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(14) DSMS-PMC-75-1

(6) AN OVERVIEW OF DOD POLICY FOR AND ADMINISTRATION OF INDEPENDENT RESEARCH AND DEVELOPMENT

PROGRAM MANAGEMENT COURSE 75-1

AN INDIVIDUAL STUDY REPORT

BY

(9) Final rept.,

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(11) MAY 1975

(12) 164 p.

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FORT BELVOIR, VIRGINIA 22060

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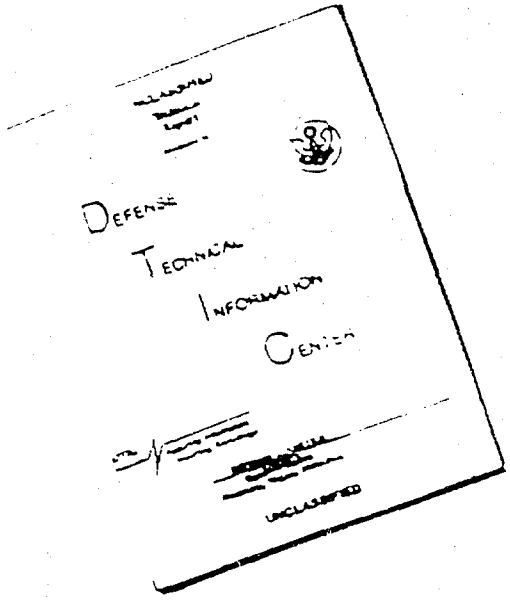

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AN OVERVIEW OF DOD POLICY FOR AND ADMINISTRATION OF INDEPENDENT RESEARCH AND DEVELOPMENT

Study Project Report

Individual Study Program

Defense Systems Management School

Program Management Course

Class 75-1

by

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Major US Air Force

May 1975

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This study project report represents the views, conclusions, and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management School or the Department of Defense.

EXECUTIVE SUMMARY

Independent research and development (IR&D) is contractor initiated and conducted research and development effort not sponsored by a contract or grant. The DOD recognizes IR&D as a normal cost of business and accepts its reasonable and allocable share of these costs. The major defense contractors incurred over $1 billion in IR&D costs in 1974 and recovered over $450 million of these costs from the DOD. The allowability of IR&D costs and DOD policy and administration of this area have been and are controversial.

The purpose of this report is to present an overview of DOD IR&D policy and administration. The evolution, current status, and major areas of existing controversy are highlighted. IR&D can be traced back to 1940 and has been an allowable cost in one form or another on negotiated DOD contracts since that time. The early DOD IR&D policy appears to have evolved rather naturally along with the other cost principles through about 1959. However, the IR&D cost principles which were issued in 1959 were immediately controversial. While the 1959 cost principles remained in effect for over a decade, there was continuous effort to devise better cost principles throughout the 1960s. Initially, the effort received little attention. However, in the mid-1960s the Army Audit Agency and, then, the GAO questioned some aspects of DOD policy and administration of IR&D. Finally, in the late 1960s, Congress became directly involved, and ultimately,

imposed guidelines for DOD IR&D policy.

The current DOD policy and administration is a direct outcome of the extensive activities of the 1960s and is summarized in this report. While a period of calm might be expected after the activities of the 1960s, such has not developed. IR&D is more controversial now than ever before. Senator Proxmire is suggesting additional legislative restrictions on IR&D. Further, the GAO, the Defense Science Board, the Commission on Government Procurement, Admiral Rickover, Dr. Currie, and many others have expressed their views on IR&D. The major areas of current controversy are identified and briefly discussed in the report and the positions of the major participants in the IR&D dialogue identified.

In summary, the current DOD policy appears to be a reasonable balance of the needs for good stewardship of the taxpayer's funds and the needs for a strong technological base. Major shifts in policy, whether to the more liberal extremes advocated by the industry or the more restrictive extremes advocated by Senator Proxmire and Admiral Rickover, would probably be detrimental to the best interests of the Department of Defense.

ACKNOWLEDGEMENTS

The author is indebted to quite a number of individuals whose help and patience were invaluable in accomplishing this project. Mr. David D. Acker provided valuable assistance as study advisor. Mr. James W. Roach, ODDR&E, made available his files and answered many questions. Mr. Charles E. Deardorff, (ASD(IL), answered a variety of questions and made available his files. Further, two summary reports he wrote a few years ago were of great value in piecing together the evolution of IR&D policy. Mr. Herbert L. Brewer, Aerospace Industries Association, provided two or three references the author could not find in the DOD files. Lt Colonel William A. Williams, Air Staff, and the Headquarters Air Force Systems Command IR&D team (Mr. James T. Brannan, Captain James N. Anderson, Captain William J. Lewandowski, Major James C. Roan, and Mr. Lloyd G. Mitchell to mention a few) kept the author abreast the latest developments and provided background materials. Mrs. James H. Terrell, Jr. did much of the draft typing from virtually unintelligible handwritten drafts and did an excellent job typing the final report. Finally, my wife endured the project with good humor and assisted with the draft typing.

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LIST OF ACRONYMS

AD	Assistant Director
AEC	Atomic Energy Commission
AIA	Aerospace Industries Association
ASD	Assistant Secretary of Defense
ASPR	Armed Services Procurement Regulations
ASRSC	Armed Services Research Specialists Committee
BOB	Bureau of the Budget
C	Comptroller
CITE	Contractor Independent Technical Effort
CODSIA	Council of Defense and Space Industries Association
COGP	Commission on Government Procurement
COSATI	Committee on Scientific and Technical Information
CTE	Competitive Technical Effort
CWAS	Contractor Weighted Average Share
DCAA	Defense Contract Audit Agency
DCS	Deputy Chief of Staff
DDC	Defense Documentation Center
DDR&E	Director, Defense Research and Engineering
DOD	Department of Defense
DODI	DOD Instruction
DPC	Defense Procurement Circular
DSB	Defense Science Board
FY	Fiscal Year
GAO	General Accounting Office
G&A	General and Administrative

LIST OF ACRONYMS Con't

ID	Independent Development
IL or I&L	Installation and Logistics
IR	Independent Research
IR&D	Independent Research and Development
LMI	Logistics Management Institute
MICOM	Army Missile Command
NASA	National Aeronautics and Space Administration
O...	Office of ...
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OTE	Other Technical Effort
PMR	Potential Military Relationship
RDT&E	Research, Development, Test and Evaluation
R&D	Research and Development
TD	Treasury Decision

SECTION I

INTRODUCTION

Independent research and development (IR&D) is contractor initiated and directed research and development effort not sponsored by or required in performance of a contract or grant. It includes the full spectrum of R&D effort from basic research to development and encompasses system and concept formulation studies.

Essentially all contractors do IR&D whether or not they do business with the DOD. When you buy a car, toaster, washer, soap, and so forth, a part of the price is used by the company to support its IR&D program. Thus, IR&D is an integral element of the commercial market place. The same practice is followed for competatively-priced DOD fixed-price contracts. In this case price competition is thought to insure the reasonableness of the elements of cost, such as IR&D. However, for negotiated contracts and, especially, cost reimbursable contracts, there is a basic dilemma involving the DOD's need to ". . . stimulate innovation in an unconstrained fashion and obtain a reasonable assurance that tax dollars thus spent result in effort of broad national value as opposed to undue enrichment." (Ref. 1, p. 40) This, then, is the essence of the continuing debate on the DOD IR&D policy and administration. The debate is far from academic since substantial resources are involved.

The major defense contractors spent $1,148 million for IR&D in 1974. Of this amount about $457 million was recovered from the DOD. The rest of these costs were recovered mainly from commercial customers and a small amount from other Government agencies. Hence, this is an area of substantial DOD investment.

The DOD currently recognizes IR&D as a normal cost of doing business. Through this support the DOD seeks to:

> "1. Assure the creation of an environment which encourages development of innovative concepts for Defense systems and equipment which complement and broaden the spectrum of concepts developed internally to DOD.
>
> 2. Develop technical competence in two or more contractors who can then respond competitively to any one requirement DOD seeks from Industry.
>
> 3. Contribute as appropriate to the economic stability of its contractors by allowing each contractor the technical latitude to develop a broad base of technical products." (Ref. 2, p. 2)

Reasonable and allocable amounts of contractor incurred IR&D costs are thus accepted as indirect costs on DOD negotiated contracts.

Independent research and development is important to the DOD program manager for several reasons. First, IR&D contributes significantly to maintaining a viable technology base in the defense industry which the DOD is dependent upon for system development and production. Second, IR&D is a vital element in the process of translating military needs into technology and system needs during the conceptual phase of the system acquisition process. Third, IR&D often

provides alternate technical solutions to problems encountered during later phases of a system development. Finally, IR&D consumes on the average about two percent of every RDT&E and procurement dollar spent by the program office. Thus, while the greatest IR&D contribution occurs early in the acquisition process, it is an area which should be recognized by the program manager as a potential source of valuable technical information and a consumer of program resources.

The purpose of this report is to present an overview of the DOD policy for and administration of contractor IR&D. To understand the current DOD policy and administration requires an appreciation of the evolution of DOD policy in this area. IR&D costs, by whatever name they happened to be called, have been allowable in some form since 1940. The changes in policy were relatively evolutionary during the early years. However, there was an extensive dialogue on IR&D policy during the 1960s which ultimately led to Congressional involvement and legislative action. The current DOD policy and practice are a direct product of the dialogue of the 1960s and the legislative restrictions imposed by Congress in 1970. Notwithstanding the extensive discussion of IR&D policy in the 1960s, IR&D is more controversial now than ever before. The various phases of DOD policy on IR&D are directly related to the IR&D cost principles in use during the period. A brief summary of the evolution of the IR&D cost principles is presented in the

following paragraphs.

1.1. Treasury Decision 5000 (1940)

Independent research and development (IR&D) costs have been recognized in some form since Treasury Decision (TD) 5000 appeared in August 1940. TD 5000 was published as a consequence of the Vinson-Trammel Act and included cost principles for use in determining excess profits. These cost principles were used by the DOD as a guideline for determining the allowability of cost in some cost reimbursement contracts. These principles included language recognizing contractors' indirect engineering expense as an allowable cost. (Ref. 3 and Ref. 4, p. 1)

1.2. Green Book (1942)

In April 1942 a new set of cost principles was published in a small green booklet titled "Explanation of Principles for Determination of Costs Under Government Contracts." (Ref. 5) The principles had been prepared under Navy cognizance and generally followed TD 5000 in its treatment of allowed costs. These cost principles gradually replaced TD 5000 for most cost-type contracts that were written after April 1942.

Included in the Green Book under the heading of "Engineering and Development" was the following statement:

> "32. Distinction has previously been made between engineering services related immediately to manufacturing operations (shop engineering expense) and research, experimental and development costs not related to current manufacture but devoted to future improvement

in and application of products. The cost of the latter research and experimental development work may be absorbed in manufacturing cost on a regular basis by means of absorption rates, on the principle that these activities are usually maintained under a consistent program independently and apart from current manufacturing operations, and that their benefit relates to products on a uniform scale over a period of years more properly than according to actual expenditures in any given year. When these costs are deferred or capitalized in conformity with a consistent plan, reasonable allocation may be treated as a cost of performing a contract.

"33. Alternatively, when it is the policy to charge off actual research, experimental and development expenses currently in each year rather than to use stabilized absorption rates, a reasonable portion thereof may be allocated to the cost of performing the contract." (Ref. 5)

As the language indicates IR&D could be charged at a rate which would understate the costs in some years and overstate it in other years. On the other hand, IR&D could be charged off as a current year expense. However, both methods could not be used simultaneously. These cost principles governed the recovery of costs for IR&D until the Armed Services Procurement Regulation was issued in 1949. (Ref. 4, pp. 1-3 and Ref. 6, pp. 10-11)

1.3. Armed Service Procurement Regulation (1949)

The Green Book was superseded by the initial publication of Section XV of the ASPR in March 1949. Section XV provided standards for the determination and allowance of costs in connection with the performance of cost-reimbursement type contracts. It included examples of allowable and unallowable costs which impacted IR&D-type work:

"15-204. Examples of Items of Allowable Costs

(s) Research and development specifically applicable to the supplies or services covered by the contract.

15-205. Examples of Items of Unallowable Costs

(j) General research, unless specifically provided for elsewhere in the contract.

15-502. Examples of Subjects Requiring Special Considerations

(m) Research programs of a general nature." (Ref. 7)

In applying these cost principles several problems developed. First, difficulties were encountered in determining whether R&D costs were specifically applicable to the supplies or services covered by the contract. Some contracting officers took a narrow view of these provisions and believed the work had to be required by the contract to be allowable. Others held a broader view. Second, some contracting officers interpreted the phrase "general research" as including both independent research and independent development and only allowed IR&D costs when provided for in a contract clause. (Ref. 4, pp. 3-5; Ref. 6, p. 11)

These difficulties gave rise to a practice on the part of some contractors, who expected to be awarded numerous contracts, of negotiating separate agreements covering IR&D costs for periods of up to three years. Contracts negotiated subsequently incorporated these agreements as a contract clause. This procedure precluded repeated negotiations of

this element of cost. In return for this consideration, the contractors agreed to provide technical information for review by the Government. This practice was a precursor to the advance agreements of later years. (Ref. 4, p. 5)

Beginning in the mid-1950s there was considerable pressure on the DOD to develop a new set of cost principles which would give both more precise policy guidance and would be applicable to all types of contracting or contract settlement types. The final product required several years to develop but in November 1959 a complete revision of Section XV was published. (Ref. 8)

1.4. Revised Section XV, ASPR (1959)

This revision of the IR&D cost principles was prepared during the aftermath of Sputnik when there was a general feeling that R&D should be encouraged. Thus, the new cost principles recognized both independent research (IR) and independent development (ID) as allowable to the extent that they were reasonable and allocable. IR was to be allocated to all work of the contractor whereas ID was to be allocated to the product line to which it applied. Contractors were encouraged to include indirect and administrative costs in their IR&D pool, however, they were not required to do so. Advance agreements were encouraged, but not required, and three approaches to determining the reasonableness of IR&D costs were suggested:

"(i) Review of the contractor's proposed independent research and development program and agreement to accept the allocable costs of specific projects;

(ii) agreement on a maximum dollar limitation of costs, an allocable portion of which will be accepted by the Government;

(iii) an agreement to accept the allocable share of a percentage of the contractor's planned research and development program." (Ref. 9, para. 205.35h)

The last item came to be known as cost sharing from the first dollar. These cost principles are included as Appendix A.

Since IR&D was one of the more difficult problem areas reflected in the cost principles, DOD Instruction 4105.52, "Uniform Negotiation for Reimbursement of Independent Research and Development Cost," was issued on 28 June 1960. It provided a method for negotiation of a single agreement covering the allowance of IR&D costs for contractors performing work for more than one Service. Further the Instruction established an Armed Services Research Specialist Committee (ASRSC) to review, at the request of the negotiators, the IR&D programs of selected contractors for the purpose of (1) determining whether adequate separation had been made of research and development and (2) to determine whether the programs were reasonable in scope and well managed. The Instruction also provided for the assignment of negotiation responsibility to a single military department. (Refs. 8 and 10)

The Military Departments established a list of contractors whose IR&D costs exceeded $1 million and whose business was 50% or more with the DOD. Most of the contractors were assigned to the Navy and Air Force for negotiation of advanced agreements. The assignments were based primarily upon which Service had the predominant amount of work in the plant. In the early going two contractors assigned to the Air Force refused to negotiate agreements unless they were granted full recovery and not forced to share costs. This impasse was broken when the Director of Procurement Policy at Headquarters, Air Material Command, advised each company that until an acceptable advance agreement was negotiated no IR&D costs could be recovered from the Air Force. At this point the contractors accepted the Air Force proposal and other contractors followed suit. (Ref. 4, p. 10)

As the advance agreements evolved, DOD negotiators tended to require cost sharing from the first dollar. Originally they worked on a basis of 50/50 sharing with a contractor who was 100% DOD. However, it soon became clear that this was too much of a burden for the contractors to bear and 75/25 ratios became the norm. Contractors with less than 100% DOD business generally obtained better share ratios, however, few were granted 100/0 ratios. In addition to sharing from the first dollar, DOD negotiators also insisted upon establishing a maximum dollar ceiling above which the DOD would not recognize any costs for reimbursements. (Ref. 4, p. 10)

The National Aeronautics and Space Administration (NASA) voluntarily joined the DOD Tri-Service IR&D negotiation process in the 1963 time period. NASA has continued to participate in this process to this time with no serious problems. (Ref. 4, p. 10)

During the early 1960s, the Bureau of the Budget engaged in a project to standardize the cost principles of all Government agencies. A problem developed in the differing IR&D philosophies of the Atomic Energy Commission (AEC)* and the DOD. The AEC objected to the allowance of costs for any IR&D project not related directly or indirectly to its contract work. The DOD considered the AEC position too restrictive and thought it would result in IR&D becoming a Government directed program. The philosophical difference between the DOD and AEC and internal DOD concerns regarding the appropriateness of the 1959 ASPR cost principles, precluded adoption of a government-wide IR&D policy in the early 1960s. (Refs. 11; 12; and 4, p, 19)

The 1959 IR&D cost principles were controversial from their initial release. However, they were in force for over a decade. The extensive discussion of the problems with the principles, alternate principles, and general IR&D policy

*The AEC was recently reorganized out of existence; the R&D portions of AEC were incorporated into the Energy Research and Development Administration. However, where reference is made to events which occurred while AEC was in existence, AEC will be cited. Where the new organization is involved it will be cited.

which took place during the 1960s is summarized in Section II. The efforts of the 1960s culminated in new cost principles which were implemented in January 1971 and are still in effect today. The current policy and practices are discussed in some detail in Section III. DOD policy in the IR&D area is more controversial now than ever before. The major areas of controversy are identified and discussed in Section IV.

SECTION II

SEARCH FOR A NEW POLICY

The ink was hardly dry on the 1959 cost principles when problems began to surface in its implementation and interpretation. The first ASPR case was opened in September 1960 to consider the need to clarify the allocability language. Two more cases were opened within the next year. However, before the ASPR Committee could complete action on these cases the problems were elevated to higher levels within OSD. High level ad hoc groups worked the IR&D problem for the next eight years. Early activity was chaired by ODDR&E but in the later years it was headed-up by OASD (IL). None of the proposed cost principles were implemented because Congress ultimately became involved in 1969-1970 and the next set of cost principles implemented was responsive to legislation imposed in the Fiscal Year (FY) 1971 Military Procurement Authorization Act.

A wide variety of alternative cost principles were considered during the 1960s. Many of the ideas rejected then are once again surfacing in the current dialogue on IR&D. Consequently, the highlights of the 1960 considerations will be summarized in the following paragraphs.

2.1. Identification of Problems (1962-1963)

A small working group chaired by Dr. L. M. Hartman, ODDR&E, and including representatives from OASD(IL) and

OASD(C) was established in September 1962 to review the IR&D situation and recommend a solution. The group submitted its findings and recommendations in November 1962. (Ref. 13, a later summary is Ref. 14) The group identified five problem areas as follows:

1. Cost Sharing:

   - Government negotiators were requiring both cost sharing and a ceiling limitation; a double limitation.

   - Cost sharing was being required without a finding of unreasonableness.

2. Allowability by Specific Projects:

   - Project-by-project control placed too great a restriction on scientific freedom of choice.

3. Negotiation Procedure:

   - The DOD negotiation team did not include a technical representative and there was no formal feedback to the contractor of the technical evaluation results.

   - The Air Force and Navy were believed to be grossly understaffed for effective administration of IR&D negotiations.

   - The Army had a decentralized negotiation procedure which caused communications and control problems.

4. Technical Evaluations:

   - Undue emphasis was being placed on contractors' technical plans as the primary communication device.

   - The Armed Services Research Specialist Committee was not effective as a committee.

   - Only Navy evaluators had made on-site reviews at contractors' plants.

- Evaluation reports were tardy (3-8 months after receipt of technical plans), uninformative, and frequently devoted to trivia. The feeling existed that reports were not being used in establishing negotiation objectives and some of the evaluation shortcomings was due to this.

- Benefit of technical evaluation process was that contractors have to be explicitly concerned about their technical planning and this had resulted in improved technical management of certain corporations.

- Technical evaluators had been spending too much time trying to draw a line through the gray area between IR and ID.

- IR&D negotiations were being completed 8-10 months after the beginning of the contractor's fiscal year largely as result of lateness in obtaining technical plans and completing technical evaluations.

5. Allocation:

   - Allocation of costs (IR vs ID) was mainly a function of the skill of the technical writer.

   - IR&D-type work had been found in many accounts called something other than IR&D and not subject to the controls applied to IR&D (hereafter referred to as the cost classification problem).

   - The rigid procedure of the ASPR XV-205.35 allocation procedure frequently did not fit the circumstance, especially for decentralized corporations. (Ref. 13, pp. 1-5)

These were the underlying problems which to a greater or lesser extent were attacked by all subsequent efforts to devise new cost principles. The emphasis on the technical evaluation process appears to have been due to Dr. Hartman's presence in the group. When he ceased to be involved, emphasis shifted away from this area.

The group concluded that the 1959 IR&D cost principles could not be fixed and that a completely new policy should be developed. To aid in developing a new policy the group identified nine objectives to be considered in its development:

1. Encourage a balanced program of industrial research and development in support of both long-range and short-range national security.

