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Transfer of Space Technology to the American Consumer: The Effect of NASA’s Patent Policy*  
Samuel I. Doctors†  

I. INTRODUCTION  

Each year the Federal Government now spends more for research and development . . . than it did in all the years from the time of the Revolution through the end of World War II . . . . But never . . . has so much money been spent by the Government with so little consideration for its ultimate social and economic consequences . . . . Billions of dollars go for research but mere fractions of mills for putting the product of this large scale inquiry to the good of the society at large.1  

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In fiscal 1966 the federal government financed at least $15.9 billion of research and development, or about 70% of the total research and development in the country. 15 NATIONAL SCIENCE FOUNDATION, FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND OTHER SCIENTIFIC ACTIVITIES 5 (1966) [hereinafter cited as 1966 NSF REPORT].  
If research and development plant and technical data activities are included, the National Science Foundation data indicates that a total of $17.6 billion was spent in research and development related activities. In 1940, 0.8% of the total federal budget was spent on science and technology; while in fiscal 1966 it is estimated that 15% of the total federal budget was spent on science and technology.  
Even the $17.6 billion figure probably considerably understaters federal spending for extramural research and development. The major procurement agencies fund a considerable amount of research and development through reimbursement of corporate spending for “independent research and development,” “product improvement,” and “bid-proposal” costs. The amount may be as high as 5% of contract sales to the federal government. The percentage is based not on the worth of the research and development contract, but on a percentage of total procurement sales to the federal government including research, development, and production. Hearings on S. 789, 1809, 1899 Before the Sub-Comm. on Patents, Trademarks, and Copyrights of the Senate Comm. on the Judiciary, 89th Cong., 1st Sess., pt. 2, at 400 (1965). The funding is negotiated with the particular agency or service that is the largest customer and is added to allowable overhead rates. See ASPR § 15-205 (Nov. 1963, rev. 3); NASA PR § 15.205-35 (Nov. 1965, rev. 6).  
It is very difficult to obtain reliable, accurate data as to the amounts actually paid to contractors for this in-house, indirectly funded research and development, since the total amount expended by any given company for independent research and development, product improvement,
During the past several years there has been a growing realization in this country that more should be done to promote the utilization by other segments of the economy of technology developed by federal agencies and their industrial partners.\(^2\) With the formation of a large-scale national space program under the National Aeronautics and Space Administration (NASA), particular concern has been expressed over the confinement of a very large portion of the nation's scientific and technical resources within just three mission-oriented federal agencies—the Department of Defense, the Atomic Energy Commission (AEC), and NASA.\(^3\) Assuming that for the foreseeable future the major portion of government sponsored research and development will continue to be conducted by these three agencies, the question of how to enhance technology transfer from the space-defense sector to other technologically advanced portions of the economy becomes very important.

The AEC and NASA have undertaken formal programs aimed at promoting the transfer of technology developed as a result of government sponsored research and development to and bid-proposal funds is considered highly proprietary. Government participation may run up to 80% or 90% of the total cost with the balance being funded from corporate "profits."

In fiscal 1962, this overhead funding was running at a rate of about 4.5% of the total Department of Defense procurement or about $0.9 billion.

The significance of this overhead research and development funding is that it apparently represents a significant share of all research and development spending attributed to private companies working for the Department of Defense and NASA. Yet private research and development funding is often cited as the reason for granting to federal contractors rights to patentable items discovered in the course of federal contract work and for minimizing their responsibility to report information not specifically required to fulfill the given contract. Even when reported the information is often limited in distribution and availability.


Whether such overhead research and development funding is considered public or private, the policies associated with its use may need to be reexamined in light of their implications for overall economic progress rather than solely in light of the narrow mission objectives of the Department of Defense. See notes 33 & 42 infra.


3. The Department of Defense, NASA, and the AEC procure over 85% of the federal government's research and development. See 1966 NSF Report, supra note 1.
sectors of the economy outside the space-defense milieu. On the other hand, the Department of Defense has sought to minimize disclosure of research and development results thereby hindering any such transfer. Although the application of much of the research and development performed under the auspices of these three agencies may be limited to the immediate technological application, nevertheless, as long as the bulk of the research and development resources of this country are expended by these three federal agencies, methods of improving their rates of technology transfer to other sectors should be investigated. Because a full blown analysis of technology transfer in the federal agency setting is beyond the scope of this Article, attention will be directed only to the influence that a government agency’s patent policy may have on the transfer of technology developed by that agency. While patentable items form only a small por-

4. Solo, supra note 1, at 280. The Department of Defense has been primarily concerned with its mission goals and has paid little attention to the possibility of economic gain from technology transfer, assuming that its contractors would commercialize as much of their work product as they thought appropriate. Since Department of Defense procurement dwarfs all other science agency budgets, it is likely that the Department’s policies play a large role in influencing contractor reaction to NASA’s attempts to establish a program for transfer.


It has also been argued that not only has military-generated technology been of limited use to the civilian economy, but that the transfer of technology from the space-defense sector is growing more difficult than it was in the days of simpler weapon systems. Solo, Gearing Military Research and Development to Economic Growth, 1982 Harv. Bus. Rev. 49.

6. Some indication of the disparity between the total amount of technology available for transfer and the number of patentable items
tion of the total technology developed by an agency, their transfer is more easily measured than that of nonpatentable technology since these items are well documented and their use can be more readily traced. This element of measurable feedback is most important in evaluating any program of technology transfer, since so little is presently known about the actual process of transfer.7

Broadly speaking, a patent policy may influence a technology transfer program in one of two alternative ways. A liberal or "license" patent policy—one that allows government contractors to retain title to all or most patentable inventions discovered in the course of government sponsored research and development—may act as an incentive to contractors to disclose inventions to the government. The rationale behind such a policy is that, if a contractor knows that he will obtain patent rights to his innovation, he will report it so that he may reap the patent-monopoly profits. Such reporting may be termed the "input" function in a technology transfer program. On the other hand, a "strict title" policy—one in which the government retains title to any patentable inventions—frees the device for all to use, since government-held patents are generally available for licensing to all.8 The rationale behind the "strict title" policy is that if no one has a right to exclude others, the technology will be as widely disseminated as possible. This may be termed patent policy's influence on the "output" function in a technology transfer program.

This is admittedly a highly simplified conceptualization, but it serves to illustrate the basic tension in the relationship of patent policy to technology transfer: the greater the patent incentive provided to contractors to disclose new innovations, necessarily the less available the device will be for transfer. Of course, if an inventor-contractor himself commercially develops the device to which he was accorded the patent rights, he

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8. See Tektronix Inc. v. United States, 351 F.2d 630 (Ct. Cl. 1965).
bypasses the technology transfer system in the sense that he transfers the device to another sector within his own company. Hence, it may be argued that not only does the contractor-take-all policy encourage reporting, but also that it makes elaborate systems to transfer technology unnecessary, since the contractor himself will commercially apply the device. However, the experience of the government indicates that freely giving contractors patent rights to inventions is not a significant element in motivating utilization. Therefore, it would seem that agency policy should not favor the contractor-inventor in the grant of patent rights unless the contractor is able to demonstrate intra-company utilization.

