to predict that if they kept title to a given invention that a foreign corporation would exploit the invention while American firms would not.

As an analogy, one could predict with reasonable certainty based on past experience the approximate number of Americans who will die from accidental causes in the course of the next year. But there is no way of identifying the specific individuals who will suffer this fate.

Only by allowing contractors the right to normally retain title can we feel any confidence that our patent policies will maximize, to the extent they can, the position of U.S. industry in the world markets.

(4) Public Health.

As discussed earlier severe utilizations problems emerged in the public health area when contractors were not guaranteed exclusive rights. And in cases where the R&D needs to be performed by commercial concerns, obviously the use of deferred determination provisions would not eliminate participation problems, since the contractors will want guaranteed rights. 1/ A case-by-case approach would, therefore, in order to operate as satisfactorily as the H.R. 8596 approach

1/ See fn. 1, p.18.

have to operate with a heavy bias in favor of leaving title with the contractor. In essence, a case-by-case approach would have to operate as a title-in-the-Contractor approach as it applied to medical and related research if it was not to have detrimental impact on the public health. We thus see no advantage in adopting a case-by-case approach as opposed to the H.R. 8596 approach vis-a-vis public health concerns. Indeed, unless truly liberally administered, the result would be most likely to be detrimental to the public health.

(5) and (6) Economic Growth and Innovation.

For purposes of this discussion we are combining the two factors of economic growth and innovation since as our previous analysis indicated the economic growth objective is basically a function of the rate of innovation. However, in line with our attempt to consider separately each of the objectives of patent policy we remind the reader that the following discussion attempts to isolate the innovation objective from the competition objective. 1/ In the final subsection we will examine in more detail the competition objective.

We think all parties can agree that patent policy should be designed to stimulate the development of inventions into new products and processes. The basic disagreement is over how this is best done. We think it is fair to state the supporters of H.R. 8596 would agree that in some cases innovation will take place just as quickly even if an inventing contractor is not allowed to retain rights. On the other hand, most title-in-the-government advocates recognize that there are cases when innovation will be fostered by leaving title in a contractor. However, these same advocates would also argue that in some cases innovation will be more likely to take place if the Government retains title and in some cases dedicates or in others licenses the invention. And one would have to concede that in some cases this might well be true. The argument goes, therefore, that the best thing to do is for the Government to decide each case individually in light of the facts.

There are unfortunately certain problems that make this seemingly ideal and rational approach unworkable. To put the matter simply we find it difficult to believe that Government agencies would have sufficient staffs, budgets, and expertise to undertake the rather detailed technical, economic, and marketing studies that would allow anyone any degree of confidence in

1/ See introduction to subsection (2) on p.6, supra.

his prediction that taking title from contractors would improve the chances of innovation. Also, we think the same problem of identifying individual cases discussed in the foreign competition section may be at work here.

The experience of most persons involved in technology transfer is that the chances of a given invention being commercialized are considerably enhanced if exclusivity is available. We would remind the reader of the 1968 Harbridge House findings discussed earlier at page 8.

We believe that a case-by-case approach would not increase the chances of innovation. Presumably innovation would only decrease in cases where a contractor retained title and failed to use the patent and prevented others from doing so. We fail to understand how the Government could predict such behavior either at the time of contracting or after an invention was identified. It seems to us that the Government's march-in rights are the real remedy for such behavior.

The only other variation that might be suggested would be for the Government to defer a decision until it announced the existence of the invention and accepted offers, i.e. it established a licensing program. While in theory such a solution may be attractive in reality it is unworkable and has severe drawbacks which were discussed previously. We do not know why the Government should be any more successful than universities in finding nonexclusive licensees. If the Government, therefore, offers an exclusive license, we wonder how the Government could be any more confident that its exclusive licensee will develop the invention more quickly than an inventing contractor who makes the representation required under H.R. 8596. And if the Government grants nonexclusive licenses, as they will be under strong pressure to do, how do Government officers know that dominant firms will not offer to accept such licenses simply to prevent a potential competitor from obtaining an exclusive license. In point of fact, one is likely to find that only the large companies will have the staff to keep track of inventions being offered for license by the Government.

Moreover, as discussed previously, a policy in which rights are not guaranteed to contractors at the outset could have the effect of decreasing the number of inventions reported to the Government. We believe many university investigators would soon learn that there is no particular advantage to reporting and identifying inventions since about all they will get out of this is the "honor" of having to help Government attorneys prepare patent applications. Similarly a complicated and time consuming deferred determination procedure is likely to discourage many universities from requesting rights. We suspect that under a case-by-case system the Government will be so busy making determinations in those cases where contractors and grantees are not discouraged from requesting rights that the Government will have no resources left to do anything with invention disclosures which are not accompanied by requests for rights.

We think a similar phenomenon would occur with some of the Government's profit-making contracators and subcontractors. There is a possibility that some contractors may decide it is more in their interest to refrain from disclosing inventions, and they may not report inventions in which they can make a reasonable case that the invention was outside the scope of the contract. Without voluntary disclosure, as a practical matter we think it unlikely that the Government or others would be able to recognize that particular patented products should be subject to royalty-free Government licenses and march-in rights. Only through happenstance and expensive litigation is the Government likely to discover and establish its rights for whatever worth that may prove to be.

Again, we are not denying that there might be a few cases under a deferred determination approach in which denying a contractor rights will result in earlier innovation than would have been the case if the contractor had obtained rights under the H.R. 8596 approach. We do not believe that such cases will occur often enough, however, to overcome the other problems cited above. In addition, one must also expect that in some cases the Government will come to the wrong conclusion and deny contractors rights in cases in which, if the truth were only known and the future predictable, it would be found that this denial stymied the further development of the invention.

In summary, given the overwhelming evidence that innovation is fostered by exclusivity, only with 20-20 hindsight could the Government be expected to improve the odds in favor of innovation that leaving rights to contractors provides. And, even if the Government had some magical means of always reaching the proper determination, the time consuming and expensive process would likely have a negative effect on the total number of inventions reported and the willingness of some inventing organizations to pursue rights.

Thus, we seem to be back where we were during our comparison of the H.R. 8596 and title-in-the-Government approaches. That is, for each of the six objectives discussed so far, we find the H.R. 8596 approach superior to a case-by-case approach. Thus the case for an approach other than H.R. 8596 once more depends on the competition objective, and further assumes that this objective is overriding.

(7) Competition.

We concluded in our earlier comparison of title-in-the-Government versus the H.R. 8596 approach, that the latter would really promote competition more adequately than the former. The question that must be examined now is whether a case-by-case approach will do

an even better job by ensuring the use of the best approach in each individual case. We believe a reasonable way to approach this is to examine the types of situations in which leaving title in contractors might prove anticompetitive and then to examine whether it would be reasonable to expect that the Government could prevent this by a case-by-case examination. This discussion will concentrate on situations where the inventing contractor is a large, dominant firm or one that controls a substantial share of its commercial markets. We assume that title-in-the-Government advocates do not consider it anticompetitive for a smaller competitor to develop an invention into a product that allows it to increase its share of the market. Presumably, that increases competition.

Leaving an invention with a dominant firm could arguably lead to an anticompetitive result in certain situations. One situation would be where the firm chooses to suppress the invention and not use it or license others. For reasons discussed previously, we do not understand how the Government could rationally predict such behavior. Again, march-in rights appear to be the only answer to this.

A second anticompetitive effect might be that the large firm would develop the invention so as to further enhance its dominance. However, for the various reasons discussed previously, it can be doubted that very many of these inventions would actually be used by competitors even if they were freely available to them on a nonexclusive basis. There is, of course, little doubt that there would be cases when they would use them. One can certainly hypothesize sets of conditions, which will sometimes occur, which would support this. However, again, while such cases may be identifiable with hindsight, as a practical matter it seems highly unlikely that Government personnel could identify these situations in advance. Because Government personnel will lack the detailed knowledge of market conditions, the various firms involved, the technology involved, and alternative technologies that would be required to exercise a meaningful judgment, it can be expected that case-by-case decisions will be decided on the predilections of individual decision-makers. And we will not relist all the other problems that such a costly and elongated process would entail. The impossibility of a truly meaningful case-by-case process suggests to us that the Government would be better advised to establish a policy that takes advantage of the fact that in most cases the H.R. 8596 approach seems destined to prove beneficial.

One might argue that this problem could be avoided if under a case-by-case approach, the Government took title to the inventions of dominant firms and used a licensing program. Under this approach, one could argue one could come out ahead if you ended up giving an exclusive license to a small firm. We will not reiterate the various problems and drawbacks to Government licensing that we have previously discussed.

We would, however, note that the same persons who advocate title-in-the-Government oriented policies, also seem to oppose the granting of exclusive licenses by the Government except as a last resort.

Another observation that needs to be made, and one that may pertain to any suggestion that under a case-by-case approach the Government could distinguish between its treatment of dominant and nondominant firms is this. How could procurement officials and program officers determine which firms are "dominant"? A good part of antitrust law seems devoted simply to determining what is the relevant market in any given case. The resolution of this issue, on an after-the-fact basis, during the course of antitrust litigation may take years and require detailed analysis by economists and others. At the time of contracting how could one possibly even know the commercial markets to which would-be inventions might pertain. And even after an invention is identified this may be an equally impossible question since the invention may have multiple potential uses. And even where its use is tied closely into an ongoing product line, one is back to the problem of identifying the relevant market. The administrative nightmare that would be created ought to be readily apparent.

In summary, it is highly dubious whether a case-by-case approach would increase the competition generated out of given inventions. We admit that in some cases it might. However, we remind the reader that in line with the discussion in the preceding subsection, even if the result were beneficial vis-a-vis some inventions, innovation will be decreased. With fewer innovations long-term competition under a dynamic model of the economy would decrease.

We would also note that competition is desirable presumably because it results in lower prices to the consumer. Since the administrative costs of a case-by-case approach that was truly designed to attempt to fully access the facts in each case would be enormous, these costs must be weighted against potential price decreases. Since in our estimation the number of cases in which a case-by-case approach is likely to increase competition and possibly lower prices as compared to the H.R. 8596 approach will be miniscule, these savings are highly unlikely to offset the higher administrative costs that would have to be borne by the taxpayers year after year.

Finally, one more fact that we believe needs to be weighted in the overbalance is that even if in a few cases higher prices resulted from a contractor retaining title, the consumers nevertheless must find the product a better value than its prior alternatives or they would not pay the price.

Summary

We believe it apparent that careful examination of the impact of alternative patent policies on the various objectives of Government patent policy shows the H.R. 8596 approach to be superior to any of the alternatives on every count. No doubt title-in-the-Government advocates would reject our analysis of the competition situation, but it is doubtful that they will be prepared to provide any reasonable analysis to support their rejection. In any case, it is unclear why the competition factor should be deemed to outweigh the other factors we have enumerated.

While with hindsight one could probably show that in some situations the various objectives on balance would best have been served by the Government keeping title, it seems clear that all evidence points to this being the case in only a small percentage of situations, some of which, in any case, can be accounted for by the discretion left in agencies under H.R. 8596 to deviate from the standard provisions. More importantly, while 20-20 hindsight may reveal individual situations in which it would have been better for the Government to have obtained title, our analysis has shown the practical impossibility of reasonably identifying such cases in advance. If one examines carefully the various solutions that title-in-the-Government advocates often proffer to mitigate the concerns of advocates of the H.R. 8596 approach, one will find that they presuppose an ability in Government officials to predict a future course of behavior that could only reasonably be predicted if one possessed a wealth of knowledge about specific technologies, industries, firm capabilities, and other factors that is just not available. And even to gain a fraction of the knowledge that would make the decision-making process anything more than a ritualistic affirmation of the decision-maker's predilections would require such an enormous administrative cost as to probably offset any hypothetical savings to consumers that might be generated by the increased competition that is supposedly going to result from the process.

We, of course, do not claim that patent policy is necessarily the dominant force in shaping any of the objectives. Overall other factors will have a much greater influence on competition, innovation, and economic growth than will Government patent policy. We do believe, however, that patent policy will have a definite influence, for better or worse, depending on the policy, in each of the areas we have discussed. While one cannot, unfortunately, measure with any precision the exact magnitude of the impact in any of the areas (save, perhaps, administrative costs, if one defined precisely how each policy was to operate), we feel it would be foolish to ignore the obvious direction in which patent policy can affect these objectives. The weight of experience and evidence strongly suggests that H.R. 8596 represents the proper approach to Government patent policy. There is virtually no reason to suppose that either a title-in-the-Government or case-by-case approach would prove as beneficial.

Section 2. Considerations Affecting Government Patent Policy as it Pertains Specifically to Universities.

The university community is concerned with Government patent policy not only for the general reasons set forth in Section 1, but also because of the impact these policies can have on university operations.

Many universities believe they have an obligation as public institutions to attempt to transform the ideas and knowledge developed at the university into useful products and processes. The universities also believe that the licensing of their inventions is a potential source of income to support further research and educational activities. Without attempting to draw the line between where one motive starts and the other ends the clear fact of the matter is that unless a university is allowed to retain rights in its inventions in the great majority of cases private industry will not invest in the commercialization of these inventions and most universities would have little incentive to devote staff and resources towards interesting industry in pursuing the development of inventions. Our previous discussion has outlined some of the reasons for this. And the reasons for this are well developed in the 1975 Report of the Ad Hoc Subcommittee on University Patent Policy, Committee on Government Patent Policy, FCST. Likewise, we think that report accurately describes the shortcomings of alternative approaches. In the interest of brevity, we would refer you to that report rather than repeat the various points it made. The university community agrees with the analysis in that report which was prepared by various experts within the Government.

Government patent policy can also have a very significant impact on efforts to obtain industrial support for university research. Quite apart from the licensing of inventions, the university community is vitally interested in expanding the contributions of industry to university research.

However, it has been the experience of the universities that many companies that might otherwise be interested in supporting research will decline to do so if it is found that the university investigator is carrying on related work under Government sponsorship in which the Government controls the disposition of any inventions. While many firms do not demand the assignment of future inventions as a condition of support, many at a minimum, want some sort of right of first refusal for a license. If a company believes that the university rights will be confused and uncertain because of the related Government work, typically it will back off and support will not be obtained. On the other hand, if the Government related work is being done for an agency such as DHEW or NSF with which the university has an Institutional Patent Agreement allowing it to retain rights, most companies are satisfied and will consumate an agreement to support university research in which they are interested. Thus, it should be well understood that because such a large percentage of university research is Government-sponsored, unless Government patent policies provide for certainty of rights in the university, it will be extremely difficult to achieve anywhere near total amount of industry support for university research that would seem potentially achievable.

Finally, we believe that a title-in-the-Government policy completely ignores the equities of the university community in inventions made by university investigators. Rarely does the Government pay full salary of university investigators. Overhead costs are shared by the university. The facilities and libraries in which research is performed has usually been payed for in whole or in part through private sources or State financing. The universities, many of which are state supported, are as responsible, perhaps more so, than the Government for establishing the environment in which inventions are made. For the Government to take title to university inventions is to ignore the equity of the universities and the States that support them. We see no reason to believe that universities, as public institutions, are not as capable as the Government of obtaining utilization of these inventions in a manner designed to protect the public interest. Indeed, it is obvious if one compares the university record with that of the Government that we are much more capable of securing private investment in the further development of our inventions than is the Government.

Section 3. Problems with the "Status Quo".

The previous analysis has explained the reasons why the university community believes H.R. 8596 represents the optimum approach to Government patent policy. We were, however, also asked to provide comments on what, if any, problems we might foresee if, instead of the enactment of H.R. 8596 the "status quo" were maintained.

There are two classes of reasons why that suggestion disturbs the university community. First, the current "status quo" is essentially a mixture of title-in-the-Government oriented piecemeal legislation and/or the case-by-case approach as represented by the President's Memorandum and Statement of Government Patent Policy. Since our previous analysis has shown these approaches to be inferior to the H.R. 8596 approach, it seems desirable to change the situation. In President Carter's words, "Why not the best?" Secondly, and perhaps more importantly, it seems inevitable that without the enactment of legislation along the lines of H.R. 8596, Government patent policy will move further and further in the direction of a title-in-the-Government oriented policy through the enactment of further piecemeal legislation and because of changes in key administrative personnel.

On the first point, two major R&D agencies, NASA and DOE, are essentially forced by their statutes to use a deferred determination approach. A number of other agencies also have interpreted various enabling statutes to require a title-in-the-Government or deferred determination approach with respect to all or significant portions of their R&D activities. These include the Department of Agriculture and Interior, and there are others. Obviously, if one concludes that H.R. 8596 embodies the proper approach to Government

patent policy, one should not be satisfied to have significant portions of Government R&D activities governed by counter-productive legislation.

We also believe that the President's Statement on Government Patent Policy, which is the other major document governing current policies, is somewhat overbalanced in the direction of title-in-the-Government. For example, we see little justification for section 1(a)(ii) which establishes a rule that the Government should take title to inventions resulting from health-related research. As discussed previously the experience of DHEW clearly demonstrates the folly in having drugs and other health-related inventions placed in the public domain. We also believe that while section 1(a)(i) may be partially correct, much depends on how this section is interpreted. We would agree that if the Government awards a contract to develop and carry a product all the way to the commercial market place that the Government should retain control over the disposition of inventions made under the contract. However, it is relatively rare for the Government to fund items that far, yet it seems unclear whether section 1(a)(1) is meant to apply where the contract is to support some development, but only at a relatively early stage, and where considerable private investment will still obviously be needed to bring any product to the market.

Secondly, we judge the current "status quo" to be a rather precarious one, and one that leaves the actual policies and practices of individual agencies subject to arbitrary changes depending on the whims of particular strategically placed individuals. There has been a history both before and since the promulgation of the President's Policy of the Congress inserting title-in-the-Government oriented patent provisions in major R&D legislation, often at the eleventh hour. The NASA Act is a well-known example of that. And more recently, the ERDA legislation was accompanied by restrictive patent provisions. Indeed, it appears that this legislation is even being interpreted to put the universities at a disadvantage as compared to industry in obtaining waivers from DOE. It appears to the university community that the ERDA provisions are likely to become the model used in future efforts to insert patent provisions in legislation establishing or reorganizing R&D programs. Such piecemeal efforts are difficult to prevent because they do not affect all the agencies. Moreover, in the case of new programs there is often no one with an interest in the program who can effectively point out the problems that will be created. And, quite honestly, neither the universities, industry, or persons within the Government who might be opposed to such developments have the time and energy to constantly refight this battle.

It is our understanding that the concern about piecemeal legislation was one of the major factors that led the Committee on Government Patent Policy to prepare a draft bill in 1976. We think it is a very real concern. We do not see how more piecemeal legislation can realistically be prevented unless the attempt is made through the mechanism of H.R. 8596 to get a Government-wide policy adopted. While the passage of H.R. 8596 would not preclude persons from attempting to get piecemeal provisions adopted, its passage would make it considerably easier to combat such attempts and would probably deter them. Indeed, we believe that even if H.R.8596 ultimately fails to secure passage, a vigorous Executive Branch effort to obtain its passage would have beneficial effects. We feel certain that such an effort might at least educate some Congressmen of the issues and facts. Based on this, some of those Congressmen might prove willing in the future to help combat piecemeal efforts to insert title-inthe-Government provisions in R&D legislation.

It is fairly obvious to the university community that under the present circumstances many Executive Branch officials who might otherwise be inclined to move their agencies closer to an H.R. 8596 approach are afraid to do so because of concern over Congressional reaction. Many Federal officials are simply not willing to risk the reaction of certain Senators or Representatives that actively and vocally support a title-in-the-Government approach. Indeed, it would appear to the university community that the timidity with which the Administration has handled the development of its position on H.R. 8596 may reflect these very fears. We note that the Committee on Government Patent Policy recommended a bill substantially like H.R. 8596 late in 1976. Yet, despite the overwhelming support of the Government's experts in this area, higher Government policymakers appear hesitant to actively recommend that the President support H.R. 8596. It seems obvious that without the passage of H.R. 8596, the political climate will be such that it will simply be impossible for the Executive Branch to formulate an effective Government-wide patent policy.

Related to the preceding observation, the university community is concerned that even those agencies whose patent policies are not governed by restrictive legislation and that have adopted patent policies which are now responsive to the needs of the university community cannot necessarily be counted upon to always follow such policies. For example, the university community generally believes that DHEW, NSF, and DOD, among the agencies not governed by restrictive statutes have had the most responsive university patent policies. Yet in 1976, DOD suddenly abolished their list of universities with approved patent policies and, while we are hopeful that DOD will adopt the Institutional Patent Agreement approach after the Federal Procurement Regulation revisions in this area are issued, there is now a degree of confusion regarding DOD patent policy as it pertains to universities.

We would also note that neither DHEW nor NSF have always had patent policies and practices that were responsive or fully effective. While numerous persons within both of those agencies have been supportive of their current IPA and waiver policies, it is also fairly apparent that without the perserverance, dedication, and understanding of a few key individuals these agencies would not have the policies they have today. Similiarly, it took initiative and leadership from within the bureaucracy to obtain the preperation and adoption of the Report of the Ad Hoc Subcommittee on University Patent Policy by the Committee on Government Patent Policy in 1975, and its implementation in the Federal Procurement Regulations. But we cannot be sanguine that such leadership and initiative will always be present within the Federal bureaucracy. Changes in personnel or in agency leadership may lead to reversals of policy that are not based on a complete understanding of the situation. Accordingly, we would prefer that Government patent policy, assuming it is soundly established, be established by law and not by men.

Finally, a decision to maintain the "status quo" would seem in conflict with the declaration of Congress in the National Science and Technology Policy, Organization, and Priorities Act of 1976 that:

> "Federal patent policies should be developed, based on uniform principles, which have as their objective the preservation of incentives for technology innovation and the application of procedures that will continue to assure the full use of beneficial technology to serve the public."

Thus, we urge the Administation to support H.R. 8596 as the means of fullfilling this Congressional declaration.

32-635 O - 78 - 20

March 9, 1978

Dr. Newton O. Cattell, Director
Office of Federal Relations
Association of American Universities
Suite 730, One DuPont Circle
Washington, D. C. 20036

Dear Dr. Cattell:

I have been very favorably impressed by the various documents which have been prepared in support of patent policies of universities like Purdue. I do not see how much more can be done as far as logical reasoning is concerned.

The final result seems to be a political decision, and I am at a loss to know what to do about it.

We at Purdue and other universities know that knowledgeable people within NSF and NIH understand the problem, understand universities, and are supporting our views. We have been told confidentially that they have gone as far as they can without jeopardizing their own positions. The problem is at the top of both agencies. Who can really influence the director of NSF and the Secretary of HEW?

The detailed analysis of the university position on HR 8596, prepared by the Society of University Patent Administrators, is truly outstanding. I suspect that no one in a top position in any of the Federal agencies or in the Congress will read it because of its length (32 pages--draft dated 2-1-78). This is the paper prepared by Howard W. Bremer, President of the Society of University Patent Administrators and patent counsel for the Wisconsin Alumni Research Foundation.