2. Contribute to the establishment and adoption of standards of good management of industrial research and development.

3. Promote the independence and the free enterprise character of American industry.

4. Encourage quality programs in industrial research and development.

5. Provide for the allowance of the reasonable and allocable "costs of doing business" of Government contractors.

6. Achieve equity among contractors in handling cost allowance.

7. Minimize administrative complexities and inconsistencies.

8. Adhere to the extent possible to the traditions of commercial practice.

9. Cooperate with other Government agencies with a view to the adoption of uniform cost principles. (Ref. 13, pp. 6-8)

This is a rather complete listing of goals which most people who have considered the IR&D problem have addressed with varying degrees of emphasis on particular items. As we will see, there are a wide variety of alternatives which meet the above objectives to one degree or another.

Finally, the group recommended new cost principles which encompassed the following key ideas:

1. Distinctions between types of technical costs should be discontinued.

   - IR&D definition should be broadened to include all scientific and engineering work which is not sponsored by contract, grant or other arrangement except manufacturing and production engineering.

   - Bid and proposal (B&P) costs* should be limited to administrative costs only.

   - Full overhead and general and administrative costs should be included in IR&D.

2. Cost sharing from the first dollar and control by project-by-project approval should be eliminated; control of reimbursement should be accomplished by ceilings only.

3. Allocation of costs should be flexible in principle and not predetermined by definitions.

   - No longer a distinction between IR and ID to use as basis for allocation.

4. An evaluation should be made of the total technical management of a contractor in order to determine reasonable costs and allocation prior to negotiations.

   - Review should be done on-site at the contractor's facility every two years.

   - Team should include technical, audit, and procurement personnel.

   - Evaluation process should be the responsibility of an individual in ODDR&E.

   - Technical personnel should participate in negotiations. (Ref. 13, pp. 11-15)

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*Bid and proposal costs are the costs of preparing, submitting and supporting a bid or proposal. These costs are also allowable indirect costs per ASPR 15-205.3.

These principles were reviewed by the military departments, other government agencies, and, in a slightly broadened form, by industry. The most controversial issue within the DOD was the proposal to eliminate cost sharing. However, the factor which led to the abandonment of the proposal was the projected high cost (manpower and funding) of accomplishing the management reviews. Further, there was a lack of an objective criteria for evaluating contractors' programs and difficulties in trying to insure that subjective evaluations performed by one group were comparable to those performed by other groups for other contractors. (Ref. 4, p. 21; 15, pp. 433-435)

Up to this time there had been few Congressional or other inquiries. The only major inquiry occurred in June 1961 when Senator H. Humphrey, Chairman, Subcommittee on Reorganization and International Organizations, Senate Committee on Government Operations, had questioned Mr. G. Bannerman, Deputy Assistant Secretary of Defense (Procurement) regarding IR&D. After the hearings Mr. Bannerman wrote a six-page letter to Senator Humphrey providing a history of the allowability of IR&D as a cost of doing business, the present policy, the administrative structure for negotiating the costs, and an estimate of the costs to the DOD for 1960. (Ref. 8) As the time goes on there will be a significant increase in outside review of IR&D.

2.2. DOD IR&D Steering Group Activities (1964-1966)

2.2.1. Evolution of the Cost Principles

In late 1963 leadership in the effort to devise new cost principles was elevated to the Assistant Director (AD) level in ODDR&E (Mr. James Roach, AD (Engineering Policy)). The DOD IR&D Steering Group under his direction undertook to devise a new approach to the cost principles.

In late 1964 the DOD IR&D Steering Group evolved a two-phase plan of attack for generating the revised cost principles. First, the IR&D cost principles were to be modified to combine IR&D and B&P into a single category of cost called Contractor Independent Technical Effort (CITE), eliminate cost sharing, improve the IR&D definition and state a specific policy on application of indirect and administrative costs to CITE (referred to as the burdening of CITE). Second, thresholds and criteria for determining reasonableness were to be devised (including consideration of Contractor Weighted Average Share (CWAS)).

Later, the two phases were combined and cost principles which included the concept of using industry norms in the determination of reasonableness was circulated to industry for comment. The industry position was that the combination of costs into CITE was inappropriate since it would cause changes in accounting practices, would lump together costs that were often not related, would use IR&D to describe costs that were not IR&D and would obscure visibility in

the makup of these various expenses. Also, there was opposition to the use of industry norms in determining the reasonableness of IR&D costs. This opposition was based upon the belief that IR&D costs were more reflective of the needs of an individual company than of a particular industry. However, industry voiced cautious support for the effort to include CWAS as a criteria for reasonableness. (Ref. 4, pp. 25-26)

In early 1966 the Logistics Management Institute undertook a review of the proposed cost principles which encompassed the two major elements:

- combination of IR&D and B&P into a single account, and
- use of a norm or average approach for the determination of reasonableness rather than reviewing and analyzing the contractors' IR&D efforts.

The LMI study criticized both suggestions and concluded that the proposed CITE plan did not represent an improvement in the process of determining the reasonableness of IR&D and B&P costs. (Ref. 16, p. ii)

In late 1966 OASD(I&L) personnel became increasingly concerned about the combination of all technical effort into CITE. On 7 October 1966 the Assistant Secretary of Defense for Installations and Logistics discussed the issue with the Secretary of Defense who stated that he did not want IR&D and B&P costs lumped into a single category. Thus, pursuit of the CITE approach ended. (Ref. 4, p. 27)

Leadership in developing the new cost principles now shifted to OASD(I&L) and the so-called Malloy Committee which will be discussed in Section 2.3.1. However, it will useful to examine some of the events not associated with developing the new cost principles which took place during the 1964-1966 time period. These outside events were becoming more important.

2.2.2. Related Events

During 1964 three major policy letters were written to senior DOD officials which summarized the DOD position on IR&D cost allowability, patent and data rights, and so forth. In February 1964 the ASD(IL) wrote to Senator McClellan, Chairman, Subcommittee on Patents, Trade Marks and Copyrights, Committee of the Judiciary. He provided background on the cost principles and allowability of IR&D costs and addressed specific questions on DOD's policy on acquiring patent and data rights as a consequence of reimbursing a portion of a contractor's IR&D (the DOD does not acquire such rights). (Ref. 17) In November 1964 the Deputy Secretary of Defense responded to a GAO letter regarding the DOD policy on patent and data rights. (Ref. 18) The essence of this letter was later sent to field personnel in Defense Procurement Circular #22. (Ref. 19) During the same month, the Deputy Director, Defense Research and Engineering, provided the Bureau of the Budget (BOB) a detailed position paper on the DOD's rationale for supporting IR&D, DOD policy

on patent and data rights, DOD position on a relevancy requirement for IR&D, and DOD policies and procedures for determining the amount of reimbursement. (Ref 20) These letters provide a good summary of the DOD philosophy which has existed over the years.

In the spring of 1965 the Army Audit Agency published a report on its study of IR&D and other related technical effort. (Ref. 21) The audit covered 19 individual defense contractors and produced five major conclusions:

1. IR&D efforts were being intermingled with other independent technical efforts such as bid and proposal, conceptual studies, contract support, etc. (cost classification problem).

2. Some contractors applied indirect and administrative costs to IR&D while others did not (burdening problem).

3. The technical rating methods used by the three Services were not consistent and there was little exchange between the Services.

4. Advance agreements were negotiated before, during, and after the period covered. Some contractors that should have agreements did not have them. There were inconsistencies in cost-sharing arrangements.

5. Contractors were free to change IR&D plans during performance and there had been significant changes in some programs. (Ref. 21, pp. 2-4)

This was the first formal audit to document many of the problems which had motivated the efforts to improve the IR&D cost principles. Further, it questioned the adequacy of DOD surveillance and control of IR&D.

About a year later the Subcommittee on DOD Appropriations of the House Committee on Appropriations systematically

questioned DOD witnesses on the benefits of IR&D to the DOD. They also asked whether the DOD witnesses felt the resources could be better utilized by adding them to the Service RDT&E accounts and making IR&D a disallowed cost. The DOD position was that IR&D was of value and should be retained as an allowable cost. However, with one exception, the witnesses were unable to state specific benefits. (Ref. 22) This probing led Dr. Foster, DDR&E, to establish a Defense Science Board Task Group on IR&D which will be discussed in more detail in Section 2.3.2.

2.3. OASD(IL) Led IR&D Activities (1967-1969)

2.3.1. Evolution of the Cost Principles

Subsequent to the Secretary of Defense decision to drop the CITE concept, OASD(IL) took the lead in developing new cost principles for IR&D and B&P. Essentially the same people continued working on the cost principles. The first product of the OASD(IL) effort emerged in January 1967. Key elements were:

1. IR&D costs of CWAS approved contractors were to be accepted as reasonable except that the Secretary of the Military Department could withdraw the approval in special cases.

2. IR&D costs for non-CWAS approved contractors incurring less than $1M in IR&D costs were to be subject to a formula ceiling.

3. IR&D costs for non-CWAS approved contractors incurring over $1 million of IR&D costs were to be subject to the negotiation of advance agreements. Failure to negotiate such an agreement limited the contractor to a $1 million ceiling.

4. Cost sharing from the first dollar was eliminated.

5. Unsolicited B&P costs (incurred prior to receipt of RFP) were to be handled exactly the same as IR&D costs.

6. B&P costs incurred after receipt of a request for proposal were to be subject to the general ASPR rules of reasonableness.

7. If a contractor was required to negotiate an advance agreement for either IR&D or B&P, he was required to negotiate an agreement for both. The agreement was to have a separate ceiling for each but either could be increased if the other was decreased by a like amount. (Ref. 4, pp. 28-29)

Principles in this form were sent to industry and other agencies in January 1968. Industry comments were received in April and June 1968 and suggested substantial changes to the cost principles. (Refs. 23 and 24) In response to these comments the attempt to segregate types of B&P costs was abandoned and a procedure for determining an IR&D ceiling when negotiations failed was provided.

In October 1968, revised cost principles were presented to the DOD Industry Advisory Group which recommended that negotiations of advance agreements be abandoned and that all contractors be subject to the same formula. (Ref. 4, p. 34) In December 1969, the Deputy Secretary of Defense approved the use of the formula for all contractors. (Ref. 25) The key elements of the new cost principles were:

1. Both IR&D and B&P were to be subject to a straight formula for determination of reasonableness,

2. There was to be interchangability between IR&D and B&P ceilings,

3. An appeals procedure was to be provided for special cases when the formula provided an unequitable result,

4. All B&P costs, solicited and unsolicited were to be included in the formula computation,

5. All IR&D and B&P costs were to be burdened except that G&A would not be included, and

6. Contractors with approved CWAS rating would not be subject to the formula. (Refs.26 and 27)

These cost principles were formally sent to industry, other Government agencies, and the GAO in February 1969. The next month they were published as advance information for DOD personnel in Defense Procurement Circular No. 68. The industry reacted negatively to the proposed cost principles taking the basic position that IR&D and B&P costs should be fully reimbursed with no limiting factors other than the general rule of reasonableness. (Ref. 28) The General Accounting Office also took a serious interest in the proposal and after pursuing a number of questions in the summer of 1969 (Ref. 29), took the position that the proposed principles would lead to increased government cost without commensurate benefits and decrease government awareness of the value of a program it was substantially funding (through the reduction of technical evaluation activity). (Ref. 30) These cost principles were overtaken by Congressional activities in the IR&D area and never implemented as will be discussed in Section 2.4. The outside events which occurred during 1967-69 will be summarized in the next section.

2.3.2. Related Events

As a result of the inquiries by the House Appropriations Subcommittee in the spring of 1966, DDR&E established a Defense Science Board (DSB) Task Group to examine:

- the adequacy of communications of IR&D efforts, and
- generate examples of benefits of IR&D.

The Task Group was mainly composed of executives from the aerospace industry. Their recommendations were that (1) the present concept of allowing IR&D as an overhead item be continued and (2) ODDR&E issue annually a DOD report containing voluntary submissions by companies on significant IR&D projects. (Ref. 6) A Supplement included the first group of examples (Ref. 31) and similar reports were published in 1968, 1969, and 1970 (Refs. 32, 33, 34, 35, and 36) Thus, in subsequent years DOD witnesses were forearmed with examples of benefits of IR&D. (see, for example, Ref. 37)

The Logistics Management Institute completed a Reconnaissance Study of IR&D and B&P in August 1967. Their primary recommendation focused on improving technical evaluations to achieve consistency, stimulate industry-Government coupling, avoid unnecessary duplication, and establish closer liaison between technical evaluators and negotiators. (Ref. 38)

It was during this time period that the GAO became more active in the IR&D/B&P area. In 1967 they issued a report on the costs of bidding and related technical efforts

charged to Government contracts at Lockheed Missile and Space Company. The GAO found much work in bidding and related efforts which they felt could be classified as IR&D. IR&D was covered by a ceiling and, hence, subject to reduced recovery whereas bidding and similar expenses were not covered by ceilings. Thus, a motive could be asserted for a contractor to shift costs from IR&D to other areas. The GAO felt the DOD regulations were ambiguous and since most disputes are decided in favor of contractors in this situation, the GAO recommended that the DOD issue improved cost principles at the earliest possible time. The GAO findings collaborated the cost classification findings of the Army Audit Report (Ref. 39)

The GAO issued a draft report on a major study of Government-wide IR&D in July 1968. The GAO report identified several problem areas, such as:

- Lack of a Government-wide IR&D policy,
- Need for a closer relationship of Government R&D efforts and IR&D,
- Delays in negotiating advance agreements,
- Relationship between bid and proposal, other technical effort*, and IR&D (cost classification),
- Extensive use of cost sharing from the first dollar,
- Allocation of other overhead costs to IR&D (burdening),

*Other Technical Effort, OTE, was a term of convenience applied to technical effort which was not classified as IR&D but appeared to be IR&D-type work.

- Differences in Military Services administration of IR&D.

- Relevancy of IR&D to Government interests, and

- Rights to royalty-free use of inventions under IR&D.

Further, the GAO report included four recommendations:

1. There should be a Government-wide IR&D policy.

2. There should be a more systematic method of disseminating to Government personnel the information contained in the IR&D technical plans.

3. There should be uniform DOD procedures for prenegotiation arrangements, technical plan requirements, and scope and nature of the technical evaluations.

4. The Federal Council for Science and Technology should undertake a study as to whether the Government should receive royalty-free license rights to inventions arising from IR&D. (Ref. 40, pp. 88-89)

The DOD opposed one recommendation (No. 4), favored two (Nos. 2 and 3) and was neutral on the other one (No. 1). (Ref. 41) Industry provided the GAO extensive comments on the report but did not take explicit positions on the recommendations. (Ref. 42)

Thus, in the 1967-69 time period the Congress and, especially, the GAO were becoming more involved in the IR&D area and the DOD was reacting to their stimuli. Most of these stimuli were reasonably indirect and did not challenge the DOD policy in this area. However, in 1969 this situation changed.

2.4. Congressional Intercession (1969-1970)

The Congress became directly involved in IR&D policy matters during the floor debate on the FY 1970 Military Procurement Act. This involvement lasted for about 15 months and resulted in legislative action impacting IR&D in the FY 1970 and FY 1971 Military Procurement Authorization Acts.

2.4.1. FY 1970 Military Procurement Authorization Act

In August 1969 Senator Proxmire introduced Amendment No. 123 in the FY 1970 Military Procurement Authorization Bill. The amendment read as follows:

> "No part of the funds authorized by this Act shall be available for payment, directly or indirectly, to any contractor under a negotiated contract for any research and development work, bid and proposal expense, or other technical effort unless such work, expense, or other effort is specifically authorized under the terms of the contract or unless such work, expense, or effort is determined by the contracting agency to be of direct or indirect benefit to the work being performed under the contract." (Ref. 43)

In his comments Senator Proxmire criticized the lack of control the DOD had over IR&D, bid and proposal, and other technical effort costs and the significant increase in these costs from 1963 to 1969. He alleged that DOD officials did very little reviewing of contractor IR&D programs and were in no position to determine their worthiness. He was especially critical of the planned DOD cost principles (February 1969 version) which he asserted:

> ". . . completely eliminated any semblance of control by instituting a formula basis for determining the reasonableness of contractors' IR&D and bid and proposal costs. Under this system no contractor,

regardless of the degree of business he does with DOD would be required to have his proposed programs scrutinized in any way prior to incurring costs that will be reimbursed by the Government." (Ref. 43)

Amendment No. 123 would have essentially imposed the AEC cost principles* on the DOD and would have had far reaching consequences. Accordingly, Senator Proxmire later agreed to replace Amendment No. 123 with one which would impose a 20 percent reduction in IR&D, B&P and OTE costs for FY 70 authorized funds and to resubmit the original amendment as a separate bill which would be the subject of hearings in the next session of Congress. In his comments in announcing this agreement on the floor of the Senate, Senator Proxmire reiterated his criticism of existing and planned DOD policy in this area. He cited the GAO report of 1967 as giving examples of the kind of excesses which occurred under IR&D and raised as major question, "Why do we need to spend $685 million for an IR&D program when we already are spending billions of dollars on R&D contracts?" He went on to state that he had ". . . felt for a long time this program (IR&D) should not only be questioned but deleted . . . ." Thus, the lines were clearly drawn for the subsequent Congressional inquiry into IR&D. (Ref. 44)

In resolving the issue over Amendment No. 123 the Senate unanimously supported the proposed 20 percent

*The AEC IR&D cost principles are reproduced as Appendix B.

reduction in IR&D while the House did not include such a clause in its bill. Consequently, the issue went to the Conference Committee and the result was Section 403 of Public Law 91-121 which required that the DOD limit its reimbursement to 93 percent of the amount that it would otherwise paid. The provisions of the law were implemented by Defense Procurement Circular No. 75 in December 1969. (Ref. 45) Because of the rubber baseline and limited application (FY 70 funds only), the law was quite difficult to implement in a meaningful way (Ref. 46) and, as will be noted below, only remained in effect for a year. While the difficulties in implementing the law were recognized by DOD and industry, they were far more interested in what would transpire with respect to Senate Bill 3003.

2.4.2. FY 1971 Military Procurement Authorization Act

As agreed with Senators Stennis and McIntyre, Senator Proxmire introduced Senate Bill 3003 in October 1969. The bill provided that IR&D costs would be allowable under negotiated contracts only if specifically provided for in the contract and the IR&D had a direct or indirect benefit to the work being accomplished under the contract. Bid and proposal expenses under any negotiated contract would not be allowed to exceed one percent of the direct charges. (Ref. 47) In introducing this bill Senator Proxmire was even more veminent in his condemnation of current and planned DOD management of IR&D. Further, he exploited the findings of

the Army Audit Report (Ref. 21), GAO draft report of 1968 (Ref. 40), and the earlier GAO report (Ref. 39) to illustrate his assertions. In particular, he questioned the adequacy and administration of advance agreements, the effectiveness of technical evaluations, duplication of DOD sponsored R&D, and work being done under IR&D that was not related to Government or military needs. (Ref. 48)

In early January 1970 Senator Stennis asked for DOD views on what specific implementing actions would be involved if Congress established a specific ceiling on IR&D and for any other alternatives the DOD might suggest. (Ref. 49) The DOD response was provided by ASD(IL) and asserted that line item control was not administratively feasible. He then suggested two alternatives: first, the formula approach of the February 1969 proposed cost principles and, second, an approach based upon negotiated advance agreements. (Ref. 50) Subsequently, the Acting General Counsel of the DOD provided Senator Stennis the DOD views on Senate Bill 3003. The DOD strongly opposed the bill. (Ref. 51)

During the same time period the Aerospace Industries Association made known its position in opposition to Senate Bill 3003. Their key points were that the bill (1) would, in essence, preclude companies from recovering necessary costs of doing business through the prices of goods or services sold, (2) would preclude companies from developing and maintaining their technical competence, and (3) imposed

unnecessary restrictions since effective controls on companies' recoveries of the cost of independent technical efforts* were already provided by the intense competition for DOD and NASA contracts. (Ref. 52, and 53)

As promised earlier, hearings were scheduled in early 1970 by both Senate and House Armed Services Committees. However, before the hearings got underway there was a crash effort in OSD to develop a policy which would be acceptable to the Congress as a whole if not to Senator Proxmire. The general feeling was that the February 1969 cost principles were not defensible and continuing to pursue them would only lead to further restrictive legislation.

New DOD IR&D Policy

The result of this effort was a DOD white paper on IR&D signed by both the ASD(IL) and the DDR&E and approved by the Deputy Secretary of Defense. In essence, the proposed policy provided more direct and positive control particularly for the large defense contractors who incurred the majority of the costs in this area. The main differences from the February 1969 proposed cost principles were that (1) advance agreements were to be required for major contractors, (2) technical evaluations were to be made uniform DOD-wide

*Independent technical efforts is a generic term referring collectively to IR&D, B&P, and OTE.

and strengthened, and (3) a data bank was to be established to provide a centralized body of IR&D project data. It was this policy that the DOD took to Congress as an alternative to further legislation. (Ref. 54)

GAO Position Definitized

On the eve of the hearings the GAO formally published its extensive study of IR&D which had been issued in draft form in 1968. The GAO suggested three major areas for Congressional consideration:

> 1. All contractors' independent technical efforts, including IR&D, bid and proposal, and other technical efforts should be considered as a single entity since no clear distinction can be made between these items and, consequently, any agreed ceilings on IR&D can be avoided through description of an IR&D project under different terminology.
>
> 2. DOD should be required to break out and identify separately in its appropriation requests the amount estimated as required for this purpose.
>
> 3. Congress should establish a government-wide policy on independent technical effort since the DOD/NASA and AEC policies differ. In this area the following issues were suggested:
>
> a. Whether or not the present practice of allowing IR&D as an acceptable overhead cost in negotiated costs should be replaced by a system of:
>
> (1) Extending the use of direct R&D contracts to include those IR&D projects which the agency wishes to support fully or on a cost-sharing basis and thereby providing greater assurance that the desired work will be performed and that the Government will be entitled to information and royalty-free rights to any inventions arising therefrom and

(2) Authorizing an allowance for a stipulated percentage of the remainder of the contractor's total IR&D effort, irrespective of the source of funding, either as a profit factor or through acceptance as a recognized overhead cost as an incentive to contractors to continue technical efforts beyond those directly contracted with the Government.

b. Whether or not allowances to contractors for IR&D should be confined to projects that have a direct and apparent relationship to a specific function of the agency, and

c. Whether or not, if IR&D allowances by DOD and NASA are continued on the present basis and are not related directly to current or prospective Government procurement, financial support should be provided to companies with similar capabilities which do not hold Government contracts as a means of supporting and strengthening industrial technology. (Ref. 55, Digest pp. 2-3)

The GAO report included extensive discussions of the lack of an overall government IR&D policy, the need for a closer relationship of Government R&D efforts and IR&D, rights to royalty-free use of inventions under IR&D, and other problem areas. (same as those in the draft report Ref. 40) This report was the basis for GAO testimony at the hearings.