Since NASA's policies present the best current example of an attempt to reconcile the basic tension described, its patent policy has been chosen for discussion. NASA, among all federal agencies, has devised such a policy not only because it is one of the three largest research and development sponsoring agencies, but also because, outside of the Department of Agriculture, it has the most ambitious program of any government agency for the dissemination of technology. NASA's formal program, the NASA Technology Utilization Program, affects both the acquisition (input function) and the dissemination (output function) of technology generated by NASA sponsored research and development. NASA's patent policies are an integral part of both functions of this program.

II. PATENT POLICY AND THE INPUT FUNCTION

A. Advance Waivers Under the Space Act

Before technology developed under a government contract can be transferred it must be reported to the sponsoring government agency. Beginning in 1962 NASA inserted in its research and development contracts a “New Technology Clause” requiring the reporting to NASA of any innovation developed in the

9. See notes 42-54 infra and accompanying text.
10. Most other agencies with “dissemination programs” merely maintain a library type of operation. The larger exceptions, aside from NASA, are the AEC's Industrial Cooperation Program aimed at promoting civilian use of atomic energy and the State Technical Services Program of the Department of Commerce, which was recently initiated to promote the more widespread use of new technology.
11. The Technology Utilization Program is administered by the NASA Office of Technology Utilization through its Regional Dissemination Centers.
course of research and development work. Beyond the contractual obligation to report imposed on contractors by this clause, NASA has attempted to encourage reporting by waiving its patent rights to any innovation to contractors who apply for such waivers. Current NASA regulations permit three types of waiver: (1) a blanket waiver prior to contract initiation; (2) a blanket waiver within sixty days of the execution of the contract; (3) a waiver for particular innovations after they have been identified and reported.

The congressional mandate for such waiver authority, it is argued, may be found in section 305(a) of the Space Act, which provides that inventions made by NASA contractors in the course of their work “shall be the exclusive property of the United States ...” unless the Administrator waives the government’s rights. Section 305(f) states that the Administrator may waive all or any part of the rights of the United States under this section with respect to any invention or class of inventions made or which may be made by any person or class of persons ... if the Administrator determines that the interests of the United States will be served thereby.

However, there is considerable dispute over just what policy Congress had in mind when it passed section 305. One study has concluded that Congress neither intended presumptively to vest

12. NASA PR § 9.101-4 (1966). Section 305(b) of the Space Act, 42 U.S.C. § 2457(b) (1964), requires that such clauses be inserted in NASA research and development contracts. NASA’s original clause was patterned after similar sections of Armed Services Procurement Regulations § IX (now § 9.200, April 1965, rev. 10).
15. 14 C.F.R. § 1245.106(a) (1967).
17. Id. § 2457(f).

Congress has seriously considered this matter. In 1958 when it passed the Space Act, it provided in section 305 that the Government was to take title to these patents, except in the unusual and exceptional case. . . .

NASA was apparently unhappy with this congressional policy, however. Twice it sought changes in section 305 to
title in the government nor presumptively to waive title; but rather intended to provide for a "flexible" policy. This seems to indicate that Congress preferred to leave detailed elaboration to the Administrator.

One may refer to the words "or class of inventions made or which may be made . . ." in section 305 for support of the Administrator's authority to grant blanket waivers in advance of the identification of any particular invention. However, a "class of inventions" does not necessarily mean any invention which may occur in the course of a large government sponsored research project. The words "which may be made" are certainly not conclusive either, since Congress could have been referring to inventions which might be made after the Act was passed. NASA has also relied in part on the President's Patent Policy Statement of 1963 for its rights to grant blanket waivers. It was asserted there that where the subject matter of the contract is within "an area in which the contractor has an established nongovernmental commercial position, the contractor shall normally acquire the principal or exclusive rights throughout the world in and to any resulting inventions . . . ." Although this statement by inference appears to contemplate blanket waivers of title at or before contract initiation, any reliance by NASA on it is ill-founded. Clearly such a statement of policy made

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22. In attempting to devise a consistent if nonuniform government patent policy, the statement contemplates three different situations: 1) cases where the best interests of the public would be served by retention of exclusive rights in the government; 2) cases "where the purpose of the contract is to build upon existing knowledge or technology . . . .," in which case the contractor should be allowed the patent, and 3) cases "where the commercial interests of the contractor are not sufficiently established to be covered by . . . [2] above, [in which cases] the determination of rights shall be made by the agency after the invention has been identified. . . ." 28 Fed. Reg. at 10,945 (1963). By implication,
by the executive to all government agencies in general is not very persuasive of congressional intent with regard to a particular agency such as NASA.\textsuperscript{23}

Whether or not NASA has the authority to grant advance waivers is less significant than the effect of the inadequate congressional guidelines on agency administration of patent regulations. On the one hand, NASA continually seeks to convince its congressional critics that, while its promulgated regulations may appear unduly liberal, there is in practice little deviation from an AEC-type\textsuperscript{24} practice.\textsuperscript{25} On the other hand, it seeks to convince contractors that its blanket waiver provisions are an important incentive to report their inventions to NASA. Maintenance of this dual policy has apparently failed to achieve either objective.\textsuperscript{26}

B. ADVANCE WAIVERS, WAIVERS, AND LICENSES AS INCENTIVES TO REPORT

The justification for the granting of advance waivers is that they “create a positive and selfserving incentive for the contractor to prepare and submit . . . reports”\textsuperscript{27} thereby creating an input into NASA’s technology bank for its Technology Utilization Program. However, the same can also be said for waivers granted on particular inventions after they have been identified because the contractor will be motivated to report by the belief that he will receive a waiver. NASA’s guarantee of an irrevocable, nonexclusive, royalty-free license to any contractor.

\textsuperscript{23} In addition, waiver of these patent rights by NASA is arguably a “disposal of property” within art. IV, § 3 of the United States Constitution. See notes 90–94 infra and accompanying text for a discussion of this issue. If this is the case, only Congress can authorize such waivers.

\textsuperscript{24} The AEC retains title to nearly all of the innovations spawned by its research and development funds.

\textsuperscript{25} Examples of this dual policy may be found by contrasting the official NASA annual review, \textit{A Review of NASA’s Patent Program} for 1967, with a statement delivered to NASA contractors by NASA’s Chief Patent Counsel, Robert F. Allnutt, (Feb. 1966). At page 28, the former document states that

Of all contractor inventions reported, commercial rights have been waived in less than 4% of the cases, and advance waivers have been granted or recommended in only 118 contracts out of almost 13,200 contracts and subcontracts awarded by NASA since the advance waiver policy was established.

However, these low percentages are due to the fact that few contractors apply for waivers. Of those who do apply, 81% obtain regular waivers, and 42% receive advance waivers. See note 28 infra.

\textsuperscript{26} See note 18 supra.

\textsuperscript{27} NASA, \textit{A Review of NASA’s Patent Program} 22 (1967).
who reports an innovation which is eventually patented\(^2\) is also considered an incentive to report. The rationale here is that so long as the contractor knows that he can use the device, he will not be deterred from disclosing it.