I have the uneasy feeling at the moment that our view will not be supported. It is true that we do have a few inventions conceived on Federal

funds which could bring royalty income. It is not a primary university function to make inventions, but we should be permitted to benefit when such inventions are made. However, we can truthfully say that, unless universities (and private business) are permitted to develop inventions through patents and licensing--including exclusive licenses--, the U. S. will fall further behind Germany and Japan in new technology, and that society will be the loser.

Sincerely,

F. N. Andrews
Vice President for
Research, and Dean

FNA:d
C.c. to Senator Birch Bayh
Senator Richard G. Lugar
Dr. Arthur G. Hansen
Congressman Floyd Fithian
Dr. R. L. Davis

SAME LETTER SENT TO DR. FRANK PRESS, DIRECTOR-OFFICE OF SCIENCE & TECHNOLOGY POLICY

FEB 23 1978

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

OFFICE OF THE PRESIDENT

February 14, 1978

Mr. Stuart E. Eizenstat
Assistant to the President
for Domestic Affairs & Policy
The White House
Washington, D.C. 20500

Dear Mr. Eizenstat:

On behalf of the higher education community, we would like to convey our views concerning the awarding of patent rights developed by colleges and universities in the performance of federally funded research.

Colleges and universities unanimously support H.R. 8596, the Uniform Federal Research and Development Utilization Act of 1977, which permits the contractor to retain exclusive rights to inventions subject to a nonexclusive, nonstransferable, irrevocable paid up license in the government. We firmly believe that the uniform regulations provided for in the bill will best achieve a policy of making inventions available to the public. We urge your support of this legislation. In the absence of support for this proposal the higher education community strongly favors the maintenance of the existing federal policy permitting diverse policies within the various federal agencies rather than vesting patent rights in the government or establishing a policy of deferred determinations.

The process of education at most colleges and universities embraces the conduct of basic research which may or may not develop a patentable item. The occurrence of an invention during the course of the research is virtually always incidental to the main objectives of the research agreement and only in rare instances provides financial benefits. An invention, when it occurs, is largely attributable to the personal creativity of the investigator buttressed by his years of professional training and experience, and to the scholarly environment and research resources provided by the university.

Since such inventions are generally developed in performance of basic research, they tend to be embryonic in nature and, therefore, usually require substantial investment of private risk capital for the further development necessary to introduction into the market. Accordingly, if university inventions are to be used, institutions must seek to interest industrial concerns who have the commercial capability the university lacks. Therefore, unless the university has the ability to grant exclusive licenses, it may be unable to attract the necessary risk capital. When the government retains title, the patents are made available to all comers on a nonexclusive or even royalty free basis. This is tantamount to "dedication" of the invention to the public. In such cases, a commercial concern may often be dissuaded from investing the necessary development effort to make the product or process useful to the public.

Inventions resulting from research sponsored by Federal agencies involve equities of the government, the contractor, and the inventor. When a patentable invention is made by an investigator in an academic institution with the help of Federal funds, rarely, if ever are the Federal funds the sole or even the major factor contributing to the invention. The insight of the investigator, derived from his career working in a given field, is generally paramount. The university itself virtually always helps to finance the laboratories, equipment, and personnel contributing to the invention.

Our position is elaborated in recent testimony submitted to the Subcommittee on Monopoly and Anticompetitive Activities of the Senate Select Committee on Small Business, a copy of which is attached.

If you have any questions about our position, we would be pleased to discuss it with you at your convenience.

Cordially,

J. W. Peltason

western union **Telegram**

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3124923485 TDBN EVANSTON IL 108 06-21 0357P ESTPOMA
PMS HONORABLE GAYLORD NELSON

IT IS OUR UNDERSTANDING THAT ADDITIONAL HEARINGS OF YOUR SUBCOMMITTEE ON MONOPOLY WILL BE HELD ON JUNE 20 21 AND 26, 1978 AT WHICH TIME IPA HOLDERS WILL BE GIVEN THE OPPORTUNITY TO TESTIFY. ALTHOUGH NORTHWESTERN UNIVERSITY DOES NOT WISH TO TESTIFY, WE SUPPORT THE CONCEPT OF A GOVERNMENT-WIDE IPA, AS NOTICE IN THE GSA AMENDMENTS PUBLISHED IN THE FEBRUARY 2 1978 FEDERAL REGISTER, AND URGE YOUR COMMITTEE TO FAVORABLY REPORT ON ITS USE AS AN EFFECTIVE TRANSFER MECHANISM OF UNIVERSITY DEVELOPED TECHNOLOGY. THESE TYPES OF AGREEMENTS ARE ESSENTIAL IF DISCOVERIES OF UNIVERSITY PERSONNEL ARE TO BE DEVELOPED AND MADE AVAILABLE FOR THE PUBLIC'S GENERAL USE
RESPECTFULLY
DAVID MINTZER VICE PRESIDENT FOR RESEARCH AND DEAN OF SCIENCE
NORTHWESTERN UNIVERSITY

16:24 EST

MGMCOMP MGM

5048 (5-74)

STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

SPONSORED PROJECTS OFFICE
GALVEZ HOUSE

(415) 497-2883

June 16, 1978

The Honorable Gaylord Nelson
Chairman, Monopoly and Anti-Competitive
Activity Subcommittee of the
Select Committee on Small Business
United States Senate
Washington, D. C. 20510

Dear Senator Nelson:

I am writing to you to express the strong interest with which Stanford University is following the hearings of your Subcommittee and to let you know of our very real concern over the implications for universities and colleges of any recommendation you may make.

Our viewpoint and recommendations with regard to Government patent policy are essentially identical to those made by Dr. Thomas Jones, Vice President for Research, Massachussetts Institute of Technology, in his testimony on May 23. To avoid repetition I will not write further on this matter except to let you know that we strongly endorse the recommendations made by Dr. Jones and urge that you and your Subcommittee give them your favorable consideration.

Yours sincerely,

John B. Richey
Assistant Director
Sponsored Projects Office

VICE PRESIDENT FOR RESEARCH

PHONE: 307/766-5355

THE UNIVERSITY OF WYOMING
UNIVERSITY STATION, BOX 3355
LARAMIE, WYOMING 82071

June 22, 1978

Senator Gaylord Nelson
United States Senate
Senate Office Building
Washington, D. C. 20510

Dear Senator Nelson:

I have had an opportunity to review the testimony of Dr. Thomas F. Jones of M. I. T. concerning the implementation of a uniform, government-wide program of Institutional Patent Agreements. We fully support Dr. Jones' position for the principal reason he cites, "... not because of the potential financial return (which is minimal), but because of their value as effective instruments for technology transfer."

Thus, while we will be unable to testify before your Subcommittee, please record that the University of Wyoming supports the concept of a government-wide IPA and urges its favorable consideration.

Sincerely,

E. Gerald Meyer
Vice President for Research

cc: President Carlson

THE UNIVERSITY OF NEW MEXICO | ALBUQUERQUE, NEW MEXICO 87131
ASSOCIATE PROVOST FOR RESEARCH
SCHOLES HALL 235 SOUTH
TELEPHONE 505: 277-5084

June 22, 1978

Senator Gaylord Nelson, Chairman
Monopoly and Anticompetitive Activities
Subcommittee
Senate Small Business Committee
United States Senate
Washington, D.C. 20510

Dear Senator Nelson:

I understand that your Monopoly and Anticompetitive Activities Subcommittee intends to hold hearings during the latter part of June and that interested parties will be afforded an opportunity to testify before the Subcommittee regarding institutional patent agreements. Representatives of The University of New Mexico are not available to appear before your Subcommittee in this instance; however, may I take this means to advise you that I support the concept of a government-wide IPA for research-oriented institutions of higher education. Further, may I ask that your Subcommittee consider favorably the use of the IPA as an effective mechanism that will enhance the transfer of technology from university research to the users.

Sincerely,

Joseph V. Scaletti

JVS:dt
cc: Senator Pete V. Domenici
Senator Harrison H. Schmitt
Dr. William E. Davis, President, UNM

Yale University *New Haven, Connecticut 06520*

GRANT AND CONTRACT ADMINISTRATION
108 Hall of Graduate Studies

June 14, 1978

The Honorable Gaylord Nelson
221 Rayburn Senate Office Building
Washington, D. C. 20510

Dear Senator Nelson:

I understand that the Subcommittee on Monopoly and Anticompetitive Activities of the Committee on Small Business has scheduled continued hearings on government-wide institutional patent agreements. They are to be held on June 20, 21 and 26.

The purpose of this letter is to record Yale University's support for the concept of a government-wide institutional patent agreement. Such agreements represent an important component of an effective university technology transfer program. We hope that the Subcommittee hearings will document the efficiencies available through the IPA mechanism, and will endorse incorporation of the agreement in the Federal Procurement Regulations.

Sincerely,

Joseph S. Warner
Director

JSW/jdk

THE UNIVERSITY OF MICHIGAN
DIVISION OF RESEARCH DEVELOPMENT AND ADMINISTRATION
119 COOLEY MEMORIAL LABORATORY—NORTH CAMPUS
ANN ARBOR, MICHIGAN 48105
PHONE 313-764-4200

June 14, 1978

Senator Gaylord Nelson
Chairman, Subcommittee on Monopoly
and Anticompetitive Activities
Select Committee on Small Business
Russell Office Building
Washington, D. C. 20510

Dear Senator Nelson:

I would like this opportunity to make a few brief comments as to your stand concerning the rights to those patents which resulted from Federal research. Further these comments are based on over two decades of experience with patent responsibility at a major University; in addition, thereto, there has been approximately eight years of Federal service. During this period of approximately twenty-eight years, I have worked directly with some thirteen Federal patent policies.

Our experience for the last eight years conclusively proves to us that the Institutional Patent Agreement is by far the most effective and expeditious method of bringing campus technology to the public. Since 1970, we have had an Institutional Patent Agreement with the Department of Health, Education, and Welfare, and since 1974 with the National Science Foundation. At the outset, industry was slow to cooperate in such programs; the tide is now turning in favor of general acceptance. When one considers such factors as the limited period of exclusivity, plus the enormous output of funds, such general acceptance is amazing. As evidence of the support of such programs, we responded immediately to the announcement of IPA's in the Federal Register of February 2, 1978. No action was taken on any of our requests due to the action of the General Services Administration to declare a moratorium for such requests for 120 days. I assume that such action was taken in order that your Subcommittee might have more time to review and comment. After waiting so many years for a uniform Federal policy, another 120 days is of little import.

In conclusion, I would like to restate that the Institutional Patent Agreement is most equitable; it places a high risk on industry for such a limited period of exclusivity; yet, it is, while slowly but noticeably, becoming more attractive. Hence, I respectively ask you to reconsider your opposition to the Institutional Patent Agreement.

Sincerely yours,

Joseph J. Keeley

Joseph J. Keeley
Associate Director

JJK:cw

WISCONSIN ALUMNI RESEARCH FOUNDATION

POST OFFICE BOX 7365 • MADISON, WIS. 53707 • TELEPHONE (608) 263-2500

June 22, 1978

Senator Gaylord Nelson
United States Senate
The Capitol
Washington, D.C. 20510

Dear Senator Nelson:

Howard Bremer and I both very much appreciated the opportunity to speak for the Wisconsin Alumni Research Foundation at the hearing before the Monopoly and Anti-competitive Activities Subcommittee, Senate Small Business Committee on Tuesday. I hope our presentation, as well as those by Research Corporation and University Patents provided some useful insights into why we believe institutional patent agreements are so valuable in bringing the benefits of University research to the public.

With a schedule as busy as yours, we are particularly appreciative of the chance to meet with you in your office in the afternoon. I hope we were able to clarify any misunderstandings. If there is any further information that WARF can provide, please let us know.

Again, thank you for your consideration.

Sincerely,

John R. Pike

John R. Pike
Managing Director

JRP/ecs

UNIVERSITY OF MINNESOTA
TWIN CITIES

Office of the Administrator

Patents
University-Sponsored Educational Materials
332 Morrill Hall
100 Church Street S.E.
Minneapolis, Minnesota 55455
(612) 373-2092

June 12, 1978

The Honorable Senator Gaylord Nelson
221 Russell Senate Office Building
Washington, D. C. 20510

Dear Senator Nelson:

We have been informed that the Senate Small Business Subcommittee under your chairmanship has scheduled hearings for June 20 and 21, 1978 on the subject of University institutional patent agreements. This letter is written in support of the institutional patent agreement concept.

The University of Minnesota has operated under an institutional patent agreement with the Department of Health, Education and Welfare for the past twenty-five years. This agreement has greatly facilitated the availability for use by the public of health-related inventions such as heart valves, antiarrhythmic drugs, bladder stimulators and artificial glands. Such agreements make possible important and necessary relationships with manufacturers for the development of workable, medically acceptable, clinical embodiments of various inventions. The agreements enable arrangements to be made for the expenditure of large amounts of private capital (in the millions of dollars in some cases) that would not be forthcoming from either Government or from the University resources to bring an invention to the point of public use.

Carefully placed institutional patent agreements permit the management in the public interest of inventions that arise during Government-funded research. We encourage your Subcommittee to lend its support to the Government-wide adoption of this valuable patent management mechanism.

Very truly yours,

G. Willard Fornell

G. Willard Fornell
Patent Administrator

GWF:mkc

PURDUE UNIVERSITY
OFFICE OF THE VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

June 14, 1978

Senator Gaylord Nelson
Select Committee on Small Business
Subcommittee on Monopoly and
Anticompetitive Activities
Russell Senate Office Building
Washington, D.C. 20510

Dear Senator Nelson:

Although we do not wish to testify at hearings that we understand will be held June 20, 21 and 26 relative to Institutional Patent Agreements, we would urge your committee to issue a favorable report on their use as an effective technology transfer mechanism of university developed technology. The regulations contained in the February 2, 1978 Federal Register amending the Federal Procurement Regulations would serve to expedite technology transfer making the results of research available to the public much sooner than would otherwise be available. We have found such to be the case with those agencies where we now have an Institutional Patent Agreement.

Institutional Patent Agreements make it easier to attract risk capital for evaluating and developing technology developed by Universities. Without some assurance of a license agreement, which is impossible without an Institutional Patent Agreement, companies will not cooperate in the evaluation program. Furthermore, without some assurance of protection and exclusive licensing a small business cannot and will not invest its limited capital in new technology.

We support the concept of a government wide Institutional Patent Agreement because we believe such an approach will maximize technology transfer thereby benefiting the majority.

Very truly yours,

F. N. Andrews
Vice President for Research
and Dean

cc: Senator Birch Bayh
Senator Richard G. Lugar

Graduate House East
Suite 160
West Lafayette, Indiana 47907

UNIVERSITY OF VIRGINIA
CHARLOTTESVILLE
22903

ASSOCIATE PROVOST FOR RESEARCH
MADISON HALL
(804) 924-3606

16 June 1978

Senator Gaylord Nelson
Chairman
U. S. Senate Monopoly and Anticompetitive
Activities Subcommittee of the
Select Committee on Small Business
Washington, D. C. 20510

Dear Senator Nelson:

I understand that the Subcommittee will hold hearings on June 21, 22, 23 and 26 on the subject of government-wide Institutional Patent Agreements. The University of Virginia will not be able to be represented at these hearings but would like to be on record as supporting the concept of government-wide IPA's and urges your Subcommittee to support the use of IPA's as an effective transfer mechanism for university-developed technology. We hope that the regulations for government-wide IPA's of the GSA will be implemented.

The University of Virginia has developed an assertive program in the last five years to manage inventions by our faculty and staff. So far some 83 inventions have been disclosed, 35 patents have issued and 12 licenses have been negotiated. Royalty income, which has been modest to date, has supported additional research within the University and the administration of the patents program.

Equally important and greater in dollars is the research support ($280,000 last year) which we have received from industries with potential interests in the technology which might result. I emphasize that the research originates with our faculty and traditional academic rights, such as the right to publish, are maintained. Without the IPA we would be hardpressed to develop either this source of research support or royalty income because of the uncertainty about assignment of rights by the Federal government and the accompanying uncertainty of industry about its future commercial position; our ability to help transform for use by the public the products of our research would be greatly reduced.

I hope that this information will be helpful for your Subcommittee's investigation.

Sincerely yours,

Dennis W. Barnes
Associate Provost for Research

cc: Mr. Carl B. Wootten
Executive Director
University of Virginia Alumni
Patents Foundation

Dean of Research Oregon State University Corvallis, Oregon 97331 (503) 754-3437

May 22, 1978

The Honorable Senator Gaylord Nelson
Chairman, Select Committee on Small Business
Room 424 Russell Building
Washington, D.C. 20510

Dear Senator Nelson:

As patent manager for Oregon State University I wish to submit this letter for your consideration in connection with the May 22 and 23 hearings of the Select Committee on Small Business regarding patent policy of the executive department on research grants and contracts. I should state at the outset that although I have had 23 years of administrative experience at universities, I have only been involved in the Oregon State University technology transfer program the past five years. Further, my experience has dealt with domestically significant inventions rather than those of primary interest to the military.

I understand you have requested that the Office of Management and Budget delay implementation of federal procurement regulations that would permit universities to retain possession and control of their discoveries that are financed in part or wholly by federal funds and hence be encouraged to license these discoveries to private industry. Upon query of Senator Packwood's office, I understand your concerns about the proposed changes lie in a) the possibility of increasing economic concentration among a few industries, b) the withholding of new knowledge from society and c) the establishment of an excessive give-away government activity.

We are supportive of the proposed changes in federal procurement regulations. In apposition to your stated concerns, we would place those concerns of the many people who over many years developed the proposed changes in the federal regulations. From my own experiences and from comments and writings of others[1,2] these might be stated as follows:

a) the patent system makes important essential contributions to our economic well-being, and most inventions arise from research and development activities which the American people have gradually chosen to support largely through tax-supported federal programs (federal share 55%; industry share 42%, other 3%),

b) present restrictions in extended rights policy in federal grants and contracts present unbearable risks in the costly development and marketing of many new technologies so that both regional and national companies avoid the majority of promising new technologies because of insufficient prospective returns and

c) present policies restrict the flow of new technologies into commerce from successful university technology transfer programs that cooperatively develop new technologies with newly formed small businesses, small regional companies as well as large corporations.

A few examples will be cited as evidence that even our small Oregon State University technology transfer program has been effective. We have recently negotiated three license agreements with small Oregon companies (one a new local microbiological laboratory) involving 1) a special digital readout device for use in teaching, 2) a new ornamental pear variety and 3) a totally new biological material for the control of Crown Gall disease of nursery plants. The Crown Gall disease caused over $1 million in losses to Oregon nurseries in 1968-1969 so the importance of this new technology to the state and region is self-evident. All of these new technologies arose from state-supported research so we were able to provide exclusive licenses for periods of time appropriate to the development needs of each technology.

We have had one important new technology that was killed by federal bureaucratic apathy in patent counsel staffs of two departments (U.S. Department of Commerce and the U.S. Department of the Interior) that had participated in support of the research over several years in cooperation with the State of Oregon. Even though the combined federal support of the research was less than that contributed by the State of Oregon, the federal policies were invoked and the new technology was not developed and marketed. The new technology was an attenuated strain of the Infectious Hematopoietic Necrosis Virus (IHVN) that causes devastating losses to hatchery fingerlings of salmonid fishes. As you know, salmon growing in hatcheries for release into Pacific Northwest streams and for use in aquaculture is big business. Vaccination of young fish in the hatchery can be readily accomplished before release. As in the case of poliomyelitis in humans, a killed virus vaccine (Salk type of

polio vaccine) is effective but less so than an attenuated virus vaccine (Sabin type of polio vaccine). In case of IHNV of salmon the killed virus protects 75-80% of the fishes but attenuated IHNV gives 95-100% protection. A relatively new veterinary biological company was willing to produce the attenuated virus and place it on the market. However, they would have to invest an estimated $700,000 to produce the live vaccine. They estimated they would have to have an exclusive license for six years after first sales of vaccine to recover costs. At the same time we had a new technology which improved the method of delivering the live attenuated virus that arose in the same cooperative federal-state supported research program. The new method would have reduced the hazard of introducing the live attenuated virus into natural streams. Extended rights on both technologies were necessary to the development of the attentuated IHNV for market. Our requests for extended rights, though adequately argued and documented, were both denied by the two departments even though they knew we had a reputable company poised with a suitable license agreements to assure development. As a consequence, the attenuated form of this virus is not being developed; they are using the killed virus which is much less costly to produce, and the emerging field of fish health has received a major set back at a time of increased interest in salmon fishes for human food.

We are having difficulty generating interest of companies in new technologies that have developed in research supported by federal sources. Recently, a major Pacific Northwest corporation refused to consider an improvement in firing method of furnaces using wood fuels because of the restrictive policies of the U.S. Department of Energy, the source of support for the research in which the new method arose.

As a cumulative result of these experiences we are strongly supportive of the proposed changes in federal procurement regulations that would ease the transfer of new technologies from federally supported research. In our program we can find no evidence to support your concerns that the proposed changes would restrict flow of information to the public or provide a "give-away" to large corporations. In our experience, the exact opposite is true; namely, that present policies significantly restrict technology flow to small as well as large companies of primarily state or regional significance as well as large corporations with international activities. Because of the magnitude and diversity of government research support present policies have a dampening effect on operation of the patent system in the U.S. which has long been recognized by some of our wisest of men[1] as important to the strength of the American economy.

Yours sincerely,

J. Ralph Shay

J. Ralph Shay
Assistant Dean of Research

JRS:SLN

References:

1. Lincoln, Abraham. 1859. Second Lecture on Inventions and Discoveries. Speech delivered before the Phi Alpha Society of Illinois College at Jacksonville, Ill., Feb. 11. In: Basler, Ray P. 1953. The Collected Works of Abraham Lincoln. III: 356-363. Rutgers University Press, New Brunswick, New Jersey.

2. Testimony of Norman J. Latker, Betsy Ancher-Johnson, and others in "Government Patent Policy" hearings before the Subcommittee on Domestic and International Scientific Planning and Analysis of the Committee on Science and Technology, U.S. House of Representatives, 94th Congress, Sept. 27-October. 1, 1976.

Dean of Research

Oregon State University

Corvallis, Oregon 97331 (503) 754-3437

July 21, 1978

Dr. Joshua Lederberg
Rockefeller University
York Avenue at 66th Street
New York, New York 10021

Dear Dr. Lederberg:

I read with interest the comments in Nature 274, July 6, 1978, wherein you had proposed to Senator Gaylord Nelson a Research Corporation type federal organization for patents arising from government type research.

The arguments I find against your suggestion include:

1. Research Corporation now serves very well in this capacity. Patents with large potential income and extensive licensing potential often flow to them both from federally-supported and non-federally-supported research.

2. A federal corporation as you propose would likely not be interested in pushing inventions with low potential income or those of primarily state or regional interest.

3. The university technology transfer programs are serving state and regional needs very well; many new small companies are often originated and frequently aided by new technologies arising in university research. Often the new technologies are not patentable, or it is not necessary to patent. Currently government patent lawyers proceed to file on these technologies despite the lack of need for successful commercialization. There is no reason to expect them to do differently in the organization you propose.