Congressional Hearings

The Congressional hearings on IR&D were held early in 1970. The House hearings were conducted by an IR&D Subcommittee of the Armed Services Investigating Subcommittee of the Armed Services Committee. Representative Philbin (Massachusetts) chaired the IR&D subcommittee and was assisted by Representative Gubser (California). The Senate hearings were conducted by the Ad Hoc Subcommittee on Research

and Development which was chaired by Senator Thomas McIntyre (New Hampshire) and included Senators Young (Ohio), Byrd (Virginia), Murphy (California), and Brooke (Massachusetts). The House hearings were conducted 25, 26, February and 2 March 1970 and the Senate hearings on 2, 6, 9, and 13 March 1970.

The individuals and organizations testifying at the hearings are listed on the next page. Senator Proxmire spoke for this bill. However, the other Congressmen opposed his proposed legislation. The General Accounting Office representatives basically reiterated the positions taken in their report. The majority of witnesses at both hearings were from industry. They provided information on the benefits of IR&D, cost trends, management procedures, and reiterated the industry position on IR&D. The AEC representatives provided their rationale for why the AEC needed cost principles which differ from those of the DOD. (Refs. 56 and 57)

The only DOD witness was Dr. Foster and he forcefully defended the value of IR&D to the DOD. Further, he proposed a DOD administrative solution to the problems identified by the GAO and Congress which would negate the need for legislation in the area. The five point proposal is given below and was based on the white paper approved a few days earlier by the Deputy Secretary of Defense:

INDIVIDUALS AND ORGANIZATIONS TESTIFYING AT IR&D HEARINGS

HOUSE HEARINGS

Hon. Emilio Daddario, Representative
General Accounting Office
Western Electronic Manufacturers Association
Aerospace Industries Association
National Security Industrial Association
Electronic Industries Association
Boeing Company
Westinghouse Electric Company
Department of Defense (DDR&E)

SENATE HEARINGS

Hon. George Murphy, Senate (California)
Hon. William Proxmire, Senator (Wisconsin)
Hon. Alan Cranston, Senator (California)
General Accounting Office
Western Electronics Manufacturers Association
Aerospace Industries Association
National Security Industrial Association
Electronic Industries Association
Department of Defense (DDR&E)
Atomic Energy Commission

"1. Use individually negotiated advance agreements for the control and reimbursement of these costs for approximately 100 of the larger defense contractors.' This will require an increase in the number of contractors with which we negotiate advance agreements by a factor of almost two. Such agreements, after a formalized detailed technical review of the proposed IR&D program, will establish a separate dollar ceiling for the DOD's reimbursement of each of these costs, but allow the contractor to combine the individual amounts into a single pool if he chooses. We will require the contractor to burden these costs as he would for a contract, except that G&A would not be added. The requirement to negotiate an advance agreement will be enforced by automatically establishing a low threshold for recovery of these costs where no advance agreement exists.

2. Strengthen technical review and evaluation of contractors' IR&D programs, as currently established under DOD Instruction 4105.52. Establish uniform review and evaluation procedures to be used throughout the DOD. The system will require the review of a company's individual IR&D projects as submitted at the time of the advance agreement.

3. A data bank will be established to provide a centralized body of IR&D project cost and technical information. This information will be available to the Government technical community at large.

4. Use the DOD developed formula for control and determination of reasonableness of these costs for the remaining large number of smaller companies who recover IR&D and B&P costs. This will provide a workable system that can be uniformly applied, and one which will assure results that can be easily monitored and adjusted as needed.

5. The Military Departments will increase as necessary the support and resources needed to effectively perform the required IR&D technical reviews and evaluations." (Ref. 56, pp. 267-269)

Thus, the DOD once again took the initiative in establishing an appropriate solution to the IR&D problem. The DOD proposal was a balanced position between the restrictive

proposal of Senator Proxmire and the liberal suggestions of industry representatives.

Congressional Resolution

The House and Senate came to different conclusions on the need for legislation in the IR&D area and the differences were ultimately resolved by the Conference Committee for the Military Authorization Bill for Fiscal Year 1971.

The Senate Armed Services Committee recommended legislative action in the IR&D area but did not support Senator Proxmire's bill. The Committee supported the DOD efforts to improve its administration of IR&D. However, the Committee expressed its belief that in view of the importance of independent technical effort to the security of the country and the amount of money used to fund it annually, broad legislative controls were justified. (Ref. 58, pp. 97-98; see also Ref. 59) The Senate adopted language which provided the following:

> "a. Restricted payments to contractors for independent research and development, bidding and proposal and other technical effort work which is relevant to Defense functions and operations,
>
> b. Required negotiation of advance agreements with all contractors who receive more than $2 million in IR&D, B&P, or OTE in their last preceding year,
>
> c. Required that negotiations of advance agreements be based on submitted plans and a technical evaluation of the IR&D portion of those agreements,

d. In the event negotiations are held with any company required to enter into an advance agreement, but no agreement is reached, reimbursement would be made in an amount substantially less than the contractor otherwise would have been entitled to receive,

e. The Department of Defense was required to report to Congress with regard to IR&D, B&P and OTE expenditures,

f. Establish a ceiling of $625 million on payments to be made pursuant to advance agreements negotiated under the act, and

g. Repeal of Section 403 of the fiscal year 1970 act which limited payments for IR&D, B&P and OTE to 93 percent of the total cost contemplated by the Department." (Ref. 60, p. 21)

The House Armed Services Committee IR&D Subcommittee concluded t t adequate control of defense expenditures for IR&D, B&P, and OTE could be achieved through improved DOD administration rather than through legislation. The House Subcommittee also recommended that:

(1) Section 403, Public Law 91-121 be repealed

(2) The Department of Defense:

(a) Separate the costs of B&P and OTE in the negotiation of advance agreements for IR&D,

(b) Extend the use of advance agreements to firm receiving $2 million or more from the DOD for IR&D, B&P and OTE provided the use of cost sharing arrangements be eliminated,

(c) Provide appropriate right of appeal where, in the absence of an advance agreement, the DOD establishes recovery of costs which a contractor claims is less than the amount of its fair share,

(d) Develop uniform regulations which will provide clear guidance to all services as to policies, practices and procedures to be followed in the establishment of allowable IR&D costs and the negotiation of IR&D advance agreements, and

(e) Provide Congress annual reports on the IR&D payments made to major contractors during the prior year.

(3) The criteria of relevancy not be used as a determining factor in the support of basic research efforts of contractors. (Ref. 61, pp. 14-15)

The House included no language on IR&D in its version of the authorization bill. Thus, the issue went to the Conference Committee for resolution.

The compromise worked out in the Conference Committee was that legislation would be inacted but there would be no ceiling on DOD reimbursement of IR&D, B&P and OTE. Further, the relevancy requirement was changed to a "potential" relationship to accommodate the House objection that a direct relevancy requirement would preclude contractors from doing basic research under IR&D. Finally, all reference to "Other Technical Effort" was eliminated since the DOD planned to reclassify all OTE costs into IR&D, B&P or other appropriate overhead categories. (Ref. 60, pp. 21-22) The final legislation was Section 203 of Public Law 91-441, the Military Procurement Authorization Act for Fiscal Year 1971, which is included as Appendix C. The DOD had previously begun to implement its five point plan since both Armed Services Committees had agreed to it. (Ref. 62) Once the

law was passed the implementation was expedited. However, the implementation required a significant period of time since it represented a rather significant overhaul of the DOD's administration of IR&D. Current DOD policies and practices are discussed in the next section.

SECTION III

CURRENT DOD POLICY AND ADMINISTRATION

The current DOD policy and administration of IR&D is based on both the requirements of the Public Law provisions and the plan which DOD advanced during the IR&D hearings. These requirements and commitments are outlined in Section 3.1. After the law was passed DOD established a senior management policy council to monitor implementation and deal with IR&D policy issues. The activities of this group are summarized in Section 3.2. The major elements of the current DOD policy and administration of IR&D are outlined in Section 3.3. Then, relevant data on the size and content of the IR&D program are presented in Section 3.4.

3.1. Legislative Requirements

In setting out to overhaul IR&D policy and administration, DOD not only had to comply with the provisions of Section 203, Public Law 91-441, but also the provisions of the "get well" plan presented to Congress during the hearings. The major requirements of the law were:

1. Any company which recovered, in its prior fiscal year, more than $2 million of IR&D or B&P from DOD contracts that are subject to the Truth in Negotiations Act must negotiate an advance agreement with DOD.

    a. Advance agreements may be concluded with the corporation or with product divisions which recover more than $250 thousand of such payments.

b. Companies required to negotiate advance agreements cannot be paid IR&D/B&P costs except pursuant to the terms of an advance agreement.

c. If a company negotiates but does not reach agreement, no reimbursement shall be made except for an amount substantially less than would otherwise be allowed by DOD.

2. The IR&D portion of the advance agreement must be negotiated on the basis of DOD technical evaluation of the contractor's proposed program.

3. No IR&D or B&P costs may be paid unless the work has, in the opinion of the Secretary of Defense, a potential relationship to military functions or operation.

4. Reduce allowances resulting from failure to reach agreement are subject to appeal in accordance with regulations to be prescribed by the Secretary of Defense.

5. The Secretary of Defense is required to submit annual reports to Congress on or before 15 March setting forth

a. Companies with whom negotiations were held and results.

b. Defense Contract Audit Agency (DCAA) report on IR&D and B&P payments to major defense contractors.

c. The manner of DOD compliance with the legislation and any major policy changes proposed by DOD.

6. The prior legislation establishing the 93 percent limitation was repealed. (Ref. 63, pp. 5 and 6)

Further, the DOD had committed itself to implementing its proposed solution to the IR&D problem. Accordingly, in early October 1970 Senator McIntyre wrote to the Secretary of Defense stating:

> "The provision as now written (Section 203, Public Law 91-441) is perfectly consistent with the plan for improved administration of these programs which was presented to Congress by Dr. Foster in his testimony before the Committee this past March. It is the Committee's hope that the Department will move expeditiously to implement this plan."

Senator McIntyre went on to identify five objectives for implementation:

1. Reclassify appropriate OTE items to IR&D or B&P,

2. Establish uniform standards for burdening except for G&A,

3. Establish uniform procedures for determining allowable IR&D/B&P,

4. Establish a data bank for IR&D, and

5. "Beef up" personnel and other resources to improve technical evaluations and realize the goal of negotiating with 100 largest defense contractors. (Ref. 64)

Subsequently, Senator Stennis endorsed Senator McIntyre's views in a follow-up letter to the Secretary of Defense. (Ref. 65) Thus, in addition to the specific provisions of the law, the DOD was committed to a number of additional actions. Early in the implementation process a top management group was established to oversee the implementation and DOD policy in this area.

3.2. DOD Management Organization for IR&D.

In July 1971 the Deputy Secretary of Defense established a DOD IR&D Policy Council to recommend necessary guidance and policy on a continuing basis. (Ref. 66) Members included DDR&E (Chairman), ASD(IL), ASD(C) and the Assistant Secretaries of the Military Departments for

I&L and R&D. Representatives of NASA and AEC were invited to participate as observers. A Charter was prepared and formally published in DOD Instruction (DODI) 5100.66, "Establishment of Policy for, and Technical Evaluation of, IR&D Programs." (Ref. 67) In addition to chairing the DOD IR&D Policy Council, DDR&E was also responsible for the DOD Technical Evaluation Group which was established to coordinate the technical evaluation and activity and which will be discussed in more detail in Section 3.3.3. The ASD(IL) is responsible for the ASPR Committee which generates the cost principles and has staff cognizance for the tri-service negotiation groups which negotiate advance agreements.

The DOD IR&D Policy Council has met eleven times since it was established. Typical topics considered by the Council are summarized below:

1971

- Review/Approve Charter
- Status of Trial IR&D Data Bank

1972

- Working Group Activities
- Congressional Interest in IR&D
- Service Briefings on Procedures for Negotiating Advance Agreements
- Review of Proposed Technical Evaluation Form
- Industry View of IR&D/B&P Procedures/Policy
- Uniform Negotiation Procedures (twice)
- Patent and Data Rights
- Evaluation Simplification

1973

- Introductory Briefings (All members changed during 1973.)

1974

- DOD Input to GAO In-Depth Investigation
- Industry Tri-Association Committee Presentation
- Service Comments on Relevancy
- DOD IR&D Data Bank Decision Briefing
- Review of Updated Documents
- Summary of DSB Report on IR&D
- Guidelines for Level of IR&D Support

1975

- Discussion of DSB Report on IR&D

The agenda items were initially mainly associated with implementation and have since evolved to a continuing review of policies and procedures.

The Air Force has established an Air Force IR&D Policy Council to interface with the DOD Council and oversee Air Force IR&D activities. It is chaired by the Assistant Secretary of the Air Force R&D and includes Secretariat, Air Staff and Headquarters, Air Force Systems Command representatives. (Ref. 68) Neither of the other Services have established IR&D policy councils.

The DOD IR&D Policy Council established a Working Group on Nature, Objectives and Effects of the IR&D Program at an early meeting. The Group conducted an industrial survey in the summer of 1972 to obtain additional data on how industry handles IR&D and industry reaction to DOD policies and procedures. The Group has published a very informative report on IR&D; the latest version was released in June 1974 (Ref. 69) and is available from Mr. Gersham R. Makepeace, ODDR&E, who has chaired the Group since its inception.

3.3. Elements of DOD IR&D Policy and Administration

The major elements of the DOD IR&D policy and administration are discussed in this section. The evolution of the DOD policies and practices are traced to their current status. The areas discussed are (1) cost principles, (2) negotiation of advance agreements, (3) technical evaluations, (4) potential military relationship determinations, (5) appeal hearing groups, (6) annual report to Congress, and (7) IR&D data bank.

3.3.1. Cost Principles

The requirements of Public Law 91-441, Section 203, were initially addressed in Defense Procurement Circular (DPC) No. 84 dated 30 November 1970. This DPC:

- Required contractors to negotiate advance agreements for the period beginning 1 January 1971 if they recovered over $2 million of IR&D and B&P from DOD contracts in their fiscal year 1970,
- Required IR&D/B&P to have a potential relationship to a military function or operation as a condition of allowability,
- Provided for technical evaluations,
- Provided for interchangeability between IR&D and B&P,
- Reduced payment for contractors who failed to complete required negotiations was established at an amount not to exceed 75 percent of what otherwise would have been accepted, and
- Provided for three-man Departmental appeals boards (Ref. 70, see also Ref. 63, p. 9)

Representative Gubser, who had been on the House IR&D Subcommittee, thought that DPC No. 84 overimplemented the law. The DPC provided that any contractor who recovered over $2 million in IR&D and B&P form the DOD would be required to negotiate an advance agreement. Representative Gubser questioned two aspects of the above requirement. First, there was no restriction on the type of contracts the $2 million was recovered under whereas the law included the statement:

> "The provisions of this section shall apply only to contracts for which submission and certification of cost or pricing data are required in accordancw with Section 2306(f) of Title 10, United States Code" (Truth in Negotiation Act).

Second, the law referenced IR&D or B&P whereas the DPC used the phrase IR&D and B&P. Both of these points were given serious consideration by the DOD and in the first case resolved in favor of Representative Gubser's position but the second was not changed since DOD felt its position was consistent with prior commitments and legislative history. Defense Procurement Circular No. 87 changed the criteria to only IR&D/B&P costs recovered on contracts subject to the Truth in Negotiations Act. (Refs. 71 and 72)

The revised ASPR IR&D/B&P principles were developed consistent with DPC 84 and 87. They also provided for two other provisions which related to Dr. Foster's five point plan. These were the requirement for full burdening of IR&D/B&P except for G&A and for the use of CWAS, or the

formula, in establishing IR&D/B&P ceilings for contractors not required to negotiate advance agreements. These principles were first published as Defense Procurement Circular No. 90 in September 1971. They became effective for new contracts awarded in the first fiscal year of each contractor beginning on or after 1 January 1972. In hardship cases application could be delayed for up to one year. (Ref. 73, see also Ref. 63, p. 10) These cost principles are still in effect. (Ref. 74, see Appendix D)

3.3.2. Negotiation of Advance Agreements

The tri-service negotiation groups had been in existence since the early 1960s and the new policies and procedures had the main impact of requiring negotiations with more contractors and strengthening the government negotiating position. During the hearings the DOD had obligated itself to establish uniform negotiation procedures (Ref. 64) This topic was one of the main concerns of early DOD IR&D Policy Council meetings. Further, an ASPR case (ASPR Case 71-102, ASPR Guidance for Negotiating Advance Agreements for IR&D and B&P) was established in 1971 to consider the topic. The Director of Procurement Policy, ASD(IL), put forward a strawman set of procedures which included a weighted guideline approach to determining a reasonable ceiling. This approach was unacceptable to the ASPR Section XV, Part 2, Subcommittee because they did not feel a set of guidelines could satisfactorily encompass all possible circumstances and

conditions. (Ref. 75) Although there has been much discussion of uniform negotiation procedures, none have been issued by OSD and each negotiation group still does its negotiations as it sees fit.

The Air Force tri-Service group has used a guideline approach in establishing the Government negotiation objective for their negotiations since 1972. The guideline is applied by the negotiator and the results are reviewed at a pre-negotiation meeting of the negotiator, his supervisor, and the IR&D technical manager. If in the judgment of the negotiator it is necessary to deviate from the guidelines to obtain an equitable result, such is permitted.

Once it became clear that it was not possible to obtain agreement on uniform procedures for negotiations, and the GAO had identified residual deficiencies in this area, a joint DDR&E/ASD(IL) memorandum was issued giving broad guidance for the negotiation of IR&D/B&P advance agreements. The guidance provided

- All elements in the evaluation and negotiation process should seek out and reward projects which solved critical deficiencies or reduced the cost of equipment,
- Departmental negotiators should meet together from time-to-time to exchange views and identify issues,
- Results of the technical evaluation should have a meaningful and traceable effect on the negotiated ceiling,
- Multiyear advance agreements are encouraged,

- Inflationary or deflationary economic factors would be given consideration,

- Technical representatives should participate in pre-negotiation meetings,

- Negotiators are responsible for B&P potential military relationship determinations. The basis should be the same as for IR&D determinations since IR&D and B&P are interchangeable, and

- Non-relevant projects can be included in the ceiling so long as there are enough potentially relevant projects to cover all costs allocated to the DOD. (Ref. 76)

This guidance was subsequently updated in October 1974. However, only a few minor changes were made. The OASD(IL) IR&D focal point was designated to arrange inter-Departmental negotiator meetings. A new paragraph requiring negotiators to maintain adequate negotiation files was added and the first paragraph was moved to the DODI 5100.66. (Ref. 77) Thus, while uniform procedures have not been established there is overall guidance available to provide a framework for the negotiation process.

3.3.3. Technical Evaluations

Improving the technical evaluation process was a major thrust of Dr. Foster's five point plan for improving DOD administration of IR&D. Further, Congress appears to have regarded technical evaluations as a necessary part of providing adequate stewardship of the tax payers funds going into IR&D. Thus, a major effort was undertaken to upgrade the technical evaluation process. This effort was spearheaded by the DOD Technical Evaluation Group (successor to

Armed Services Research Specialist Committee) which was chaired by ODDR&E* and included members from each Service and a NASA representative.

Initial Technical Evaluation Policies and Procedures

The basic technical evaluation policy document, DODI 5100.66, "Establishment of Policy for, and Technical Evaluation of, IR&D Programs," was published in February 1972. This document provided for yearly evaluation of contractor submitted technical plans and on-site reviews at least once every three years. The Technical Evaluation Group (TEG) was to (1) establish criteria, methodology, and evaluation forms for use by all Services, (2) designate the lead department for each contractor, (3) determine the standard format for contractor technical plans and other similar functions. A departmental IR&D technical manager was to be designated by each Service. His responsibilities were (1) to designate the organizations within his department that were responsible for evaluating company technical plans, (2) ensure effective evaluations, (3) prepare and submit evaluation report, and so forth. Further, he was responsible for verifying that the evaluation covered at least 90 percent of the dollar value of each company's IR&D program to ensure that the

*Mr. Elliott B. Marwood was the initial chairman. The Group was subsequently chaired by Mr. David D. Acker and, now Mr. James W. Roach.

evaluation was valid. The departmental IR&D technical managers were the Service members of the TEG and were responsible for the technical evaluation activity in their Service. The evaluations themselves were done by scientists and engineers in the laboratories and acquisition divisions of the Services and NASA. (Ref. 67) A standard technical evaluation form for use DOD-wide was published in May 1972 and has been used henceforth by all the Services and NASA. (Ref. 78)

The guidelines for contractor technical plans were also issued in February 1972. They provided for presentation of a tabular synopsis and narrative discussion for each IR&D project. The tabular synopsis includes such information as the principal investigator, his telephone number, project funding, and so forth. The narrative includes a discussion of the problem being addressed, the objective and technical approach for the current year, and progress for the prior year. The technical plans were to be organized by technical areas as indicated by Committee on Scientific and Technical Information (COSATI) fields and groups. (Ref. 79)

To further insure that the new evaluation procedures were understood by field personnel, ODDR&E sponsored an IR&D Seminar in September 1972. It was attended by 200 DOD/NASA personnel mainly associated with the technical evaluation process.