However, none of these incentives appears to have had any noticeable effect on contractor reporting. Initially it should be noted that the number of patent applications arising out of government financed research and development is generally much smaller than the number of such applications generated by private research and development in the same research area. One study comparing research and development in electronics capital goods done for the Department of Defense, with privately financed research and development in that field, showed that a billion dollars of privately financed research and development yielded about 9,000 patent applications, while a billion dollars of government financed research and development yielded only about 760 patent applications.\(^2\)

In addition, there is no apparent correlation between present agency patent policies and disclosure rates. The Department of Defense, which allows its research and development contractors to take title to all innovations, has both the highest disclosure rate—the Navy with 1,653 disclosures per billion dollars of research and development—and almost the lowest—the Air Force with 657 disclosures per billion dollars.\(^3\) The AEC, which retains title to almost all patents on contractors' inventions, has one of the highest disclosure rates, 1,613 disclosures per billion dollars,\(^3\) while NASA, with a fairly liberal patent policy, is near the bottom with 610 disclosures per billion dollars.\(^3\) However,

\(^2\) C.F.R. § 1245.113 (1967).
\(^3\) Freeman, Research and Development in Electronics Capital Goods, in NATIONAL INSTITUTE ECONOMICS REVIEW 73 (1965). While lack of motivation in carrying an idea through to the point of commercial practice may account for much of this discrepancy, lack of reporting must also be a substantial factor.
\(^3\) FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY, ANNUAL REPORT ON GOVERNMENT PATENT POLICY 25-37 (1966) (these figures are for fiscal 1965).

### Estimated Extramural Research and Development

<table>
<thead>
<tr>
<th>Year</th>
<th>Contractor Disclosures</th>
<th>Expenditures in billions</th>
<th>Disclosures per billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>1203</td>
<td>3.107</td>
<td>400</td>
</tr>
<tr>
<td>1965</td>
<td>2094</td>
<td>3.429</td>
<td>630</td>
</tr>
<tr>
<td>1966</td>
<td>3310</td>
<td>4.20</td>
<td>788</td>
</tr>
<tr>
<td>Total</td>
<td>6607</td>
<td>10.736</td>
<td>Average: 620</td>
</tr>
</tbody>
</table>
with the sole exception of NASA, whose present policies have been operative only since 1964, these agencies have not established or administered patent policies with a view to maximizing transfer. Rather, they have established them to fulfill the mission requirements of each agency.

NASA's lower rate of reporting might be accounted for by the rapid initiation of its program, its esoteric technology, its emphasis on increments in precision rather than on new devices, and its highly mission-oriented research and development. But if explanations are to be sought in the peculiar nature of NASA research and development, it must be noted that NASA contractors disclose significantly less often than do NASA employees. NASA contractors, however, have probably done more of the basic construction work (out of which few innovations would come) than have NASA employees.

In addition, seventy per cent of NASA's research and development funds are spent on the Apollo program for which North American Aviation is the largest prime contractor. While prime contractors are obligated to impose the New Technology Clause on first tier subcontractors, there is no provision of penalties for lack of compliance by subcontractors, nor does the prime contractor have any incentive to enforce the clause against his subcontractors. By contracting for so much of its research and development through Apollo, and most of that through one large prime contractor, NASA probably has a greater proportion of its work done by the less reporting-oriented subcontractors than either of the other agencies.

Whatever the causes of NASA's peculiarly low rate of reporting, the important fact is that agency patent policy has

33. The Department of Defense has long been indifferent to contractor reporting, receiving less than 40% of the reports that are by-products of its research and development programs. The President's Science Advisory Committee, Science, Government, and Information (Jan. 10, 1963) (commonly known as the Weinberg Report). Because NASA contractors are often also contractors with the Department of Defense, the impact of NASA's uniquely heavy emphasis on contractor reporting may have been diluted by contractor inertia.

34. Professor Solo found that for the period 1958-1965, NASA employees reported nearly twice as many inventions per employee as did contractors' employees (where "employee" was defined as being a scientist or engineer). On the other hand, for 1965 itself, the rate of reporting was about equal. Solo, Invention Under NASA-Sponsored Research and Development 14 (1966) (part II of a working paper for NASA). The Watson and Holman conclusions are similar. Watson & Holman 35-36.

35. 1966 NSF Report supra note 1, at 3.
been virtually irrelevant to the reporting function. The hypothesis that granting patent rights to a contractor will lead him to report is not supported by available data. Actually contractors are relatively indifferent to whether or not patent rights are granted. In the contract negotiation process, the price does not appear to be dependent upon whether a waiver of patent rights is granted. Moreover, few NASA contractors have ever bothered to apply for waivers, either in advance of contract execution or after a particular device has been reported.

This contractor indifference might be explained by the uncertainty of the rewards. When the contractor acquires rights in a research and development contract, he has no idea what the patent potential of the contract is—i.e., the number of patents the contract will ultimately yield, the value of any patents actually resulting from the contract, or the date on which he can expect any benefits to be realized. Probably more important is the fact that NASA retains a nonexclusive, royalty-free license to use any device to which it waives title for government work. This means that in bidding for future government contracts the patent has no value, since any contractor awarded such a contract can use the device without applying for a license or paying royalties. On the other hand, if a contractor does

36. WATSON & HOLMAN 163. See also Solo, supra note 34, at 41: The strongest impression to be gotten from an examination of the record of waived inventions is of the indifference, the general, pervasive, the sometimes absolute indifference on the part of the contractor to the commercial potentialities of inventions made under government research and development contracts.

37. Of 8,065 reported inventions as of December 31, 1966, contractors petitioned for waivers on 428 items, or 5% of those available. Of 13,200 prime contracts or first or second tier subcontracts, advance waivers were requested in 341, or 2.5% of the cases. NASA, A REVIEW OF NASA'S PATENT PROGRAM 28 (1967).

38. WATSON & HOLMAN 164.


40. Abolishing this reserved license would not give the contractor any less incentive because even patents which are the product of private research and development are irrelevant to a contractor's bidding strategy. The Comptroller General's construction of 28 U.S.C. § 1298 (1964) has led government procurement agencies to disregard any possible patent infringements in selecting among bids and proposals. Herbert Cooper, B-135916 (Aug. 28, 1959). See generally Mossinghoff & Altnutt, Patent Infringement in Government Procurement: A Remedy Without a Right?, 42 NOTRE DAME LAW. 5 (1966). If the decision of the Comptroller General in Herbert Cooper were reversed, then it is arguable that the government retained license should also be abolished. This would give an innovating contractor an additional incentive to report by insuring that he will be the only one able to use this innovation in
not report his innovations he can reveal them in later bids and proposals as being useful in future government work. In this way failure to report may give him an advantage over his competitors when the next government research and development contract is let.

Also, where a number of inventions may have arisen partly from NASA funding and partly from research and development sponsored by the Department of Defense, a contractor may report his invention only to the Department since he can obtain title to Department of Defense supported inventions almost as a matter of course.\textsuperscript{41} Since projects sponsored by NASA and the Department of Defense may overlap and even use the same technologists at different times, it is often quite difficult to determine which agency funding is primarily responsible for any given invention. Thus, a contractor may follow his self-interest by not reporting it to NASA and still not believe that he has acted dishonestly or illegally.