4. The last thing we need is another government corporation with all the red tape involved and lack of sensitivity to small business and regional needs especially in a field so important to state and regional economic development as the current university technology transfer programs.

I have been delighted with the liberalization of federal rights to patents extended to universities and others by the proposed changes originally announced in the Federal Register, vol. 43, no. 23, Thursday, February 2, 1978, pages 4424-4427 and which went into effect July 18, 1978. I think those proposals if allowed to stand will make a significant contribution to our economic system and, over the longer term, to our balance of payments.

Yours sincerely,

Ralph Shay

J. Ralph Shay
Assistant Dean of Research

JRS:SLN

Copies to: Senator Gaylord Nelson ✓
Senator Bob Packwood
Mr. Bob Witeck

THOMAS F. JONES
VICE PRESIDENT FOR RESEARCH

CAMBRIDGE, MASSACHUSETTS 02139
(617) 253-5914

June 28, 1978

The Honorable Gaylord Nelson
Chairman, Subcommittee on Monopoly
and Anticompetitive Activities
Senate Select Committee on Small Business
221 Russell Senate Office Building
Washington, D.C. 20510

Dear Senator Nelson:

You will recall that in the testimony which I presented to your committee on May 23 I pointed out how the public is served by the transfer of new technology to the marketplace, and how this is facilitated by university management of patents.

The purpose of this letter is to bring to your attention an example of the Government benefiting to the extent of millions of dollars under present patent policies.

In my testimony I mentioned Dr. Jay Forrester's invention of the magnetic core memory which played such a crucial part in the computer technology of the 50's and 60's. I indicated that this invention gave American computers a startling lead over the rest of the world.

I have since found an additional part of the story which I felt you should know.

The magnetic core memory is a significant example of benefits to the Government by way of provisions which are a part of current policies: a royalty-free license to the Government along with incentives to the institution at which the invention

occurred. Dr. Forrester had submitted a professional journal paper before any work was done in industry in this area. However, the organization managing Massachusetts Institute of Technology's patents at that time thought there was little economic future in the then-infant computer field. Delays resulted, and a patent application was filed by an industrial organization before the Forrester patent application. The ensuing legal complexities led to years of litigation before one cent was realized by M.I.T. Had M.I.T. not persevered in this litigation, the Government, which did not have a license under the industrial application and has used billions of bits of computer memory, would undoubtedly have paid many millions of dollars in royalties. At no expense to the Government, but at substantial expense to M.I.T., the Forrester patent was upheld and the Government received the full benefit of a royalty-free license.

Had M.I.T. been unable to retain commercial rights, there would, of course, have been no motivation to enter the litigation which resulted in saving the Government millions of dollars -- more than the cost of the entire computer development project out of which the magnetic core memory was born!

Sincerely yours,

Thomas F. Jones
Vice President for Research

TFJ:g

UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

OFFICE OF THE PRESIDENT

GLEN L. TAGGART
PRESIDENT

June 22, 1978

Senator Gaylord Nelson, Chairman
Subcommittee on Monopoly and
Anticompetitive Activities
221 Russell Senate Office Building
Washington, D. C. 20510

Dear Senator Nelson:

I understand that Institutional Patent Agreement holders will be given an opportunity to testify before your subcommittee on June 20, 21, and 26. Utah State University does not wish to testify, however, we support the concept of a government-wide IPA, and we urge your subcommittee to favorably report on its use as an effective transfer mechanism of university developed technology.

Sincerely yours,

Glen L. Taggart
President

GLT/bb

cc: Senator Jake Garn
Senator Orrin Hatch

THE UNIVERSITY OF UTAH

VICE PRESIDENT
FOR RESEARCH
304 PARK BUILDING
SALT LAKE CITY, UTAH 84112
801-581-7236

26 June 1978

Refer to: 78-307

The Honorable Gaylord Nelson
United States Senator
221 Russell Bldg.
Washington, D.C. 20510

Dear Senator Nelson:

I have been informed that you are holding hearings regarding Institutional Patent Agreements and that universities have been given an opportunity to testify.

Though the University of Utah has not requested permission to testify in your hearings, we support the concept of government-wide institutional patent agreements and urge your committee to favorably report on their use as an effective method of transferring technology from the university to the private sector.

I have read the comments on the desirability of institutional patent agreements for universities submitted before your committee by Dr. Thomas F. Jones, Vice President for Research at the Massachusetts Institute of Technology, and wholeheartedly support his position.

Sincerely yours,

William S. Partridge
Vice President for Research
University of Utah

WSP:m

Reprinted from *Commerce America*, Vol 2, No. 6.
U.S. Department of Commerce

Government Research Spurs Private Profits

A recent $20,000 royalty check received from the drug firm of Merck & Company for a new hepatitis vaccine was the first major payoff of a new Commerce Department technology transfer program. The vaccine was developed by Nobel laureate Baruch Blumberg while performing research for the National Institutes of Health (NIH).

With this new program, Commerce's National Technical Information Service (NTIS) is trying to introduce government inventions with commercial applications to the marketplace as part of the agency's role of promoting use of all unclassified technical material generated by government funds.

NTIS Director William T. Knox says "We don't generate technology, but we try to see that it gets used. Essentially, in our technology transfer program, we're trying to move inventions from the government laboratory into the private sector for commercial use."

Unlike every other government agency, NTIS has to support itself through its own efforts and without any federal appropriation. Thus, it can't afford to wait indefinitely for a new program to pay its own way. "I expect this program to be fully self-supporting five years from now," says Knox.

Actually, it's not a very large program—about $500,000 annually—half of which goes into getting foreign patent protection. But it still must support itself.

This particular program got under way at the request of other federal agencies who sought assistance in promoting the use of their inventions. This led to the decision to make use of a long-ignored Executive Order empowering the Secretary of Commerce to receive custody of foreign rights to inventions that other federal agencies did not seek to protect abroad. This provision had rarely been invoked, and consequently the foreign rights to much government-generated research had not been protected. Thus, much of the commercial potential that these inventions represented was being left undeveloped, or was being exploited by foreign firms without any benefit to the U.S.

"Our first task was to demonstrate that these inventions had commercial appeal," says NTIS Deputy Director Peter F. Urbach. "It was an open question at the time, and there was a lot of skepticism, even within our own agency. We let some contracts to disinterested outside firms, under which they evaluated a wide range of government patents and picked out the ones that seemed to have the most commercial potential. They prepared promotional brochures and mailed them to selected private organizations. The strong response told us that the interest certainly was there.

Federal policy on royalties varies from agency to agency.

"That led to a weekly newsletter—*Government Inventions for Licensing*—which lists all new government inventions, new patents and newly-filed patent applications, with a notation to indicate which ones are believed to have the greatest commercial potential. The weekly newsletter lists the 2,500 new government inventions produced each year. It now has several hundred paid subscribers.

"Next we contacted other federal agencies about transferring the foreign patent rights to their inventions to NTIS. We've already made agreements along those lines with the National Bureau of Standards and Departments of Interior, Agriculture and HEW. Negotiations are currently under way with several other agencies, including the Defense agencies who are responsible for the majority of the inventions developed each year by federal researchers.

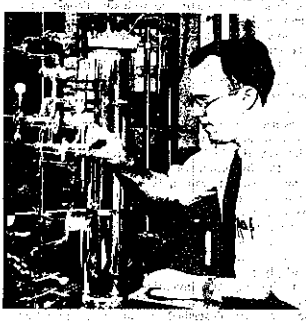
"By obtaining foreign patent protection on government inventions, NTIS and the originating agency are able to offer U.S. businessmen world rights to new government technology instead of just a U.S. license. Where no U.S. firm is interested in exploiting the technology and foreign firms are interested, the U.S. Government receives a royalty from the foreign user instead of having the government technology used abroad with no return to the U.S."

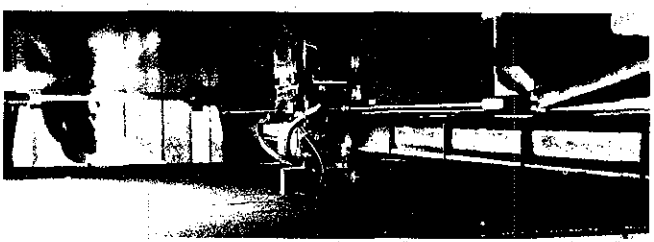
NTIS technology transfer specialist George Kudravetz has begun sounding out the directors of federal research labs and asking them directly if they have any "hot" new technology that might have commercial applications. "We're finding a surprising amount of material, varying from automated wheelchairs to an anti-fouling paint for ship bottoms," says Kudravetz.

"That paint and the hepatitis vaccine are our outstanding success stories to date. The Navy, which had developed the paint, was very helpful in promoting it through a seminar at the Naval Ship R&D Center in Annapolis," he says. The invention had previously been described in an article written by the Navy inventors in a technical journal. The journal article however did not lead to any industry interest. It took the NTIS-Navy seminar and extensive NTIS promotion to bring the new development to the attention of U.S. industry. As a result of these NTIS efforts, some 16 U.S. firms have now been licensed domestically to produce it. Since the Navy charges no royalties on technology it develops, these firms have all gotten royalty-free licenses.

Federal policy on royalties varies from agency to agency. The license on the NIH invention, Dr. Blumberg's hepatitis vaccine, for example, had a small royalty involved.

Other promising inventions that NTIS is cur-





The laser, a glamor technological development of the space age, is the heart of a commercial fabric cutter described as the first major advance in apparel manufacturing since the invention of the sewing machine.

rently seeking to license include an improved artificial lung membrane from NIH, a self-calibrating electro-chemical chlorine monitor developed by the National Bureau of Standards and an ultra-high absorbent polymer derived from flour developed by the Department of Agriculture.

These inventions are all first announced in *Government Inventions for Licensing*. Initially they are all available for licensing on a non-exclusive basis, which means that any number of firms can make use of them. In cases such as the Navy's anti-fouling paint, where little further development work is required to come up with a marketable product, and where several firms are interested, the invention is licensed to all interested firms on a non-exclusive basis.

But in cases involving extensive further development work and expenditure of funds before coming up with a finished product, and where there is a risk that these funds may not be recovered by the sale of the product, firms are understandably reluctant to undertake the risks until assured they will reap the full reward for their efforts.

Accordingly, once an invention has been made available on a non-exclusive basis for six months and no takers have been found, it can then be made available to a single firm on an exclusive basis for five years only. "But first we must prove no one's interested in it on a non-exclusive basis," says Knox.

The firm interested in an exclusive license on a government invention must submit an application which includes a description of how the invention will be exploited and what resources the firm will use to bring the invention to market. After six months, if no one is interested in a non-exclusive license, NTIS can consider granting an exclusive license.

If several firms are interested in an exclusive license and none is willing to accept a non-exclusive license, the individual plans for the exploitation of the invention will serve as the basis for deciding which applicant gets the exclusive license.

Announcement of a new invention available for licensing in the weekly NTIS Bulletin is generally not sufficient to trigger industry interest in the invention. Additional announcements and promotion efforts are made on those inventions that appear particularly promising.

Approximately 200 inventions per year are selected as having the greatest commercial potential. These are then described in one page bulletins known as *Selected Technology for Licensing*. In addition to announcing the invention, the bulletins attempt to provide some insight into the commercial potential for the invention and possible areas of application.

The *Selected Technology for Licensing* bulletins are distributed through a new NTIS subscription service, *Tech Notes* (see back cover), which announces much of the government's new technology —patented and unpatented. In addition to being made available on a subscription basis, *Selected Technology for Licensing* is also distributed to nearly 100 trade publications which republish the bulletin to make their readers aware of the latest available government technology.

Finally, where the licensing potential of the invention warrants it, NTIS directly contacts prospective licensees, making them aware of the availability of the new technology and seeking to interest them in licensing the inventions.

"We've also broken completely new ground in rewarding government-employee inventors for their contributions and for their help in transferring their new technology to private users. Prior to this, it was customary for agencies to give the foreign rights on federal employee inventions to the inventors themselves as a reward.

"In actual fact, the inventors were usually in no position to do anything with those rights. For the most part they were civil servants living from payday to payday, without the slightest prospect of being able to raise the $3,000-$5,000 it takes to protect an invention for the first couple of years in the dozen-or-so countries with the markets to take advantage of it.

"The inventors also were in no position to find the licensees who could convert their inventions into commercially-viable products. These inventions don't attract licensees the way flypaper attracts flies. Just because you build a better mousetrap, the world doesn't necessarily beat a path to your door," according to Knox.

"Under the technology transfer program, NTIS bears the foreign filing costs for what we believe are the commercially-attractive inventions. We also actively seek out the licensees. Then once the new technology is licensed, we reward the inventor with a share of some of the royalties. The maximum award is 15 percent of the royalties, and the minimum is $300.

"We're hoping that this Incentive Awards Program, plus the knowledge that their inventions are now more likely to be used in the commercial marketplace rather than sitting on the shelf, will spur federal researchers into producing and reporting more and better inventions."

NTN-77/0714

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Antifouling Compound for Underwater Protection

Organotin polymer has a slow release rate that extends antifouling life.

Barnacles and other marine growth are effectively inhibited by a new long-lasting antifouling coating developed by the U.S. Navy. One application of the polymer, formed from organotin compounds and a vinyl resin, can keep ship hulls and other submerged objects growth-free for up to 5 years (see figure). This extended life is possible because the new formulations are less subject to leaching by seawater.

The polymers can be applied as coatings or transparent films, as a syrup for impregnating wood, or as an integral part of ferrocement or concrete structures. The controlled and reduced leaching rate reduces pollution.

The specific formulation can be tailored for desired applications, but a typical coating is made from a hydroxide of tributyl tin that is incorporated into an acrylic polymer by esterification. Other polymers and other organotins (or mixtures thereof) can be used. Coatings of all of these formulations exhibit a reduced leaching rate because the tin is chemically bound within the coating.

You can find out more about this Government-owned technology and licensing conditions by requesting support package NTIS-IP-74-02 It includes the complete patent application, four related technical reports, cassettes of an oral presentation, and glossy photographs demonstrating the lack of barnacle growth on long-submerged test plates. This package is available from NTIS for $125. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

This **Test Panel** accumulated barnacles on the unprotected (top) portion but not on the area coated with organotin polymer.

NTN CATEGORY A B C D E F G (H) I J K

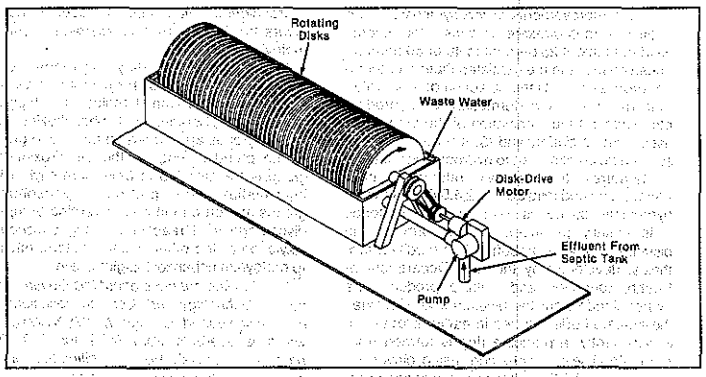
NTN-77/ 0999

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Evaporating Waste Water

Rotating disks dispose of septic tank effluent regardless of climate, soil, or terrain.



Spinning Disks expose film of waste water to air to speed evaporation. Disk apparatus is more effective than an evaporation bed and requires far less area.

In many locations, septic tanks do not work well. Either the soil contains too much clay to allow waste water to seep through it or the ground surface slopes too steeply. In either case, offensive and unhealthy waste water collects on the surface.

Now, researchers at the U.S. Environmental Protection Agency have developed a compact effective apparatus for disposing waste water in such problem areas. The apparatus employs rotating disks partly immersed in a trough of waste water (see figure). As each disk turns, it carries with it a film of waste water into the air, where the film can evaporate.

The disk diameter ranges from 2 to 10 feet (0.6 to 3 meters), depending on the septic tank capacity. The disks rotate at 0.01 to 2.0 revolutions per minute, depending on such factors as the humidity and the volume of waste water. Water is pumped into the evaporation trough from an equalization tank, which receives the runoff from a septic tank.

You can find out more about this Government-owned technology and licensing conditions by requesting support package NTN/SP-77/0999 which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NTN CATEGORY A B C D E F G H I J K

NTN-77/ 1000

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Improved Production of Antifolate

New procedures in synthesis of methotrexate increase its output.

Three improvements in the synthesis of the antifolate methotrexate increase the overall yield from about 25 percent to 40 or 50 percent. These changes in the multistep Piper-Montgomery process are: (1) the selection of a pH value that minimizes the formation of byproduct pteridines, (2) the elimination of the previously-used acetate buffer, and (3) the conversion of sulfite acid addition salt to hydrochloride salt.

Methotrexate is closely related to both aminopterin and folic acid. A 2,4,5,6-tetraamino-pyrimidine sulfite is one starting material; it is usually produced in the form of the bisulfite in an acetate buffer. The modified synthesis, developed by the U.S. Department of Health, Education, and Welfare, produces the hydrochloride from the bisulfite and eliminates the acetate buffer utilized in earlier processes. Subsequently, a pteridine ring is formed from the pyrimidine hydrochloride, using dihydroxy-acetone at pH 5.5 ± 0.2 to form the second ring. This strict pH control, together with the use of hydrochloride salt minus the acetate buffer, favors the formation of 2,4-diamino-6-hydroxy-methylpteridine.

Subsequently the 6-hydroxymethyl compound is converted to the hydrobromide acid salt and reacted with 3 moles of a triphenyl dibromophosphorane, and phosphazine protecting groups are formed on the amine groups of the pteridine ring as the 6-hydroxymethyl group is transformed to 6-bromomethyl, a key intermediate. The protecting phosphazine groups are left on the primary amino groups to discourage side reactions during subsequent alkylation of the other major reactant, ethyl N-(p-methylaminobenzoyl)-L-glutamate.

You can find out more about this Government-owned technology and licensing conditions by requesting support package NTN/SP-77/1000 which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NTN CATEGORY A B C D E F G H I J K

NTN-77/ 1001

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

More Protein From Safflower Seeds

New extraction process yields more protein of higher quality for food additives.

After the oil has been pressed out of safflower seeds, there is still a lot of protein left in them. A new process developed at the U.S. Department of Agriculture extracts such protein in greater concentrations (96 percent versus 90 percent with previous methods) and with less fat, fiber, and ash.

Additional oil is first extracted from the pressed safflower seeds by treating them with hexane. The seeds are then dried and treated with an alkalizer to create a juice containing soluble protein and with an acid to precipitate the protein. The new process differs from previous processes in that low solvent and drying temperatures are used, and a less-acid precipitation is employed (pH = 6 instead of 4 to 5).

As a result, the extracted protein is more suitable for human consumption: it is more concentrated, contains a greater variety of amino acids, and is cleaner. Moreover, the extract is more soluble in an acidic medium such as fruit juice, foams more in batters and whipped toppings, and has superior baking properties.

You can find out more about this Government-owned technology and licensing conditions by requesting support package which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NTN CATEGORY A B C D E F G H I J K

32-635 O - 78 - 22

NTN-77/ 1002

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Batch-Peeling Fruits and Vegetables

Carboxylic acid solutions help to remove skin without wasting flesh in food-processing plants.

Carboxylic acids in water loosen the skins of pears, grapefruit segments, tomatoes, potatoes, carrots, and many other fruits and vegetables so that the skins can be removed quickly and completely by mechanical methods. The carboxylic acids (such as acetic, lauric, or oleic acid) hardly attack the flesh of fruits and vegetables under the skin; waste is therefore kept low, and an attractive appearance is maintained.

In tests on tomatoes, peeling loss with carboxylic acid was only 4.8 percent by weight, whereas 12 percent was lost with lye treatment — the usual commercial method for removing peels. The tomatoes that had been treated with carboxylic acid were a uniform deep red after the loose skin was removed by a rubber-disk peeler, but the lye-treated tomatoes were marred by white vascular tissue, which had been exposed because flesh had been eaten away.

Advantages of Carboxylic-Acid Treatment Over Lye Treatment
• Less Weight Loss • Better Appearance • Low Temperatures • Simple Waste Disposal

Unlike lye, carboxylic acid presents minimal disposal problems. In fact, waste from the carboxylic-acid treatment can be dried and used directly as animal feed or fertilizer. The carboxylic-acid technique was developed by researchers at the U.S. Department of Agriculture.

You can find out more about this Government-owned technology and licensing conditions by requesting support package which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NTN CATEGORY A B C D E F G H I J K

NTN-77/ 1003

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Encapsulating Chemical/Biological Materials

Agents can be encapsulated for controlled release by converting a soluble matrix to an insoluble one.

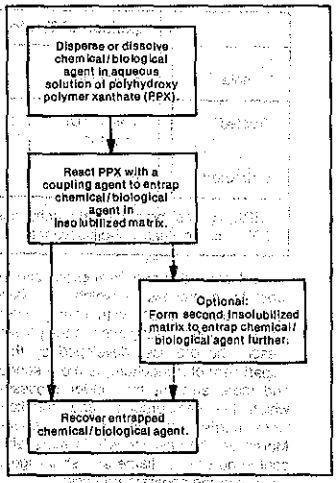
Chemical and biological agents can be encapsulated by a new entrapment process developed at the U.S. Department of Agriculture. In this process the active agent is dissolved in a starch solution, and then the starch is made insoluble by the addition of another compound. The agent thus becomes surrounded by an insoluble matrix (see flow diagram in figure). The compound that makes the starch insoluble can be any one of many oxidative, polyvalent-metal-ion, or difunctional coupling agents.

If the matrix and subsequent processing are properly chosen, the encapsulation shields the agent against hostile environments, makes it safer to handle, and releases it to the surrounding medium at virtually any rate desired. Encapsulation prevents highly volatile agents from evaporating and protects agents against decomposition from exposure to ultraviolet light.

Agents encapsulated by the entrapment process can be used in gardens and fields to release pesticides, to attract ants, and as repellants, plant-growth regulators, and fertilizers; or they can be used to release odors and flavors in dried foods when they are reconstituted.

You can find out more about this Government-owned technology and licensing conditions by requesting support package NTN/SP-77/1003 which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161



Process for Encapsulation consists basically of three steps, or four steps if extra encapsulation is needed for protection or extra-slow release.

NTN CATEGORY A B C D E F G H I J K

NTN-77/ 1004

NTIS National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

Selected Technology for Licensing

Flameproof, Shrinkproof Wool

Properties of wool fibers are improved in a single chemical process.

Comparison of Treated and Untreated Wool After Laundering

Sample	Reactants	Area Shrinkage	Afterflame	Char Length
Treated	TBPA, TDI, m-cresol	0	0.9 s	3.6 in.
Untreated	None	43%	26.7 s	Totally burned

TBPA = Tetrabromophthalic anhydride
TDI = Tolylene 2,4-diisocyanate

Wool can be made flameproof and shrinkproof by a process in which the fibers are reacted simultaneously with a halogenated acid anhydride and an isocyanate in the presence of cresol. The process, developed by the U.S. Department of Agriculture, is more economical and more efficient than older processes, in which the flameproofing and shrinkproofing were carried out in separate operations. Moreover, the new process is more effective, conferring greater flame and shrinkage resistance than the separate processes.