The agenda for the meeting indicates the scope of coverage:

Keynote	Mr. E. Ball, ODDR&E
Evolution of IR&D	Mr. C. Deardorff, OASD(IL)
Report of Working Group	Mr. G. Makepeace, ODDR&E
DOD IR&D Technical Evaluation Group	Mr. E. Harwood, ODDR&E
- Technical Plans	Maj J. Eash, USAF Member
- On-Site Reviews	Mr. J. Crellin, USA Member
- Scoring Technical Evaluations	Mr. A. Cook, USN Member
NASA Evaluation Activities	Dr. R. Nash, NASA Member
Negotiating with Contractors	Mr. L. Mitchell, USAF Senior Negotiator
IR&D Data Bank	Mr. W. Thompson, DDC
Relevancy Determinations	Mr. E. Harwood, ODDR&E Mr. J. Garcia, NASA
Audit Activities	Mr. R. Logsdon, DCAA
Summation and Future Activities	Mr. D. Acker, ODDR&E

Service Implementation

Since the Service members of the TEG were also responsible for implementation of the process in their Services, there was a relatively rapid implementation. Each Service published internal regulations on the IR&D technical evaluation process. (Refs 80, 81, and 82) A detailed set of guidelines for field personnel was published by the Air Force as an Air Force Systems Command Supplement to the appropriate Air Force Regulation. The Supplement provided scoring procedures, instructions for completing the evaluation

forms, evaluation report format, and so forth. (Ref. 83)

In the summer of 1974, NASA created an IR&D office in the Office of Aeronautics and Space Technology. The objectives of the office were to: (1) manage this NASA-wide technical evaluation activity and (2) to encourage a strong interaction between NASA and industry. (Ref. 84) This action is expected to upgrade NASA particiaption in the technical evaluation process.

Revised Documentation

In early 1974 the Technical Evaluation Group undertook a review of existing DOD IR&D documentation. As a consequence the DODI 5100.66 and guidelines for contractor technical plans were reissued in late 1974. During the intervoning period of time the revisions were negotiated with industry (via CODSIA), reviewed and commented upon by the Services, and finally approved by the DOD IR&D Policy Council.

The revised DODI 5100.66, "Establishment of Policy for, and Administration of, IR&D Programs" (Ref. 2), was somewhat broadened to include reference to the DOD IR&D Data Bank and to provide a set of principles which include a rationale for DOD support of IR&D. The main change relating to the technical evaluation process was the replacement of the requirement that 90% of the dollar value of the contractor program be evaluated with the requirement that the lead Department verify that the overall evaluation has been sufficiently comprehensive to permit the formation of a

reasonable conclusion concerning the technical quality of the contractor's program. Further, the new DODI specifically assigns to the TEG responsibility for assisting auditors and contracting officers in resolving cost classification questions involving IR&D. This practice had developed in the early 1970s but had previously been covered by regulation.

The guidelines for contractor technical plans were rewritten mainly for clarity and did not change the nature of the information being requested from industry. (Ref. 85)

3.3.4. Potential Military Relationship Determination

Section 203 of Public Law 91-441 required the DOD to determine whether or not IR&D projects have a "potential relationship to a military function or operation," (referred to as agency relevancy). Responsibility for this determination was assigned to the Technical Evaluation Group. (Ref. 86, para IV C2a) Since no legislative criteria was provided for this determination, there was considerable uncertainty as to just what it should be. The Air Force took the lead in formally stating criteria for the determination. There were some difficulties to early determinations and a few cases were resolved by ODDR&E. However, with time, some degree of consistency evolved in the determinations and the other Services gradually adopted the Air Force criteria. In early 1973 the Chairman of the Technical Evaluation Group formally issued the Air Force criteria as a guideline to be

used by all Services. (Ref. 86) The criteria is illustrated below:

Is the DOD precluded by law or otherwise, from funding such R&D?	What is the nature of the military requirement for the end product?	What will be the application of the end product?	Is another government agency responsible for this field of R&D?	CONCLUSION Is the IR&D project potentially relevant?
Yes				No
No	URGENT			Yes
	NONE (Not used by military)			No
	ROUTINE	Primarily Military		Yes
		Primarily non-military, but with substantial military application	Yes	No
			No	Yes
		Only incidental military application		No

Experience in the Air Force indicates that about 90% of the contractor IR&D projects are potentially related based upon this criteria. Since the DOD reimburses only about 40% of the contractor IR&D programs, the relevancy requirement has had little direct impact on ceilings. However, it may have motivated contractors to pursue work which they felt would be judged potentially related.

3.3.5. Departmental Appeal Hearing Groups

Section 203 of Public Law 91-441 required that an appeal procedure be established by the Secretary of Defense for contractors who negotiate but are unable to reach agreement with the DOD negotiator. Departmental IR&D/B&P Appeal Hearing Groups were established by ASPR 15-205.35 (para D1h). Each Department is required to have a group which is composed of representatives of the Assistant Secretary for I&L (Chairman), Assistant Secretary for R&D, and General Counsel. Determinations by the Appeals Groups are to be the final and conclusive determinations of the Department of Defense.

To date there has been only one appeal. It occurred during the first year of operation under the new procedures when Aerojet General Corporation failed to reach agreement with their negotiator (Navy). Aerojet appealed the negotiator's determination and the Navy Appeal Hearing Group ruled in favor of the negotiator. Aerojet subjequently initiated litigation in the US Court of Claims but a final ruling has not yet been issued by the Court. The essence of

this situation is that Aerojet refused to accept a ceiling which was other than the amount they unilaterally determined to be their normal and reasonable cost of business. They asserted to do otherwise was a form of cost sharing which is precluded by the ASPR. The Navy rebuttal, in part, was that, by definition, negotiation is a process of offers and counteroffers and that Aerojet was insisting that their offer be accepted a priori. (Ref. 87)

3.3.6. Annual Report to Congress

Section 203 of Public Law 91-441 requires an annual DOD report on IR&D setting forth:

- Companies with whom negotiations are held and results.
- DCAA report on IR&D and B&P payments to major defense contractors.
- The manner of DOD compliance with the legislation in Section 203 and any major policy changes proposed by DOD.

The procedure which has evolved is that the DOD submits its report on or before 15 March each year. Subsequently, Senator McIntyre enters it into the Senate record along with any related letters and GAO reports and gives his personal assessment of DOD's actions. To date five reports have been released:

Year	Congressional Record
1971	24 March 1971, S3815-3818
1972	11 May 1972, S7681-7697
1973	8 May 1973, S8570-8583
1974	28 May 1974, S9042-9055
1975	9 April 1975, S5560-5568

DODI 7700.17, "Report to the Congress on IR&D/B&P Advance Agreements Negotiated with Defense Contractors" provides the mechanism for assembling the data for this report. (Ref. 88)

3.3.7. IR&D Data Bank

The IR&D Data Bank was one of the items in Dr. Foster's five point IR&D "get well" program. However, the need for such a data bank appears to trace back several years.

Background

At hearings of the House Subcommittee on DOD Appropriations, conducted in April 1966, Representative Mahan asked DDR&E and the Service R&D witnesses for examples of benefits of IR&D to the DOD. Only the Air Force witness was able to immediately respond. (Ref. 22) DDR&E then established a Defense Science Board Task Group on IR&D which, in part, compiled a volume of examples of benefits of IR&D. (Ref. 31) These examples were collected directly from industry on a voluntary basis. This procedure was also followed in 1968, 1969, and 1970. (Refs. 32, 33, 34, 35, and 36) While these volumes provided a ready reference for DOD witnesses and were provided to Congressional Committees, they were not too useful for supplementing the technical plans in disseminating information to DOD scientists and engineers.

The idea of an IR&D data bank similar to the DOD's Work Unit Information System was advocated by the GAO in its 1968 draft report. (Ref. 40, pp. 49-51) The concept was to provide a centralized body of IR&D data available to DOD

scientists and engineers to preclude unnecessary duplication of effort. The idea was generally well received by Congress but opposed by industry as unnecessary. (Ref 90) However, in devising an acceptable plan for improved administration of IR&D, DDR&E included establishing a data bank of cost and technical information. (Ref. 54)

Trial IR&D Data Bank

DOD established a trial IR&D data bank at the Defense Documentation Center in 1970. (Ref. 89) Abstracts of technical objectives, approach and progress, limited manpower data, the principal investigator and his telephone number, COSATI field and group, category of technical effort (research, development, or studies), and so forth were included. However, all cost data was excluded because of industry objections. An input manual was published in June 1971, (Ref 91) and an output manual in August 1972. (Ref. 92) The data bank became operational in January 1972 and made its first search in March 1972. Since contractor participation was voluntary, only about 34 corporations provided data. Government usage was about 1000 searches between the time the bank opened for business and October 1974.

Evaluation

In the early 1970s the Army Missile Command (MICOM) established a program for utilizing IR&D data. The utilization program included a current awareness program for MICOM

scientists and engineers wherein a profile was established for each S&E and IR&D summaries provided to them. The MICOM system included a capability for retrospective searches and also staff personnel searched the IR&D data before approving in-house projects to preclude unnecessary duplication of effort. As a part of this system MICOM established a computerized data bank of IR&D information which they extracted from IR&D technical plans. The data included was less extensive than that included in the DDC IR&D Data Bank. However, the MICOM data bank essentially covered all contractors. (Ref. 93)

The existence of two IR&D data banks was criticized by the GAO in a letter report in August 1973. (Ref. 94) Subsequently, the Technical Evaluation Group evaluated the two IR&D data banks and submitted a comprehensive set of recommendations to the DOD IR&D Policy Council in February 1974. (Ref. 95) The major recommendations were (1) the DOD should have an IR&D data bank located at the Defense Documentation Center (DDC), (2) it should be covered in appropriate regulations (DODI 5100.66), (3) the data bank should be made available to DOD field personnel via the DDC remote terminal system and (4) cost data should be included in the data bank.

Permanent Data Bank

The DOD IR&D Policy Council approved the recommendations at its March 1974 meeting. In subsequent negotiations with

industry cost data was again deleted. Otherwise, the recommendations have been rather faithfully implemented via the revised DODI 5100.66 (Ref. 2) and the revised Department of Defense Form 271, "IR&D Data Sheet" which has been approved by the Office of Management and Budget. (Ref. 96) Thus, beginning in 1975 all contractors with advance agreements will input data to the IR&D Data Bank which is now on a permanent basis. Revised data input manuals are currently being prepared by DDC for use by the contractors. However, the approved data sheet format was sent by DDR&E to all contractors in December 1974 so they could input data in 1975. (Ref. 97) During the trial period the data bank was restricted to DOD users. However, in December 1974 NASA was granted access to the IR&D Data Bank.

3.4. IR&D Data Summary

Some data on IR&D/B&P costs and technical content are available from existing sources, however, the data leaves much to be desired. Overall data on IR&D/B&P costs will be summarized in Section 3.4.1. A rough estimate of the DOD's indirect contribution to industry research and development is given in Section 3.4.2. Finally, a brief summary of the technical content of IR&D is given in Section 3.4.3.

3.4.1. IR&D Cost Data

The Defense Contract Audit Agency (DCAA) collects IR&D data each year for the major defense contractors. This data is published in a yearly report. (Ref. 98).

Similar data has been assembled by DCAA since 1963. Summaries of this data appear in DOD presentations, GAO reports, Congressional discussions, the yearly DOD report to Congress and Senator McIntyre's report to the Senate. Contractor-by-contractor data is included in the DCAA report but not publicly released since it is business sensitive data.

A typical set of DCAA data is given in Table 3.1. The first column, "Contractor Costs," are contractor incurred costs. The second column, "Accepted by Government," are the amounts accepted by the Government as reasonable for allocation to all customers (ceiling or actual expenditures if lower). The "DOD Share" is the DOD's allocable share of the accepted column. The DCAA data also includes total and DOD sales. Hence, various ratios to sales can be calculated. For 1974, typical ratios based on the above data are:

$$\frac{\text{DOD Share of IR\&D}}{\text{DOD Sales}} = 2.1 \text{ percent, and}$$

$$\frac{\text{DOD Share of IR\&D and B\&P}}{\text{DOD Sales}} = 3.7 \text{ percent.}$$

Unfortunately, there are many deficiencies in the DCAA data which largely negates its value. First, the coverage is DOD contractors who have an annual auditable volume of costs incurred of $15 million or more or required 4,000 or more man-hours of DCAA direct audit effort. Thus, only a portion of the contractors are included. The DOD position has been that

Table 3.1. Summary of IR&D and B&P Costs*

Year	Contractor Costs			Accepted by Government			DOD Share		
	IR&D	B&P	Total	IR&D	B&P	Total	IR&D	B&P	Total
	(000,000 omitted)								
1968	$ 766	$381	$1,157	$579	$367	$946	$338	$271	$609
1969	808	426	1,234	653	409	1,062	410	289	699
1970	753	413	1,166	597	398	995	376	278	654
1971	703	427	1,130	567	390	957	354	265	619
1972	936	469	1,405	725	432	1,157	392	306	698
1973	1,051	526	1,577	809	488	1,297	441	356	787
1974	$1,145	$546	$1,694	$901	$504	$1,405	$457	$361	$805

*From Ref. 99, p. 3 and the 1975 DOD Report to Congress.

this sample includes 85-90 percent of the total (Ref. 99, p. 9).

A number of additional problems are inherent in the DCAA data including:

1. Different sets of contractors included in sample in different years,

2. Changes in burdening practices from year-to-year are not reflected in the data,

3. The IR&D definition was broadened in 1971 and unknown amounts of additional effort were thereafter transferred into IR&D, and

4. The DCAS data on DOD share includes costs reimbursed by foreign governments which vary from year-to-year.

An effort has recently been made to track some of these changes as illustrated in Table 3.2:

Table 3.2

COMPARISON OF 1972/1973 IR&D/B&P COSTS*

	1972	1973
Total IR&D/B&P	$698 million	$787 million
Less increase due to burden	0	55
	$698 million	$732 million
Less amount allocated to foreign sales	13.8	36.0
	$684.2 million	$696.0 million
DOD Sales	$19,117 million	$20,941 million
Less foreign sales	435	961
Net DOD Sales	$18,682 million	$19,980 million
Ratio to Sales	3.65	3.48

Thus, the year-to-year adjustments can be quite significant. Further, the author is aware of no effort to develop a consistent set of data going back to 1963 or even 1968. Hence, year-to-year comparisons of this data are specious and should be avoided.

There is one other source of detailed data on IR&D and that is the tri-service negotiation groups. They have the official files which include proposed values as well as the type data summarized by the DCAA. The Air Force has computerized some portion of its data base. However, extracting data from the tri-service negotiator's files usually involves tedious sifting through the hard copy material.

*Obtained from OASD(IL), also in Ref. 100, p. S9043.

3.4.2. DOD Indirect Contribution to Company-Funded R&D

Each of us contribute to contractor IR&D when we buy virtually anything which is on the market. General Motros has one of the largest IR&D programs the author has been exposed to. Whenever, you buy one of their cars you contribute to their IR&D program. The same is true when you buy a toaster, washer, television and so forth. Thus, the DOD is just one of a multitude of contributors to company research and development. The total amount of company-funded research and development (as distinct from federally-supported R&D) is given in National Science Foundation data (Ref. 101, p. 26) as $11,347 million for 1972. The DOD contribution to this amount was about $392 million. Hence, the DOD contributed only about 3.5 percent of the total company-funded research and development in the country in 1972.

3.4.3. Technical Content of IR&D

The DOD IR&D Data Bank project summaries for 1974 were summarized in an effort to highlight some characteristics of DOD-related IR&D efforts. (Ref. 102) The sample size is indicated in Table 3.3. The 104 divisions or companies represent 25 corporations as listed in Table 3.4. The number of projects is about one-half the number estimated to be conducted by the contractors with advance agreements each year. The distribution of projects and effort by category (research, development, and studies) is given in Table 3.5. About one-half the projects are in research (applied and

Table 3.3

Size of IR&D Data Bank (1974)

Number of Companies/Divisions	104
Number of Projects	2890
Professional Manyears	10193

Table 3.4

Corporations in Data Bank (1974)

Bell Laboratories	Martin Marietta
Boeing	Motorola
Chrysler	Perkin-Elmer
Curtiss-Wright	Philco-Ford Communication
General Dynamics	Raytheon
General Electric	RCA
Goodyear Aerospace	Rockwell International
Grumman	Sanders Associates
GTE Sylvania Electronic	Sperry Rand
Hughes Aircraft Company	TRW Systems
ITT Defense--Space Group	United Aircraft
Lockheed Aircraft	Westinghouse
LTV Aerospace	

Table 3.5

Distribution of Projects and Manpower Loading by Category

Category	Number of Projects (percent)	Professional Manyears (percent)
Research	47	33
Development	42	44
System and Concept Formulation Studies	11	23

basic). Past studies suggest that the vast majority of these efforts are applied research with a relatively low percent classified as basic research (maybe 3—5). The emphasis on system studies is probably greater for this group of contractors than for the general population since it includes most of the major systems primes.

The breadth of IR&D activity is indicated by the distribution of effort versus the technical areas listed in Table 3.6. For this group of contractors there are projects in 73 percent of the technical areas and ten or more projects in 33 percent of the areas (see Table 3.7). Those technical areas with the most projects are listed in Table 3.8 and those with the greatest manpower loading are given in Table 3.9. Thus, technical effort in IR&D does appear to be broad based but with some concentration in those areas most closely related to DOD activities.