Finally, there is no reporting requirement for any inventions produced under independent or overhead research and development funding which is responsible for a significant number of innovations.\textsuperscript{42}

C. Contractor Utilization of Waived Inventions

As observed in the introduction, to the extent that contractors themselves commercialize inventions on which they are given patent rights, a formal technology transfer system is bypassed in that transfer has already been accomplished within one company. Thus the additional factor of intracompany transfer must


\textsuperscript{42} See generally Sherwin & Isenson, First Interim Report on Project Hindsight (Summary, June 30, 1966; revised Oct. 13, 1966, N. AD 642-400). "Independent research and development" or "overhead" research and development is funded by federal agencies (notably the Department of Defense and NASA) on the theory that higher commercial corporate profits are not available to the space-defense contractor to reinvest in "company" research and development, and that such investment is essential to maintain a competitive position in the rapidly changing technological space-defense market. Letter to the General Accounting Office Explaining Department of Defense Policy as to Research and Development (Jan. 29, 1965). Although federally reimbursed, contractors are not required to disclose results to government agencies. NASA PR § 9.101-7 (Nov. 1965, rev. 6).
be weighed in determining the desirability of a liberal waiver policy.

The overall utilization rate of inventions to which NASA has waived title is thought to be about 11.5 per cent. Estimated rates for federal research generally have been seven to thirteen per cent. But "utilization" can be an elusive concept. If it means the number of inventions successfully applied commercially, rather than the number of inventions on which commercial development has merely taken place, then only seven inventions can be said to have been commercialized by NASA contractors between 1959 and 1965. This represents about 4.5 per cent of the number of waivers granted in that period. These extremely low figures should be contrasted with the estimated sixty per cent commercial utilization of patents resulting from private research and development.

These figures must be received with some reservation. For one thing NASA is of relatively recent origin, and commercial development of a device may take considerably longer than the present duration of NASA's existence. Also, it is no doubt true that government sponsored research produces innovations which are more expensive to develop commercially than those which are the product of private research. Still, NASA's rate is unquestionably low.

It is possible that the rate would be even lower had NASA not attempted, in its advance waiver regulations, to distinguish between contractors having the potential to utilize their inventions and those lacking such potential. Since only the former are likely to be encouraged to report by the incentives of patent rights and waivers and, by definition, only the former are likely themselves to commercialize the invention, NASA requires that

43. WATSON & HOLMAN 148-49.
44. See note 4 supra.
45. Solo, supra note 34, at 34.
46. Watson, Bright & Burns, supra note 5, at 377.
47. While the development rate varies enormously depending on the innovation, a rough guide would be 14 years or longer from conception to industrial applications. See LYNN, AN INVESTIGATION OF THE RATE OF DEVELOPMENT AND DIFFUSION OF TECHNOLOGY IN OUR MODERN INDUSTRIAL SOCIETY (1958); 1 NATIONAL COMMISSION ON TECHNOLOGY, AUTOMATION, AND ECONOMIC PROGRESS, TECHNOLOGY AND THE AMERICAN ECONOMY 1, 4 (1966); Holman, The Utilization of Government-Owned Patented Inventions, 7 IDEA 109, 130, 131 nn.22, 23 (1963); Mansfield, Diffusion of Technological Change, in NSF'S REVIEWS OF DATA ON RESEARCH AND DEVELOPMENT (1961).
48. NATIONAL PLANNING ASSOCIATION, TECHNOLOGY TRANSFER AND INDUSTRIAL INNOVATION (1967).
the contractor have an established nongovernmental commercial position in the area of work called for by the contract before an advance waiver is granted.49

Even with this limitation of “commercial position,” advance waivers are a very blunt instrument when compared with waivers on particular inventions. When waivers are granted only on particular inventions some assessment can be made of an individual contractor’s ability to develop that invention. However, this kind of judgment is impossible for advance waivers because one cannot predict what inventions may originate as byproducts of any given research and development. Many inventions to which contractors retain title under advance waiver probably do not relate in any meaningful way to the contractor’s “established commercial position.”

Not only is the “established commercial position” distinction nearly meaningless when applied to advance waivers, but the distinction taken by itself is not a very useful one, since the term “established commercial position” is very difficult to define. Taken literally, one supposes that General Electric, General Motors, and other industrial giants will be able to show an established commercial position in many fields, whereas smaller companies may not. But the large corporations, and the large aerospace corporations in particular, appear to show a very low utilization rate, whereas smaller companies appear to commercialize the technology developed under federal funding more readily. The aerospace divisions of large diversified corporations and aerospace companies act similarly when it comes to utilization of NASA inventions, in that there appears to be very little intracompany transfer between the military-space divisions and their commercial counterparts.50 Consequently, although aerospace companies and aerospace divisions of large corporations received over ninety per cent of the prime contracts with NASA,51 by January 1, 1966, they had obtained waivers on only ninety-seven inventions, compared to the fifty-two waived inventions.

49. 14 C.F.R. § 1245.104(a) (6) (1967).
50. PECK & SHERER, THE WEAPONS ACQUISITIONS PROCESS—AN ECONOMIC ANALYSIS 128-37 (1962). Aside from possible physical isolation of the various divisions, the managers of large aerospace divisions or subsidiaries act as “profit centers” in that maximum personal advancement comes from division or subsidiary profits, not from reporting new innovations to other divisions or subsidiaries of the same company.
51. NASA-supplied data indicates that over 90% of the research and development funding in fiscal 1965 was given to corporations listed among the 500 largest by Fortune, and most of these were among the 100 largest.
tions held by smaller companies. More importantly, of these ninety-seven inventions only nine are in commercial use, or about nine per cent. An equal number of innovations is being commercially used by small companies, which is about seventeen per cent of waivers held by these companies. While the numbers are small, they substantiate to some extent the thesis that greater commercialization is undertaken by smaller companies. Further substantiation is provided by several studies which have shown that smaller companies tend to be more innovative generally and, in particular, tend to have less difficulty than do large aerospace contractors in transferring space-defense technology to their civilian operations.

Therefore, the regulations should distinguish between companies with demonstrated commercialization capability, including a genuine intent to commercialize, and those without such capability or intent. There is no need to provide explicitly that small companies should be given a preference. Rather, if the above thesis is correct, the smaller contractors will automatically receive a larger number of waivers simply because they appear to be more innovative and more successful in commercializing space-defense technology. Finally, the distinction is reasonable only when applied to waivers on individual inventions. Advance waivers must be abolished if the regulations adopt such a distinction.