The new treatment can be used on wool in virtually any form — fiber, thread, yarn, slivers, rovings, knitted or woven goods, and felts. The wool may be white or dyed. It may be pure or combined with other textile fibers, such as cotton, regenerated cellulose, or animal hair. The process reagents actually combine chemically with the wool, and therefore the flameproof and shrinkproof properties endure through many washings and drycleanings (see table).

You can find out more about this Government-owned technology and licensing conditions by requesting support package NTN/SP-77/1004 which is available from NTIS for $10. Prepayment is required. Requests citing the support package number should be directed to:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NTN CATEGORY A B C D E F G H I J K

[3110-01]

DISSEMINATION OF TECHNICAL INFORMATION

Request for Comment

AGENCY: Office of Management and Budget.

ACTION: Request for public comment.

SUMMARY: The Office of Management and Budget is seeking public comments on a proposed Federal policy regarding the dissemination of scientific and technical information which results from Federal funds. The proposed policy would: (1) Establish that scientific and technical information which results from Federal funds shall, to the extent possible, be made available to the public, (2) require agencies to select that method for disseminating scientific and technical information which is in the best interests of both the agency and the Government; (3) require, with certain exceptions, that scientific and technical information be made available on a

full-cost recovery basis; and (4) require the National Technical Information Service, Department of Commerce, to maintain a central index of scientific and technical information which is available from the Federal Government.

DATE: Comments should be received by August 18, 1978.

ADDRESS: Comments should be submitted to the Office of Management and Budget, Information Systems Policy Division, Washington, D.C. 20503.

FOR FURTHER INFORMATION CONTACT:

Kenneth B. Allen, Information Systems Policy Division, Office of Management and Budget, Washington, D.C. 20503, 202-395-3785.

SUPPLEMENTRY INFORMATION: Proposed Policy (insert policy).

VELMA N. BALDWIN,
Assistant to the Director for Administration.

[Bulletin No. 78—Draft June 30, 1978]

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: DISSEMINATION OF TECHNICAL INFORMATION

1. *Background.* Each year Federal agencies spend a significant amount of resources to support and undertake research and development programs. Through its involvement in these activities, the Federal Government acquires a large volume of technical information, much of which could be used to support activities in the public and private sectors beyond the immediate mission of the sponsoring Federal agency. Currently, no single organization is responsible for coordinating the dissemination of technical information published by or for the Federal Government. As a result, individuals and organizations who are interested in finding out what technical information is available from the Federal Government must contact a number of different sources.

Many Federal agencies utilize the National Technical Information Service (NTIS) of the Department of Commerce, which is a clearinghouse for the collection and dissemination of scientific, technical and engineering information (see 15 U.S.C. 1151-1157). Pursuant to this statute, NTIS has an ongoing program to make copies of reports available to the public, publish indexes and announcements on available reports and maintain a publicly accessible computerized bibliographic file covering reports and other documents prepared or sponsored by many different Federal departments and agencies. NTIS has cooperative agreements with hundreds of government organizations to make their technical information available to the public and normally does so at little or no cost to the contributing agency. Income from the sale of technical information products and services is used to support the NTIS operation.

2. *Purpose.* The purpose of this Bulletin is to establish Federal policies for disseminating technical information which results from federally funded research and development activities and to prescribe executive department and agency responsibilities for disseminating such information.

3. *Scope.* The policies and responsibilities established by this bulletin apply to all technical information which results from federally funded research and development activities and which would be required to be disclosed under the Freedom of Information Act (5 U.S.C. 552). The policies and responsibilities established by this bulletin are applicable to all technical information, as defined in paragraph 4.

4. *Definition.* For the purposes of this bulletin, "technical information" is defined as all technical, scientific, business and industrial information which results from federally funded research and development activities sponsored or supported by an executive department, agency or establishment; which may be of some direct or indirect benefit to the private sector and which is subject to public disclosure in accordance with paragraph 3 of this bulletin. Typically, such information will be in the form of interim or final reports.

This definition does not include administrative and budgetary information; legal briefs, correspondence; public notices; internal agency operating procedures; agency memoranda or records; patents and trademarks; nautical/aeronautical charts; and similar information.

5. *Policy.* It is the policy of the U.S. Government that all technical information which results from federally funded research and development shall be made publicly available, consistent with the need to protect individual privacy, national security and proprietary interests. More specifically the following policies are hereby established:

Each department and agency shall determine the appropriate method for disseminating the technical reports and studies it prepares or sponsors.

The National Technical Information Service, Department of Commerce, shall maintain a file of all federally funded technical information which is available from executive departments and agencies or other sources.

All technical information which is made available by the Federal Government shall be priced to recover the full costs of printing, publicizing and disseminating such information, unless otherwise required by statute or demonstrated not to be in the national interests.

Consistent with the provisions of OMB Circular No. A-76, the Federal Government shall rely upon the private enterprise system to publish and disseminate technical information, except where it is in the national interest to do otherwise.

6. *Agency Responsibilities.* Each executive department and agency shall take appropriate steps to insure that technical information which results from research and development activities it undertakes or sponsors is made available to business and industry, other agencies of the Federal Government, State and local government, universities and research centers, and the general public. In carrying out this responsibility, agencies are encouraged to use the facilities of the National Technical Information Service (NTIS) of the Department of Commerce for the purpose of printing, publicizing and disseminating technical reports. Each department and agency shall:

a. Select that method of disseminating technical information which is in the best interest of both the agency and the Federal Government. Decisions regarding the appropriate method shall, unless otherwise required by law, be made on the basis of mission need, cost and Federal policy.

b. Evaluate its existing methods of disseminating technical information to assure that they are in the best interests of the agency and the Government. The criteria to be used for such evaluations shall be the same as that identified in 6(a) above.

c. Submit a bibliographic description of each technical report it prepares or sponsors to the NTIS and identify where and how each report can be obtained.

d. Issue such regulations and procedures as are necessary to carry out these responsibilities.

7. *National Technical Information Service Responsibilities.* The NTIS of the Department of Commerce shall:

a. Maintain and make public an index of all technical reports available from the Federal Government. This index should, at a minimum, briefly describe the contents of each report and identify where and how it can be obtained.

b. Publish and make available to the public each technical report which it receives from Federal departments and agencies.

c. Make technical reports available on a full cost recovery basis.

d. Annually publish in the FEDERAL REGISTER the cost allocation formula used to set prices on documents available through the NTIS.

e. Issue such guidance as is necessary to carry out these responsibilities.

f. Comply with the printing and binding regulations of the Joint Committee on Printing, U.S. Congress.

8. *Effective Date.* The requirements set forth in this bulletin are effective 90 days from the date issued.

9. *Further Information.* For further information on the policies and responsibilities outlined in this Bulletin, please contact the Information Systems Policy Division, Office of Management and Budget, Washington, D.C. 20503, 202-395-3785.

JAMES T. MCINTYRE, JR.,
Director.

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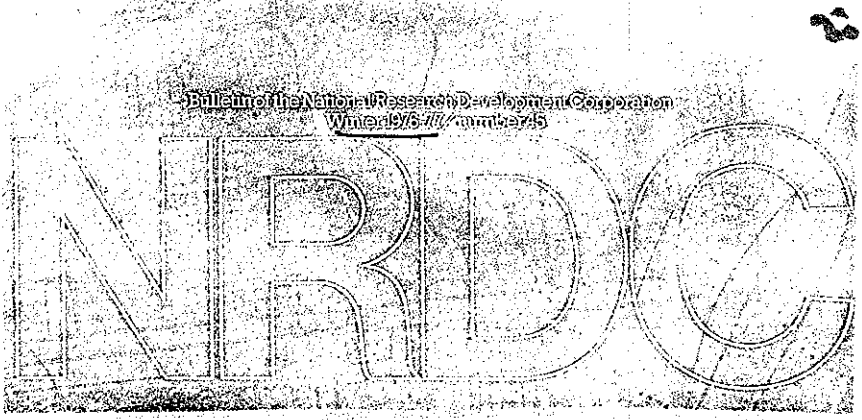
Bulletin


Bulletin of the National Research Development Corporation
Winter 1976 /// number 45
NRDC

The changing patent systems in Europe

by R S Crespi, BSc, CPA,
Patents Controller, NRDC

In considering the proposals for the reform of UK patent law, deriving initially from the Banks Committee Report in 1970, which were adopted in part and developed in the Government Green Paper in 1975, we can see an intention to harmonise with the strong currents flowing elsewhere in Europe for the fashioning of a common system of patent law and practice. These currents began as early as 1960 and are now approaching the point at which they will flow out into the open sea on which inventors of the future will voyage. The British inventor will consequently find some changes when operating within the confines of his own future national patent law and on the wider front envisaged in the European system, but none which that most adaptable species cannot readily adjust to.

'Anyone critical of fundamental features of the old patent law will look in vain for any far-reaching differences between the old and the new.'

Anyone critical of fundamental features of the old patent law will look in vain for any far-reaching differences between the old and the new. The legislators have avoided introducing many truly original concepts, and what we will have in Europe is an amalgam in which Germanic influence is much in evidence, although the moderating effect of British ideas may well be very significant in practice The siting of the European Patent Office in Munich and the consequences for the staffing of the Patent Office Examining Divisions and Appeal Boards may turn out to be of enormous importance in influencing the practical character of patent activity in our continent.

Publish and be damned ?

Among the changes indicated above, I would like to highlight first an important practical point which is likely to concern inventors, namely, the law regarding publication. It is not uncommon still to find inventors for whom the question of patenting their invention arises long after they have either publicly disclosed their ideas or put them into practical use in some way. This phenomenon is not, of course, restricted to inventors whose primary interest is in the world of learning but it occurs frequently with inventors of this kind. Many of these are surprised and dismayed to find that prior publication of the invention in a scientific journal destroys 'novelty' in the patent-law sense and ruins their chances of subsequently obtaining patent protection. Total loss may have been avoided if the journal in question was connected with a Learned Society and the inventor discovered the legal facts in time to file a British patent application within the six-month period of grace following publication allowed in the Learned Society provisions of our present statute. It is hard to console the disappointed inventor who did not know of this pitfall and regrettably one must now report that, under the new European laws which we expect will come into operation during the next few years, these concessions to the impulsive publisher do not exist. The rule of novelty will be quite strict and a patent application will be adjudged for novelty against the so-called state of the art which will include 'everything made available to the public by means of a written or oral description, by use, or in any other way' prior to the relevant date. The non-prejudicial nature of disclosures made without the inventor's permission, or display at an officially recognised exhibition, or disclosures made in a privileged and confidential manner, will all be preserved with certain conditions attached. The Learned Society provisions will probably disappear from British national patent law.

'... under the new European laws... concessions to the impulsive publisher do not exist.'

European developments

In addition to the present individual national systems of patent law which will continue to

The changing patent systems in Europe

continued

exist, usually in modified form, there will be two new types of European patent available to inventors: the European patent, which is the subject of the European patent convention

> '... there will be two new types of European patent available to inventors ...'

(EPC) signed in Munich in October 1973, and the Community patent dealt with in the Community patent convention (CPC) signed in Luxembourg in December 1975.

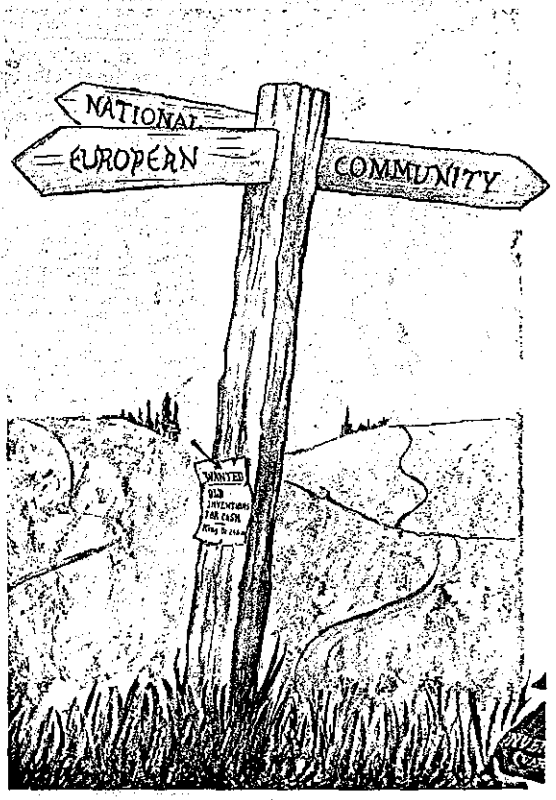
One might well ask why two such systems have been created. In continental Europe the concept of a Community patent as a unitary right having the same effect throughout the Common Market and subject to no nationalistic barriers has been strongly motivated. To the prime movers of the European patent concept, the European Patent Convention was only a first stage, open in principle to all states of the European continent and effective in any state which would sign and ratify the Convention. The second stage (CPC) was expected to follow rapidly upon the first. EPC provides for one patent-examining and -granting system leading to, effectively, a bundle of 'national' patents in designated states. It is only with the CPC that the truly single patent, having the unitary character referred to above, emerges.

It is the declared intention of the Governments of EEC states to move sufficiently rapidly to enable the first Convention (EPC) to enter into force in the Spring of 1977, thus allowing the European Patent Office to receive patent applications by the end of that year. It is not necessary for all EEC states to ratify it to achieve this object. The coming into force of the Community patent convention, however, will take somewhat longer because it is of the essence of the thing that all nine states of the Community ratify it. There will therefore be certain transitional provisions which interlink the European and Community patent systems from a practical point of view.

Options for the British inventor

We can understand these matters more clearly by considering the options open to the British inventor, who will as before start with a basic application filed in the United Kingdom Patent Office that will be a springboard for further patenting by the national or European or Community routes or a combination of these. Within 12 months of filing his basic application, an inventor will be able to undertake overseas patenting by national routes as in the past, claiming priority under the International Convention. National routes will, of course, still be necessary and indeed the sole route for obtaining protection in territories outside the European area, although at this point passing mention should be made of another form of international patent collaboration which is also in progress, namely, the Patent Co-operation Treaty (PCT), which conceptually is wider than Europe and could eventually embrace the European system within its scope.

If the European route is chosen,



the British inventor will be able, once we have ratified the Convention, to file his European application in the British Patent Office in London, which will act as a branch office of the European Patent Office in Munich. English is one of the three official languages which can be used for the specification and any proceedings relating to it. One may start with a selection of any of the states which are parties to the Convention; this selection must be designated at the outset and cannot be added to later. It may embrace all nine states of the Community.

If the nine are included in this way the applicant must make his choice at the outset whether he wishes to obtain a European patent (*ie* a European patent bundle covering nine designated states which can be dropped individually and selectively at a later stage by non-payment of renewal fees), or whether he intends to obtain a unitary Community patent. In the latter case it will be understood that conversion to a Community patent can only be effected after the Community patent convention has come into operation.

The best buy?

On the question of cost, it is rather early to attempt a definite statement. On present estimates it is considered that if patent protection is required in three or more European territories it should be cheaper to proceed by the European route rather than the individual national routes. The European route involves the risk that in prosecuting the patent application all the eggs are in the one basket. Many inventors and, indeed, many industrial firms may well not require protection in more than about three European territories and they may prefer to use the traditional national routes if the higher costs of maintenance of the full Community patent are not warranted. The cheaper option of selecting European territories including part of the EEC (perhaps only those in which manufacture of the invention will occur) remains open but, unfortunately, not for ever. The ability to select only a part of the EEC where a European patent may run was a concession wrung from the more rigorous and thoroughgoing Europeans at the Luxembourg convention and it is limited to a transitional period of 10 years, after which it can be revoked by a qualified majority decision of the Council. It could even be revoked within the 10 years by unanimous decision.

'The European route involves the risk that in prosecuting the patent applications all the eggs are in the one basket.'

Patentability

We need say very little about patentability under European law beyond the simple statement that to be patentable an invention must be new, must involve an inventive step, and must be susceptible of industrial application. There is a list of exclusions from patentability, and computer programs and methods of presenting information are on it. Chemical inventors will probably fare better under this law than under the previous laws.

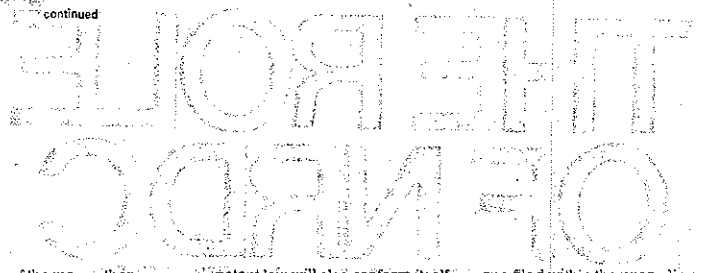
It remains to be seen how difficult it will be to obtain a European patent, but one is allowed the speculation that the new system will have to be made not too unattractive to inventors if it is to survive financially, especially in its early years, and so some reasonable element of optimism is permissible. The scope of the patent will be determined by the patent claims, which are to be interpreted according to principles somewhere between, on the one hand, the current British tendency to be bound by the limitation of the literal wording used and, on the other, the German practice of liberally extending the words of the claim to the inventive idea underlying them.

'... the new system will have to be made not too unattractive to inventors if it is to survive financially...'

Inventors who are now engaged in writing specifications—or, as I would prefer, instructing their patent agents to do the job for them—should bear in mind that the European system is now closer than they might have expected.

Reform of British patent law

The British Government is being urged at the present time to ratify the above-mentioned European Patent Conventions which it has already signed. It is clear that the Government will not be satisfied simply to introduce brief legislation dealing with these European matters but intends at the same time to carry through the overhaul of the whole of British patent law along the lines it announced a year ago. This inevitably means delay,



because of the many other demands on Parliamentary time, and we must expect professional pressure on the Government to increase, otherwise we shall lag behind our European colleagues in becoming established practitioners and interpreters of the European system both for our own benefit and that of major non-European sources of invention.

'The most interesting proposed change in the new British law is the taking into consideration by the Examiner, in the prosecution stage of the application, of the criterion of inventiveness . . .'

The most interesting proposed change in the new British law is the taking into consideration by the Examiner, in the prosecution stage of the application, of the criterion of inventiveness, which in the past he has been unable to challenge. This will dispose of many applications of the type which pass through to publication on the strength of mere textual novelty but will not stand up to real criticism and this change should improve the reputation of our patent system. Approval of this change is of course subject to the proviso that Examiners use their new power judiciously and pay heed to reasonable arguments in support of inventiveness, bearing in mind the care which our Courts habitually take over this most difficult question to avoid unduly subjective judgements. The tightening up of the rules regarding prior publication has been mentioned above in the context of European law. British patent law will also conform itself to that standard and will treat as a bar to novelty not merely publication within the UK, as before, but publication anywhere, as other countries have done for a long time.

Demise of the provisional

There are other indications too that an inventor, especially the academic inventor, will have to think his position out rather more carefully than in the past and be more prepared to resist the temptation to rush into print with his first results. These can often amount to not much more than an interesting lead as distinct from a quantum of knowledge sufficient to provide an effective foundation of priority in relation to a patentable invention. Thus the idea of the provisional specification (the first step in the patenting process) being permissibly rather sketchy, with a further 12 months to work it all out before the complete specification has to be written, will certainly not survive. Indeed according to the Government's proposals to bring our national patent law into line with European law, there will be no more provisional specifications, at least not in the old sense. Something comparable will continue to exist, in that one application will be able to claim the priority of an earlier one filed within the preceding year, but the present benevolent attitude to what a complete specification can fairly claim based on ideas imperfectly adumbrated in a provisional specification may undergo transformation.

'. . . the idea of the provisional specification being permissibly rather sketchy, with a further 12 months to work it all out before the complete specification has to be written, will certainly not survive.'

The disappearance of the provisional specification system may well be an occasion for lamentation on the part of many inventors, especially those with very limited financial support, because provisional protection has always been viewed as a relatively inexpensive way of protecting oneself before attempting to negotiate with a more powerful potential partner or adversary. I personally do not regard the passing away or modification of this system as tragic; because it has frequently been a temptation for some to act prematurely in the belief that the provisional specification enabled one to pre-empt a wide monopoly on the basis of relatively little work and solid data. That was never the purpose of the system, which was designed, rather, to enable an inventor to establish his priority for an invention already in being and capable of a clear formulation of its essentials, but still perhaps in need of perfecting as to matters of detail.

NRDC, as a major user of the patent system, continues to look forward with interest to the next decade, in which there will be much to excite and challenge its advisers, on both the patenting and licensing fronts, before any sort of equilibrium is reached. ■

BULLETIN NRDC
AUTUMN 1974
#41

THE ROLE OF NRDC

by I Maddock, CB, OBE, DSc, FInstP, CEng, FIERE, FIEE, FRS,
Chief Scientist, Department of Industry

Dr Ieuan Maddock graduated with first-class honours in physics from the University of Wales, Swansea in 1938 and during the war years was engaged in explosives research. In 1947 he joined the team set up to produce the British atomic bomb, subsequently holding several important posts in nuclear weapons research, and was awarded an OBE in 1953. Dr Maddock joined the Atomic Weapons Research Establishment at Aldermaston in 1955, later becoming Chief of Applied Physics and Assistant Director. In 1959 he started work on the detection of nuclear explosions fired in space and underground and was the British delegate to the Geneva conference with the USA and the USSR on the abolition of nuclear tests. He directed this work until 1965, when he was loaned by the UK Atomic Energy Authority to the Ministry of Technology to act as Deputy Controller in charge of the newly created Industry Divisions; he was appointed controller in 1967. Dr Maddock was appointed Chief Scientist of the Department of Trade and Industry in February 1971.

Whether it is measured in terms of the number of people employed or the annual turnover, research and development has become a big industry in the United Kingdom, just as it has in most other industrialised nations. About 30% of all this nation's science graduates are engaged somewhere in R & D, and a high proportion of engineers are engaged in project and development work.

What, then, does all this produce? Where does it all lead?

Some of it is devoted to developing a better understanding of the laws of nature so that the ways to locate and process minerals, to communicate by electric signals, to operate safely in hazardous surroundings or to sustain health etc can be improved. Some of it is motivated by pure intellectual curiosity about the way that nature has assembled the Universe, the atom or the living cell. Much of it is aimed at developing very specific designs and techniques concerned with nuclear power, aircraft, computers or pharmaceuticals. All of it, however, produces 'invention' either by chance or by deliberation.