Table 3.6 Technical Areas

Aeronautics

0101 Aerodynamics
0102 Aeronautics
0103 Aircraft
0104 Aircraft flight instrumentation
0105 Air facilities

Agriculture

0201 Agricultural chemistry
0202 Agricultural economics
0203 Agricultural engineering
0204 Agronomy and horticulture
0205 Animal husbandry
0206 Forestry

Astronomy and Astrophysics

0301 Astronomy
0302 Astrophysics
0303 Celestial mechanics

Atmospheric Sciences

0401 Atmospheric physics
0402 Meteorology

Behavioral and Social Sciences

0501 Administration and management
0502 Documentation and information technology
0503 Economics
0504 History, law and political science
0505 Human factors engineering
0506 Humanities
0507 Linguistics
0508 Man-machine relations
0509 Personnel selection, training and evaluation
0510 Psychology *(Individual and group behavior)*
0511 Sociology

Biological and Medical Sciences

0601 Biochemistry
0602 Bioengineering
0603 Biology
0604 Bionics
0605 Clinical medicine
0606 Environmental biology
0607 Escape, rescue and survival
0608 Food
0609 Hygiene and sanitation
0610 Industrial *(Occupational)* medicine
0611 Life support
0612 Medical and hospital equipment and supplies
0613 Microbiology
0614 Personnel selection and maintenance *(Medical)*
0615 Pharmacology
0616 Physiology
0617 Protective equipment
0618 Radiobiology
0619 Stress physiology
0620 Toxicology
0621 Weapon effects

Chemistry

0701 Chemical engineering
0702 Inorganic chemistry
0703 Organic chemistry
0704 Physical chemistry
0705 Radio and radiation chemistry

Earth Sciences and Oceanography

0801 Biological oceanography
0802 Cartography
0803 Dynamic oceanography
0804 Geochemistry
0805 Geodesy
0806 Geography
0807 Geology and mineralogy
0808 Hydrology and limnology
0809 Mining engineering
0810 Physical oceanography
0811 Seismology
0812 Snow, ice and permafrost
0813 Soil mechanics
0814 Terrestrial magnetism

Electronics and Electrical Engineering

0901 Components
0902 Computers
0903 Electronic and electrical engineering
0904 Information theory
0905 Subsystems
0906 Telemetry

Energy Conversion *(Non-propulsive)*

1001 Conversion techniques
1002 Power sources
1003 Energy storage

Materials

1101 Adhesives and seals
1102 Ceramics, refractories and glasses
1103 Coatings, colorants and finishes
1104 Composite materials
1105 Fibers and textiles
1106 Metallurgy and metallography
1107 Miscellaneous materials
1108 Oils, lubricants, and hydraulic fluids
1109 Plastics
1110 Rubbers
1111 Solvents, cleaners and abrasives
1112 Wood and paper products

Mathematical Sciences

1201 Mathematics and statistics
1202 Operations research

Mechanical, Industrial, Civil and Marine Engineering

1301 Air conditioning, heating, lighting and ventilating
1302 Civil engineering
1303 Construction equipment, materials and supplies
1304 Containers and packaging
1305 Couplings, fasteners and joints

Mechanical, Industrial, Civil and Marine Engineering *(cont'd)*

1306 Ground transportation equipment
1307 Hydraulic and pneumatic equipment
1308 Industrial processes
1309 Machinery and tools
1310 Marine engineering
1310.1 Submarine engineering
1311 Pumps, filters, pipes, tubing and valves
1312 Safety engineering
1313 Structural engineering

Methods and Equipment

1401 Cost effectiveness
1402 Laboratories, test facilities, and test equipment
1403 Recording devices
1404 Reliability
1405 Reprography

Military Sciences

1501 Antisubmarine warfare
1502 Chemical, biological, and radiological warfare
1503 Defense
1504 Intelligence
1505 Logistics
1506 Nuclear warfare
1507 Operations, strategy, and tactics

Missile Technology

1601 Missile launching and ground support
1602 Missile trajectories
1603 Missile warheads and fuzes
1604 Missiles
1604.1 Air and space launched missiles
1604.2 Surface launched missiles
1604.3 Underwater launched missiles

Navigation, Communications, Detection and Countermeasures

1701 Acoustic detection
1702 Communications
1702.1 Radio communications
1703 Direction finding
1704 Electromagnetic and acoustic countermeasures
1705 Infrared and ultraviolet detection
1706 Magnetic detection
1707 Navigation and guidance
1708 Optical detection
1709 Radar detection
1710 Seismic detection

Nuclear Science and Technology

1801 Fusion devices *(Thermonuclear)*
1802 Isotopes
1803 Nuclear explosions
1804 Nuclear instrumentation
1805 Nuclear power plants
1806 Radiation shielding and protection

Nuclear Science and Technology *(cont'd)*

1807 Radioactive wastes and fission products
1808 Radioactivity
1809 Reactor engineering and operation
1810 Reactor materials
1811 Reactor physics
1812 Reactors *(Power)*
1813 Reactors *(Non-power)*
1814 SNAP technology

Ordnance

1901 Ammunition, explosives and pyrotechnics
1902 Bombs
1903 Combat vehicles
1904 Explosives, ballistics and armor
1905 Fire control and bombing systems
1906 Guns
1907 Rockets
1908 Underwater ordnance

Physics

2001 Acoustics
2002 Crystallography
2003 Electricity and magnetism
2004 Fluid mechanics
2005 Masers and lasers
2006 Optics
2007 Particle accelerators
2008 Particle physics
2009 Plasma physics
2010 Quantum theory
2011 Solid mechanics
2012 Solid state physics
2013 Thermodynamics
2014 Wave propagation

Propulsion and Fuels

2101 Air breathing engines
2102 Combustion and ignition
2103 Electric propulsion
2104 Fuels
2105 Jet and gas turbine engines
2106 Nuclear propulsion
2107 Reciprocating engines
2108 Rocket motors and engines
2108.1 Liquid rocket motors
2108.2 Solid rocket motors
2109 Rocket propellants
2109.1 Liquid rocket propellants
2109.2 Solid rocket propellants

Space Technology

2201 Astronautics
2202 Spacecraft
2203 Spacecraft trajectories and reentry
2204 Spacecraft launch vehicles and ground support

Table 3.7

Frequency of Projects and Resources by Technical Areas

Number of Projects	Technical Areas (percent)	Corrosponding Professional Manyears (percent)
0	27	0
1- 9	40	7
10-19	11	13
20-29	7	13
30-39	2	5
40-49	2	4
50-99	8	20
100-199	2	13
200-299	1	25

Table 3.8

Technical Areas With Greatest Number of Projects

Technical Area	Percent of Total Number of Projects
Electronic Components (0901)	8
Aircraft (0103)	8
Computers (0902)	6
Communications (1702)	6
Radar Detection (1709)	5
Masers and Lasers (2005)	3
Industrial Processes (1308)	3
Spacecraft (2202)	3
Missiles (1604)	3
Jet and Gas Turbine Engines (2105)	3
Navigation and Guidance (1707)	3

Table 3.9

Technical Areas With Largest Professional Manyear Loading

Technical Area	Percent of Total Effort
Aircraft (0103)	21
Cost Effectiveness (1401)	6
Mathematics and Statistics (1201)	6
Communications (1702)	5
Radar Detection (1709)	4
Computers (0902)	4
Electronic Components (0901)	4
Jet and Gas Turbine Engines (2105)	3
Missiles (1604)	3

SECTION IV

MAJOR AREAS OF CONTROVERSY

Prior to 1969, the primary IR&D issues revolved around such things as reasonableness, burdening, cost sharing, and other aspects of DOD administration of IR&D. The main participants in the dialogue were industry and the DOD. Congress made some inquiries during this period but had little impact on the dialogue. However, since 1969, Congress has been directly involved in the IR&D area and the nature of the issues has changed to some extent. In addition to questions of DOD administration, some individuals are now challenging the fundamental concept, asserting that Congress should have some type of line item control of IR&D and searching for some fundamental change in the mechanism which will finess many of the cited problems. Further, activity in the IR&D area has been significantly greater than in the 1960s. A list of the major IR&D events since 1970 is given on the following page. A brief summary of each of these items is given in Appendix E. These reports and statements provide the basic positions which are summarized in this section by major area of controversy.

MAJOR IR&D EVENTS SINCE PASSAGE OF SECTION 203, PUBLIC LAW 91-441

Date	Event
March 1971	GAO Report, "Feasibility of Treating Contractor's IR&D Costs as a Budget Line Item"
April 1971	GAO Report, "Implementation of Section 203, Public Law 91-441, On Payments for IR&D and B&P Costs"
December 1972	Report of the Commission on Government Procurement
April 1973	GAO Report, "Payments for IR&D and B&P Costs"
August 1973	GAO Letter Report on IR&D Data Banks
September 1973	GAO Letter Report on Small Contractor Problems
	Senator Proxmire Amendment to Limit IR&D
March 1974	Industry Position Paper on IR&D and B&P Efforts
April 1974	DDR&E Statement to Congress
May 1974	GAO Report, "DOD's Implementation of Section 203, Public Law 91-441, Involving Contractors' IR&D"
	Admiral Rickover Statement to House Appropriation Committee, Subcommittee on DOD
	Statement of Principles for DOD R&D
August 1974	GAO Partial Report, "In-Depth Investigation into IR&D and B&P Programs"
December 1974	GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work"
February 1975	DDR&E Statement to Congress
	DSB Task Force on IR&D Report
Impending	GAO Final Report, "In-Depth Investigation into IR&D and B&P Programs"

4.1. Allowability of IR&D Costs

The current DOD policy is that IR&D costs are allowable and, hence, recoverable to the extent they are reasonable and allocable.

The main adversary of this policy is Senator Proxmire and he is supported by Admiral Rickover. In September 1973 Senator Proxmire stated ". . . a case can be made that this program (IR&D) is a backdoor boondoggle and ought to be eliminated altogether." (Ref. 103, p. S17517) Senator Proxmire apparently challenges the need for IR&D primarily on the basis that it is unnecessary for the DOD to have two separate programs to sponsor research and development efforts by private contractors (direct contract R&D and IR&D). Further, he sees defense contractors who receive IR&D as being able to improve their ". . . competitive advantages over small firms and nondefense contractors who are not eligible for the IR&D subsidy." (Ref. 103, p. S17518) Admiral Rickover basically agrees with the above positions and asserts that if IR&D was made a disallowed cost, and the DOD directly contracted an equivalent amount of funds, the DOD would get far more for its money. (Ref. 104, p. 119)

The majority of people who have commented on IR&D have supported its allowability. The Commission on Government Procurement (COGP), which included Senators Chiles and Gurney, Representatives Horton and Holifield, and the Comptroller General of the United States (Elmer Staats), supported IR&D

as ". . . in the Nation's best interest to promote competition (both domestically and internationally), to advance technology, and to foster economic growth . . . ." (Ref. 1, p. 31)

Senator Cranston earlier supported IR&D in his testimony to the IR&D hearings in 1970:

> "I have concluded that in an era of rapid technological innovation, the IR&D program is the most economical long-run program for guarantying security of the United States. . . ." (Ref. 56, p. 1676)

The latest Defense Science Board Task Force on IR&D, which was selected largely from academia to avoid the obvious vested interest of defense contractors, strongly supported the allowability of IR&D. (Ref. 105, p. i) Further, a recent panel reviewing military R&D for the Center for Strategic and International Studies, Georgetown University, also supported the concept of IR&D:

> "This panel believes that IR&D is a valuable and legitimate operation. It should be funded substantially and should be controlled by the government only to the extent necessary to safeguard the public interest and the competitive positions of DOD's suppliers.
>
> The basic public policy issue here is whether a government agency should directly control the work done under IR&D. This panel takes a position midway between a common industry position--no direct control at all--and a position of many Congressional critics--full control of the amount and nature of the IR&D.
>
> IR&D is basically desirable, because it is a check to insure against errors in judgment--or too great a focus on immediate needs--by those government officials who determine R&D activities. Also, if used flexibly, it helps provide a measure of stability to the national technical manpower pool. The spur of competition ensures relevance and payoffs." (Ref. 106, p. 34)

Thus, there has been substantial support for the IR&D

concept from nonmilitary-industrial complex representatives.

The majority of DOD technologists who have spoken out on the issue have supported the need for IR&D. Dr. Currie, DDR&E, has taken a strong position on IR&D in his testimony to Congress (Refs. 107, 108, and 109) as have the Assistant Secretaries for R&D of the Military Departments. (Ref. 110) Further, several of the military technologists have spoken in favor of IR&D: General George S. Brown, when Chief of Staff of the Air Force (Ref. 111); Lt General William Evans, Deputy Chief of Staff (DCS) for Research and Development, Headquarters, U.S. Air Force DCS/Research and Development (Ref. 112); Major General Charles Wilson, when DCS/Production and Procurement, Air Force Systems Command (Ref. 113, p. 60); and, at the working level, Colonel Charles Scolatti, when Commander of the Air Force Flight Dynamics Laboratory. (Ref. 114) Further, the vast majority of DOD personnel are reported to support the need for and value of IR&D. (Ref. 113, p. 60)

It goes without saying that the aerospace industry regards IR&D as vital to its continued existence. When Senator Proxmire again challenged IR&D in 1973, the industry established a Tri-Association Ad Hoc Committee for IR&D and B&P. The Committee published the industry case for IR&D in three interrelated documents in early 1974. (Refs. 115, 116, and 117)

Another issue which is involved in the question of allowability is the benefit/cost aspect. No one in industry or the DOD has been able to quantitatively demonstrate that benefits exceed costs for IR&D for the same reason this has not been done for DOD contract R&D. (See, e.g., Ref. 56, p. 1675 for Hyman Fine's comments). Hence, benefits are usually addressed by way of specific examples of payoff to the DOD. The most extensive recent contribution to this area is in the industry "Technical Papers on IR&D and B&P Efforts" Ref. 117, pp. 26-247) which not only presents examples but also tries to structure an overall framework for a benefit discussion.

4.2. Congressional Line Item Control of IR&D Costs

In the first direct Congressional restrictions on the DOD management of IR&D in the FY 70 Military Procurement Authorization Act (PL 91-121, Section 403), the Congress imposed a form of line item control. The DOD was to limit IR&D expenditures to 93 percent of what they would have otherwise been. This requirement was basically unworkable and was repealed a year later. During the FY 71 Military Procurement Authorization Bill discussions, the issue of line item control was again raised. The Senate version of the authorization bill incorporated a ceiling on IR&D. However, the ceiling was removed by the Conference Committee and did not appear in the final act. Hence, there is no Congressional line item control of IR&D today.

Senator Proxmire asked the GAO to determine the feasibility of treating contractors' IR&D costs as a budget line item in late 1970. In early 1971 the GAO reported that in their judgment Congressional line item control was feasible. The DOD has always opposed this concept and took strong exception to the GAO report. Further, the GAO recommended that no action be taken on line item control of the time since the adequacy of Section 203, Public Law 91-441, provisions had not yet been determined. Hence, the GAO report had no direct impact at the time it was published (see Refs. 118, 119 and 120).

In September 1973, Senator Proxmire asserted that Public Law 91-441 IR&D provisions had been ineffective, costs for IR&D had continued to rise, and hence, a Congressionally imposed ceiling was necessary. He suggested legislation which would have limited IR&D to 50 percent of what it had previously been. However, he agreed to a GAO in-depth investigation, but commented ". . . I do think that the GAO study will give us the basis, give us the reason, to put a ceiling on the authorizations." (Ref. 103)

The DOD has constantly opposed line item control as administratively impractical and as essentially eliminating the independence of IR&D. (Refs. 50 and 118) The industry has also argued against line item control. Their basis is that line item control is inconsistent with the basic concept that IR&D is a normal cost of doing business and, hence, an

element of overhead. Thus, IR&D is applicable to all products sold to government or commercial customers. Legislation should not arbitrarily limit recovery of "normal" costs of business, rather, the Government should accept its fair share of these costs. (Ref. 115, p. 32)

Line item control appears tc be a highly likely outcome of the current IR&D debate, especially if Congress as a whole is not satisfied with the DOD management of IR&D after they receive the final report on the GAO in-depth investigation and conduct whatever hearings they regard as necessary.

4.3. Mechanisms for Reimbursement of IR&D Costs

IR&D costs are currently recovered through overhead. This is the procedure which has been followed since IR&D was first recognized as an allowable cost in the early 1940s. This approach parallels practice in the commercial world where contractors recover IR&D costs as part of the price of their product. The same is true for competitively priced DOD fixed-price contracts. In these cases competition is presumed to protect the customer. Thus, the issue is how to handle IR&D costs for negotiated contracts. The basic dilemma involves "the Government's inability to satisfy the opposing goals of (a) stimulating innovation in an unconstrained fashion and (b) obtaining reasonable assurance that tax dollars thus spent result in effort of broad national value as opposed ot undue enrichment." (Ref. 1, p. 40)

Some thought has been given to alternative approaches, however, no firm suggestions have been made. One member of

the Commission on Government Procurement advocated looking into a variety of alternate approaches, including:

- National R&D awards,
- Agency priority lists and recovery proportional to compatibility with the list, and
- Tax credit devices. (Ref. 1, pp. 40-42)

The GAO in-depth investigation includes a perusal of alternate methods. The GAO sent a list of 14 alternatives to a wide variety of Government, industry, and other people for comment. Three basic approaches were included: direct contracting, recovery through overhead, and recovery through profit. (Ref. 121) Recipients were asked for their opinions on the 14 listed alternatives and suggestions for other approaches. The results of this survey will be interesting if not conclusive.

One of the six papers in the Tri-Association Committee's "Technical Papers on IR&D and B&P Efforts" gives the industry position on alternative methods. Nine methods, which span the spectrum from full recovery to the AEC method, were considered. Twelve criteria were identified and used in assessing the alternatives. The conclusion was that full reimbursement (Inherent Economic Constraints in Competition) is the preferred alternative. "Anything less than the full reimbursement of these costs . . . in effect is a subsidization of the U.S. Government by American Industry." (Ref. 117, pp. 16-24)

In essence, most alternatives identified in these studies are variations on the theme of four basic approaches:

- direct contract,
- recovery through overhead,
- recovery through profit, and
- tax credit.

No one has yet come up with an alternative to the current method which has attracted significant industrial, DOD, and Congressional support. Hence, until such a brilliant idea appears, DOD IR&D policy will probably evolve around the current process of allowing recovery through overhead.

4.4. Elements of DOD Policy and Administration

In this section the major areas of controversy regarding specific elements of DOD IR&D policy and procedures are presented. Several areas of controversy were resolved in the 1970 upgrading of IR&D administration (burdening, cost sharing, and so forth). However, several areas are still being debated. The areas to be discussed include:

- Reasonableness criteria,
- Negotiation Procedures,
- Technical Evaluations,
- Relevancy,
- Patent and Data Rights, and
- Cost Classification.

4.4.1. Reasonableness Criteria

The issue in this area is the determination of reasonableness for major contractors (those that recover over $2 million in IR&D and B&P). The determination today is made through negotiation of advance agreements. In this area there are those who support the current procedures, those who think they should be strengthened to give the DOD more control and those who would relax the controls.

The first dissenting position of the Commission on Government Procurement advocated continuation of the current DOD reasonableness test. The Comptroller General and three of the four Congressmen on the Commission supported this position.

Senator Proxmire argues that the current procedures are not effective since IR&D costs have continued to grow since Section 203, Public Law 91-441, was passed. (Ref. 98, p. S17517) Thus, he would supplement the DOD procedures with Congressional controls as summarized in Section 4.2. Admiral Rickover advocates direct contracting of IR&D projects which have sufficient benefits to warrant the cost. (Ref. 104, p. 123)

Most of the other challenges to DOD policy in this area advocate liberalization of the reasonableness criteria. These include the majority recommendation of the Commission on Government Procurement (COGP) (Ref. 1, p. 31), the recommendation of the DSB Task Force (Ref. 105, pp. 16-17), and

the industry position (Ref. 115, p. 34). The industry wants full recovery of incurred costs irrespective of the extent of negotiated DOD contracts in a cost center. The DSB Task Force and COGP majority recommendation would apply CWAS in some form to major contractors. These proposals are very similar to the proposed cost principles of February 1969 (See Section 2.3.1). All of them would result in significant increased in the cost of IR&D to the DOD. GAO and DCAA estimate that the increases would range from $50 million to about $110 million. (Ref. 30 and Ref. 122) Further, these approaches would materially reduce the DOD's visibility of contractor IR&D through reduced technical evaluation activity (which goes hand-in-hand with negotiation of advance agreements). The benefits to be realized by the DOD due to the above mentioned proposals appear to be nominal. Thus, these proposals suggest significant increases in cost to DOD with, at best, nominal benefits. It is doubtful these proposals could be implemented by the DOD without incurring the wrath of Congress and budget line item control.

4.4.2. Uniform Negotiation Procedures

One of the areas that Senator McIntyre identified in his follow-up letter to the Secretary of Defense in 1970 was establishment of uniform negotiation procedures. The DOD tried unsuccessfully to develop such procedures in the early 1970s. In lieu of procedures, the DOD ultimately published broad guidelines (see Section 3.3.2.).

The GAO cited this as a deficient area in their detailed implementation investigation: "Negotiation procedures are neither uniform nor consistent . . . ." (Ref. 123, pp. 23-25) Further, they reiterated the recommendation that the DOD establish uniform negotiation procedures.

The Air Force has devised a coupled guideline/judgmental approach which seems to satisfy the intent of the original OSD concept of uniform negotiation procedures to preclude inequities to contractors. Further, this approach has enabled the Air Force IR&D Policy Council to review and approve overall negotiation objectives on a year-by-year basis. Hence, it would appear that uniform guideline/judgmental procedures could be developed DOD-wide if interservice barriers could be lowered somewhat.

4.4.3. Technical Evaluations

Increased emphasis on technical evaluations was one of the key aspects of DDR&E's five point plan to improve DOD administration of IR&D. Uniform procedures were implemented by a revitalized Technical Evaluation Group chaired by an ODDR&E representative (see Section 3.3.3.). The issue now is the efficiency and effectiveness of the technical evaluation process.

The GAO in its detailed review of DOD implementation of Section 203, Public Law 91-441 had only one criticism of the technical evaluation process and that was related to the need for consistent, adequate feedback of the results of

technical evaluations (Ref. 123, p. 21). Further, the GAO recommended that the DOD improve the administration of contractors' IR&D by:

> "Establishing guidelines that require a quantification of the technical quality of contractors' programs to be uniformly recognized in the negotiation of ceilings with reward or penalty, as appropriate." (Ref. 123, p. 36)

Thus, the technical evaluation process received much better marks in 1973 than it had in the prior detailed GAO review in 1968 (see Ref. 40).

In a recent interview Dr. Currie, DDR&E, commented favorably on the technical reviews:

> "Our IR&D review teams are getting the cooperation of the companies, and I believe that the review is very effective." (Ref. 124, p. 8)

Another positive reaction to the current process came from the Commander of the Air Force Flight Dynamics Laboratory. He felt that the IR&D technical evaluation process had been greatly improved during his six year involvement with it (1968-1974) and that there had been an improvement in corporate management of IR&D in parallel with the government's improvement in its technical evaluation process. Further, he observed that:

> "The IR&D programs are evaluated with more scrutiny, technical expertise, and depth than any other R&D element." (Ref. 114)

In their comments on the above cited GAO report, industry complained that the cost of the technical evaluation process was substantial and that they desired "economical but effective reviews." (Ref. 123, p. 45) Industry has recently been relatively silent on the technical evaluation process. However, if their position on reasonableness was accepted there would be no need for technical evaluations since industry would receive full recovery of IR&D costs as necessary business expenses.

The Defense Science Board Task Force on IR&D questioned both the effectiveness and efficiency of the technical evaluation process. They observed:

> "Technical reviews should be kept to a reasonable level. Company brochures should be kept simple and used primarily for conveying information; and overhead costs associated with present reviews, which are probably too high for both government and contractors, should be reduced. Finally, the self-correcting nature of the overall system . . . seems to be the best guarantee of quality." (Ref. 105, p. 11)

Unfortunately, the Task Force gave no basis for its assertions regarding the technical evaluation process.

Admiral Rickover criticized the technical evaluation process in his testimony to Congress, asserting that "The DOD reviews of contractors' IR&D program tend to be superficial . . .." (Ref. 104, p. 118) Further, in his recommendations, Admiral Rickover suggests that the DOD should direct contract any projects which have sufficient benefits to warrant the cost so that ". . . responsible Government officials can exercise technical supervision of the work . . ."