An aid to making such a distinction would be the placement of Technology Utilization personnel in positions to advise on or actually render the initial decisions on applications for waivers. The petitions for waiver are currently processed through the NASA Inventions Contributions Board, which, since

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52. Watson & Holman 150.
53. Id.
55. Roberts & Wainer, The New Entrepreneurs (a forthcoming book by two MIT professors on MIT spin-off firms); Shimshoni, Aspects of Scientific Entrepreneurship, May 1966 (Doctoral Thesis, Harvard Graduate School of Arts and Sciences). The spin-off firms studied by Roberts, Wainer, and Shimshoni reported 40% of their sales were in the commercial market after 5 years, as compared with little or no commercialization of space-defense technology by the large space-defense contractors. But U.S. Arms Control and Disarmament Agency, Defense Industry Diversification (1966) argues that some large aerospace firms have been moderately successful at transferring their space-defense developed technology to commercial operations.
the personnel of the Board have little contact with the companies applying for waivers, is unlikely to have the necessary expertise to determine whether a contractor has a genuine intent to commercialize.

Technology Utilization personnel would bring to the waiver decision process more knowledge of company utilization and more experience with particular companies; they would also add a "technology transfer outlook" to the processing of waivers which Board members are not likely to have. With such personnel in almost continual contact with most NASA contractors and with their interest in promoting commercialization, it is likely that they would be in an excellent position to make an initial assessment of the petition, subject to review by the Inventions Contributions Board.

D. WAIVER AS A BARRIER TO COMMERCIALIZATION BY OTHERS

While a liberal waiver policy does not seem to encourage reporting or direct commercialization by the innovating contractor, it does have a negative impact on the output function. Whenever NASA waives its right to an invention, the resulting patent remains with the innovating contractor and necessarily discourages others from using or developing the device. NASA has taken several steps to minimize this obstruction in the transfer system. The first is the decision of NASA to grant advance waivers only to firms showing an established commercial position. This increases the number of inventions available for use by non-NASA contractors. Furthermore, if the distinction, which was recommended previously, is drawn so that waiv-

56. Nor does a liberal waiver policy seem to provide the basis for another justification often advanced in its favor, namely, that by waiving rights the "best" contractors will be obtained by the government or that contractors will be encouraged to assign more creative personnel for government sponsored work. While examination of these justifications is beyond the scope of this Article, there is no evidence that the AEC or NASA obtains lesser efforts from contractors than does the Department of Defense. See Hearings on Patent Policies of Government Departments and Agencies Before the Senate Subcomm. on Monopoly of the Select Comm. on Small Business, 86th Cong., 2d Sess. (1960); Hearings Before the Subcomm. on Monopoly of the Senate Select Comm. on Small Business, The Effect of Government Patent Policies on Competition, Monopoly, Economic Growth and Small Business, 87th Cong., 2d Sess.; Ownership of Inventions Developed in the Course of Federal Space Research Contracts 11, 12-27, (Comm. Print 1962); Watson & Holman 142-88; but see Holst, Government Patent Policy—Its Impact on Contractor Cooperation and Widespread Use of Government Sponsored Technology, 9 IDEA 273, 274 (1965).
ers are granted only to firms with demonstrated capacity and intent to utilize particular innovations, then the obstruction to transfer represented by waivers would be removed.

Secondly, NASA has attempted to minimize this obstruction by attaching a number of conditions to its waivers in the form of "march-in" rights, which provide that the innovating contractor's title will revert to NASA if: the invention is not brought "to the point of practical application" within three years of the granting of a United States patent; the patent is needed for public health; or the contractor has refused to license any responsible applicant, either royalty-free or at reasonable royalties, more than three years after he has obtained a United States patent.57

NASA has revoked twenty-three waivers on single inventions,58 but has not divested a contractor of title to any invention held under an advance waiver. Since it has been barely three years since these regulations were adopted, this low revocation rate, as compared to the very high nonutilization rate, is perhaps not too unreasonable. However, it appears unlikely that NASA will expend the necessary resources to keep track of the state of development of all its waived inventions, and it seems even more improbable that NASA will be inclined to disrupt harmonious contractor relationships with many revocations.59 These provisions will probably be invoked, if at all, only at the urging of a third party interested in the device.

A related question is what happens to the license granted the inventor-contractor should his patent rights be revoked. NASA regulations describe such licenses as being "irrevocable."60 The Patent Council's Office interprets this as meaning that even if the patent is revoked, the contractor still retains his royalty-free, nonexclusive license. Such an interpretation

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58. As of Jan. 1, 1967 there were 267 waivers granted on individual inventions; therefore, revocation of 23 of them is about 9% of the total. There were also, as of Jan. 1, 1967, 53 inventions held under advance waivers. If these are included, NASA revocations represent about 7% of waived inventions. NASA, A REVIEW OF NASA's PATENT PROGRAM 28 (1967).
59. President Eisenhower observed that it appeared that the interests of the government agencies and the space-defense industries were closely allied. Address from the White House (Jan. 19, 1961). But see Scherer, THE WEAPONS ACQUISITIONS PROCESS 114-17 (1964), in regard to the Army's efforts to force Douglas Aircraft to disclose company know-how for use in "break-out" of Honest John missile production.
60. 14 C.F.R. § 1245.113 (1967).
presents an unnecessary barrier to utilization of the device, since NASA may later wish to grant an exclusive license to a third party as an incentive to commercialize the innovation. If the contractor has retained his nonexclusive license, the "exclusive" commercial rights granted to the third party are not really exclusive, and the latter will know that if he develops the device and makes it successful, another may take advantage of his development work. Furthermore, this license may undercut the contractor's incentive to commercialize since he knows that even if he fails to put forth his best efforts, he retains a potentially valuable nuisance interest.

If NASA ceased to grant these licenses automatically to inventing contractors, the advantage to the output side could arguably be overbalanced by the disadvantage to the input side in the form of a reduced incentive to report. However, if NASA makes it clear that any inventing contractor who can show commercial interest and potential for any one of his inventions may obtain a waiver thereto, then the unavailability of the license should make little difference. A contractor is encouraged to report by the present license policy only if he himself wants to utilize the device commercially. If he can obtain the patent in that case, he has no need of the license.

But since NASA patent policy exists in an industrial milieu created and dominated by the Department of Defense, it is unlikely that more than marginal improvement in contractor reporting rates can be expected unless the Defense Department also adopts a policy of selective grant of title to contractors based on their intent to commercialize. Nevertheless, NASA as the leader among federal agencies in promoting technology transfer appears to have an implied duty to formulate and administer a policy designed to maximize transfer within its present operational context.

E. ALTERNATIVE INCENTIVES TO REPORT

If advance waivers are abolished, irrevocable licenses terminated, and regular waivers administered so as to allow title to vest in innovating contractors only where they can demonstrate commercial potential, the incentive for contractors to report will be only slightly less than at present. Presently, patent rights act as an incentive to report only where commercial rights are important, and it is in just those situations that the

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61. See notes 32-36 supra and accompanying text.
above recommendations would allow a waiver of those rights.

However, as previously indicated, a liberal waiver policy and the contractual penalties imposed by the New Technology Clause have been ineffective in promoting reporting. Therefore, some other means will have to be used to encourage contractor disclosure. Although a comprehensive examination of this topic is beyond the scope of this Article, a brief mention of several possible approaches, as yet untried or only partially tried, will be made.

NASA could institute a program of payments to reward contractors' employees for discovering and reporting useful innovations. Thus far, NASA has not initiated such a program with any of its contractors, although authority to do so exists under section 306 of the Space Act. However, NASA has maintained an award system for its own employees, whose disclosure rate is much higher than that of contractors' employees.