Invention in context

Over half of all the R & D performed in the UK is funded by the Government, and that includes nearly all of the research done at our universities and special research centres, nearly all of the nuclear power, a major part of aerospace and nearly half of the electronics industry. Government is therefore deeply involved in the inventing business. It is also involved in a more remote way with the inventions which arise from privately funded research, whether this is by giant industrial organisations or by private individuals tinkering around in the family garage. At any stage these activities in both the public and the private sector can lead to a new product, process or technique which could be beneficial to trade, cause a new industry to flourish or extend the potential of existing products. There is therefore a constant dialogue between Government and industry, either directly with companies or through the various Research Associations, about the inventions that are or may be appearing.

Alas, the process of invention is only a small part of the total endeavour which leads to a business or commercial success. If the total invention phase consumes one unit of effort (research, development and prototype demonstration), the phases that follow (engineering design, production technology and management, quality control, marketing, servicing, etc) will certainly consume five units and possibly as many as ten. This is a factor so often overlooked by the enthusiastic inventor, who believes that when he has successfully demonstrated his brainchild on the laboratory bench the door to success and fortune has been opened. Those who pledge their money to the exploitation of technological invention are exposing themselves to a two-fold risk. Not only are there the normal business hazards—the whimsies of the market place, the attitude of employees, the supply of materials, the cost of borrowed money, terms of trade with overseas countries, etc—but there are also the technological risks. What problems will emerge when the successful laboratory model is scaled up to its full working size? Will there be production problems? Will materials problems emerge owing to fatigue and creep? Will the apparent market advantage be eroded as the technological problems emerge and are mastered, and will the product be rapidly superseded by a competitor version within a short time? These accumulated uncertainties can frequently be daunting, particularly if there are less complex options available to those who specialise in providing risk capital. This is where NRDC has a valuable role to play.

The place of the Corporation

The large Government involvement in R & D, the high cost of the 'post R & D' phase and the added uncertainties of technological risk make it necessary to have an organisation which bridges the gap between the researcher and the ultimate user—generally in industry. Its task is to seek out promising inventions from both the Government-funded

sector and from private sources, and, where appropriate, to launch these on their way to successful exploitation. It is not the job of NRDC simply to derive vast income from some successful invention ; its success must be measured by the number and quality of new products or techniques that have been given a chance to flourish. In a particular case, success for NRDC is achieved at the point when industry itself decides to take the invention further using its own resources.

Although NRDC is a public corporation, it functions as a highly autonomous body. It falls to Ministers to appoint

'It is not the job of NRDC simply to derive vast income from some successful invention . . .'

the Chairman and Board Members of the Corporation and, because there are public monies involved, to approve certain kinds of activities and expenditure. But it is the Corporation itself that seeks out and evaluates inventions, makes the investment, monitors progress and collects the revenue. NRDC borrows its capital from the Government, but loans are repayable at the end of their fixed term, or may be repaid earlier if the cash-flow situation of the Corporation permits. Because NRDC has to aim to break even financially, in the main it judges its projects in terms of their potential for ultimate commercial success, but in marginal cases it may nevertheless decide to go ahead because there are wider 'national interest' considerations. In order to ensure that their judgment of the national interest is in general accord with the views of Ministers and that they are generally aware of Government attitudes or of maturing policies, senior officers of the Corporation maintain a regular dialogue with Government Departments, and in particular with the Department of Industry, which is specifically charged with responsibility for the general affairs of the Corporation, including accountability to Parliament. By this process the Corporation and Departments keep in step and a complete clash of outlook is improbable but not, I must add, impossible.

Where a project is clearly aimed at a national objective; *eg* strategic independence of overseas supplies or stimulation of the growth or revival of an industry, this primarily is a matter for the Government Departments to handle. But even here the Corporation can be invited to play a role through the provisions of Section 11 of the Development of Inventions Act. Ministers wishing to utilise the expertise of NRDC may request the Corporation to undertake or manage such a project ; the Government determines the broad course of action and monitors progress and, because the project would not normally be viable by NRDC's commercial criteria, the Department concerned would underwrite the expenditure.

Because NRDC operates primarily on the basis of the commercial viability of projects and Government Departments deal with matters where the national interest is dominant, the potential area of overlap is minimised. There is an increasing tendency for Departments to examine any proposal made to them (or generated within them) to see if they fall clearly in the 'commercial' province of NRDC. In appropriate cases the proposals are referred to the Corporation or the proposer is asked to make a direct submission. I use Departments in the plural, since there are many involved, particularly the Department of Industry, the Department of Health and Social Security, the Department of Education and Science (including the Research Councils), the Department of the Environment and the Department of Energy.

Some recent changes

In recent times Government-funded applied research and development has been placed on a 'customer–contractor' basis. This has had two effects on NRDC. In the first place, many of the Government laboratories, and specifically the industrial research establishments of the former Department of Trade and Industry, have been urged to establish a direct contractual relationship with industry (including consultants) and to do more to exploit their designs and inventions. This has meant that for some laboratories the automatic obligation to offer the rights in all their inventions to NRDC has been relaxed and the larger

'A continuing role for NRDC in the development and exploitation of both public- and private-sector inventions seems assured.'

laboratories can, if they wish, now exploit by direct interaction with manufacturing companies or through 'user clubs'. Conversely, NRDC is no longer compelled to deploy its resources trying to exploit everything offered to it from all Government laboratories. Despite the greater freedom allowed them, most of the laboratories concerned have elected to maintain their relations with NRDC, although the basis of the link may have been changed by mutual agreement. The Research Councils' and universities' links with NRDC have not been altered.

The second change arises through the creation of the Research Requirements Boards. The Boards, which currently fall within the control of the Department of Industry, are all specifically instructed to consider the potential exploitation of any field of research that they support. Projects are frequently amended in such a way as to ensure a close involvement of industry at a very early stage and NRDC can be an important element producing this involvement. Within the Department of Industry there is a Committee of the Requirements Boards Chairmen which is chaired by the Minister of State (Lord Beswick) and comprises the Chairmen of all of the Department of Industry Research Requirements Boards and some senior officials. The Chairman of NRDC, Sir Frank Schon, is a member of this Committee in order to ensure that there is a close relationship between the work of the Corporation and the objectives of the Requirements Boards.

A continuing role for NRDC in the development and exploitation of both public- and private-sector inventions seems assured. It must, however, remain flexible in its methods of operation to meet changing circumstances, and there is a joint obligation on the Corporation and the Government not only to maintain but to improve relations in areas of mutual interest. ■

R A E Walker, OBE, FCIPA, Secretary of NRDC from 1949 to 1973

The creation of NRDC

Ronnie Walker spent the years before the Second World War practising patent and trade-mark law in Chancery Lane. In 1941 he joined the Board of Trade, providing for civil supplies and usage of industrial and scientific machinery and equipment. During 1946-47 he managed the Inter-Departmental Reparations Secretariat responsible for securing the allocation of the UK's share of reparations plant and machinery from Germany. He was active in the setting up of NRDC and, in 1949, was appointed its Secretary, a post he held until his retirement last year. It is impossible to summarise the value of his efforts on behalf of the Corporation; probably his achievement that is best known publicly is his scoop of Christopher Cockerell's hovercraft patent rights within 24 hours of the first visit of the inventor on the afternoon of 16th April 1958. Mr Walker was awarded the OBE in 1971 in recognition of his services to the Corporation.

In the early months of the Second World War, I was directed to work at the Board of Trade, the Government Department which was almost totally concerned with the civilian side of the nation's war effort. My own job was livened on occasion by contact with colleagues who were otherwise engaged: they were planning for the country's postwar future.

The detailed nature and scope of these activities and above all the optimism on which they were founded, never failed to amaze me. Their full extent, however, was not within my ken, and it was not until the end of the War that a specific planning activity of particular interest came to my notice, namely, the Government's wartime concern with the nation's treatment of its inventive talent. While there was a generally held view that the British were second to none in producing new inventions, they were not, it was thought, good at developing and putting them to commercial use; some remedy should be sought to rectify this situation.

Concern on this score was, in fact, expressed in 1943 by the Scientific Advisory Committee. This Committee had recommended the establishment of the National Research Trust for 'holding and exploiting in the public interest patents which may be assigned to it by the voluntary action of the inventors or at the direction of any fund or institution by which the researches leading to the inventions have been supported'.

Thoughts of the 1943 Committee

The Committee's view of the circumstances which had led to this recommendation was expressed as follows:

(a) A large and growing number of patents had resulted from researches carried on in universities, Government research establishments, and other institutions financed directly or indirectly from charitable endowments or public funds. Hitherto, there had in general been no mechanism to provide for the commercial development and exploitation of such patents, although the Imperial Trust was in existence merely as a legal entity to hold patents, but by its charter was prevented from holding medical patents.

> '... the Government's Steering Committee on Post-War Employment recommended that Government finance should be made available "for the initial development and testing of new inventions ..."'

(b) It was generally recognised that academic bodies and publicly financed research organisations were not well fitted, either by experience or outlook, to exploit patents arising from their own researches. Failure to

provide adequate alternative machinery, however, might result in valuable patents being neglected or exploited in an undesirable manner, or in the inequitable treatment and consequent discouragement of individual research workers, many of whom might have contributed to a particular invention though not themselves the inventors. There was, moreover, the practical problem of determining the rights in the results of researches carried out in co-operation between workers supported by public funds and charitable endowments on the one hand and those employed by the research organisations of industry on the other.

(c) Ethical objections were felt by many people, including research workers themselves, to the exploitation for private advantage of patents resulting from publicly or charitably financed researches. This feeling was particularly strong in the medical field, where it was obvious that special considerations might apply.

(d) On the other hand, the free and immediate publication of the results of such researches without patent protection would often open the way to a range of patents by commercial interests, possibly foreign, such as to block the further advance of research by the original academic inventor in the field of his own discovery.

(e) These difficulties, partially practical, partially ethical, and partially psychological, constituted a definite hindrance to technological development, not only in the medical field. The establishment of a body charged to take over patents resulting from publicly financed researches, and to exploit them in the public interest, making awards when these are appropriate and are desired by the inventors, would do much to overcome these difficulties, and in particular to remove the suspicion which many academic inventors feel towards the patenting of scientific inventions and discoveries.

In 1944, some months later, the Government's Steering Committee on Post-War Employment recommended that Government finance should be made available for 'the initial development and testing of new inventions where this is beyond the resources of the inventor and appears to be in the national interest' and 'for testing under factory conditions the results of research and inventions'.

The Government at that time was the National Government headed by Winston Churchill.

'... the Bill was short and concise, and so well drafted that the main clauses have remained on the statute book unchanged for 26 years.'

Postwar preliminaries

By July 1945 a Labour Government under Clement Attlee had come into office, and its Ministers became closely involved in the consideration of these proposals. At the Fifth Meeting of the Industrial Sub-Committee of a Cabinet Committee set up by the Lord President of that time (Herbert Morrison) held on Monday, 26th November 1945, a paper by the Chancellor of the Exchequer (Hugh Dalton) was discussed which invited consideration of the proposal to establish a National Research Trust for the purposes referred to above. After a discussion which is said to have taken some hours, the Sub-Committee approved in principle proposals contained in the Chancellor's paper and invited the President of the Board of Trade, then Sir Stafford Cripps, to arrange for them 'to be further considered in the light of the Sub-Committee's discussion, with a view to their ultimate embodiment in a draft Bill'.

The main points made by Ministers in this discussion were recorded as follows:

(a) 'The ultimate success of an invention ought not to be judged purely by the commercial profit which it could show without reference to the general economic advantage to the nation.'

(b) 'The proposed National Research Trust ought to be given a wide financial discretion. While there would be a large number of cases in which patents would be assigned to it free of cost, it might detract from the Trust's value to industrial progress if it were precluded from accepting and exploiting patents on which the assignee expected a reasonable commercial return.'

(c) It was desirable 'to establish clearly the division of functions between the Departments responsible for research and those responsible for development work ... we would lose a very valuable distinction if the Department of Scientific and Industrial Research was expected to assume responsibility for development work'.

(d) 'The opportunity should be taken to draft a forward looking and imaginative Bill dealing with the whole field of patent law and the development of industrial processes.'

These concepts had now to be reduced to practice, and Cripps appointed an Inter-Departmental Committee to advise him on how the Trust should be set up and operate. The Committee comprised 16 departmental representatives; they were occupied for two years in preparing a report which proved to be a thorough and painstaking effort to produce practical proposals to meet the need identified by Ministers.

The Committee recommended that the proposed organisation should be given a wide discretion in the manner in which it operated and that it should be empowered:

(a) not only to receive patents and patent rights voluntarily assigned to it, but to take the initiative in acquiring such rights on appropriate commercial terms;

(b) in developing patents and patent rights, not only to make use of Government research and development agencies, but to place research and development contracts with commercial organisations;

(c) in exploiting patents and patent rights, not only to grant licences on suitable exclusive or non-exclusive terms, but in exceptional circumstances to form a new company, in which it would hold the whole or the majority of the shares, for the purpose of producing and distributing a particular product.

The Committee recommended that the Trust should be incorporated by Statute with a title such as 'the National Research and Development Corporation'. It should be governed by a board of directors appointed by the appropriate Minister (who might be either the Lord President or the President of the Board of Trade), the board comprising a full-time managing director, a part-time chairman, and not more than eight part-time directors having financial, commercial or scientific experience. There should also be an advisory council whose members, in addition to their collective advisory functions, might be called on individually as experts to advise on specific projects. The Trust should receive a fixed grant from the Treasury of, say, £30 000 per annum for five years, for administrative expenses, and, for financing its projects, should be allowed to borrow up to, say, £5 million over five years, subject to a ceiling for individual projects.

Wilson succeeds Cripps

Soon after the report had been presented to him, Stafford Cripps moved from the Board of Trade to become first Minister of Economic Affairs, and it became the task of his successor, Harold Wilson, to put through Parliament the necessary legislation to bring the corporation into being. This legislation was to be

The creation of NRDC

founded on the Development of Inventions Bill which followed closely the recommendations of the report, particularly the terms of reference to be laid down for this new public corporation. Unlike much other legislation of the time, the Bill was short and concise, and so well drafted that the main clauses have remained on the statute book unchanged for 26 years.

The Bill was first introduced into the House of Lords on 29th April 1948. By June it had reached the House of Commons and, on the 11th of that month, Harold Wilson, as President of the Board of Trade, moved its Second Reading. He said:

'The purpose of this Bill is to ensure that a full and proper use is made of British inventions, especially those which have been made in Government research establishments or in organisations such as the universities, which are partly financed by Government grants. I think it is well recognised, and a matter of no controversy at all, that if we are to maintain our competitive power in world markets, and also to provide a continually improving standard of living at home, it is vital to keep up a continuous flow of new ideas into industry, of new products, of new processes for making old products, and of new ideas generally, leading to increased production.

I think the whole world will agree that as a nation this country has been second to none in the production of new ideas and of new inventions. But in the past we have sometimes been slow to put these ideas to full use, or even, occasionally, neglectful of them altogether, often with very grave results.

The historic case of that, of course, was the result of Faraday's investigations in the early part of the last century, producing new and valuable varieties of glass —investigations which were not followed up commercially, with the result that in the first world war we found how great was our dependence on the German optical glass industry, which had made full use of Faraday's investigations. That deficiency had to be made good, and was made good only in the war itself by the concerted effort and the skill of British science and British industry—indeed, in not one but in two world wars.

In the last thirty years there has been a very great increase in the amount of scientific research work done in Government sponsored organisations, and also, as I have said, in the universities . . .

It was much considered before the war, and it was considered during the war itself by the Scientific Advisory Council, who concluded at that time that an organisation should be created, independent of Government Departments, which could take over inventions and discoveries arising from Government research and see that British industry was given the opportunity of making full use of them. As the House knows, the problem was considered, again independently, by the Swan Committee on patent law, which made recommendations of a very similar kind.

The problem arises chiefly because inventions or ideas coming from the laboratories or research stations are not necessarily, or even usually, in a form in which they can be used industrially, or in which they can be sold as marketable products. Very often much further experimental work is necessary; very often it is necessary to have a full scale working model, or pilot plant, which it would not be appropriate to set up, and which the particular scientists in question would not wish to set up, and would have no technique for setting up, in their own research unit, or in Government Departments or the universities . . .

There is, of course, the problem of the private inventors or small firms who have worthwhile inventions but are themselves without resources and without experience to undertake the development and exploitation of them. Although the main reason and justification for this Bill relates to inventions brought out in Government establishments and universities, the Bill does provide for dealing with problems connected with Government and private inventions.

It provides for the establishment of a National Research Development Corporation, which will be an independent body, subject only to general directions from the Board of Trade and to control on a number of specific issues, to which I will come in a moment. Its directors will be chosen from men with expert knowledge and experience of bringing inventions to fruition, because, as I have said, this is a skilled and specialist job. The corporation will be charged with the job of dealing in this way with the inventions handed over to them, in the best interests of the nation as a whole. The Corporation will, of course, be financed initially from Government funds, but our intention is that in course of time, and in not too long a time, it will be self-supporting.'

Subsequently, in the Committee stage on 30th June 1948, an amendment requiring the Corporation to balance its revenue account was rejected after considerable discussion, as was also an amendment to reduce the Corporation's proposed borrowing powers from £5 million to £2 million in the first instance.

Royal Assent was given on 30th June 1948; there had been no political controversy about the measure. The progress through Parliament was notably rapid.

The assembly of the first Board

By this time I had been transferred to the small team in the Board of Trade which, having seen the legislation put through Parliament, had the task of arranging for the setting up of the Corporation. As a professionally qualified patent agent who for many years prior to the War had been concerned on an international scale with the patenting of inventions and their commercial exploitation, the prospect was interesting and exciting. It also represented a significant change from my previous involvement with the obtaining of the United Kingdom's share of the industrial reparations which the Allies were then exacting from Germany.

> 'Meanwhile, a queue of expectant inventors at the Board of Trade reached considerable proportions . . .'

But the months went by and no NRDC had been set up; delay had occurred in the selection of Members for the Corporation's Board. Meanwhile, a queue of expectant inventors at the Board of Trade reached considerable proportions, and the handling of them and their papers was just one of my preoccupations. Criticism over the delay was publicly expressed but, after the

appointment in April 1948 of the Earl of Halsbury as Adviser to the President on the setting up of the Corporation, and Managing Director designate, events moved quickly.

The Corporation came into being on 28th June 1949 by the appointment of:
Sir Percy H Mills, Chairman (subsequently Lord Mills, now deceased)
Lord Halsbury, Managing Director
Professor P M S Blackett (subsequently Lord Blackett, now deceased)
Sir John Duncanson (now deceased)
Sir Edward Hodgson (now deceased)
Mr W E P Johnson
Sir Edward de Stein (now deceased)
and soon after
Professor E C Dodds (subsequently Sir Charles Dodds, now deceased)

'Halsbury was a godsend.'

I thought that Halsbury was a godsend. Both his father and his grandfather were lawyers and both had scientific leanings. His grandfather, the first Earl, was three times Lord Chancellor, author of that legal classic, 'Halsbury's Laws of England', and also a Fellow of the Royal Society.

Our Halsbury, however, had started his working life at the age of 17 as an accountant but turned to science and took his BSc at the University of London as an external student. He gained first-class honours in chemistry. From then onwards he turned to research and development, working on soaps and fatty alcohols with Lever Brothers, then with Firth Brown during the War on special steels required for jet turbine blades. His acquaintance with law and his first-hand experience of the problems of research and development, and no less his financial knowledge, were wholly relevant to the exercise of the Corporation's functions.

'Mills was single minded in his endeavours to help British industry.'

Mills was also well chosen. At the outset he pronounced a fundamental proposition: the Corporation would embark on no projects like the notorious groundnut scheme which the Colonial Development Corporation had set up somewhat earlier, and which had met with disaster. In his view, NRDC's job was to help British industry, and he never failed to pursue this as the keystone to the Corporation's activities while he was in office as Chairman.

Mills was single minded in his endeavours to help British industry. This aim was consistently followed during the War, when he was Controller of Machine Tools, and after the War, when he was in charge of the Economic Sub-Commission of the Control Commission for Germany. I came into contact with him in both these jobs while he was evolving schemes for helping the industries of this country. I still remember his caustic comment when at the first Corporation Board Meeting he discovered that the pencils I had put round the table were marked 'Made in Germany'.

In the years following the War there was a dearth of office space in central London; rebuilding of the bombed areas had not caught up with the demand. For six months, the Corporation was housed temporarily by the Board of Trade in IC House, Millbank. During that time I had to find other accommodation. The Ministry of Works decided that it could not help, and the private estate agents had not come up with anything suitable. I therefore decided to walk the streets and look for 'to let' boards.

One rainy afternoon, I found a regency property which afforded the space we then thought to be adequate. It was 1 Tilney Street, just off Park Lane.

Lord Halsbury
– NRDC's first Managing Director

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continued

The creation of NRDC

Above
Lord Mills
—NRDC's first Chairman

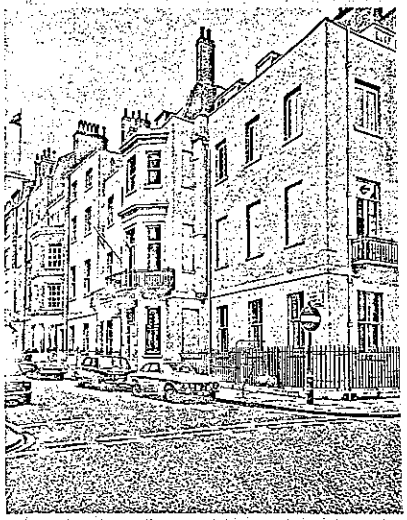
Right
'1 Tilney Street . . . remained the Corporatlcn's headquarters until 1965.'

Reputedly Mrs Fitzherbert, George IV's mistress, had lived there, but this scurrilous assumption was disproved when, in later years, the Corporation extended its offices to 2 Tilney Street, then to number 3, and from there to a house on the other side of the street which we were told had been built on the site of Mrs Fitzherbert's town residence. Anna Neagle, the actress, was said to have been an occupant of number 2.

The rent negotiated for number 1 was 15s per square foot, for number 2 was 30s per square foot, and for number 3 was 35s a square foot. By the time the Corporation's offices had been extended to Stanhope Gate, round the corner, 65s per square foot was the asking price.

'. . . other parts were somewhat squalid, but it all had character . . .'

1 Tilney Street, however, remained the Corporation's headquarters until 1965. Some parts of the house were elegant and a delight to the eye, other parts were



somewhat squalid; but it all had character, which is so lacking in modern office blocks, and was a few steps from Hyde Park.

On 22nd February 1950, the Corporation held a board meeting for the first time in number 1. It was the eighth such meeting and, in the eight months that had preceded it, the Corporation had made substantial progress with its work. In retrospect, it is evident that the pace of work generally at that time was greater than at present, no doubt a legacy of wartime urgency. Long hours and a six- or seven-day week were a normal consequence of my involvement in the Corporation's work, and some years went by before a five-day week became the norm.

It is not the concern of this article to narrate subsequent events, but it interests me to recall that to start up NRDC we borrowed £50 000 from the Board of Trade. The interest rate was 2%, and we had nearly £20 000 left at the end of the financial year. There was trouble with the Treasury for keeping it in the bank. They

wanted it back and to issue a fresh loan. NRDC has gone some way in 25 years. In the financial year ended 31st March 1974 its total incomings were over £9.3 million, its total outgoings were over £5.6 million, and almost £2.5 million was spent on new projects.