(Ref. 104, p. 123)

In summary, the technical evaluation process as currently structured provides the DOD timely visibility of and influence on contractor IR&D efforts and provides the contractors an independent assessment of their IR&D programs. These two factors are significant benefits of the entire IR&D process. A reduction in technical evaluation activity would seriously erode these benefits. Admiral Rickover's proposal would eliminate the independence of a segment of the R&D spectrum. Thus, it may well be that the DOD's current process is not too far from an optimum balance.

4.4.4. Potential Military Relationship Requirement

The potential military relationship (PMR) requirement is probably the most controversial aspect of Section 203, Public Law 91-441. The Senate version of the bill had language requiring a direct relationship to a military function or operation. The House bill had no similar language. In the Conference Committee the compromise was a requirement that projects have a potential relationship to a military function or operation (referenced to as agency relevancy). However, the GAO has noted that

> "the law . . . failed to provide any criteria for determining when a project has potential relationship to a military function or operation or any indication as to what the provision was intended to achieve." (Ref. 125, p. 2)

Thus, it should not be surprising that there are differing interpretations of what was expected from the requirement and

what should be done about it.

Support for a continuation of the agency relevancy requirement has come from the supporters of the first dissenting position of the Commission on Government Procurement and, generally, from the Military Departments.

Those supporting no relevancy requirement or a government-wide requirement (tantamount to no requirement, in the author's view) are industry (Ref. 115, p. 33), the supporters of the majority recommendation of the Commission on Government Procurement (Ref. 1, p. 31), the Defense Science Board Task Force on IR&D (Ref. 105, p. 5) and the DOD. (Ref. 126, p. 2) Support for liberalization within the DOD is mainly at the OSD staff level. The arguments in favor of a liberalized policy in this area are mainly philosophical--contractors should be free to diversify to create a broader business base, relevancy tests are inconsistent with the concept of IR&D as company-funded, and so forth.

Senator Proxmire argues that the PMR requirement has not been effective since few if any ceilings have been lowered because of the requirement. He asserts that this is because of contractor "brochuremanship" and not a true potential relationship although he provides no support for this assertion. (Ref. 103, p. S17517) Admiral Rickover has a similar view; ". . . the Department's interpretation of what makes projects have a potential military relationship is quite liberal." (Ref. 104, p. 118) Both men advocate

basically the same solution--require that projects have a direct benefit to the military.

In summary, a great deal of energy has gone into arguing over the merits of an agency relevancy requirement even though it has had little impact on contractor recovery of costs. However, the requirement may well have utility to the DOD in precluding gross redirection of effort to non-DOD areas. Thus, there seems to be little benefit to the DOD to relax this requirement. Changing the requirement to direct relevancy would preclude support for most research which, ultimately, will benefit the DOD.

4.4.5. Patent and Data Rights

Background

The DOD policy on patent and data rights on items resulting from IR&D was the subject of much discussion in the early 1960s and the DOD policy was clearly stated in several letters during that priod of time:

> "The Government does not - and should not - automatically acquire rights in technical data resulting from a contractor's independent research and development, even though the costs may be said to have been substantially paid for by the Government through the Government's purchase of the company's products or services." (Ref. 18, p. 5)

The fundamental rationale for the above policy was summarized as follows:

> "In short, it is the policy of the Department of Defense that we should pay our fair share of a contractor's normal and reasonable costs, including IR&D costs, with the Government acquiring no greater rights than accrue to any other customer buying the contractor's

products or services. In this respect we should not deal with companies heavily engaged in defense work on a less favorable basis than with companies predominatly engaged in commercial work. We believe that this policy is most likely to assure a continuing flow of new technology of importance to the national defense." (Ref. 18, p. 6; see also Refs. 17 and 20)

The GAO challenged the DOD policy on patent rights in its draft report on IR&D in 1968 and suggested that the DOD should receive royalty-free license rights to inventions arising from IR&D. (Ref. 40, p. 89). However, the DOD rejected the GAO suggested changes in policy. (Ref. 127)

The patent and data rights issue was reviewed by senior defense officials again in early 1970 prior to approval of the new DOD policy statement on IR&D/B&P. Secretary Packard approved the continuation of the DOD policy of not acquiring rights to technical data and patents arising from IR&D programs. (Ref. 54)

Current Issue

This is one of the few policy areas in which the DOD policy is at an extreme limit. In this case industry fully supports the DOD policy on the basis that IR&D efforts:

". . . are company initiated and company funded within the indirect costs of doing business. The Government acceptance of its share of these costs appropriately allocated to Government contracts is no different than any other customer's payment of these costs included in the purchase price of a company's products or services. As any other customer, the Government benefits from improved products or services resulting from inventions conceived during IR&D. Equity demands the company retain title to its own inventions and patents." (Ref. 115, p. 32)

Senator Proxmire and Admiral Rickover both criticize the DOD policy on patent and data rights on the basis that the DOD can reimburse a contractor for a substantial portion of his IR&D and yet the contractor retains all rights to inventions, patents and technical data developed under these programs. Admiral Rickover cited one example of an automatic welding machine which was developed under IR&D in a military division, transferred to a commercial division, then marketed to defense contractors who passed on the royalty charges to the DOD. Both men argue that this policy gives the large defense contractors a substantial competitive advantage over smaller firms. Further, they contrast the DOD policy to that of the AEC which provides a mechanism for acquiring patent and data rights if the AEC makes a significant contribution. (Ref. 103, p. S17518 and Ref. 104, p. 120) Neither man mentioned that the GAO had earlier reported that because of the nominal AEC participation in contractor IR&D costs, there had been no instances under which either patent or data rights were acquired by the AEC. (Ref. 40, p. 43) Two Air Force lawyers also criticized the DOD policy in a recent article. (Ref. 128)

In summary, this is one of the few areas in which DOD policy is at an extreme limit. This gives rise to charges of inequities but the real cost of the policy has yet to be demonstrated. One or even a few "horror" cases hardly justify a major policy change. However, if the current policy can be shown to have a high cost to the DOD, then a policy change may be in order.

4.4.6. Cost Classification

This problem was mentioned in Section 3.1. as an area of concern during the 1960s. During those years, there was a ceiling only on IR&D. Bid and proposal and other technical overhead costs were not covered by ceilings. Consequently, there was considerable concern regarding the migration of IR&D-type work into the areas which had no ceilings. An attempt was made to solve both of these problems in the 1971 cost principles. A ceiling was placed on bid and proposal costs and they were made interchangable with IR&D. The IR&D and B&P definitions were broadened to include additional efforts which were felt to be a legitimate part of IR&D/B&P (e.g., systems and other concept formulation studies). Other technical efforts which were not research and development in nature were to be placed in other overhead categories (e.g., maintenance of complex test equipment). Thus, this problem was to have been solved.

While the magnitude of this problem may have been lessened by the actions taken in 1971, it has not been solved--only shifted to new areas. Today, there are ceilings on IR&D and B&P costs. However, there are other overhead areas which include technical activities or efforts by technical personnel (e.g., manufacturing and production engineering, standardization efforts, selling costs, and so forth) which are not constrained by ceilings. Thus, the gray areas between costs covered by ceilings and costs not covered by ceilings have not been eliminated but only shifted to different areas.

One other development in this area during the 1970s is that the Technical Evaluation Group has been designated to support contracting officers in resolving these problems. During the last three years the Air Force IR&D Technical Manager has participated in about one dozen cost classification cases. There are indications that the frequency of cases is increasing as the auditors and plant representative personnel sharpen their reviews in these areas.

In summary, it does not appear to the author that there is any way to avoid a cost classification problem so long as some areas of indirect cost are capped with ceilings and other areas have no similar limitation. Further fine-tuning of definitions will certainly not eliminate the problem. One way to avoid the problem is to develop procedures for capping all areas of overhead not just one or two select items. Then, the contractor would be free to make

trade-offs between the indirect cost categories without impacting DOD costs on negotiated contracts.

4.5. Government-Wide Policy

A serious attempt was made during the early 1960s to develop a Government-wide policy on IR&D. However, the DOD and AEC were never able to reconcile their differences and there is no uniform, Government-wide policy today.

The Commission on Government Procurement recommended that IR&D receive uniform treatment, Government-wide but made provision for exceptions which would be treated by the Office of Federal Procurement Policy. (Ref. 1, pp. 31 and 39) The industry has generally supported a common policy for all Government agencies. (Ref. 115, p. 34) The GAO recently surveyed Government agencies for their views on this topic and found no unanimity among federal officials on the need for uniform, Government-wide policy on IR&D. However, the GAO expressed its support of the recommendation of the Commission on Government Procurement. The Executive Branch Position on the Commission on Government Procurement IR&D recommendation is currently being staffed through the government agencies. The recommended position is to use the DOD policy and procedures as the standard with one exception--the agency relevancy requirement would be broadened to a government-wide requirement. The recommendation also provides a mechanism for exceptions to the standard policy. (Refs. 129 and 130) The outcome of this effort

will not be known until the various government agency positions are formally established. However, the recent creation of the Energy Research and Development Administration (incorporating the R&D elements of the AEC) could lead to greater unanimity in this area.

SECTION V

SUMMARY

The spectrum of possible IR&D policy ranges from direct contracting for all R&D (no IR&D), which gives the DOD and Congress complete control, to contractor full-recovery of all IR&D costs, which gives industry essentially complete freedom in this area. However, optimum DOD policy would probably not be at either of these extremes but would be "balanced" somewhere between. The current DOD policy in essentially all areas is sufficiently balanced to incur the criticism of "hard liners," such as Admiral Rickover and Senator Proxmire, as well as "industry" spokesmen, such as the Tri-Association Ad Hoc IR&D/B&P Committee and the supporters of the majority recommendation of the Commission on Government Procurement. There are, no doubt, improvements which can be made in DOD policy and administration. However, proposed changes should be extensively researched prior to implementation because of the complexity of the IR&D area tends to obscure the outcome of policy changes.

The future evolution of the DOD policy is highly dependent upon events which are about to unfold. The final report on the GAO in-depth investigation will have a significant impact. Further, the Senate Armed Services Committee plans to hold hearings on IR&D during the FY 76 budget cycle. During the last Congressional review of this area, the Senate supported Congressional controls while the House tended to

prefer DOD administrative solutions. What will evolve this year is uncertain because the key House supporters of IR&D are no longer members of Congress. Consequently, the industry and DOD may find it more difficult to preclude further legislative restrictions this year than in the past.

In conclusion, it appears the current DOD policy is, in the main, a reasonable balance of good stewardship of the taxpayers funds and satisfaction of the needs of industry. It is doubtful that major changes can be made without disrupting this balance to the disadvantage of the Department of Defense.

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APPENDICES

APPENDIX A

DOD IR&D COST PRINCIPLES (1959)

15–205.35 ***Research and Development Costs.***

(a) Basic research, for the purpose of this Part 2, is that type of research which is directed toward increase of knowledge in science. In such research, the primary aim of the investigator is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof. Applied research, for the purpose of this Part 2, consists of that type of effort which (i) normally follows basic research, but may not be severable from the related basic research, (ii) attempts to determine and expand the potentialities of new scientific discoveries or improvements in technology, materials, processes, methods, devices, and techniques, and (iii) attempts to "advance the state of the art." Applied research does not include any such efforts when their principal aim is the design, development, or test of specific articles or services to be offered for sale, which are within the definition of the term development as hereinafter provided.

(b) Development is the systematic use of scientific knowledge which is directed toward the production of, or improvements in, useful products to meet specific performance requirements, but exclusive of manufacturing and production engineering.

(c) A contractor's independent research and development is that research and development which is not sponsored by a contract, grant, or other arrangement.

(d) A contractor's costs of independent research as defined in (a) and (c) above shall be allowable as indirect costs (subject to paragraph (h) below), *provided* they are allocated to all work of the contractor.

(e) Costs of contractor's independent development, as defined in (b) and (c) above (subject to (h) below), are allowable to the extent that such development is related to the product lines for which the Government has contracts, *provided* the costs are reasonable in amount and are allocated as indirect costs to all work of the contractor on such product lines. In cases where a contractor's normal course of business does not involve production work, the cost of independent development is allowable to the extent that such development is related and allocated as an indirect cost to the field of effort of Government research and development contracts.

(f) Independent research and development costs shall include an amount for the absorption of their appropriate share of indirect and administrative costs, unless the contractor, in accordance with his accounting practices consistently applied, treats such costs otherwise.

(g) Research and development costs (including amounts capitalized), regardless of their nature, which were incurred in accounting periods prior to the award of a particular contract, are unallowable except where allowable as precontract costs. (See 15-205.30.)

(h) The reasonableness of expenditures for independent research and development should be determined in light of all pertinent considerations such as previous contractor research and development activity, cost of past programs and changes in science and technology. Such expenditures should be pursuant to a broad planned program, which is reasonable in scope and well managed. Such expenditures (especially for development) should be scrutinized with great care in connection with contractors whose work is predominantly or substantially with the Government. Advance agreements as described in 15-107 are particularly important in this situation. In recognition that cost sharing of the contractor's independent research and development program may provide motivation for more efficient accomplishment of such program, it is desirable in some cases that the Government bear less than an allocable share of the total cost of the program. Under these circumstances, the following are among the approaches which may be used as the basis for agreement: (i) review of the contractor's proposed independent research and development program and agreement to accept the allocable costs of specific projects; (ii) agreement on a maximum dollar limitation of costs, an allocable portion of which will be accepted by the Government; (iii) an agreement to accept the allocable share of a percentage of the contractor's planned research and development program.

APPENDIX B

AEC IR&D COST PRINCIPLES

9-15.205-35 Research and development costs.

(a) AEC does not accept a general allocation of independent research and development costs. Such costs are considered unallowable except to the extent specifically set forth in the contract. Research and development costs may be made allowable only to the extent to which they provide a direct or indirect benefit to the contract work.

(b) Independent research and development may be determined to be of benefit to the contract work when it is in the general field of the contract work and where the results may well have some future bearing on the contract work. The words "direct or indirect benefit" are used to allow some flexibility and to permit some basic research in the general field of the contract work.

(c) The determination that an independent research and development project is of benefit to the contract requires the exercise of technical judgment. It is not sufficient that the project relate to the field of atomic energy; technical staff must find that it is related to the contract work. Areas of interest which may relate to the contract work include: Technological methods or processes, materials research, work in the same technical field, etc. For example, independent materials research on aluminum alloy properties might be related to the contract work if a contract concerns the manufacture of fuel elements using aluminum alloy. Beryllium research, on the other hand, would not be relevant in this case. Such research might, however, relate to other AEC contracts. In master contracts or in contracts where several tasks are involved, to be of benefit the independent research and development project must relate to one or more of the tasks.

(d) A technical appraisal of each of the projects included in the contractor's independent research and development program is necessary to identify any that may be acceptable under the above principle for allocation to the AEC contract work. In addition to excluding any projects which do not provide a direct or indirect benefit to the AEC contract work, the following shall also be excluded: (1) Any research and development projects primarily

of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business (e.g., a new reactor concept the contractor wants to sell), (2) any studies or projects which are in fact undertaken in whole or in part for other sources, and (3) any such otherwise acceptable project which duplicates research and development work sponsored by AEC. The cost of research and development which has not met the test of benefit to the contract work should be excluded from any distribution of allocation of overhead to the contract.

(e) Where technical staff or proper skill and qualification is not available or the questions cannot be easily resolved by Field Offices, Headquarters staff should be called into consultation.

(f) After segregating the research and development which has been determined to be of benefit to the AEC contract work, the cost thereof shall be allocated to the contract work using the method approved by AEC for the distribution of other overhead expenses.

(g) When AEC is the predominant customer, special consideration must be given to whether the independent research and development of benefit to the contract work should be performed as part of the contract work. This is necessary to avoid the apportionment to the AEC of most, if not all, of independent research and development costs over which the AEC would have no direct control. Only an amount which is reasonable under the circumstances should be allowed. Contracting officers may find it desirable to:

(1) Specify a maximum dollar limitation of independent research and development costs, an allocable portion of which will be accepted by AEC, or an allocable share of a percentage of the contractor's independent research and development program which will be accepted by AEC.

(2) Obligate the contractor to give the contracting office advance notice of any termination of an accepted project or changes which require the contracting officer's approval.

(h) Where AEC shares in the cost of an independent research and development [1] project of a contractor or subcontractor and its

[1] The term "independent research and development" means either research or development or both. Because of the insignificant amount involved, the situation covered by 9-15.205-35(k) does not involve a contribution to a contractor's independent research and development project within the meaning of this section.

share of the cost (predetermined or actual) bears the percentage relationship indicated below to the total cost of such project during the contractor's or subcontractor's annual accounting period, the following rights shall be obtained in and to technical data and inventions or discoveries made or conceived in the course of or under such project during the contractor's or subcontractor's accounting period:

AEC's share	Technical data acquired	Patent rights acquired
Less than 20 percent.	Summary reports, to the extent requested by AEC, will be furnished on specific independent research and development projects.	None
20 percent or more, but less than 75 percent.	Summary reports shall be furnished of the pertinent IR&D project indicating the progress and specifying whether any inventions or discoveries were made or conceived during the pertinent accounting period and, if requested by AEC, a complete and detailed technical report shall also be furnished.	Nonexclusive, irrevocable, paid-up license to AEC for AEC purposes.
75 percent or more.	All technical information and data on IR&D projects will be furnished AEC for dissemination and use as AEC sees fit, but insofar as such technical information and data disclose patentable subject matter, the same will not be disseminated until patenting action has been taken.	Nonexclusive, irrevocable, paid-up license to the Government for all purposes, with the right to grant sublicenses for all purposes.

Upon a determination of the percentages as hereinabove provided, the appropriate patent and technical data provision shall be incorporated in the contract in accordance with AECPR 9-9.5019.

(i) Determination of the percentage of AEC's share of the cost of a contractor's independent R&D project shall be made on the basis of the share of such cost provided by all AEC contracts and subcontracts during the contractor's or subcontractor's annual accounting period.

(j) The field office with the predominant contract interest will be responsible for determining the percentage of the total support provided or to be provided by AEC when AEC shares in the costs of an independent research and development project and for including the appropriate contract provisions required.

(k) When the cost of the work involved in segregating the independent research and development which benefits the contract work is disproportionate to the amounts involved, a flat amount not exceeding either (1) 5 percent of the contractor's total estimated cost of independent research and development, or (2) 5 percent of the total estimated cost of direct labor and material under the contract, whichever is less, may be negotiated.

(l) The costs of independent research and development, whether or not accepted as allowable cost, shall include an amount for absorption of their appropriate share of related indirect and administrative costs.

(m) As in any overhead determination, there shall be proper coordination among field offices (and Headquarters, where desirable) in determining the amount of independent research and development which is allowable where more than one office has a contract or contracts with the same contractor. Where the amount is significant and more than one office is involved, the guidance of Headquarters should be sought.

(n) Any limitation on the reimbursement of independent research and development is not to be used to justify an increase in the fee.

APPENDIX C

SECTION 203, PUBLIC LAW 91-441

Sec. 203. (a) Funds authorized for appropriation to the Department of Defense under the provisions of this Act or any other Act shall not be available for payment of independent research and development, bid and proposal, or other technical effort costs unless the work for which payment is made is relevant to the functions or operations of the Department of Defense and unless the following conditions are met—

(1) the Secretary of Defense, prior to or during each fiscal year, negotiates advance agreements establishing a dollar ceiling on such costs with all companies which during their last preceding fiscal year received more than $2,000,000 of independent research and development, bid and proposal, or other technical effort payments from the Department of Defense, the advance agreements thus negotiated (A) to cover the first fiscal year of each such company beginning on or after the beginning of each fiscal year of the Federal Government and (B) to be concluded either directly with each such company or with those product divisions of each such company which contract directly with the Department of Defense and themselves received more than $250,000 of such payments during their company's last preceding fiscal year.

(2) the independent research and development portions of the advance agreements thus negotiated are based on company submitted plans on each of which a technical evaluation is performed by the Department of Defense prior to or during the fiscal year covered by such advance agreement;

(3) no payments for independent research and development, bid and proposal, and other technical effort costs are made by the Department of Defense to any company or product division with which an advance agreement is required by subsection (a)(1) of this section, except pursuant to the terms of that agreement; and

(4) the total dollar value of the advance agreements negotiated prior to or during a given fiscal year as required under subsection (a)(1) of this section does not exceed a ceiling to be established annually by the Congress.

(b) In the event negotiations are held with any company or product division with which they are required under subsection (a)(1) of this section, but no agreement is reached with any such company or product division—

(1) no payments for independent research and development, bid and proposal, and other technical effort costs shall be made to any such company or product division during the fiscal year for which an agreement was not reached, except in an amount substantially less than the amount which, in the opinion of the Department of Defense, such company or product division would otherwise have been entitled to receive; and

(2) the amount of money received by that company for independent research and development, bid and proposal, and other technical effort costs during its last preceding fiscal year shall be included in determining compliance by the Department of Defense with the ceiling established by Congress, pursuant to subsection (a)(4) of this section, for the fiscal year in question.

(c) The Secretary of Defense shall submit an annual report to the Congress on or before January 31, 1972, and on or before January 31 of each succeeding year, setting forth—

(1) those companies with which negotiations were held pursuant to subsection (a)(1) of this section prior to or during the preceding fiscal year, together with the result of those negotiations;

(2) the manner of his compliance with the ceiling established by Congress for the preceding fiscal year pursuant to subsection (a)(4) of this section; and

(3) the latest available Defense Contract Audit Agency statistics on the independent research and development, bid and proposal, and other technical effort payments made to major defense contractors whether or not covered by subsection (a)(1) of this section.

