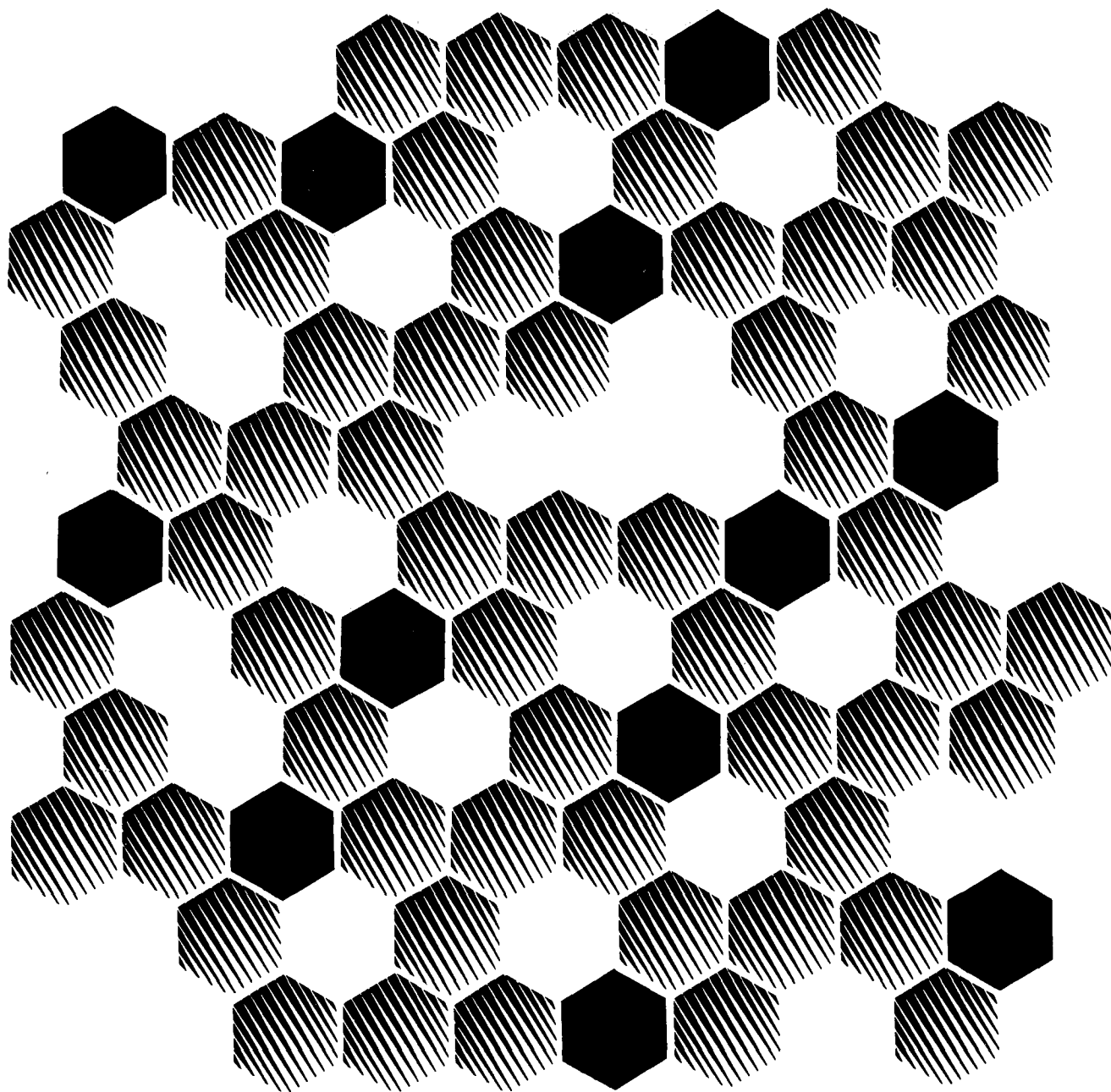


Progress Report
ON
Implementing the Recommendations
of the White House Science Council's
Federal Laboratory Review Panel