A final word. It is my belief that the Corporation is a useful cog in the country's complex apparatus for advancing innovation, and not an answer to all of the problems which emerge in this field. In fact, this is a reiteration of what Harold Wilson said in 1948 in his speech on the Second Reading referred to above:

'I do not pretend that this is a major Bill. I do not pretend that it will do anything spectacular to improve the position of inventions and discoveries and research in this country, but I claim that it fills an important gap in our scientific and economic life. It protects for the benefit not only of the inventor but of the public of Great Britain the results of inventions and discoveries in this country in which we have normally led the world but of which we have not always had the fullest results for the benefit of the inventors and for our own people. And although this Bill must be considered and set against the general background of the vast amount of research undertaken by private industry and the development of inventions in private industries, in public boards, in Government Departments and elsewhere it fulfils a necessary function.' ■

BULLETIN NRDC
AUTUMN 1974 No. 41

THE EXPLOITATION

D N King, BSc, FInstP
Controller, Exploitation Office, NRDC

Des King served with the Army in Europe and Palestine from 1942 until 1947 and then went to study at Queen's, University, Belfast. After graduating he spent two years with BX Plastics Ltd, and from 1953 until 1957 he was a geophysicist engaged in oil exploration in the UK and the Middle East. Following three years as the European representative of the US company SIE Electronics, Mr King joined NRDC in 1960 as a group executive, later becoming Manager of the Scientific Equipment Group. In his present position, as Controller of NRDC's Exploitation Office, he supervises liaison with sources of invention, licensing of accepted inventions and the financing of their further development. He also enjoys travel, the theatre and bridge.

It is, perhaps, unfortunate that the word 'exploitation' nowadays carries some sinister undertones. It conjures up for some an emotive picture of resources being acquired for a song and utilised for undue profit, with little or no benefit for the original owner. In this sense of the word NRDC cannot be accused of being an imperialist of innovation, or at least of being a very forbidding one.

Exploitation, in the NRDC sense of the word, embraces a number of interrelated activities. These include liaison with sources and potential sources of inventions, technical and commercial assessment of the output from these sources, promotion of those ideas that appear to have promise and the negotiation and monitoring of licence agreements with British and overseas companies. Exploitation also includes financing the further development of accepted inventions and of 'applied' research programmes that seem likely to produce results that can be licensed to industry. In this context, the term 'invention' is not restricted to an idea that can be protected by a patent. It covers all forms of industrial or intellectual property including copyright, design, know-how and computer software.

Government sources

Any invention made in a Government Establishment (*eg* a defence establishment such as the Royal Radar Establishment or a civil station such as the National Physical Laboratory) must, with certain exceptions, be offered to NRDC on a 'first-refusal' basis. The fact that these sources are to an extent 'captive' does not, however, relieve the Corporation of a duty to maintain as close a relationship as possible with the programmes of work being undertaken and the individuals concerned. The content of the research is the responsibility of the Establishment and its Department, and NRDC has no part in the decisions concerning this, unless it is invited to express a view. Nevertheless, the Corporation believes that early awareness of what is going on, and why, is more likely than otherwise to lead to successful exploitation of results when the time comes. Awareness helps also to bring about working relationships between the scientists who are producing the results and the NRDC executives whose job it will be to promote them.

> '... the Corporation no longer fully occupies the privileged position it used to enjoy as the nominated channel for exploitation of Government inventions.'

Reflecting the Rothschild customer–contractor principle and the wish of the Government to see its Establishments achieve greater direct income, the Corporation no longer fully occupies the privileged position it used to enjoy as the nominated channel for exploitation of Government inventions. Some Establishments are now permitted to negotiate with NRDC about the terms on which inventions are offered or to use other means of exploitation.

There are some grounds for welcoming this new policy. If nothing else, it will reinforce the need to assess realistically the commercial value of inventions and to concentrate effort on those that have significance and commercial prospects. In the longer term, there may also be an effect on the actual content of research programmes and an increasing tendency to engage in work that ab initio seems likely to produce marketable results. Whether or not this is a proper road for Establishments to follow is, of course, for the Government to decide.

The Research Councils

The Research Councils (Science, Medical, Social Science, Agricultural and Natural Environment) spend considerable sums of money in their own laboratories and units and—particularly the Science Research Council (SRC)—in the universities. With the Councils as such, NRDC is in continual contact by means of joint working parties, NRDC membership of committees

ACTIVITY OF NRDC

and the like.

All the Councils stipulate that inventions made by their employees and recipients of their grants shall be offered to NRDC for patenting and exploitation. The Corporation is made aware, by a variety of means, of work that is going on, of grants awarded and of reports of progress. It is then the responsibility of NRDC to maintain contact with the research and to take assignment, at the appropriate time, of those results that it considers can be exploited commercially.

It is by no means universally popular in university circles that inventions made in the course of research financed by, say, SRC should be thus offered. The point of view has been strongly expressed —and is still strongly expressed by some—that the involvement of NRDC inhibits university/industry collaboration and hinders rather than helps the utilisation of results by industry.

NRDC takes a different view. We believe that when the expenditure of public money in the universities gives rise to commercially valuable results, it is proper that some of the financial benefit from their utilisation should flow back to the public purse, through royalty payments. Such income is then available to NRDC for encouraging new inventions in other places, for further development of inventions that need it and for helping industry develop its own ideas. It is, at the least, questionable that the financial benefit of an invention arising from public expenditure should accrue solely to a company, arbitrarily selected by an inventor, or to individuals.

Apart from financial aspects, there is the broader consideration of securing maximum use. To consider an extreme case, a university man may have good consultancy or other contacts with a local firm and be able to transfer his results to it for manufacture. The transfer may be fast and it may be efficient; manufacture and sale might speedily be effected. But the questions of the ability of that company to meet even the UK market and the need to seek overseas patents and overseas licensees might never be raised and, if they are not, the full potential of the invention might never be realised.

To consider a further example, it is not usually possible to protect computer software by patents. The value of software rests on copyright and it is important, if that value is to be realised, to maintain a degree of confidentiality in respect of disclosure of the essential content of programs. In this relatively new area, the Corporation has not yet completely evolved a means of exploitation that can be reconciled with the understandable wish of authors to use the software in a variety of ways and to describe their results to industry and others.

'Decisions as to patenting and exploitation are solely for the universities to make.'

'Experience shows that most problems are soluble when there is sympathetic discussion of initially divergent viewpoints and interests.'

In the context of the Research Councils especially, there is an ever-present need for dialogue between university people and NRDC. Experience shows that most problems are soluble when there is sympathetic discussion of initially divergent viewpoints and interests.

Other sources

Unless there has been Research Council or Government funding of the research, there is no mandate on university inventors to offer their results to NRDC. Decisions as to patenting and exploitation are solely for the universities to make. Nevertheless the number of ideas communicated to NRDC has increased steadily over the years to the point where the universities have replaced Government establishments as the main source of the inventive input to NRDC.

The emergence of the universities as the major contributor of ideas probably reflects in part, changing circumstances in Government research. It certainly reflects, and indeed justifies, the view of the Corporation that it is necessary to maintain a conscious and continuous liaison effort with the academic institutions. Because of the number of universities and polytechnics—to say nothing of the number of departments and faculties within them—and because of the other responsibilities of NRDC staff, this liaison effort is unavoidably limited, whatever direction or selective criteria may be applied to it.

continued

THE EXPLOITATION ACTIVITY OF NRDC

In recognition of these limitations, a number of liaison techniques, supplementary to visits by NRDC staff, are often adopted. Symposia are sometimes arranged at which academic and NRDC staff—and representatives from industry when appropriate—can exchange views and information in defined areas of interest. Recently several vice chancellors and principals have been kind enough to visit the Corporation for discussions and we would warmly welcome visits from more of them. Experimental use, on a contract basis, has been made of two of the industrial offices —ULIS of the University of Leeds and CICL of Edinburgh—that have been set up in many universities, in order to determine if these offices could act locally for NRDC in encouraging and progressing business.

Setting aside private inventors, the majority by far of ideas communicated to the Corporation come from the universities, Government and the Research Councils. Other sources include the Research Associations, some charitable organisations and Commonwealth and foreign official organisations. Formal and informal links, which facilitate exchanges of information, advice and experience, have been made with many of the overseas organisations.

> 'The input of ideas to NRDC is great and our wish is to see it grow.'

Selection and decision taking

The input of ideas to NRDC is great and our wish is to see it grow. Statistically it can be shown that many inventions are made, some achieve modest success but only a very few turn out to be of major technical and commercial significance.

Having said this, it is essential, if sufficient effort is to be available for those inventions that have potential promise, to exercise an early judgment on whether to accept or reject submissions.

> 'During the last two years particularly, the NRDC threshold of acceptance of new ideas has deliberately been raised . . .'

Decisions of this kind can only be based on the best information that is available or can reasonably be gathered and represent, at best, a balance of factors. During the last two years particularly, the NRDC threshold of acceptance of new ideas has deliberately been raised and the in-house portfolio weeded of cases that have not fulfilled their apparent early potential.

There are two consequences of this policy of increased selectivity.

The first is in the general area of 'public relations'. It is necessary, when declining a submission, to retain the confidence of the inventor and to ensure that he respects the reasons for the decision, even though he may not fully agree with them. The same inventor must not be deterred from returning with a possibly much more significant idea in the future.

The second is that the policy might increase the chances of an invention being rejected or discarded too ruthlessly or too soon. There is no automatic or infallible safeguard against this danger. One can only be conscious of it and rely on the Corporation's internal monitoring and review systems and the accumulated experience of its executive staff.

Acceptance of an invention means that NRDC, having assessed the situation with the inventor—and sometimes, in confidence, with others—has decided that there is a reasonable probability that a licensee will be found and that an adequate royalty income will be achieved. It means also that the Corporation takes full responsibility for seeking patent protection and for licensing, becoming

... and let in-house portfolio weeded of cases that have not fulfilled their apparent early potential

the legal owner of such rights, including patent rights, as there may be. Depending on its nature, the invention will be allocated to one of the seven technologically based groups within NRDC, where it becomes the responsibility of an individual executive whose technical background and knowledge of the industry are particularly relevant. The Corporation's Patents Department will take any patent actions that are necessary and desirable, acting in concert with the inventor and the group executive. The way is then clear for exploitation to begin.

The transition to industry

There are many ways of arousing interest in an invention in manufacturers and users. The inventor may well be agreeable to presenting papers at conferences or providing articles for journals. There is no dearth of exhibitions where prototypes or models may be demonstrated. Inventions of more popular interest can merit mention in the daily Press. The Corporation itself publishes this Bulletin which, in non-Anniversary issues, includes information about what is currently available for licensing. About 12 000 copies of the magazine are circulated throughout the world.

These are somewhat mechanistic ways of reaching potential licensees and users. Also vitally important are the many good relationships that NRDC executives have built up over the years with the people in industry who make or influence decisions. The value of the accumulated knowledge of the capabilities, plans and limitations of industry that derives from these personal contacts cannot be overstated.

It is not infrequently the case that an invention is very immature and further development is needed before it is reasonably proven or assumes a marketable form. Corporation finance can be made available for this. The work can often be carried out at the inventive source, if that source is agreeable. Alternatively a commercial laboratory, a Research Association or, say, AERE Harwell, might be considered a more suitable place.

Often—and this is usually to be preferred—the development may be undertaken by a designated licensee company, with NRDC and the company sharing the cost between them. Depending on the nature of the project, and his availability, the inventor may continue to make an active contribution

> '. . . the inventor may continue to make an active contribution as a consultant or otherwise.'

as a consultant or otherwise. When the development spend is substantial an arrangement will be worked out that provides for the Corporation to recover its spend separately from its royalty income. In any event the Corporation's investment is usually unsecured; recovery is dependent upon final technical and commercial success.

Licensing policy

Licences granted by NRDC to manufacturers can be exclusive, semi-exclusive or non-exclusive; it depends on the circumstances surrounding the particular property being licensed. If a licensee has to make a considerable investment in developing an invention for the market, or in setting up new production facilities, it is reasonable for him to seek exclusivity, particularly if the market is uncertain or limited. NRDC readily recognises considerations such as these and is prepared to grant exclusive licences if there are sensible reasons for doing so, subject, in the case of Government inventions, to the approval of the relevant Department. Whatever the kind of licence, there will usually be provision for a down payment, a royalty on selling price and a yearly minimum payment to encourage adequate performance by the licensee.

As a public corporation, the first duty of NRDC is to British industry and inventions are offered in the first instance to UK companies. In the absence of UK interest, or if it seems unlikely that British-based licensees will be able to satisfy the world market, overseas licensees will be sought. Many non-British companies maintain a general contact with NRDC and are anxious to keep aware of what is available for licensing. Also, as has been mentioned earlier, the Corporation has formal and informal links with NRDC-type organisations in the Commonwealth and in foreign countries, and can use these links to locate potential licensees. Sometimes it is possible to encourage arrangements between British and overseas companies that are mutually beneficial. In fact the bulk of the Corporation's licensing income currently derives from overseas licensees. £5.7 million of the Corporation's licence income of £7.2 million for the year ended 31st March 1974 was accounted for by overseas agreements.

Payments to inventors

There is a standard revenue-sharing arrangement for university inventions, which applies to those that are voluntarily offered and also to those which are offered because of a Research Council grant. The arrangement is simple and provides for the university to receive 50% of the net income after deducting certain NRDC costs, mainly patent expenditure. However, in recognition of the fact that patent costs are likely to be greatest early in the life of an invention at the time when royalty income is just starting to build up, the arrangement provides for 5% of the cumulative gross to be paid to the university until such time as there is a net income available for

> 'How much of the university share is passed on to individual inventors is entirely a matter for the university . . .'

sharing. How much of the university share is passed on to individual inventors is entirely a matter for the university and NRDC has no say in this.

Government inventors and inventors who are employed by Research Councils are eligible for awards. The amounts of such awards are decided by a Government committee or by the Research Council, as the case may be, and the payments are made by NRDC.

Licensing objectives

The aims of the Corporation in its licensing activity are mixed. Patenting costs are high and renewal fees for granted patents, particularly if there have been overseas filing programmes, are ever rising. Added to this is the cost of visiting inventors scattered throughout the UK to discuss inventions that, in the event, may not be accepted or, if accepted, might fail to be licensed. There are also expenses in connection with promotion of accepted cases by way of exhibitions and visits to potential licensees, and the preparation of legal agreements. From time to time, legal action is taken against infringers.

All of these costs are borne by NRDC and a first objective, therefore, is that licence income overall shall, at least, meet them. This need reflects the Act of Parliament that requires NRDC to

THE EXPLOITATION ACTIVITY OF NRDC
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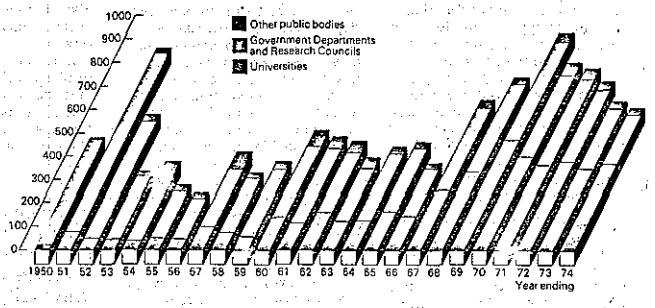
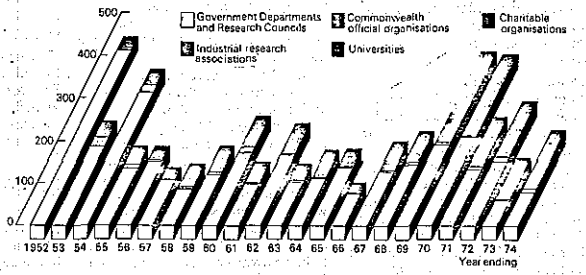
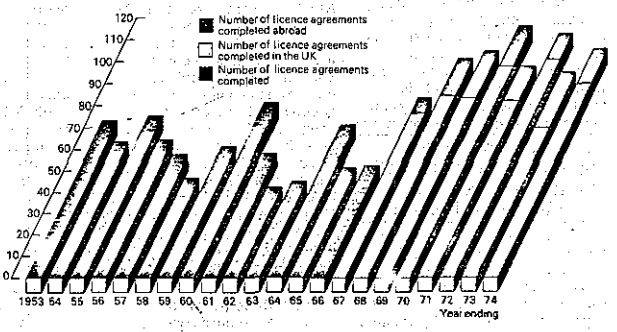


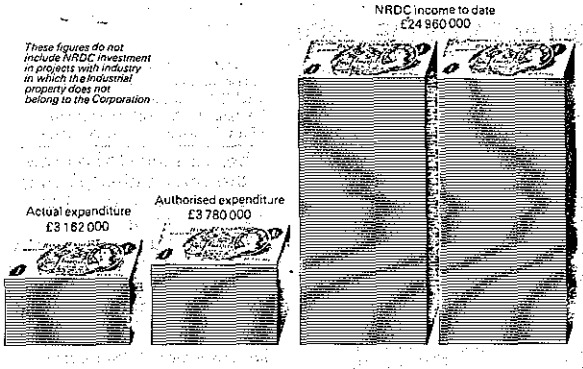
Inventions communicated to the Corporation



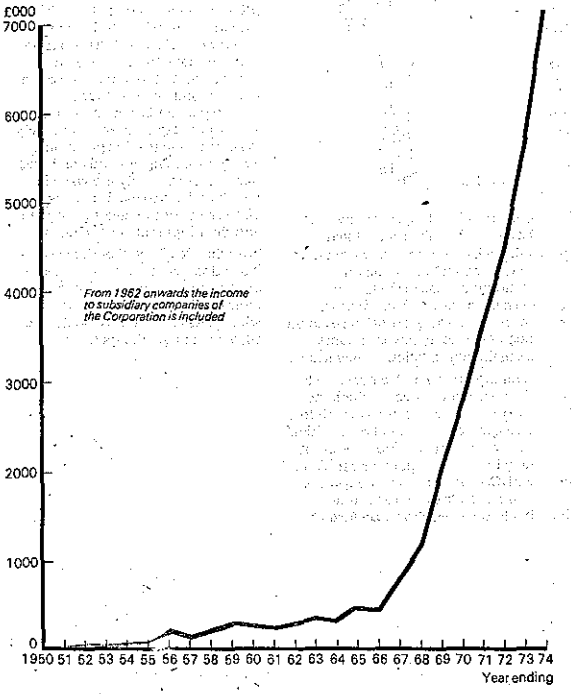
Patent rights assigned to the Corporation



Licence agreements completed by the Corporation



Investment in 168 exploitation projects current at 31st March 1974



Income from NRDC patent holding

continued

THE EXPLOITATION ACTIVITY OF NRDC

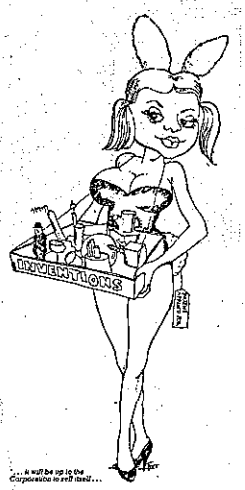
attempt to meet outgoings with income. Where revenue is shared, as is the case with university inventions, the Corporation has a particular duty to attempt to maximise its income.

The Act of Parliament also enjoins NRDC to act in the public interest. It remains therefore a primary duty of the Corporation to encourage the manufacture and use of British inventions and to provide help and facilities for this end.

Past, present and future

Much of the early effort in the quarter century of the Corporation's life was necessarily devoted to establishing feelings of trust and of confidence in the minds of those with whom it had to, or wanted to, do business. It was a unique and fledgling organisation of unknown capability and without a track record. This was an uphill task, that will continue as fresh faces replace the well known ones and as economic and political pressures and constraints change.

NRDC is now accepted nationally as a main channel for effecting the transfer to industry of the results of research expenditure in the public sector. Working relationships have been established with mandatory and voluntary sources of inventions. There is in house at NRDC a rare combination of patent, legal, technical and commercial skills that can deal efficiently with most situations that present themselves. The size of the Corporation has been contained so that these skills can operate effectively and there is appreciation that it is possible to be flexible in the approach to any problem, without sacrifice of basic principles.



Because of NRDC, many inventions have reached the market that otherwise might not have done so, and these include some outstanding successes in financial terms. For several years now, there has been a profit on revenue account, due mainly to income from the exploitation of new ideas.

Looking forward, it is possible to discern some areas in which the Corporation will have to adapt to a changing environment or in which renewed effort will be needed. It may be that the special position of NRDC as the preferred exploiter of the results of Government-backed research will be further eroded. If so, it will be up to the Corporation to sell itself to the Establishments and demonstrate the value to them of the services it offers. There is much to be done in the universities to bring home to individuals there the worth of the NRDC facilities and the availability of finance for orientated research and for development. There is an ever-present need to keep abreast of changes on the industrial scene and to maintain knowledge of industry's needs and capabilities. There is a requirement continually to re-examine the Corporation's structure and its methods of doing business, especially the ways in which its finance can be utilised effectively for the encouragement and development of new ideas.

> 'There is much to be done in the universities to bring home to individuals there the worth of the NRDC facilities and the availability of finance for orientated research and for development.'

In all this, NRDC will endeavour, as it has done in the past, to act as an organisation in which realism is tempered with sympathy, a willingness to take risks and, above all, a wish to get things done. ■

BULLETIN NRCD
Spring 1975
NUMBER 42

£1,000,000 for university inventions

by Dr J C Cain, PhD, ARIC, FIBiol
Board Member and Chief Executive,
Department of Applied Science, NRDC

At the beginning of April this year, NRDC began a special campaign within British universities and polytechnics to publicise its role as a supporter of dedicated research and development. It is hoped that posters using the theme '£1 million available' will be prominently displayed on university noticeboards and that every researcher in science and technology will receive, via his head of department, a promotional leaflet to make sure that he is aware of the availability of financial support from the Corporation.

The penicillin syndrome
NRDC was established under an Act of Parliament called the Development of Inventions Act. In the discussions and deliberations by the various committees that considered the desirability of setting up the Corporation, and also in the debates in Parliament, it was clearly hoped that academic research, particularly in the universities, would be a fruitful source of invention for NRDC.

'Penicillin' was at that time a very recent happening, and was a classic example of a major commercially valuable invention which had been made in United Kingdom universities, but on which no patent protection was sought prior to the existing information being made available to the United States, and where subsequently the major breakthroughs and inventions were made which led to its production in bulk. These later inventions and the associated knowhow gave American industry a dominant position for some years in penicillin production.

This story has always raised strong emotions in some quarters but the reality must be kept in perspective. At that time it was probably doubtful whether commercially effective patent protection could have been obtained on the work done in the UK. Also, the country was at war and the public interest was best served by the rapid development by an ally of a life-saving drug. Nevertheless, it is certainly conceivable that some form of commercial arrangement beneficial to the UK could have been entered into at that time.