A related suggestion is that NASA seek to channel reports directly from contractors' employees to the NASA Technology Utilization Program, thus bypassing company channels. Although individual inventors are already motivated to disclose inventions to enhance their professional prestige, the recognition by higher administrative officials in the company, including patent counsel, of the company's interest not to disclose whatever can successfully be hidden acts as a barrier to disclosure. A direct channel from the employee-inventor to NASA would eliminate this barrier.

NASA could also keep track of the rates of disclosure for its various contractors. Current records show that the rates vary much more than can be justified entirely by differing types of research and development work. By keeping such records, and referring to them when a contractor seeks a new government project, some incentive to report could perhaps be created.

Finally, NASA could make payments to its contractors to enable them to initiate intracompany technology utilization pro-

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62. 42 U.S.C. § 2458 (1964). This possibility was studied for NASA. Ebenstein, NASA Inventions and Contributions Awards Program, Aug. 19, 1966 (internal NASA memo). NASA has very recently issued regulations indicating the award program has been extended to contractor employees, 32 Fed. Reg. 11,262 (1967), although actual implementation appears to be moving slowly.
63. See note 34 supra.
64. Solo, supra note 34, pt. 3, at 9.
65. Id. pt. 2, at 16.
grams. Presumably this would involve the assignment of several company engineers to monitor the research of other employees for reportable items. NASA has funded one such program with its largest contractor, North American Aviation. The rate of reporting for North American went up by a factor of eight in the first year after payment, although the quality of these disclosures may not have increased.

III. PATENT POLICY AND THE OUTPUT FUNCTION

A. NASA LICENSE POLICY

A major effect of an agency's patent policy on the output function has already been noted—a liberal waiver policy without significant contractor commercialization acts as a clog on the dissemination and use of the technology by others. Patent policy can affect the output function in a positive manner as well, provided title to innovations is not waived. Licensing without royalties, or even in some cases exclusive licensing, may act as an incentive for third parties to commercialize government developed technology.

NASA describes its license policy as follows:

[NASA] regulations provide for broad royalty-free, non-exclusive licensing during the first two years after a patent is issued to NASA. After the two year period, if the benefits of the inventions have not been brought to the public, NASA will grant an exclusive license to exploit the invention. If, however, the invention has been commercially worked during the two years, the patent will continue to be available on a non-exclusive basis. This licensing policy differs from that of other government agencies in that in cases where utilization will thus be made possible, the granting of exclusive licenses will be used as an incentive to commercial working of dormant government owned patents. . . .

This statement is somewhat misleading in that the license denoted as “exclusive” has a number of significant limitations


67. Although the rate of reported items increased greatly, several Technology Utilization personnel felt that most of the increased number of disclosures were of “little value” for the purposes of the Technology Utilization Program.

attaching to it. If the originating party was a NASA contractor, this license is subject to an irrevocable, royalty-free, nonexclusive license in him. The term of the limited exclusive license is not necessarily co-extensive with that of the patent, but is a negotiable item between the applicant and the Administrator. The regulations also provide for "march-in" rights, under which the Administrator may revoke the license if the licensee fails to use "his continuing best efforts to work the invention." "Best efforts" are to be defined in the negotiations between the applicant and NASA. This limited exclusive license is also subject to a royalty-free, nontransferable right to practice the invention by or on behalf of the government. Finally, the license is nontransferable, except to a successor in interest of the licensee.

B. NASA LICENSE POLICY AS A SPUR TO UTILIZATION

Although NASA's grant of a limited exclusive license could offer a significant incentive to industry to commercialize certain of NASA's inventions, the visible effects of this policy on the output function have been something less than spectacular. As of January 1, 1967, NASA had title to 488 patents, with about 746 pending. Of that number, only 365 patents and 509 applications were listed as available for licensing. NASA had granted eighty nonexclusive licenses on thirty-six different patents, forty-three nonexclusive "licenses" on nineteen patent applications, and two exclusive licenses, one of which has since been terminated because the licensee could not justify additional development costs. This means that about ten per cent of NASA-held available patents were licensed in 1966. Of these, about eleven per cent were in commercial use. Thus, assuming minimal use by nonlicensees, about one per cent of NASA-held

69. 14 C.F.R. § 1245.113 (1967).
70. 14 C.F.R. § 1245.205 (c) (3) (1967).
71. 14 C.F.R. § 1245.205 (c) (8) (1967).
72. 14 C.F.R. § 1245.205 (c) (4) (1967).
73. 14 C.F.R. § 1245.205 (c) (5) (1967).
74. NASA, A REVIEW OF NASA's PATENT PROGRAM 13 (1967). These figures may be overstated. Watson and Holman found the official 1965 NASA published figures to differ considerably from those they obtained through interviews. See WATSON & HOLMAN 69.
75. NASA, supra note 74, at 29.
76. Id.
77. Cf. WATSON & HOLMAN 68.
78. Cf. id. at 68-101.
79. The assumption is quite reasonable (despite widespread knowledge that the government will not enforce its patents against nonli-
patents have been successfully commercialized.

With only one exclusive license outstanding, comparisons between exclusive and nonexclusive licenses would be meaningless. Still, it seems reasonable to speculate that the added incentive of exclusive commercial rights would encourage faster development. Admittedly, the patent incentive to commercialize the device provided by an exclusive license is no greater than that offered a contractor to whom title to the patent has been waived. The difference is that exclusive licensees can be selected from companies more likely to commercialize—those with a proven record of success in the commercial market for the given class of invention or who are able to demonstrate a clear intent to enter the given commercial market. Moreover, companies can be selected on the basis of their interest in a particular device instead of being granted advance waivers on whatever inventions may turn up. Thus, the granting of advance waivers ought to be discontinued, and emphasis placed more on exclusive licensing to noncontractors vis-a-vis individual waivers for contractor-inventors.

C. Exclusive License—Alienation of a Nonexistent Right?

NASA has granted only two exclusive licenses, one of which has been terminated, and has turned down several other requests for exclusive licenses. This failure to fully utilize its exclusive licensing prerogative can probably best be explained by the uncertainty that exists as to what kinds of licenses NASA or any other government agency is statutorily or even constitutionally censed users) because the license costs nothing and because NASA may well supply the licensee with supplementary information. Solo, Invention Under NASA-Sponsored Research and Development 42-43 (1966) (part II of a working paper for NASA).

80. The evidence that smaller firms will be more successful in commercializing space-defense innovations is less impressive than that supporting the proposition advanced earlier, that smaller firms will utilize innovations which they themselves have produced as NASA contractors. See notes 49-54 supra. A poll of subscribers to one of NASA's Regional Dissemination Centers found a high degree of success reported by small businessmen who subscribed to the programs. All of them commented that the availability of advanced NASA research material and information is invaluable as each of their firms is too small to maintain its own research development department. These small businessmen constituted fully half of those 10 reporting financial gain. Hearings Before the Subcomm. on Advanced Research, and Technology of the House Comm. on Science and Astronautics, 89th Cong., 2d Sess., pt. 4, at 646 (1966).