(d) The provisions of this section shall apply only to contracts for which the submission and certification of cost or pricing data are required in accordance with section 2306(f) of title 10, United States Code.

(e) The ceiling to be established pursuant to subsection (a)(4) of this section for fiscal year ending June 30, 1971, shall be $625,000,000.

(f) Section 408 of Public Law 91-121 (83 Stat. 204) is hereby repealed.

APPENDIX D

DOD IR&D COST PRINCIPLES (1971)

15-205.35 ***Independent Research and Development Costs.***

(a) *Definitions.* A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant and which consists of projects falling within the following three areas: (i) basic and applied research, (ii) development, and (iii) systems and other concept formulation studies. IR&D effort shall not include technical effort expended in the development and preparation of technical data specifically to support the submission of a bid or proposal. For the purposes of this paragraph:

(1) *Basic research* is that research which is directed toward increase of knowledge in science. The primary aim of basic research is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof.

(2) *Applied research* is that effort which (A) normally follows basic research, but may not be severable from the related basic research, (B) attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques, and (C) attempts to advance the state of the art. Applied research does not include efforts whose principal aim is design, development, or test of specific items or services to be considered for sale; these efforts are within the definition of the term "development," defined below.

(3) *Development* is the systematic use, under whatever name, of scientific and technical knowledge in the design, development, test, or evaluation of a potential new product or service (or of an improvement in an existing product or service) for the purpose of meeting specific performance requirements or objectives. Development shall include the functions of design engineering, prototyping, and engineering testing.

(4) *Systems and other concept formulation studies* are analyses and study efforts either related to specific IR&D efforts or directed toward the identification of desirable new systems, equipments or components, or desirable modifications and improvements to existing systems, equipments, or components.

(5) *Company* includes all divisions, subsidiaries, and affiliates of the contractor under common control.

(b) *Composition of Costs.* IR&D costs shall include not only all direct costs, but also all allocable indirect costs except that general and administrative costs shall not be considered allocable to IR&D. Both direct and indirect costs shall be determined on the same basis as if the IR&D project were under contract.

(c) *Allocation.* As a general rule, IR&D costs shall be allocated to contracts on the same basis as the general and administrative expense grouping of the profit center (see 3-1003.3) in which such costs are incurred. However, where IR&D costs clearly benefit other profit centers, or the entire company, such costs shall be allocated through the G&A of such other profit centers or through the corporate G&A, as appropriate. In those instances when allocation of IR&D through the G&A base does not provide equitable cost allocation, the contracting officer may approve use of a different base. Where allowable IR&D is established by advance agreement pursuant to (d)(1) below, the advance agreement shall specify the allocation procedures.

(d) *Allowability.* Except as provided in (e) below, costs for IR&D are allowable only in accordance with the following:

(1) *Companies Required to Negotiate Advance Agreements (CWAS-N/A).*

(A) Any company which received payments, either as a prime contractor or subcontractor, in excess of $2 million from the DoD for IR&D and B&P in a fiscal year, is required to negotiate an advance agreement with the Government which establishes a ceiling for allowability of IR&D costs for the following fiscal year. Computation of the amount of IR&D and B&P costs to determine whether the $2 million criterion was reached will include only those recoverable IR&D and B&P costs allocated during the company's previous fiscal year to all DoD prime contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. The computation shall include full burdening in the same manner as if the IR&D and B&P projects were contracted for except that G&A will not be applied.

(B) When a company meets the criterion in (A) above, required advance agreements may be negotiated at the corporate level and/or with those profit centers (see 3-1003.3) which contract directly with the DoD and which in the preceding year allocated recoverable IR&D and B&P costs in excess of $250,000 including burdening as in (A) above, to DoD contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. When ceilings are negotiated for separate profit centers of the company, the allowability of IR&D costs for any center which, in its previous fiscal year, allocated less than $250,000 of IR&D and B&P costs to such DoD contracts and subcontracts may be determined in accordance with (d)(2) below.

(C) Companies which meet the threshold in (A) above shall submit technical and financial information to support their proposed IR&D program in accordance with guidance furnished by the Armed Services Research Specialists Committee. Results of the technical evaluation performed by the Armed Services Research

Specialists Committee, including determination of potential relationship, will be made available to the contractor by the cognizant Departmental central office.

(D) Ceilings are the maximum dollar amounts of total costs for IR&D work that will be allowable for allocation to all work of that part of the company's operation covered by an advance agreement. Within the ceiling limitations contractors will not be required to share IR&D costs. In negotiating a ceiling, in addition to other considerations, particular attention must be paid to such factors as:

(i) The technical evaluation of the Armed Services Research Specialists Committee including the potential relationship of IR&D projects to a military function or operation.

(ii) Comparison with previous year's programs including the level of the Government's participation.

(iii) Changes in the Company's business activities.

(E) The total amount of IR&D costs allocated to DoD contracts pursuant to this subparagraph (1) shall not exceed the total of expenditures for IR&D projects with a potential relationship to a military function or operation. For contracts which do not provide for cost determinations on a historical basis, this requirement will be considered to have been met if the estimated IR&D costs allocated to the contract do not exceed its proportionate share of the total estimated costs of IR&D with a potential relationship to a military function or operation.

(F) No IR&D costs shall be allowable if a company fails to initiate negotiation of a required advance agreement prior to the end of the fiscal year for which the agreement is required.

(G) When negotiations are held with a company meeting the $2 million criterion or with separate profit centers (when negotiations are held at that level under (B) above) and an advance agreement is not reached, payment for IR&D costs is required to be reduced substantially below that which the company or profit center would otherwise have received. The amount of such reduced payment shall not exceed 75% of the amount which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached prior to the end of the contractor's fiscal year for which such agreement is to apply, negotiations shall immediately be terminated and the contracting officer's determination of the reduced amount shall be furnished.

(H) Contractors may appeal decisions of the contracting officer to reduce payments. Such appeal shall be filed with the contracting officer within 30 days of receipt of a decision. For the purpose

of hearing and deciding such appeals, each department will establish an appeals hearing group consisting of the following:

(i) A representative to be designated by the Assistant Secretary (Installations and Logistics) or the Director, DSA, who shall be Chairman;

(ii) A representative to be designated by the Assistant Secretary (Research and Development) or ODDR&E in the case of DSA; and

(iii) A representative to be designated by the General Counsel, Judge Advocate General of the Department or Counsel of DSA. Determinations of the appeals group shall be the final and conclusive determination of the Department of Defense.

(I) Advance agreements negotiated shall include at least the following:

(i) A separate dollar ceiling for IR&D. However, provision shall be made permitting the contractor to recover costs for IR&D above the negotiated ceiling, provided that recovery of B&P costs covered by the same agreement is decreased below its ceiling by a like amount.

(ii) A provision stating how IR&D costs are to be allocated (see (c) above).

(iii) A statement that the costs for IR&D work recoverable under contracts citing DoD funds subject to Section 203, P.L. 91-441 limitations shall not exceed A such contracts' allocable share of the ceiling, and B the total costs of the contractor's IR&D determined to have a potential relationship to a military function or operation.

(iv) A statement that estimated costs or actual costs incurred, as appropriate, not in excess of the ceilings negotiated shall be used in the pricing of all contractual actions when negotiations are based on elements of cost and in final price determinations.

(J) Prior to the execution of an advance agreement, the IR&D factor to be used for forward pricing and interim billing will be developed by and obtained from the cognizant central office of the Department responsible for negotiating IR&D advance agreements. The IR&D factor shall exclude estimated or actual costs for projects considered unrelated to a military function or operation.

(2) *Companies Not Required to Negotiate Advance Agreements (CWAS).* Allowable IR&D costs for companies not required to negotiate advance agreements in accordance with (1) above shall be established by a formula, either on a company-wide basis or by profit centers, computed as follows:

(i) Determine the ratio of IR&D costs to total sales (or other base acceptable to the contracting officer) for each of the preceding three years and average the two highest of these ratios; this average is the IR&D historical ratio;

(ii) Compute the average annual IR&D costs (hereafter called average), using the two highest of the preceding three years;

(iii) IR&D costs for the center for the current year which are not in excess of the product of the center's actual total sales (or other accepted base) for the current year and the IR&D historical ratio com-

puted under (i) above (hereafter called product) shall be considered allowable only to the extent the product does not exceed 120% of the average. If the product is less than 80% of the average, costs up to 80% of the average shall be allowable.

(iv) Costs which are in excess of the ceiling computed in (iii) above are not allowable except where the ceiling computed for bid and proposal cost under 15-205.3 is reduced in an amount identical to the amount of any increase over the IR&D ceiling computed in (iii) above.

However, at the discretion of the contracting officer, an advance agreement may be negotiated when the contractor can demonstrate that the formula would produce a clearly inequitable cost recovery. The requirements of (d)(1) above are not mandatory for such agreements.

(e) *Deferred Costs* CWAS-NA). IR&D costs which were incurred in previous accounting periods are unallowable, except when a contractor has developed a specific product at his own risk in anticipation of recovering the development costs in the sale price of the product provided that:

(1) the total amount of IR&D costs applicable to the product can be identified,

(2) The proration of such costs to sales of the product is reasonable,

(3) The contractor had no Government business during the time that the costs were incurred or he did not allocate IR&D costs to Government contracts except to prorate the cost of developing a specific product to the sales of that product, and

(4) No costs of current IR&D programs are allocated to Government work except to prorate the costs of developing a specific product to the sales of that produc..

When deferred costs are recognized, the contract (except firm fixed-price and fixed-price with escalation) will include a specific provision setting forth the amount of deferred IR&D costs that are allocable to the contract. The negotiation memorandum will state the circumstances pertaining to the case and the reason for accepting the deferred costs.

APPENDIX E

SUMMARY OF RECENT DIALOGUE ON IR&D

While it might have appeared that there was considerable activity in the IR&D area in the 1960s, the pace of such activity has increased in the 1970s. The GAO has conducted an annual review of DOD implementation as well as several special topic reviews. As a consequence of a renewed challenge to IR&D by Senator Proxmire, the GAO has underway an in-depth investigation of IR&D, industry formed a tri-association committee on IR&D and the DOD established another DSB Task Group to examine DOD IR&D Policy. The major events since the passage of Section 203, Public Law 91-441 are summarized below:

Date	Event
March 1971	GAO Report, "Feasibility of Treating Contractor's IR&D Costs as a Budget Line Item"
April 1972	GAO Report, "Implementation of Section 203, Public Law 91-441, On Payments for IR&D and B&P Costs"
December 1972	Report of the Commission on Government Procurement
April 1973	GAO Report, "Payments for IR&D and B&P Costs"
August 1973	GAO Letter Report on IR&D Data Banks
September 1973	GAO Letter Report on Small Contractor Problems
September 1973	Senator Proxmire Amendment to Limit IR&D
March 1974	Industry Position Paper on IR&D and B&P Efforts
April 1974	DDR&E Statement to Congress

Date	Event
May 1974	GAO Report, "DOD's Implementation of Section 203, Public Law 91-441, Involving Contractor's IR&D"
May 1974	Admiral Rickover Statement to House Subcommittee on DOD Appropriations
May 1974	Statement of Principles for DOD Research and Development
August 1974	GAO Partial Report, "In-Depth Into Investigation IR&D and B&P Programs"
December 1974	GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work"
February 1975	DDR&E Statement to Congress
February 1975	DSB Task Group on IR&D Report
Impending	GAO Final Report, "In-Depth Investigation into IR&D and B&P Programs"

Each of these items will be summarized in the following paragraphs.

E.1. GAO Report, "Feasibility of Treating Contractors IR&D Costs as a Budget Line Item," March 1971 (Ref. 118)*

The GAO conducted this review in response to a request by Senator Proxmire for GAO's views as to the feasibility of converting contractors' IR&D to a budget line item. The GAO concluded that a line item control of IR&D payments to major defense contractors can be developed using estimates based on historical data, together with the DOD's estimate

*References are cited in the List of References

of the amount of research and development and procurement activity to be contracted in a particular year. The major contractors' DOD share of IR&D would be paid directly under special contracts rather than as an allocated overhead charge. However, the GAO suggested that no further legislative controls be placed on IR&D until the effectiveness of Section 203 of Public Law 91-441 was determined.

The DOD reply took exception to the GAO views and challenged the depth of the GAO investigation. The DOD response pointed out a number of possible problem areas. The DOD's basic position is that line item control is not administratively feasible.

Senator Proxmire entered the report in the Congressional Record. He again asserted that IR&D is a back-door boondoggle and that stricter controls are needed. (Ref. 119) Representative Gubser took exception to the GAO recommendation and asserted that it was not feasible. (Ref. 120)

E.2. GAO Report "Implementation of Section 203, Public Law 91-441, on Payments for IR&D and B&P Costs," April 1972, (Ref. 125)

This was the first yearly review of DOD's implementation of Section 203, Public Law 91-441 done in response to a request from Senator Stennis. It was recognized by the GAO reviewers that there had not been enough time elapse to provide a meaningful in-depth review and the GAO concentrated its efforts on a few issues which arose early in

implementation. The GAO pointed out that the language of Section 203 was not clear in whether the requirement for potential military relationship determinations applied to all IR&D payments or just those associated with contractors who negotiate advance agreements. The DOD had implemented the latter approach because of the administrative difficulty of doing otherwise. The GAO also noted that the law failed to provide a criteria for determining when a project has "a potential relationship to a military function or operation." The third area discussed was DOD's implementation of the $2 million criteria to include IR&D and B&P costs rather than IR&D or B&P costs. The GAO supported the DOD's action. The GAO concluded that, in its opinion, the DOD had been "reasonably diligent" in its implementation. Further, in submitting this report to Congress, Senator McIntyre complimented the DOD for doing "a commendable job" of implementing the statutory requirements of Section 203. (Ref. 131)

E.3. Report of the Commission on Government Procurement, December 1972 (Ref. 1)

The Commission was not able to arrive at a unanimous position on IR&D and in the end had a majority recommendation and two dissenting positions. The majority recommendation is summarized below:

1. IR&D and B&P expenditures are in the best interest of the nation to promote competition, to advance technology, and to foster economic growth.

2. Policy should recognize IR&D/B&P efforts as necessary costs of doing business and provide

a. Uniform treatment, Government-wide, with exceptions treated by the Office of Federal Procurement Policy

b. Contractor cost centers with 50 percent or more fixed-price government contracts and sales of commercial products and services should have IR&D and B&P costs accepted without question as to amount. Reasonableness for other contractors should be determined by the present DOD formula.

c. Contractor cost centers with over 50 percent cost type contracts should be subject to an agency relevancy test. No relevancy restriction should be applied to other contractors.

This recommendation was supported by six of the twelve Commissioners:

Perkins McGuire, Consultant and Corporate Director

Paul W. Beamer, Senior Vice President and Director, Valtec Corporation

Edward J. Gurney, Senator, Florida

Richard E. Homer, President and Director, E.F. Johnson Company

Peter D. Joers, Special Assistant to the President of Weyerhauser Corporation

Arthur F. Sampson, Acting Administrator, General Services Administration.

The first dissenting position agreed with the major points of the majority recommendation and the first subparagraph (1., 2. and 2a). However, the other two subparagraphs were unacceptable. The thrust of the subparagraphs added by the supporters of dissention position #1 was to retain the current DOD procedures covering IR&D and B&P

costs which were adopted pursuant to Section 203 of the 1971 Military Procurement Authorization Act. However, two new items were added. First, agency procurement authorization and appropriation requests would be accomplished by an explanation of the criteria established by the agency head for such allowances. Second, the government should obtain sufficient access to contractors' commercial records to enable a determination of the allowability of the costs (this item relates to difficulties the GAO encountered obtaining such access at one contractor--see Section E. 14). The first dissenting position was supported by:

Lawton M. Chiles, Senator, Florida;

Frank Horton, Congressman, New York;

Chet Holifield, Congressman, California;

Elmer Staats, Comptroller General of the United States; and

James E. Webb, Attorney at Law.

The second dissenting position suggested that additional mechanisms should be studied to try to find a solution to the IR&D dilemma. This position was sponsored by Frank Sanders, Under Secretary of the Navy, and supported by Commissioner Sampson as potential long term solution.

The Commission recommendations have been staffed by an Executive Branch Committee which established an Executive Branch position. This group was chaired by Mr. Charles Deardorff, OASD(IL). The proposed Executive Branch position

is currently being reviewed by the General Services Administration.

It is unlikely this effort will have much impact on DOD IR&D policy since most of the Congressional/GAO Commissioners supported a continuation of the current DOD policy with minor suggestions for change. Additional backup information is included in Reference 132.

E.4. GAO Report, "Payments for IR&D and B&P Costs," April 1973 (Ref. 123)

This was the second annual review of DOD implementation of Section 203 of Public Law 91-441 in response to a request from Senator Stennis. Since the law had been in effect for two years the GAO conducted an intensive review. The GAO noted the continuing problems with the vagueness of the potential military relationship requirement. They noted several positive actions taken by the DOD to implement the provisions of Section 203. However, they did find several areas which they felt needed further emphasis by senior DOD officials. Accordingly they recommended that the DOD should:

- Insure compliance with the intent of the Armed Services Procurement Regulation which prohibits cost sharing within the ceiling.
- Perform after-the-fact reviews as soon as possible after the contractor's fiscal year ends to provide additional data for subsequent negotiations.
- Issue guidelines to the Services to insure more consistent determinations of potential military relevancy.

- Continue to emphasize the desirability of negotiating advance agreements either prior to cost incurrence or early in the contractor's fiscal year and to seek alternative means of solving this problem.

- Establish uniform negotiation procedures and policies for negotiators to aid in the consistent and equal treatment of contractors.

- Establish guidelines that uniformly recognize, during ceiling negotiation, the technical quality of contractors' IR&D programs with reward or penalty, as appropriate.

- Require the Services to maintain negotiation files which record the rationale and show the dollar effect of the factor considered in establishing the ceiling.

The DOD generally agreed with the GAO recommendations (Ref. 133) and acted to implement them by issuing guidance on negotiations and PMR determinations (see Refs. 76 and 86).

The primary recommendation to the Senate Armed Services Committee was that no changes be made in Section 203, Public Law 91-441 pending further study of the area. In presenting the GAO findings and the DOD's annual report on IR&D to the Senate, Senator McIntyre noted that the DOD had made "substantial and satisfactory progress" during the past year in further implementing the provisions of Section 203. (Ref. 134)

E.5. GAO Letter Report, IR&D Data Banks, August 1973, (Ref. 94)

This was one of two GAO special reports on IR&D issued in 1973. The GAO report questioned the need for two IR&D data banks, the adequacy of use to justify even one data bank, and the appropriateness of current data bank procedures since they seemed to lead to duplication with the technical

plans. The DOD responded to the GAO report and answered several of the GAO questions. (Ref. 135) The DOD Technical Evaluation Group was also tasked to evaluate the data banks and the results are discussed in Section 3.3.7.

E.6. GAO Letter Report, "Small Contractor Problems with DPC 90," September 1973 (Ref. 136)

The GAO conducted this review to determine if there were major problems in the handling of small contractors under the new cost principles which provide, in part, that small contractors can negotiate advance agreements if for some reason the formula does not provide an equitable result. In essence, the GAO found no major problems in this area.

E.7. Senator Proxmire Amendment to Limit IR&D Recovery, 24 September 1973 (Ref. 103)

On 24 September 1973 Senator Proxmire introduced an amendment to the FY 75 DOR Military Procurement Authorization Bill which, if passed, would have required a 50 percent reduction in the DOD's reimbursement of IR&D, B&P and OTE costs. The amendment was immediately withdrawn by preagreement with Senator McIntyre; the Senators had agreed to jointly request an in-depth GAO investigation of the basis for IR&D/B&P/OTE and alternatives to the current policies and procedures. The initial target date for completion of the study was 1 April 1974.

Senator Proxmire in his comments to the Senate (Ref. 103) once more challenged the concept of IR&D/B&P but in stronger terms than in the past. His statement includes the following comments: a case can be made that IR&D is a backdoor boondoggle and ought to be eliminated altogether; DOD controls have not been effective and IR&D costs continue to rise, both in dollar amounts and as a percentage of defense sales; the test of relevancy is not effective; IR&D amounts to a Pentagon subsidy for major defense contractors and has been used to prop up defense contractors whose sales have declined; IR&D contributes to the continued dominance of the large aerospace firms; the Pentagon has not demonstrated a willingness or capability for determining whether proposed IR&D work is ever actually performed or whether such work benefits the government; the government receives no license, patent, royalty or other rights in any inventions that result from IR&D efforts paid for with taxpayers' money; and IR&D contributes to hidden profits.

Subsequently, Senator Proxmire's staff and the staff of the Armed Services Committee prepared a group of specific questions to be addressed by the GAO. These questions were forwarded to the GAO by letters dated 8 October 1974. The GAO was asked to do a comprehensive study and include alternative recommendations ". . . so that the Committee will have a choice of actions which may be adopted." The 22 questions are reproduced as Appendix F. The response was originally

requested by 1 April 1974. However, the magnitude of the task precluded completion by that time. A partial report on the in-depth review was subsequently published in August 1974 (See Section E.13) and as of 15 April 1975 the final report has still not been published but is expected in mid-June 1975.

In response to the challenge to IR&D, industry established a Tri-Association (Aerospace Industries Association, National Security Industrial Association, and Electronic Industries Association) Ad Hoc Committee on IR&D and B&P. Their primary written product is discussed in the next section. DDR&E chartered a Defense Science Board Task Group to review the IR&D situation and advise him on desirable changes in policy and procedures. Their report is discussed in Section E.16.