Although penicillin was a unique situation, representing, as it did, such a major breakthrough in the treatment of bacterial disease, there were other earlier important inventions made in the universities but neither patented nor exploited in the UK.

Early reservations
Soon after the Corporation was set up, contact was made with all the British universities in order to publicise the Corporation's existence and its possible role in protecting, developing and exploiting inventions arising from their research. Naturally, in the early days, NRDC's financial resources and expertise were limited. Also it was by no means universally accepted at that time that universities should concern themselves with either the conscious making of inventions for whatever purpose or even with the protection and subsequent commercialisation of inventions made inadvertently. For instance, there were historical and strongly held ethical views by the medical profession against the patenting or the seeking of financial rewards from inventions in pharmaceuticals etc. Indeed some universities honestly believed that if the Corporation's activities were given formal blessing and encouragement, then many research workers would stop basic research work and bend all or the majority of their effort in directions determined by the possibility of personal financial reward through a share in any royalties received by NRDC from the successful commercial exploitation of their ideas.

In the event, the views of the medical community as represented, for example, by the Medical Research Council and the British Medical Association, changed, recognising that, with the establishment of NRDC, protection and commercialisation of relevant inventions would be undertaken in the public interest rather than only in the interest, and to the sole benefit, of individuals. Furthermore, the large majority of university research workers continued to pursue programmes of work which appealed to them primarily because of their scientific content rather than their invention potential.

A blossoming friendship
Naturally, as NRDC's links with universities, heads of departments, professors and individual research workers have become increasingly established, and the expertise and ability of the Corporation to patent, develop and exploit inventions has become evident, individual researchers or groups of researchers have increasingly considered the possible commercial utility of the results of their work and indeed, on occasions, have decided to tackle work aimed at producing inventions with potential commercial use.

Simultaneously, successive Governments have considered how at least a proportion of the large sums of public money that support research in the universities might be used in a more conscious way to create information and technological advances of value to the national economy. How, indeed, university and industry might be encouraged to work together more closely.

Some of these objectives have been achieved by changes in, or additions to, some of the awards and grants made by the research councils—particularly by the Science Research Council—and by the appointment of industrial liaison officers in many universities with a remit to publicise the university's expertise and, for instance, to increase the amount of contract research undertaken in universities on behalf of British industry. In other words, the environment in which NRDC carries out its work in the universities has been changing over the years as Government has desired to involve the universities increasingly in contributing to the solution of the country's economic problems.

It is important to point out that the Corporation's relationships with the universities are at arm's length, insofar as it has no automatic right to hear about inventions which may have been made or are in embryo, nor does it have any automatic ownership of the rights in university inventions such as it does have in respect of most inventions made in Government research establishments. The exception is where research council money is involved. Here, although the councils do not normally claim ownership of the inventive rights, they have felt it appropriate to view NRDC as the normal route by which any invention arising from work supported by them should be patented, developed and exploited. NRDC has found its relationships with the research councils to be particularly important and beneficial and several of its most important commercial successes have arisen from work supported either totally or in part in the universities by, for instance, the Medical or the Agricultural Research Councils, and commercial progress is now being made with items supported by the 'newer' research councils—Science, Natural Environment and Social Science.

NRDC's track record

The scale of the Corporation's involvement with university inventions can be set out briefly as follows. In the 25 years of NRDC's existence, it has considered 4500 inventions from the universities and has taken action, usually the filing of patent protection, on more than a third (1700). The number of these that have earned money by ultimately making the grade in industrial terms is much smaller, as would be expected—about 10% (165); but they have provided a royalty income in excess of £15 million. The Corporation now receives almost 400 inventions a year from universities—more than it receives from Government establishments—and it continues to take an interest in about one third of these.

The Corporation shares with the universities and/or their inventors the revenue it receives from licensing these inventions. This is done on the basis of a standard revenue-sharing agreement under which, put briefly, net income is shared 50:50. To date, almost £6 million has been paid out under such agreements.

Financial support

Many inventions are in a sufficiently precise form when brought to the Corporation's attention to allow patent protection to be sought immediately and attempts at exploitation to be started with industry. Many, however, need further study, often by the original inventing team, and NRDC has money available to support such work in university laboratories. Indeed, within two years of its formation in 1949 it was already funding work in universities, *eg* on electronic computers at the University of Manchester and on a possible production route to acetylene from methane at Imperial College in London. Since that time, the Corporation has supported very many, and technically diverse, projects in the universities. Currently it is supporting about 80 such projects involving a forward financial commitment of about £800 000.

It must be accepted that major inventions, in industrial terms, do not arise very frequently in any single area of science or technology and, of these, industry obviously produces a significant proportion itself. Nevertheless, on a statistical basis they do arise from academic research and in the UK NRDC has already had such a major item with the cephalosporin group of antibiotics which arose from joint work between the University of Oxford and MRC workers. This group of compounds now parallels the semisynthetic penicillins worldwide both in medical importance and in sales value, which now exceeds £200 million per annum.

£1 million available this year

The Corporation, therefore, believes that it is justified to put more effort behind seeking and supporting inventive university ideas of potential value to industry. To demonstrate this belief its Board has recently decided to make available up to £1 million in the twelve months up to the end of March 1976 for the support of university ideas, however speculative, which might lead to commercially valuable advances in industry. This will represent a very substantial increase in the level of its support in universities should good ideas arise in sufficient numbers to justify this level of support.

It is inevitable that the Corporation will have to say 'no' to many proposals because its money is not available to support research for its own sake (whereas research council money is), but only if some industrially useful objective can be achieved and in such a way that NRDC can acquire some 'industrial property' (patents, knowhow, design, software, etc) such that it can enter into licensing arrangements with industrial companies at home and, if necessary, abroad, under which it may hope to recover its money and make a profit.

NRDC has now been profitable for several years and primarily because of its success with university/research council inventions. It has the staff, professional skills and financial resources to handle much more such work, but the majority of the ideas must come from university workers themselves.

Please do not hesitate to make contact by telephone or letter if you think you have a useful idea. We will be pleased to discuss it with you promptly and suggest future action. You can make contact with anyone in the Corporation whom you may know, or myself, or with Desmond King, Controller of the Corporation's Exploitation Office ■

3/10/77

Form 990-PF

Return of Private Foundation Exempt from Income Tax

Under Section 501(c)(3) of the Internal Revenue Code

51-[illegible]

1976

For calendar year 1976, or taxable year beginning November 1, 1976 and ending October 31, 1977

Please type, print or attach label. See instructions	Name of organization: RESEARCH CORPORATION	Employer identification number (see instruction B): 13 1963407
	Address (number and street): 405 LEXINGTON AVENUE	If the foundation is in a 60-month termination under section 507(b)(1)(B) check here ☐
	City or town, State and ZIP code: NEW YORK, NEW YORK 10017	Fair market value of assets at end of year (see instruction H)

If address changed, check here ☐ Foreign organizations, check here ☐

The books are in care of ▶ Mr. Fred Lauro, Comptroller

Located at ▶ Above Telephone No. ▶ 212 986 6622

If exemption application is pending, check here ▶ ☐

Part I Analysis of Receipts and Expenditures (See instructions for Part I)

	(A) Receipts and expenditures per books	(B) Computation of net investment income	(C) Computation of adjusted net income	(D) Disbursements for exempt purposes
Receipts				
1 Gross contributions, gifts, grants, etc. (see instructions)				
2 Contributions from split-interest trusts (see instructions)				
3 Gross dues and assessments				
4 Interest				
5 Dividends				
6 Gross rents and royalties				
7 Net gain or (loss) from sale of assets not in line 11				
8 Net capital gain (see instructions)				
9 Net short-term capital gain (see instructions)				
10 Income modifications (see instructions)				
11 Gross profit from any business activities: (Gross receipts $ ____ less cost of sales $ ____ see instructions)				
12 Other income (attach schedule)				
13 Total—add lines 1 through 12				
Expenditures				
14 Compensation of officers, etc. (see instructions)				
15 Other salaries and wages		ESTIMATED RETURN FISCAL YEAR ENDED		
16 (a) Pension plan contributions (enter number of plans ▶ ____)		OCTOBER 31, 1977		
(b) Other employee benefits				
17 Investment, legal and other professional services				
18 Interest				
19 T[illegible]				
20 D[illegible]				
21 Rent				
22 Other expenses (attach schedule)				
23 Contributions, gifts, grants (see instructions)				
24 Total—add lines 14 through 23				
25 Line 13 less line 24: (a) Excess of receipts over expenditures				
(b) Net investment income (if negative enter -0-)				
(c) Adjusted net income (see instructions) (if negative enter -0-)				

RECEIVED

Part II Excise Tax On Investment Income

1 All organizations (see instructions)—enter 4% of line 25(b), Part I	Estimated Due March 15,1978	45,000
2 Credits: (a) Foreign organizations—tax withheld at source (attach Form 1042)		
(b) Tax paid with application for extension of time to file (Form 2758)		
3 Tax Due—line 1 less line 2. Pay in full with return. Make check or money order payable to Internal Revenue Service (write employer identification number on check or money order) ▶		45,000
4 Overpayment—line 2 less line 1 ▶		

Foreign organization—Enter book value ▶ $ ____ and fair market value ▶ $ ____ of investment assets held in U.S.

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief it is true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which the preparer has any knowledge.

March 8, 1978 — Bayard R. Hand (signature) — Vice President-Finance

Date — Signature of officer or trustee — Title

Bayard R. Hand

Date — Signature of individual or firm preparing the return — Address of preparer

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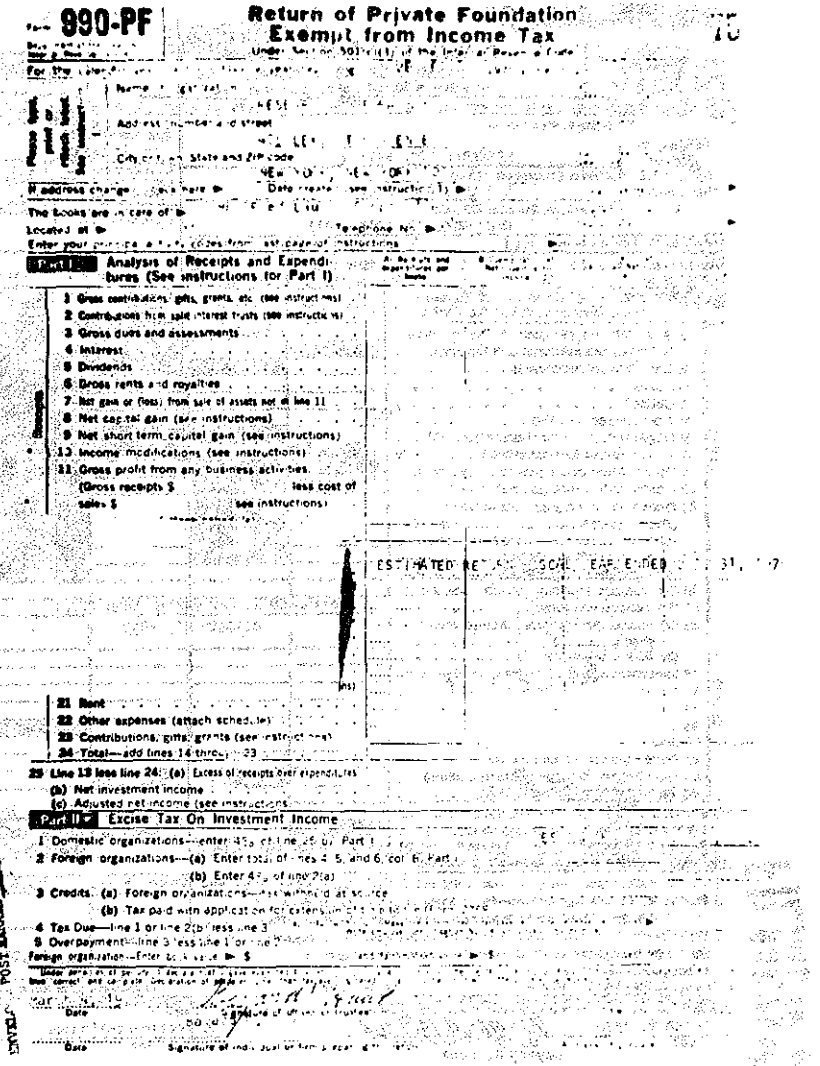

Form 990-PF

Return of Private Foundation
Exempt from Income Tax

Under Section 501(c)(3) of the Internal Revenue Code

For the calendar year [illegible]

Name of foundation

Address (number and street)

City or town, State and ZIP code

If address change, check here ▶ Date change (see instruction 1) ▶

The books are in care of ▶

Located at ▶ Telephone No. ▶

Enter your principal activity codes from last page of instructions ▶

Part I Analysis of Receipts and Expenditures (See instructions for Part I)

	A Receipts and disbursements per books	B Net investment income	C Adjusted net income
1 Gross contributions, gifts, grants, etc. (see instructions)			
2 Contributions from sale interest trusts (see instructions)			
3 Gross dues and assessments			
4 Interest			
5 Dividends			
6 Gross rents and royalties			
7 Net gain or (loss) from sale of assets not on line 11			
8 Net capital gain (see instructions)			
9 Net short term capital gain (see instructions)			
10 Income modifications (see instructions)			
11 Gross profit from any business activities (Gross receipts $ less cost of sales $ see instructions)			
21 Rent			
22 Other expenses (attach schedule)			
23 Contributions, gifts, grants (see instructions)			
24 Total—add lines 14 through 23			
25 Line 13 less line 24: (a) Excess of receipts over expenditures			
(b) Net investment income			
(c) Adjusted net income (see instructions)			

ESTIMATED [illegible] SCHEDULE FOR ENDED [illegible] 31, [illegible]

Part II Excise Tax On Investment Income

1 Domestic organizations—enter 4% of line 25(b), Part I

2 Foreign organizations—(a) Enter total of lines 4, 5, and 6, col. B, Part I

(b) Enter 4% of line 2(a)

3 Credits: (a) Foreign organizations—tax withheld at source

(b) Tax paid with application for extension

4 Tax Due—line 1 or line 2(b) less line 3

5 Overpayment—line 3 less line 1 or line 2

Foreign organizations—Enter tax paid ▶ $ and penalty paid ▶ $

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief it is true, correct and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Date Signature of officer or trustee

Date Signature of individual or firm preparing return

POST MARKED

Form 990-AR

1975
Annual Report
of Private Foundation

RESEARCH CORPORATION
405 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

Name

FISCAL - OCTOBER 31, 1976

Under Section 6056 of the Internal Revenue Code

In addition to this Annual Report, the annual return of the Foundation filed on Form 990-PF is available for public inspection. Consult an Internal Revenue Service office for further information.

Department of the Treasury
Internal Revenue Service

5145525300182

Form 990-AR (2076) Page 2

Annual report for calendar year 1976, or fiscal year beginning November 1, , 1975, and ending October 31, 1976

Name of organization: RESEARCH CORPORATION

Employer identification number: 13-1963407

Address of principal office: 405 LEXINGTON AVENUE, NEW YORK, N. Y. 10017

If books and records are not at above address, specify where they are kept: Same as above

Name of principal officer of foundation: James S. Coles - President

Public Inspection (See Instruction C):

(a) Enter date the notice of availability of annual report appeared in newspaper ▶ July 11, 1977

(b) Enter name of newspaper ▶ NEW YORK LAW JOURNAL

(c) Check here ▶ ☒ if you have attached a copy of the newspaper notice as required by instruction "C." (If the notice is not attached, the report will be considered incomplete.)

Check box for type of annual return ▶ ☒ Form 990-PF ☐ Form 5227

Revenues	
1 Amount of gifts, grants, bequests, and contributions received for the year	259,300
2 Gross income for the year	4,758,823
3 Total	5,018,123
Disbursements and Expenses	
4 Disbursements for the year for the purposes for which exempt (including administrative expenses)	4,081,235
5 Expenses attributable to gross income (item 2 above) for the year	1,807,247

Foundation Managers

6 List all managers of the foundation (see section 4946(b) IRC):

Name and title	Address where manager may be contacted during normal business hours
PER LISTING ATTACHED FOUNDATION MANAGERS	

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JUL 19 1977
28
PSC PHILA. PA.
78

6a List here any managers of the foundation (see section 4946(b) IRC) who have contributed 2 percent of the total contributions received by the foundation before the close of any taxable year (but only if they have contributed more than $5,000). (See section 507(d)(2).)

NONE

6b List here any managers of the foundation (see section 4946(b) IRC) who own 10 percent or more of the stock of a corporation (or an equally large portion of the ownership of a partnership or other entity) of which the foundation has a 10 percent or greater interest.

NONE

Form 990-AR (1975) Page 3

Balance Sheet Per Books at the Beginning of the Year

Assets			Liabilities	
PER STATEMENT ATTACHED - OCTOBER 31, 1975-1976				
Cash			Accounts payable	
Accounts and notes receivable			Contributions, gifts, grants, etc. payable	
Inventories			Bonds and notes payable	
Securities			Mortgages payable	
Government obligations			Other liabilities	
Corporate bonds			Total liabilities	
Corporate stocks			**Net Worth**	
Mortgage loans			Principal fund	
Real estate				
Less: Depreciation			Income fund	
Other assets				
Less: Depreciation			Total net worth	
Total assets 11/1/75		39,954,347	Total liabilities and net worth	39,954,347

Itemized Statement of Securities and All Other Assets Held at the Close of the Taxable Year

Asset	Book value	Market value
PER STATEMENT OF INVESTMENTS ATTACHED - OCTOBER 31, 1976		
INVESTMENT FUND (Marketable Securities and Uninvested Cash)	36,533,103	36,533,103
INVESTMENT IN RESEARCH-COTTRELL, INC. Capital Stock	76,710	1,600,000
Mortgage	90,000	90,000
OTHER INVESTMENTS (At Cost)	100,000	100,000
ALL OTHER ASSETS	1,428,666	
Pages 1 thru 7		
Total ▶		

Grants and Contributions Paid or Approved for Future Payment During the Year

Recipient — Name and address (home or business)	If recipient is an individual, show any relationship to any foundation manager or substantial contributor	Concise statement of purpose of grant or contribution	Amount
Paid during year PER LISTING OF	GRANTS ATTACHED FOR FISCAL YEAR ENDED OCTOBER 3[illegible]		
		Pages 1 thru 26	
Total		TOTAL GRANTS PAID ▶	3,071,64[illegible]
Approved for future payment			
Total		TOTAL APPROVED FOR FUTURE PAYMENT ▶	1,265,361

A notice has been published that this Annual Report is available for public inspection at the principal offices of the foundation, and copies of this Annual Report have been furnished to the Attorney General (or his designate) of each State entitled to receive reports as required by instruction F.

July 15, 1977 — Date — Bayard R. Hand (Signature of foundation manager) Bayard R. Hand — Vice President - Finance — Title

Date — Signature of individual or firm preparing the report — Preparer's address

Instructions

A. Annual Report.—An annual report is required from the foundation managers (as defined in section 4946(b)) of every organization which is a private foundation, including a nonexempt trust described in section 4947(a)(1) which is treated as a private foundation, having at least $5,000 of assets at any time during a taxable year. A private foundation may use this form for its annual reporting requirements.

If you prefer not to use this form, you may prepare the report in printed, typewritten or any other form you choose, provided it readily and legibly discloses the information required by section 6056 and the regulations thereunder.

The annual report is in addition to and not in lieu of submitting the information required on Form 990-PF under section 6033.

B. Where and When to File.—

(1) Tax-exempt private foundation.—File the report at the time and place specified for filing Form 990-PF, Return of Private Foundation Exempt from Income Tax.

(2) Nonexempt trust described in section 4947 (a)(1) and treated as a private foundation.—File the report at the time and place specified for filing Form 5227, Return of Nonexempt Charitable or Split-Interest Trust Treated as a Private Foundation under section 4947(a) of the Internal Revenue Code.

C. Public Inspection of Private Foundation's Annual Reports.—As a foundation manager, you must make the annual report required by section 6056 available at the principal office of the foundation for inspection during regular business hours by any citizen who so requests within 180 days after publication of notice of its availability; or, if you choose, you may furnish a copy free of charge to such persons requesting inspection, provided these persons do so at the time and manner prescribed in section 6104(d) and the regulations thereunder.

The notice must be published not later than the day prescribed for filing the annual report (determined with regard to any extensions of time for filing), in a newspaper having general circulation in the county in which the principal office of the private foundation is located. The notice must state that the annual report of the private foundation is available at its principal office during regular business hours for inspection by any citizen who so requests within 180 days after the date of the publication. It must also show the address of the private foundation's principal office and the name of its principal manager. A private foundation may designate in addition to its principal office, or (if the foundation has no principal office or none other than the residence of a substantial contributor or foundation manager) instead of such office, any other location where its annual report is available.

The term "newspaper having general circulation" shall include any newspaper or journal which is permitted to publish statements in satisfaction of State statutory requirements relating to transfer of title to real estate or other similar legal notices.

A copy of the notice must be attached to the annual report filed with the Internal Revenue Service.

A private foundation which has terminated its status as such under section 507(b)(1)(A), by distributing all its net assets to one or more public charities without retaining any right, title or interest in such assets, does not have to publish notice of availability of its annual report or furnish such report to the public for the taxable year in which it so terminates (Reg. 1.507-2(a)(8)).

D. Signature and Verification.—The report must be signed by the foundation manager.

E. List of States.—A private foundation is required to attach to its Form 990-PF a list of all States

(1) to which the organization reports in any fashion concerning its organization, assets, or activities, and

(2) with which the organization has registered (or which it has otherwise notified in any manner) that it intends to be, or is a charitable organization or that it is, or intends to be, a holder of property devoted to a charitable purpose.

F. Furnishing of Copies to State Officers; Listing of States.—The foundation managers must furnish a copy of the annual report (required by section 6056) to the Attorney General (or his designate) of (1) each State listed for Form 990-PF above, (2) the State in which the principal office of the foundation is located, and (3) the State in which the foundation was incorporated or organized. Such report must be furnished at the same time it is sent to the Internal Revenue Service. In addition, the foundation managers shall provide upon request a copy of the annual report to the Attorney General or other appropriate State officer of any other State. The foundation manager shall also attach to the report a copy of the Form 990-PF (or Form 5227 for a 4947(a)(1) trust) and a copy of the Form 4720 (if any) filed by the foundation with the Internal Revenue Service for the year.

G. Penalty for Failure to File Report and Notice on Time.—If a private foundation fails to file the annual report on or before the due date, or to comply with the requirements under C above, there will be imposed on the person failing any one under a duty to perform the act a $10 penalty for each day during which such failure continues (not to exceed $[illegible]). See section 6652(d)(3). If more than one person is liable, all such persons shall be jointly and severally liable with respect to such failure. Organizations that have given notice under section [illegible] as to their status and have not received a [illegible] from the Internal Revenue Service [illegible] mination as to such status [illegible] Revenue Procedure 72-21, 1972-1 C.B. [illegible] provisions for [illegible] relating to [illegible] the penalty provisions of section 6652 [illegible] to file the [illegible] report or comply with [illegible] [illegible] annual [illegible] $[illegible] for each [illegible] section 6685.)