81. WATSON & HOLMAN 91.
permitted to grant. There are basically three general questions which must be answered in determining whether a government agency such as NASA has exclusive licensing power: (1) Does government ownership of a patent necessarily eliminate the right to exclude others from using the device? (2) If not, does alienation of this right to exclude amount to a “disposal of property” requiring congressional authorization? (3) If so, has Congress delegated such authority to NASA?

1. Government’s Right To Exclude

The critical question here is whether the federal government has the constitutional authority to grant to itself the right to exclude others from the practice of certain inventions. At present, this question remains unresolved. The only case in which the government has sought to enforce a patent is Tektronix, Inc. v. United States.82 In that case the government was sued for infringement, and counterclaimed for infringement of one of its own patents. The Court of Claims avoided the constitutional issue by holding that the government was estopped from enforcing its patents because of its century-long policy of not enforcing them. Absent special circumstances justifying enforcement, or some kind of notice to the public that government owned patents will be enforced, the government was held to have impliedly licensed all users.83 However, a series of United States Attorney General Opinions which more directly faced the constitutional issue concluded that the assignment of a patent to the government is not equivalent to a dedication to the public, and that the government is thus able to enforce its patents.84

It is difficult to find any constitutional justification for the latter conclusion. Although the Constitution gives Congress the “power to dispose of . . . property belonging to the United

82. 351 F.2d 630 (Ct. Cl. 1965).
83. Id. at 633. The court relied on Buford v. Houtz, 133 U.S. 320 (1889), where the Supreme Court held that the custom of allowing grazing animals on government land impliedly licensed such use of the land.
84. 39 Op. Att’y Gen. 164 (1938); 38 Op. Att’y Gen. 425 (1936). Even here, the question is merely raised and then answered by relying on an earlier opinion by Attorney General Harlan F. Stone. 34 Op. Att’y Gen. 320 (1924). As discussed in text accompanying notes 93-94 infra, Stone in this earlier opinion had expressed his view that executive departments could license government held patents revocably and non-exclusively to private parties. The two later opinions reason that the grant of a license makes sense only if the patent has not been dedicated to general use, but they did not discuss the constitutional foundations of the power they approve.
States," this grant does not provide much support. The question still remains whether or not the government's ownership of the patent necessarily removes the patent's "property" attributes. In other words, the government first has to create the property in the patent by granting a right to exclude, and it is that power of creation which is questioned.

The Constitution also states that "Congress shall have power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their writings and discoveries." This raises the issue of whether the United States can consider itself an "inventor" entitled to exclusive rights. Certainly the policies of the patent provision are not applicable to the United States as an inventor since the government needs neither the incentive to do research nor the incentive to disclose the results of that research thought to be provided by the grant of a right to exclude others for seventeen years. Nor can it be argued that the government should be rewarded by the grant of exclusive rights to itself. However, granting an exclusive license to nongovernmental third parties can be an effective method "to promote the progress of science and useful arts," particularly when these licenses may be the only effective means to transfer government developed inventions to private industry.

Logically, it would be inconsistent to say that the government may grant to third parties a right to exclude which it does not itself possess, even though the policies behind the patent power would support such a distinction. Indeed, it seems rather clear that this distinction cannot be made, for potential licensees are not "inventors," and the federal government has been delegated authority to grant exclusive rights only to "inventors." The granting of such rights to noninventors would be the utilization of monopoly power by the sovereign so disliked by the framers when they passed the limited patent power.

85. U.S. Const. art. IV, § 3.
87. Earlier critics of government patent ownership failed to foresee this beneficial use of the power to exclude, because it did not occur to them that the government would be engaged in transferring technology. See Ewing, Government Owned Patents, 10 J. Pat. Off. Soc'y 149 (1928); Wille, Government Ownership of Patents, 12 Fordham L. Rev. 105 (1943).
88. One cannot be certain what the framers had in mind because the patent power seems to have provoked little or no debate. See Fenning, The Origin of the Patent and Copyright Clause of the Constitution, 17 Geo. L.J. 109 (1929). However, it does seem clear that the
Since the most desirable policy distinction—i.e., allowing the government to grant the right to exclude even though it cannot exercise the right itself—cannot logically be recognized, the patent provision should be construed to include the United States as an "inventor." So long as the opinion in Tektronix is upheld, this distinction can in fact be drawn. Since the government possesses the power to exclude, it may grant the power to third parties but is estopped from using the power itself by long usage.89

2. Disposal of Property

If one assumes that exclusive licenses on government patents are constitutionally permissible, the related question of to whom the authority to grant them is delegated—the Congress or each executive department—arises. If conveying the right to exclude amounts to a disposal of property, then Congress must have this power.90 It might be argued that the true value of a patent to the government lies in its defensive capabilities, in that it protects the government from infringement actions by other inventors holding similar patents. The long-standing policy of the government never to enforce its patents reinforces this conceptualization. Hence, the argument continues, so long as an agency retains sufficient control over the licensee to ensure that the government owned patent is employed in furtherance of a legitimate agency program, the issuance of a limited exclusive license is a proper use or exercise of government property rights rather than an unauthorized disposal of these rights.91 However, it is difficult to understand just what remains of the property rights inherent in a patent absent the power to exclude. There is only the right to practice the invention immune from

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89. The result under this approach is not quite the same as under approaches which deny totally the government's right to exclude since Congress or the executive could revoke the implied license by giving public notice and recover the right to exclude. A related problem is whether the granting of an exclusive license gives the public the kind of notice required by the Tektronix rationale. See Berger, Utilization or Dispensation—Suggestions for the Government's Patent Procurement Program, 48 J. Pat. Off. Soc'y 449, 460 (1966).

90. See note 85 supra.

91. While some authority to use government property in executing the laws might well be implied in art. II, Congress has explicitly confirmed such authority to the head of each department over "custody, use, and preservation of its . . . property." 5 U.S.C. § 301 (Supp. 1966).
infringement suits by others, which could as easily be afforded by publication as by patent. Clearly, if the government published rather than patented its invention, there would be no "property" created, other than a copyright granted by a separate statute. Hence, unless patents are not to be considered "property" at all, alienation of the right to exclude must be a disposal of property.

In considering the power to grant revocable, nonexclusive licenses, the leading treatment of executive power to dispose of government patent rights, implicitly assumes, first, that the federal government does have the power to exclude, and second, that disposal of all patent rights would be a disposal of property requiring explicit congressional authorization. Proceeding from there, the author sets out a number of distinctions, one being that a nonexclusive license


do not dispose . . . of the patent monopoly. . . . The patentee still retains all the elements or characteristics of the property or monopoly. He can still assign, sell, exclude others from making, using, or selling, and can sue for infringement—

and these are all the rights which a patent confers.

The initial statement is not precisely accurate because each nonexclusive license does reduce the patent monopoly and, given a finite number of potential users, a number of such licenses could eventually completely erode the monopoly. However, the distinction can nonetheless be made and, if it is, exclusive licensing is a disposition of property whereas nonexclusive licensing is not.