In essence, most IR&D activity subsequent to this event was a reaction to Senator Proxmire's renewed challenge.

E.8. Industry Position on IR&D/B&P (Refs. 115, 116, and 117)

The Tri-Association Ad Hoc Committee on IR&D and B&P undertook a major effort to establish an industry position and to sell it to Congress. The position and backup data are reflected in three documents which were published in March 1974. These were "A Position Paper on IR&D and B&P," an "Executive Summary" thereof, and a volume entitled "Technical Papers on IR&D and B&P Efforts." These documents varied in

length from 5 to 312 pages. The position taken by industry was consistent with their previous positions. Their specific recommendations are summarized below:

> "1. The requirement for potential military relationship in Public Law 91-441 would be eliminated as unworkable . . . .
>
> 2. The requirement for establishing ceilings on IR&D and B&P should be eliminated because it is in basic conflict with stated Government objectives to encourage competition and maintain a strong industry capability.
>
> 3. Line items should not be established in any agency budgets for funding IR&D and B&P costs . . . .
>
> 4. A new Government agency responsible for operational aspects of IR&D and B&P should not be established. Rather all government agencies should follow a common policy . . . .
>
> 5. Congress, in the national interest, should specifically express positive support for IR&D and B&P and correct the current motivation to continually reduce this effort.
>
> 6. In considering "alternative methods" of funding IR&D and B&P, it should be remembered that IR&D and B&P are indirect business expenses and should be fully reimbursed. In summary, full cost recovery of IR&D and B&P would place the U.S. Government on an equal footing with all other customers. Anything less than full reimbursement of these costs, in effect, is a subsidization of the Government by American industry." (Ref. 115, pp. 33-34)

This is as strong a statement of the classical industry position as one is likely to see. Additional background, rationale, and discussion is given in the other parts of the Position Paper.

The "Technical Papers" volume includes six papers:

- Economic Considerations Regarding IR&D and B&P Expense
- Alternate Methods of IR&D and B&P Cost Reimbursement
- Benefits Derived from IR&D Effort
- Benefits Derived from B&P Efforts
- U.S. and Foreign Nation Support of Industrial Technical Effort
- Industry Response to 22 Proxmire--McIntyre Questions.

About two-thirds of the volume is devoted to the discussion and presentation of benefits of IR&D.

E.9. DDR&E Statement Before the Senate Committee on Appropriations, 5 April 1974. (Ref. 107, pp. 9-34 to 36)

Dr. Currie in his prepared statement to the Senate Appropriations Committee took a strong position in support of IR&D:

> "IR&D is an essential and effective means to provide the United States with a superior technology base to meet our government's requirements. The Congress is strongly urged to give it full support."

E.10. GAO Report, "DOD Implementation of Section 230, Public Law 91-441 Involving Contractors' IR&D," 1 May 1974 (Ref. 126)

This was the third annual GAO report on the DOD implementation of Section 203 in response to Senator Stennis. In commenting on the DOD implementation the GAO noted the new DOD guidance issued by Dr. Foster and Mr. McCullough on 18 April 1973 (Ref. 76) but stated that it was too early to evaluate its effectiveness. On the need for a uniform

government-wide policy GAO contacted DOD, NASA, AEC, DOT, HEW, HUD and EPA and found no unanimity on the need for a uniform government-wide policy nor the desirability of adopting DOD policy for government-wide use. The GAO recommended that no change be made to Section 203 until completion of their in-depth investigation.

E. 11. Admiral Rickover Testimony before House Subcommittee on DOD, May 1974 (Ref. 104)

In his testimony Admiral Rickover identified four "obvious and serious problems" in the way DOD is doing IR&D business:

- DOD neither directs nor controls the contractor's R&D work being performed,
- DOD has no way to eliminate duplication, or to determine if the benefits obtained by DOD are worth the costs incurred,
- The Government has no rights in technical data or in patents derived from the work though it is primarily financed with public funds, and
- Much necessary and legitimate research and development work for weapons is being deferred by the Department of Defense for lack of funds. Yet the Department spends many hundreds of millions of dollars a year on contractors' pet projects which may not prove beneficial to the military.

He also made the following assertions:

- DOD technical reviews are superficial and the Departments interpretation of what projects have a potential relationship is quite liberal.
- The DOD would get more for its money by direct contracting rather than reimbursing IR&D.

- AEC has managed just fine without the liberal IR&D policies of the DOD, and

- IR&D is a subsidy given without going through the normal process of obtaining Congressional approval.

Thus, Admiral Rickover's position is very similar to Senator Proxmire's feelings.

When asked what he would recommend with respect to IR&D Admiral Rickover gave the following response:

> "First, Department of Defense payments for independent research and development and bid and proposal expense should be drastically reduced. The Department of Defense cannot afford to spend $787 million to $1 billion a year for this work when sufficient funds are not available to fund its own research and development projects.
>
> Second, the Department of Defense, like the Atomic Energy Commission, should allow costs of independent research and development projects only to the extent those projects provide a direct benefit to the military.
>
> Third, the Department of Defense should receive, for the Government, patent and data rights commensurate with its contribution to the costs incurred on independent research and development projects. Again, the AEC has a system which does give the Government rights to technical data and license for patents commensurate with the Atomic Energy Commission's investment in the work.
>
> Fourth, in cases where independent research and development projects are deemed to have sufficient benefits to warrant the cost, the Defense Department should finance the work by direct contract rather than through IR&D, so that the responsible Government officials can exercise technical supervision of the work, and so that the United States can retain appropriate rights to resulting technical data, inventions, and patents." (Ref. 104, p. 123)

Thus, what might have appeared to be a uniform DOD front on IR&D was broken with Admiral Rickover's blunt criticism of DOD IR&D management.

E. 12. Statement of Principles for DOD Research and Development, May 1974 (Ref. 110)

Dr. Currie and his three service counterparts, the Assistant Secretaries for R&D, signed a Statement of Principles for DOD Research and Development in May 1974 which includes the following section:

> "Independent Research and Development. A strongly supported IR&D program is essential. It must be well directed, mostly by industry, and the benefits must be clearly visible."

E. 13. GAO Partial Report, "In-Depth Investigation into IR&D and B&P Programs," August 1974 (Ref. 95)

This was the first product of the GAO in-depth investigation into IR&D. It included answers to nine of the first ten Congressional questions. Thus, in this report the GAO

- analyzed and reconsidered the costs of IR&D and B&P programs as reported by DOD for the years 1968 through 1973 (Questions 1 to 5, Appendix F)
- explored the availability of information on the costs of administering the programs (Question 6)
- Considered whether certain costs (directed toward new business, promotional and nontechnical services, etc.) are allowed and reimbursed as IR&D and B&P under DOD's regulations (Questions 8 and 9), and
- Evaluated the procedures implemented by DOD for contractors not meeting the $2 million threshold prescribed by Section 203 for advance agreements and technical evaluations (Question 10).

E. 14. GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work," December 1974 (Ref. 137)

In this report the GAO questions the DOD's acceptance of $87 million of JT 9D development costs as IR&D from 1968 through 1973 because the development was sponsored by, or required in performance of, contracts with commercial customers. The GAO recommended that the DOD

- provide specific guidance to Government review teams and the Defense Contract Audit Agency to insure that technical effort allowed as IR&D is not sponsored by, or required in the performance of, commercial contracts and

- expedite action under consideration to require that IR&D agreements specifically authorize access to contractors' commercial records for determining whether IR&D costs are allowable.

In its reply the DOD basically agreed with the GAO interpretation of the current ASPR but argued that

> "the Navy's advance agreements with Pratt and Whitney for the years in question were sound business transactions and were clearly in the Government's best interest." (Ref. 138, p. 2)

Regarding the desirability of additional guidance and access in some cases to contractors' commercial records, the DOD reply notes the practical difficulty of making determinations in this area but states that the DOD is

> "considering the feasibility of requiring contractors to whom advance IR&D agreements are negotiated to certify that costs incurred for IR&D projects sponsored by or required in the performance of a contract or other arrangement will not be allocated to DOD contracts." (Ref. 138, p. 3)

E. 15. DDR&E Statement Before the House Armed Services Committee, 21 February 1975 (Ref. 108)

Dr. Currie once again directly addressed IR&D in a major statement. He provided rationale for DOD support of IR&D and responded to charges that IR&D is a subsidy and not attuned to DOD needs. Finally, he again solicited Congressional support for IR&D.

E. 16. Defense Science Board IR&D Task Force Report, February 1975 (Ref. 105)

The Defense Science Board Task Force on IR&D was chartered in April 1974 to:

1. Identify the various objectives and uses of IR&D/B&P,

2. Identify alternative means for satisfying these objectives, and

3. Set forth and assess the pros and cons of various alternatives and recommend possible modus operandi.

A criteria in forming the Task Force was that members not be associated with the segment of industry which benefits most from IR&D. Accordingly the members were largely from the academic or non-aerospace sectors:

Dr. Gerald Tape (Chairman)
President, Associated Universities, Inc.

Dr. Walter Roberts
President, University Corporation for Atmospheric Research

Dr. Robert Loewy
Vice President and Provost
Rensselaer Polytechnic Inst.

Dr. Oswald Villaro
Senior Scientific Adviser
Stanford Research Institute

Dr. John Baldeschwieler
Chairman, Division of Chemistry and Chemical Engineering
California Institute of Technology

Dr. Joseph Charyk
President, Communications Satellite Corporation

Mr. Robert Everett
President, MITRE Corp.

Dr. Raymond Bisplinghoff
Chancellor, University of Missouri

Lt Gen Austin Betts, USA (Ret.)
Vice President for Operations
Southwest Research Institute

Lt Gen Robert E. Coffin, USA (Ret.)

Government Representative:
Mr. James W. Roach, ODDR&E

This group coined a new acronym to describe IR&D and B&P-Competitive Technical Effort (CTE)-which is reminiscent of CITE from the mid-1960s. The Task Force supported the concept of IR&D/B&P and recovery through overhead and offered the following recommendations:

- DOD reimburse, through overhead, defense contractors for CTE in the amount considered necessary to maintain a truly competitive environment among DOD's industrial sources of supply.

- The amount of CTE authorized be determined to the greatest extent possible automatically on the basis of commercial market place experience or negotiated on the basis of simple formula and guidelines, changeable by DOD periodically as conditions dictate.

- The DOD IR&D Policy Council determine the level of CTE reimbursement by setting CTE policy, establishing the CTE formula and guidelines, and reviewing CTE goals and results at regular intervals.

- The DOD not attempt to manage, direct, or require prior approval of the substance of CTE programs. Continue, however, technical exchanges for the benefit of contractor and DOD.

- There be no test of relevancy applied to CTE. If relevancy tests must be applied, they should be tests for government-wide benefits.

- DOD promote the use of inter-agency coordinated CTE policy and procedures to the extent other agencies depend on competitive sources of supply in the way DOD does, but not to create a central agency for CTE administration.

These recommendations are not particularly precise in statement but their intent is clear. The DOD should once again advocate cost principles similar to the February 1969 cost principles which make IR&D CWAS applicable (remove cost controls from most contractors) and greatly reduce the technical evaluation activity. No benefit/cost analysis is presented to show what the DOD gains from the recommended course of action. Hence, it is not clear what is new in 1975 (vice 1969) that will make the suggested changes palatable to the Congress.

E. 17. Other Inputs to the Dialogue

There have been many additional inputs to the IR&D dialogue which were not highlighted in the above paragraphs. A few of these are summarized here:

In September 1973 General George S. Brown (then Chief of Staff of the Air Force and a past Commander, Air Force Systems Command) made the following comments relative to IR&D:

"Some contractors expect the Department of Defense to participate in and absorb costs for a constant or increasing level of IR&D even though their business base may be decreasing. This is unrealistic. We understand the need for and the value of IR&D programs, and we are willing to pay our fair share. But contractor management must evaluate and reassess the worth of these projects, and make absolutely sure that the company is judicious in the use of IR&D money. What we can afford under current conditions is a far cry from what we'd all like to see done in this area." (Ref. 111, p. 6)

Lt General William Evans, Air Force Deputy Chief of Staff for R&D, in testimony to the House DOD Appropriations Subcommittee said the Air Force

"'. . .firmly endorses the concept of IR&D and believes that the use of these funds are more broadly effective than if they were constrained to specified research and development. Such a system would require the establishment of an extensive and expensive reporting, administrative and audit system for handling the program. There is no efficient way to allocate a fixed dollar figure among the numerous and various size contractors nor is there a feasible method to establish an amount in the budget for such specified efforts."

Such work, he went on, 'would tend to become directed R&D with the consequent loss of creative input from an otherwise unavailable broad base of technical professionals throughout the country. The Air Force cannot always know the exact areas to explore and act as the sole judge of embryonic concepts.'

He also cited IR&D as being a relatively uncomplicated process administratively and therefore effective for performing numerous essential R&D tasks too small to be performed economically by contracting." (Ref. 112, p. A 19)

At the technologist level the Commander of the Air Force Flight Dynamics Laboratory (Col Charles Scolatti) documented his feelings about IR&D and included the following observations in his overall assessment.

- Contractor IR&D is making a big impact on technology for weapon systems,

- Because of the improvements in on-site evaluations, documentation, IR&D management, etc., the IR&D program is now the major contributor of systems technology,

- Present and future weapon systems are now dependent on IR&D contributions.

- IR&D program results are not sufficiently publicized or credited,

- The IR&D programs are evaluated with more scrutiny, technical expertise and depth than any other R&D element, and

- Duplication has been reduced to a minimum. Unwarranted duplication has been eliminated (Ref. 114, pp. 3-5)

APPENDIX F

CONGRESSIONAL QUESTIONS

FOR GAO IN-DEPTH INVESTIGATION

1. The DCAA audits of IR&D costs show that the ratio of IR&D costs to defense sales increased from 2.73% in 1966 to 3.83% in 1972. What accounts for this increase? What is the rationale to support a high level of contractor IR&D expenditures even in the face of declining defense sales?

2. Reconcile the apparent inconsistencies in the figures for IR&D expenses from 1966 to 1972 between your April 16, 1973, report, reports by the DCAA, and the figures given by DOD to the Senate Armed Services Committee as printed in the committee report of September 6, 1973.

3. In its report to Congress, the DOD includes an amount for "other technical effort (OTE)" in its IR&D figures. What are the audit substantiated amounts for OTE for the years 1966 to the present? Why are these amounts not included in the DCAA audit report? Do the same rules apply for OTE as for IR&D and Bid and Proposal Costs?

4. The DCAA audit report of IR&D covers only those defense contractors with "an annual auditable volume of costs incurred of $15 million or more and other contractors who, although not meeting the auditable volume criteria, required 4,000 or more man-hours of DCAA's direct audit effort per year." What does the term "auditable volume" of costs incurred mean? What is the difference between auditable volume of costs and total defense sales (including both prime contracts and defense subcontracts)? What is your estimate of total IR&D *including* contractors that do not meet the criteria of $15 million of annual auditable costs incurred and 4,000 manhours of defense audit effort?

5. The IR&D figures reported to Congress are based on a DCAA statistical report covering 77 defense contractors. The top 77 defense contractors account for only 69% of defense prime contracts. How much additional IR&D costs are reimbursed by the DOD to divisions, contractors, and subcontractors not covered in the DCAA report?

6. What is the total in-house cost of administering the IR&D program—include the cost of reviewing contractor proposals, DOD negotiation teams, technical review efforts, administration of disputes, etc.? What are the comparable costs for AEC?

7. What problems are encountered by DOD and AEC contracting officers and technical or project personnel in evaluating and negotiating IR&D proposals?

8. Does DOD pay contractors' costs for:

(a) research and development projects primarily of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business;

(b) studies or projects which are undertaken, in whole or in part, for other customers; and

(c) projects which represent unwarranted duplication of other research and development work sponsored by the DOD.

Cite examples if any such costs are paid.

9. Do Bid and Proposal costs paid by the DOD include negotiating and promotional costs or the cost of salesmen, representatives or agents who do not provide technical services in connection with bids or proposals?

10. Public Law 91-441, section 203, provides that appropriated funds may not be spent for IR&D unless the Secretary of Defense determines that the IR&D has potential military value. However, it appears that the DOD does not technically review IR&D proposals in cases where it is charged less than $3 million a year. What is your evaluation of the adequacy of the DOD's technical review of such programs? Of the $700 million in IR&D expenses in 1972, how much goes to contractors under the $2 million ceiling? What is the Comptroller General's opinion of the legality of IR&D payments made in the absence of any technical review as to potential military value? Would it be feasible to lower the technical review threshold from $3 million?

11. With respect to IR&D proposals where the DOD is expected to pay in excess of $2 million per year, evaluate the adequacy of the contractors supporting data both with respect to estimated cost and technical justification? Since negotiated advance agreements on IR&D are of necessity sole source negotiations, do contractor submissions comply with the requirements of the Truth-in-Negotiations Act—that is does the contractor have to provide detailed cost or pricing data in support of his estimates and certify as to their accuracy, currentness and completeness? If not, why not?

12. For each of the years 1966 through 1972, identify what specific developments have been made by each of the top 25 defense contractors with respect to amount of IR&D received. For these same top 25 defense contractors identify each IR&D project in excess of $25,000 per year and indicate the potential military benefit rationale used by the DOD in accepting the project. Identify what patent applications have been made and what patents issued during this period to these top 25 contractors as a result of IR&D programs that have been subsidized by the DOD. Identify what income each company received from these patents or from prior patents developed under IR&D and determine whether or not this income has been credited to the DOD in proportion to its financial support of the project.

13. Does the DOD receive detailed technical reports or other technical data regarding technology developed under IR&D programs so that this information is considered in the development of weapons programs?

14. Does the DOD conduct reviews to evaluate the results of IR&D efforts by its contractors? What do such reviews, if any, show?

16. Apparently IR&D amounts are accepted (if under $2 million a year) or negotiated (if over $2 million a year) based primarily on historical rates of expenditures. Moreover, the DOD pays the most IR&D to the largest defense contractors. What safeguards are in effect to offset the competitive advantage this gives large, established firms in relation to new firms trying to enter defense business—and particularly small firms? What safeguards are in effect to prevent defense contractors from exploiting inventions developed primarily at public expense under IR&D in competition with other firms for non-defense business? Should safeguards be established in each of the aforementioned instances if they are not now in effect?

17. Since the DOD accepts IR&D as a general overhead cost and the AEC instead reimburses only IR&D costs, which are shown to be of direct or indirect benefit to specific contracts, and since both agencies are involved extensively in research and development work, what, if any, differences exist in the nature of the work or the circumstances under which it is performed that would justify the continued acceptance of IR&D costs by the DOD?

17. What is the practicability of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs under Department of Defense contracts?

18. Same as previous question, except establishing a separate program in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures.

19. What is the practicability of a combination of the present system, with an established dollar ceiling substantially lower than the $700 million level, and a separate, directly financed program as described under the previous question?

20. What is the practicability of the continuation of the present system but based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program described under question 18 above?

21. What is the practicability as well as the desirability of establishing a separate ceiling for IR&D as distinguished from B&P if the decision is made to establish a total ceiling in law?

22. What is the practicability as well as the desirability of establishing an independent government agency which will be responsible for the IR&D program on a government-wide basis, as opposed to the present sparate Agency basis?

APPENDIX G

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): An Overview of DOD Policy for and Administration of Independent Research and Development.	5. TYPE OF REPORT & PERIOD COVERED: Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): BETHEL, HOWARD E., Major, USAF	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Defense Systems Management School, Bldg. 202, Fort Belvoir, Virginia 22060	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Defense Systems Management School, Bldg. 202, Fort Belvoir, Virginia 22060	12. REPORT DATE: May 1975 13. NUMBER OF PAGES: 111
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Independent R&D
Independent Research
Independent Development
Other Technical Efforts
Cost Principles
Cost Classification
Military Procurement Authorization Act (FY 70)
Military Procurement Authorization Act (FY 71)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Item #19 KEY WORDS

Advance Agreements
Technical Evaluation
Potential Military Relationships
IR&D Data Bank
IR&D Cost Data
Company-Funded R&D
Allowability of Costs
Reasonableness Criteria
Uniform Negotiation Procedures
Patent Rights
Data Rights
Contracts Independent Technical Effort
Competitive Technical Effort

Item #20 ABSTRACT

Independent research and development (IR&D) is contractor initiated and conducted R&D effort not sponsored by a contract of grant. The DoD currently recognizes IR&D as a normal cost of business and accepts a reasonable and allocable share of the costs. This amounted to over $450 million in 1974.

IR&D costs have been allowable on DoD negotiated contracts since 1940. During this period there have been five different sets of IR&D cost principles. The development of these principles was relatively evolutionary through the fourth version which was issued in 1959. However, the 1959 principles were controversial and after a decade of study, investigation and discussion were changed in 1971.

The current DoD policy and administration is a direct outcome of the activities of the 1960s. The status of the key elements are discussed in the report: (1) cost principles, (2) negotiation of advance agreements, (3) technical evaluations, (4) potential military relationship determinations, (5) appeal groups, (6) annual DoD report to Congress, and (7) IR&D data bank.

The major IR&D issues are summarized and the positions of the primary participants identified. The main issues are (1) the allowability of IR&D costs, (2) the need for Congressional line item control of IR&D costs, (3) alternate methods for reimbursement of IR&D costs, (4) the need for a government-wide IR&D policy, and (5) adequacy of DoD policy and administration. In the latter category six areas were examined: reasonableness criteria, uniform negotiation procedures, technical evaluation process, potential military relationship requirement, patent and data rights, and cost classification.