H. Foreign Organizations.—A foreign organization which has received substantially all of its support (other than gross investment income) from sources outside the United States will [illegible] be subject to the requirements of instructions "C" and "F" above.

RESEARCH CORPORATION 13-1963407
405 Lexington Avenue, New York, N. Y. 10017
FORM 990-AR INSTRUCTION C
Notice of Public Inspection on Private Foundation's Annual Reports
FOR THE FISCAL YEAR ENDED OCTOBER 31, 1976

The 1975 Annual Report of Research Corporation, a foundation for the advancement of science, is available at its principal office, 405 Lexington Avenue, New York, N. Y. , for inspection during regular business hours by any citizen who requests it within 180 days after the date of this publication.

James S. Coles, President

FOUNDATION ADVERTISING

PUBLISHED BY
THE NEW YORK LAW PUBLISHING COMPANY
NEW YORK N.Y.

WO 4-9400

F 10882

July 11 197[illegible]

Research Corporation

BILL TO * Research Corporation
405 Lexington Avenue
New York, N. Y. 10017
Attn: Richard S. Baldwi[illegible]

PAID
JUL 11 1977

TERMS NET [illegible] DAYS NO CASH DISCOUNT. MAKE CHECK PAYABLE TO THE NEW YORK LAW JOURNAL

STATE OF NEW YORK, }
County of New York, } ss:

Vincent J. DiTomasso, being duly sworn, says that he is the Principal Clerk of the Publisher of THE NEW YORK LAW JOURNAL, a Daily Newspaper printed and published in the County of New York; that the Advertisement hereto annexed has been regularly published in the said THE NEW YORK LAW JOURNAL one time, on the 11th day of July 1977

[signature]

AN ANNUAL REPORT OF RESEARCH CORPORATION, A FOUNDATION, for the fiscal year ended [illegible] is available at its principal office [illegible] at 405 Lexington Avenue New York, N. [illegible] for inspection during regular business hours [illegible] citizen who requests it within [illegible] days hereof. Principal Manager of the Foundation is JAMES S. COLES, President. Dated 7-11-77

Sworn to before me this 11th day of July 1977

[signature]
DOUGLAS P. NUCCITELLI
Notary Public, State of New York
No. 4524218
Qualified in Suffolk County
Commission Expires March 30, 1978

7510

Form 990-PF — Department of the Treasury, Internal Revenue Service

Return of Private Foundation Exempt from Income Tax

Under Section 6033(a) of the Internal Revenue Code

514930850000

1974

For the calendar year 1974, or taxable year beginning November 1, 1974 and ending October 31, 1975

Name of organization: RESEARCH CORPORATION

Address (number and street): 405 LEXINGTON AVENUE

City or town, State and ZIP code: NEW YORK, NEW YORK 10017

Employer identification number: 13-1963407

Date of exemption letter: October 28, 1954

Enter the name and address used on your return for 1973 (if the same as above, write "Same"): Same

The books are in care of ▶ Mr. Fred Lauro, Comptroller

Located at ▶ as above — Telephone No. 212-986-6622

Enter your principal activity codes from last page of instructions ▶ 6?? 0 1 2

Part I Analysis of Receipts and Expenditures (See Instructions for Part I)

	(A) Receipts and expenditures per books	(B) Computation of Net Investment Income	(C) Computation of Adjusted Net Income	(D) Disbursements for Exempt Purposes
Receipts				
1 Gross contributions, gifts, grants, etc. (see instructions)				
2 Contributions from split-interest trusts (see instructions)				
3 Gross dues and assessments				
4 Interest				
5 Dividends				
6 Gross rents and royalties				
7 Net gain or (loss) from sale of assets not in line 11				
8 Net capital gain (see instructions)				
9 Net short-term capital gain (see instructions)				
10 Income modifications (see instructions)				
11 Gross profit from any business activities: (Gross receipts $........ less cost of sales $........ see instructions)				
12 Other income (attach schedule)				
13 Total—add lines 1 through 12				
Expenditures				
14 Compensation of officers, etc. (see instructions)	ESTIMATED RETURN FISCAL YEAR ENDED OCT. 31, 1975			
15 Other salaries and wages				
16 (a) Pension plan contributions				
(b) Other employee benefits				
17 Investment, legal and other professional services				
18 Interest				
19 Taxes (see instructions)				
20 Depreciation, amortization, and depletion (see instructions)				
21 Rent				
22 Other expenses (attach schedule)				
23 Contributions, gifts, grants (see instructions)				
24 Total—add lines 14 through 23				
25 Line 13 less line 24: (a) Excess of receipts over expenditures				
(b) Net investment income				
(c) Adjusted net income (see instructions)				

Part II Excise Tax On Investment Income

1 Domestic organizations—enter 4% of line 25(b), Part I . . . ESTIMATED 80,000

2 Foreign organizations—(a) enter total of lines 4, 5, and 6, col. (B), Part I

(b) enter 4% of line 2(a)

3 Credits: (a) Foreign organizations—tax withheld at source

(b) Tax paid with application for extension of time to file (Form 2758)

4 Tax Due—line 1 or line 2(b) less line 3. Pay in full with return. Make check or money order payable to Internal Revenue Service. (Write employer identification number on check or money order) ▶ 80,000

5 Overpayment—line 3 less line 1 or line 2

Foreign organization—Enter book value $........ and fair market value $........ of investment assets held in U.S.

FILMED

REC'D WITH DEPOSIT ... 20 1976

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief it is true, correct, and complete. If prepared by a person other than taxpayer, his declaration is based on all information of which he has any knowledge.

March 5, 1976 — Bayard ... (signature) — Vice-President, Finance

Date — Signature of officer or trustee — Title

Date — Signature and Empl. Ident. or Soc. Sec. No. of preparer — Address of preparer

5 491 990

Form 990-PF — Return of Private Foundation Exempt from Income Tax

1974

Name of organization

Please type, print or attach label. See instruction

Address (number and street)

City or town, State and ZIP code

Enter the name and address used on ... reason.

The books are in care of ▶

Located at ▶

February 15, 1972

Part I Analysis of Receipts and Expenditures (See instructions for Part I)

	Line	Item	(B) Net investment income	(C) Adjusted net income	(D) Disbursements for exempt purposes
Receipts	1	Gross contributions, gifts, grants, etc. (see instructions)			
	2	Contributions from split-interest trusts (see instructions)	-0-		
	3	Gross dues and assessments			
	4	Interest	[illegible]	[illegible]	
	5	Dividends	[illegible]		
	6	Gross rents and royalties	[illegible]	[illegible]	
	7	Net gain or (loss) from sale of assets not in line 11			
	8	Net capital gain (see instructions)	[illegible].00		
	9	Net short-term capital gain (see instructions)		[illegible]	
	10	Income modifications (see instructions)		-0-	
	11	Gross profit from any business activities: (Gross receipts $ -0- less cost of sales $ -0- see instructions)			
	12	Other income (attach schedule)		-0-	
	13	Total—add lines 1 through 12		[illegible]	
Expenditures	14	Compensation of officers, etc. (see instructions)		[illegible]	213,440
	15	Other salaries and wages		[illegible],806	329,444
	16	(a) Pension plan contributions		[illegible],653	121,247
		(b) Other employee benefits		[illegible],728	29,877
	17	Investment, legal and other professional services		[illegible]	33,447
	18	Expenses related to NSF ...		[illegible]	-0-
	19	Taxes (see instructions)	[illegible]	26,671	25,088
	20	Depreciation, amortization, and depletion (see instructions)		5,322	
	21	Rent		[illegible]	43,610
	22	Other expenses (attach schedule)		[illegible]	255,041
	23	Contributions, gifts, grants (see instructions)			[illegible],262
	24	Total—add lines 14 through 23			[illegible],436

25 Line 13 less line 24: (a) Excess of receipts over expenditures

(b) Net investment income

(c) Adjusted net income (see instructions)

Part II Excise Tax On Investment Income

REC'D WITH REMITTANCE

1 Domestic organizations—enter 4% of line ..., Part I

2 Foreign organizations—(a) enter total of lines 4, 5, and 6, col. B, Part I

(b) enter 4% of line 2(a)

JUL 15 1976

3 Credits: (a) Foreign organizations—tax withheld at source

(b) Tax paid with application for extension of time to file

4 Tax Due—line 1 or line 2(b) less line 3

PSC PHILA. PA.

5 Overpayment—line 3 less line 1 or line 2

For 21 organization—Enter ... $

Date

Date

Signature ...

Form 990-PF (1974) Page 2

Part III Balance Sheets

	Beginning of Year (A) Amount	Beginning of Year (B) Total	End of Year (C) Amount	End of Year (D) Total
Assets				
1 Cash: (a) Savings and interest-bearing accounts				
(b) Other				
2 Accounts receivable net				
3 Notes receivable net (attach schedule)				
4 Inventories				
5 Gov't obligations: (a) U.S. and instrumentalities				
(b) State, subdivisions thereof, etc.				
6 Investments in nongovernment bonds, etc. (attach schedule)				
7 Investments in corporate stocks (attach schedule)				
8 Mortgage loans (number of loans .....)				
9 Other investments (attach schedule)				
10 Depreciable (depletable) assets (attach schedule):	PER SCHEDULE ATTACHED			
(a) Held for investment purposes				
(b) Less accumulated depreciation				
(c) Held for charitable purposes				
(d) Less accumulated depreciation				
11 Land: (a) Held for investment purposes				
(b) Held for charitable purposes				
12 Other assets (attach schedule)		42,423,366		39,954,347.
13 Total assets				
Liabilities				
14 Accounts payable				
15 Contributions, gifts, grants, etc., payable				
16 Mortgages and notes payable (attach schedule)				
17 Other liabilities (attach schedule)				0
18 Total liabilities				
Net Worth (Fund Balances)				
19 Principal Fund				
20 Income Fund				
21 Total Net Worth (Fund Balances)		39,801,656.		35,089,800
22 Total liabilities and Net Worth (line 18 plus line 21)		42,423,366		39,954,347.

Part IV Analysis of Changes in Net Worth

1 Total net worth at beginning of year—line 21, Column B, Part III	39,801,656
2 Enter amount from line 25(a), Part I	(1,731,856)
3 Other increases not included in line 2 (itemize):	
	-0-
4 Total of lines 1, 2, and 3	38,069,800
5 Decreases not included in line 2 (itemize):	
	-0-
6 Total net worth at end of year (line 4 less line 5)—line 21, Column D, Part III	

Part VII Statements with Respect to Certain Activities

(File Form 4720 if question J(2), K(2), or M(2) is answered "No," or question J(3), L(2), or M(1) or (2) is answered "Yes")

	Yes	No
A During the taxable year, have you (a) attempted to influence any national, State, or local legislation, or (b) participated or intervened in any political campaign?		X
If "Yes," attach a detailed description of such activities and copies of any materials published or distributed by the organization in connection with such activities.		
B Have you engaged in any activities which have not previously been reported to the Internal Revenue Service?		X
If "Yes," attach a detailed description of such activities.		
C Have any changes not previously reported to the Internal Revenue Service been made in your governing instrument, articles of incorporation, or bylaws, or other instruments of similar import?		X
If "Yes," attach a copy of the changes.		
D Have you filed a tax return on Form 990-T for this year?	X	
E Was there a substantial contraction during the year? If "Yes," attach a schedule for the disposition(s) for the year(s) showing type of asset disposed of, the date(s) disposed, the cost or other basis, the fair market value on date of disposition and the names and addresses of the recipients of the assets distributed. (See general instruction Q)		X
F Did you file the annual report required by section 6056 (see Form 990-AR for instructions)?	X	
G Are the requirements of section 508(e) (relating to governing instruments) satisfied? (See general instruction T)	X	
If "Yes," have such requirements been satisfied by: (1) Language in the governing instrument (original or as amended), or		X
(2) Enactment of State legislation effectively amending the governing instrument and the governing instrument contains no mandatory directions which are in conflict with such State legislation	X	
H (1) Enter the names of the States required to be listed by general instruction J STATE OF NEW YORK		
(2) Have you furnished a copy of Form 990-AR (or equivalent report) to the Attorney General of each State as required by general instruction K? If "No," attach explanation.	X	
I Are you claiming status as an operating foundation within the meaning of 4942(j)(3) for calendar year 1974 or fiscal year beginning in 1974? (see instructions for Part XII) If "Yes," complete Part XII.		X
J Self-dealing (section 4941): (1) Have you engaged in any of the following acts during the year either directly or indirectly, with one or more disqualified persons (see instruction ...)?		
(a) Sale, exc...		X
(b) Borrowin...	X	
(c) Furnishin...		X
(d) Payment ...	X	
(e) Transfer ... your income or assets ...		X
(f) Agreement ... than as a ... service if ... ed in section 4946(c)) other ... mination of his government		X
(2) If any of que... acts describe... you engaged excepted	X	
(3) Have you, in a ... years beginning ... and that were ... ed in acts of self dealing in ..., Part V, of the instructions,		X
K Taxes on failure t... as defined in 4942 ... operating foundation		
(1) Did you at th... able year(s) b... nd (c), Part XI) for tax-		X
If "Yes," inse...		
(2) If "Yes," to (1 ... of assets) with ... to incorrect valuation		
(3) If the provisio... years here and ... (1) above, list such		
L Taxes on excess bu... (1) Did you hold m... Part V "Definit... se (see instruction B,	X	
(2) If "Yes," have ... May 26, 1969, ... tax under sectio... ness enterprise since ... which are subject to		X
M Taxes on investmen... (1) Did you invest ... exempt purpose ... ng out of any of your		X
(2) Did you invest, ... the carrying our ... before the first ... nner as to jeopardize ... oved from jeopardy		X

Exempt Organization Master File
Edit Sheet

1	2	3	4	5	6
2	2	2	2	1	2

7	8	9	10	11	12
2	1	2	1	2	2

13	14	15	16	17	18
1	2	2		1	

19	20	21	22	23	24
2		2	2	1	1

25	26
2	

Form 5386 (2-75) Department of the Treasury Internal Revenue Service

Part VI Statement With Respect to Certain Activities (Continued)

	Yes	No
N Taxes on taxable expenditures (section 4945).		
(1) During the year did you pay, or incur a liability to pay for any of the following—		
(a) To carry on propaganda, or otherwise attempt to influence legislation by attempting to affect the opinion of the general public or any segment thereof or by communicating with any member or employee of a legislative body, or by communicating with any other government official or employee who may participate in the formulation of legislation		X
(b) To influence the outcome of any specific public election, or to carry on, directly or indirectly, any voter registration drive		X
(c) As a grant to an individual for travel, study, or other similar purposes by such individual	X	
(d) As a grant to an organization, other than a charitable, etc., organization described in paragraph (1), (2), or (3) of section 509(a) of the Code	X	
(e) For any purpose other than religious, charitable, scientific, literary or educational purposes or for the prevention of cruelty to children or animals		X
(2) If any of questions 1(a) through 1(e) is answered "Yes," were all of such transactions excepted transactions described in section F, Part V of the instructions?	X	
(3) With respect to part (1)(d) of this question, if you answered "Yes," did you apply the exception in item 13 of section F, Part V of the instructions? If "Yes," attach the statement required for such exception	X	

Part VII Statement With Respect to Contributors, Compensation, etc.

A Persons who Became Substantial Contributors in 1976 (if more space is needed, attach schedule)

Name	Address
NONE	

B. Compensation of Officers, Directors and Trustees for 1976

Name and Address	Social security number	Title	Time devoted to position	Compensation
PER SCHEDULE ATTACHED				
Total ►				

C. Compensation of Five Highest Paid Employees for 1976 (Other than included in B above—see instructions)

Name and address of employees paid more than $10,000	Social security number	Title	Compensation
NONE			

Total number of other employees paid over $30,000 ►

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Part VI-C (continued)

D. Five Highest Paid Persons for Professional Services for 1974 (See instructions)

Name and address of persons paid more than $30,000	Type of service
Cameron, Kerkam, Sutton, Stowell & Stowell 2341 Jefferson Davis Highwy, Arlington, Va. 22202	LEGAL
Cooper, Dunham, Clark, Griffin & Moran 30 Rockefeller Plaza, New York, N. Y. 10020	LEGAL
Behr & Woodbridge 221 Nassau Street, Princeton, N. J. 08540	LEGAL
Oblon, Fisher, Spivak, McClelland & Maier 1755 S. Jefferson Davis Highwy, Arlington, Va. 22202	LEGAL

Total number of others receiving over $30,000 for professional services ▶

Part VII Capital Gains and Losses for Tax on Investment Income

a Kind of property, indicate security, real estate or other (specify)	b Description (Examples 100 sh. of "Z" Co., 2 story brick, etc.)	c How acquired P—Purchase D—Donation	d Date acquired (mo., day, yr.)	e Date sold (mo., day, yr.)
1	SCHEDULE ATTACHED			

f Gross sales price	g Depreciation allowed (or allowable)	h Cost or other basis and expense of sale	i Gain or loss (f plus g less h)
	SCHEDULE ATTACHED		

Complete only for assets showing gain in column i and owned by the foundation on 12 31 69

j F.M.V. as of 12/31/69	k Adjusted basis as of 12/31/69	l Excess of col. i over col. k, if any	m Losses (from col. h) (excess of col. k over col. j, but not less than zero)
	SCHEDULE ATTACHED		

2 Net capital gain (loss). If gain, also enter on line 8, Part I

3 Net short term capital gain (loss) as defined in section 1222(5) and (6)

Part VIII Computation of Distributable Amount for 1974 (See instructions—not applicable to operating foundations)

1 Adjusted net income from line 25(c), Part I		[illegible]
2 Minimum investment return from line 6 or 7, Part IX		[illegible]
3 Enter the higher of line 1 or line 2		[illegible]326
4 Enter sum of: (a) Tax on investment income for 1974 from Part II	[illegible]	
(b) Income tax on unrelated business income for 1974 (Form 990-T)	-0-	53,[illegible]59
5 Distributable amount (line 3 less line 4)		3,[illegible],767
6 Adjustments to distributable amount (see instructions)		-0-
7 Distributable amount as adjusted (line 5 plus or minus line 6)—also enter on line 1, Part XI		3,[illegible],767

Part IX Minimum Investment Return for 1974 (Operating Foundations—See instructions)

1 Fair market value of assets not used (or held for use) directly in carrying out exempt purposes:	
(a) Monthly average of securities at fair market value	37,21[illegible],[illegible]00
(b) Monthly average of cash balances	[illegible]95,000
(c) Fair market value of all other assets (see instructions)	20,261,000
(d) Total (add lines (a), (b), and (c))	5[illegible],6[illegible]1,000
2 Acquisition indebtedness applicable to line 1 assets	-0-
3 Line 1(d) less line 2	57,6[illegible],000
4 Cash deemed held for charitable activities—enter 1½% of line 3 (for greater amount, see instructions)	[illegible]65,[illegible]65
5 Line 3 less line 4	56,[illegible],[illegible]35
6 (a) Organizations (other than operating foundations) organized after May 26, 1969 enter 6% of line 5	[illegible]
(b) All operating foundations enter 6% of line 5	[illegible]
7 Organizations (other than operating foundations) organized before May 27, 1969, enter 5.50% of line 5	3,[illegible]24,[illegible]2[illegible]

Part X Qualifying Distributions in 1974 (See instructions)

1 Amounts paid (including administrative expenses) to accomplish charitable, etc., purpose	
(a) Expenses, contributions, gifts, etc.—total from line 24, column (D), Part I	[illegible],2[illegible]4,[illegible]26
(b) Program related investments (see instructions)	-0-
2 Amounts paid to acquire assets used (or held for use) directly in carrying out charitable, etc., purposes	-0-
3 Amounts set aside for specific projects which are for charitable, etc., purposes	-0-
4 Total qualifying distributions made in 1974 (add lines 1, 2, and 3)	[illegible],2[illegible],[illegible]56

5 Special instructions for Private Foundations Filing Final Returns ONLY. If your remaining assets were distributed to one or more of the following types of organizations please show the type(s) of organization(s) by checking the appropriate box(es):

- (a) ☐ A church. Section 170(b)(1)(A)(i).
- (b) ☐ A school. Section 170(b)(1)(A)(ii). NOT APPLICABLE
- (c) ☐ A hospital. Section 170(b)(1)(A)(iii).
- (d) ☐ A medical research organization operated in conjunction with a hospital. Section 170(b)(1)(A)(iii).
- (e) ☐ An organization operated for the benefit of a college or university owned or operated by a Government unit. Section 170(b)(1)(A)(iv).
- (f) ☐ A Governmental unit. Section 170(b)(1)(A)(v).
- (g) ☐ An organization that normally receives a substantial part of its support from a Governmental unit or from the general public. Section 170(b)(1)(A)(vi).

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Part XIII Computation of Undistributed Income (See instructions)

	Corpus	Years Prior to 1973	1973	1974
1 Distributable amount for 1974 from Part VIII				
2 Undistributed income, if any, as of the end of 1974				
(a) Enter total for 1974				-0-
(b) For prior years:			-0-	
3 Excess distribution carryover, if any, to 1974				
(a) From 1969 1,142,502				
(b) From 1972 2,087,252				
(c) From 1973 1,210,025				
(d) From 1974 886,391				
(e) Total of 3(a) through (d)	5,326,170			
4 Qualifying distributions for 1974 (4,284,456)				
(a) Applied to 1973 (but not in excess of 2(a))			(-0-)	
(b) Applied to undistributed income of prior years (Election required)		(-0-)		
(c) Treated as distributions out of corpus (Election required)	-0-			
(d) Applied to 1974 distributable amount				(3,041,044)
(e) Remaining amount distributed out of corpus	1,243,412			
5 Excess distributions carryover applied to 1974	(-0-)		(-0-)	
(If an amount appears in the 1975 column the same amount must be shown in the corpus column of line 5)				
6 Enter the net total of each column as indicated below:				
(a) Corpus. Lines 3(e), 4(c) and 4(e) less line 5	6,569,582			
(b) Prior years undistributed income. Line 2(b) less line 4(b). This amount is taxable—File Form 4720		-0-		
(c) Undistributed income for 1973. Line 2(a) less line 4(a). This amount is taxable—File Form 4720			-0-	
(d) Undistributed income for 1974. Line 1 less lines 4(d) and 5. This amount must be distributed in 1975				-0-
7 Amounts treated as distributions out of corpus to satisfy requirements imposed by Code Sections 170 (b)(1)(E) or 4942(g)(3) (Election may be required)	(-0-)			
Pass through distributions (See instructions)				
8 Excess distributions carried forward. (Line 6(a) less line 7)	6,569,582			
9 Analysis of line 8:				
(a) Excess from 1969 1,142,502				
(b) Excess from 1972 2,087,252				
(c) Excess from 1973 1,210,025				
(d) Excess from 1974 886,391				
(e) Excess from 1975 1,243,412				
TOTAL 6,569,582				