3. Delegation of Congressional Authority to NASA

Assuming that congressional authorization is necessary, it is questionable whether or not NASA has been given the necessary power to license exclusively. Section 305(a) of the Space Act grants very broad authority to the Administrator to "determine . . . the terms and conditions upon which licenses will be granted. . . ." It might be urged either that this vague

92. Publication does not afford exactly the same immunity from future infringement suits that a patent does. See Solo, supra note 79, at 28-32; Berger, supra note 89, at 461.
94. Id. at 325 (emphasis added).
95. 42 U.S.C. § 2457 (g) (1964). Section 203 (b) (3) provides that the Administrator "may sell and otherwise dispose of real and personal property (including patents and rights thereunder) . . . ." 42 U.S.C. § 2473 (1964). However, this section is specifically tied to property as defined under the Federal Property and Administrative Services Act of
language confers the necessary authority on NASA, or that long-standing congressional acquiescence in various executive departments' license policies has delegated sufficient authority to NASA as well as to the other agencies.\(^9\) However, it appears that the Tennessee Valley Authority is the only agency which has ever licensed any of its patents exclusively.\(^9\) Hence, any congressional acquiescence cannot necessarily be said to extend to exclusive licensing. Similarly, had Congress intended to alter so radically the prevailing government licensing practice by means of section 305, this would probably have been stated explicitly, since "it is clearly the intent of Congress that basic guidelines of government patent policy should be determined by Congress."\(^9\)

Therefore, since NASA justifiably appears skeptical of its authority to grant exclusive licenses, clear statutory authorization should be given. This would probably induce NASA to grant more licenses and perhaps significantly increase the utilization rate.

D. Exclusive Licensing as a Barrier to Use by Others

Just as granting a contractor exclusive commercial rights prevents others from using innovations, the grant of an exclusive license may prevent the widest possible use of technical information. NASA has taken two steps to minimize this bar to dissemination of such information.

1949, 49 U.S.C. § 471 (1964). This Act is limited to "excess property"—i.e., not needed for discharge of an agency's responsibilities and requires approval of the GSA Administrator before the property may be disposed of as "surplus." 40 U.S.C. § 472 (g) (1964). In view of the declaration in President Kennedy's patent statement that government owned inventions constitute a "valuable" national resource, 28 Fed. Reg. 10,942 (1963), such a determination that patent rights constitute "excess property" or surplus would be inappropriate.


97. The Tennessee Valley Authority's statutory mandate to dispose of patent rights is at least as vague as NASA's in that it is authorized to grant such licenses thereunder under its patents, as shall be authorized by the Board. 16 U.S.C. § 831 (d) (i) (1964).

The Authority has granted one exclusive license for a term of five years to a private firm and five such licenses to employee inventors. No test of Board authority has ever arisen, and the Authority has apparently decided not to issue any other exclusive licenses. Staff of the Subcomm. on Patents, Trademarks, and Copyrights, of the Senate Comm. on the Judiciary, 85th Cong., 2d Sess., Patent Practices of the Tennessee Valley Authority 199, 210 (Comm. Print 1959).

As noted earlier, present NASA policy is to make patents available to all potential users on a nonexclusive, royalty-free basis; if, after two years, no one has “worked” the device, then it is available for exclusive licensing. Clearly, the rationale behind the regulation is that the greatest possible commercial use provides the most desirable results. This goal can be achieved if the device is attractive enough to be developed without the incentive of an exclusive license, but if the device is not so alluring, then the less desirable alternative of offering exclusive rights is to be explored. The two-year waiting period, given an effective information dissemination program so that potential developers can learn of the device, is NASA’s measurement of the appeal of its innovations.

While the rationale of the regulation is sound, the adoption of two suggestions would facilitate the realization of its goal. First, although the idea that the passage of a period of time is an adequate measure of the commercial potential of innovations is administratively workable, it provides a somewhat crude standard. But the alternative of evaluating each invention for its commercial potential is not much more attractive. However, if the waiting period were made discretionary rather than mandatory, NASA personnel could grant exclusive licenses without waiting two years in certain instances, such as where there is only one applicant and he refuses to apply for a nonexclusive license, or where the nature of the device clearly indicates that a two-year wait would lessen the worth of an exclusive license.

The official two-year period could also be shortened to one year. The actual waiting period is a minimum of two years and three months plus the delay caused by the Inventions Contributions Board passing on the license application. With a one-year period, the Board could begin its processing of an application on the condition that it would be rejected if an application for a nonexclusive license were received.

NASA’s “march-in” rights—the right to revoke the license if the invention is not diligently worked—are also designed to minimize the bar to dissemination represented by an exclusive license. As in the waiver situation, the enforcement of such

99. See note 68 supra and accompanying text.
100. 14 C.F.R. § 1245.205 (c) (1) & (2) (1967).
101. No data is available on the time required for the Inventions Contributions Board to process applications for exclusive licenses, but a rough estimate is about eleven months, since that is the time required to process a waiver petition through the Board. WATSON & HOLMAN 195.
102. See note 71 supra and accompanying text.
103. See note 69 supra and accompanying text.
NASA's patent policy places more emphasis on attempting to encourage the reporting of inventions than on fostering the utilization of such inventions by other segments of the economy. However, both advance waivers and irrevocable, nonexclusive licenses, two of the principal means used to induce reporting, have proven ineffective in stimulating the input function of NASA's Technology Utilization Program. Initially, it is arguable that advance waivers have not been authorized by Congress. Secondly, and more importantly, waiver of patent title is valueless unless the contractor intends to commercialize the invention. Irrevocable licenses should not be granted since they provide little incentive to report and act as an impediment to commercialization by others. Advance waivers should be abolished, and waivers on individual inventions should be granted only where NASA's technology personnel determine that the contractor has the requisite commercial position or an intent to commercialize the innovation in question. In addition, alternative and more effective reporting incentives should be implemented to lessen the deleterious effects of the present patent policy on the output function.

NASA's patent policy would be a much more effective component of the Technology Transfer Program if it placed greater emphasis on the output function. Retraction of the present liberal waiver policy would remove one of the obstacles to dissemination, as would a more liberal use of exclusive licenses. However, since exclusive licenses can also operate as a partial bar to dissemination, there must be some reasonable limitations on the issuance of such licenses. A nonexclusive license could be granted for one year, with a provision for convertibility to an ex-
clusive license if no one else had worked the device during that period. In addition, Technology Utilization personnel should have the authority to waive the one-year waiting period in appropriate instances. Technology Utilization personnel should also monitor work being done by exclusive licensees, so that NASA can utilize its “march-in” rights where necessary. Finally, since NASA is justifiably uncertain of its right to grant exclusive licenses, Congress should provide it with explicit statutory authorization.

Although patent policy is not the most important variable in the process of technology transfer, it should nevertheless be revised so as to be as consistent with NASA’s Technology Utilization Program as possible. Moreover, it is one area in which the effects of policy changes can be measured so that some check can be provided on the functioning of a technology transfer program. In addition, since NASA has taken the lead in developing a comprehensive technology transfer program, a better coordinated patent policy may serve succeeding agency programs as a more workable model.