VOLUME I—SUMMARY REPORT

JULY 1984



OFFICE OF SCIENCE AND TECHNOLOGY POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20506

Progress Report
ON
Implementing the Recommendations
of the White House Science Council's
Federal Laboratory Review Panel

VOLUME I—SUMMARY REPORT

JULY 1984

OFFICE OF SCIENCE AND TECHNOLOGY POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D C 20506

CONTENTS

Volume I:

Summary Report

Introduction	1
Background	1
Committee on Federal Laboratories	2
Responses to the Recommendations	2
1. Mission	4
2. Resources: Personnel	7
3. Resources: Funding	12
4. Management	16
5. Interaction with Universities, Industry, and Users of Research Results	20
Appendix A: Presidential Memorandum	28
Appendix B: Federal Coordinating Council for Science, Engineering and Technology Federal Laboratory Committee	29

Volume II:

Status Reports By Agencies

USDA	1
DOC (NBS, NOAA)	7
DOD	17
DOE	25
DHHS (NIH)	31
DOI (USGS, BOM)	37
DOT	44
EPA	50
NASA	55
Acronym Glossary	60

Background

The White House Science Council's Federal Laboratory Review Panel was appointed by Dr. Solomon J. Buchsbaum, Chairman of the Council, in March 1982. The Panel was chaired by Mr. David Packard. Dr. George A. Keyworth, Science Advisor to the President, asked the Panel to review the Federal laboratories and to recommend actions to improve their use and performance. The Panel was specifically charged to look at laboratory missions, identify any systemic impediments to performance, and determine whether this Nation is getting the optimum return on its substantial investment in talent and facilities at the Federal laboratories.

There are more than 700 Federal laboratories, set up at various times for specific purposes. Over time, their activities have tended to expand and diversify, partly because they succeeded in their original tasks and partly because mission requirements changed. In some cases, this expansion has resulted in a dilution and weakening of purpose, mission, and capability.

Today these laboratories account for almost one-third of the Federal Government's annual expenditure for R&D and one-sixth of the total national R&D expenditure. Collectively, they employ almost half a million scientists and engineers. Thus, the Federal laboratories represent a significant fraction of the Nation's total science and technology enterprise.

The Federal Laboratory Review Panel issued its report (generally referred to as the Packard Report) in May 1983.¹ The Panel was convinced that the Federal laboratories have great potential and are an essential part of the American institutions where R&D is performed and where scientists and engineers receive training. At the same time the Panel stated that it had observed a number of serious deficiencies that limited both the quality and cost-effectiveness of R&D done by those laboratories.

The Panel made a number of recommendations focused on mission, personnel, funding, management, and interaction of Federal laboratories with universities, industry, and users of research results. In presenting its recommendations the Panel stated: "At a time when the Nation's economic and military competitiveness is increasingly challenged, it is imperative that the Nation gets the optimum return from its investment in the Federal laboratories."

Highlights of the report were briefed to the President in July 1983. In August 1983 the President directed that the Office of Science and Technology Policy and the Office of Management and Budget lead an interagency effort to respond to the central thrust of the report's recommendations.²

¹Report of the White House Science Council, Federal Laboratory Review Panel Office of Science & Technology Policy, Executive Office of the President, 1983.

²See Appendix A for Presidential memorandum.

Committee on Federal Laboratories

In response to the President's August 1983 memorandum, the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) established a Committee on Federal Laboratories³ to monitor implementation of the White House Science Council's recommendations. The Committee first met in October 1983 and established four working groups to monitor progress and coordinate joint action where necessary. These working groups were organized by topical areas covered in the Science Council's report, as follows:

- Mission and Management
- Personnel
- Funding
- External Interactions

The chairmen of these working groups and the chairman of the Committee worked closely to eliminate gaps and overlaps.

Although the charter of the Committee on Federal Laboratories expires on July 1, 1984, when the progress report is due to the President, it was the consensus of the Committee that the charter should be extended to allow continuation of periodic meetings to discuss mutual problems. There is also a need to continue the momentum established in responding to the Science Council's report.

Responses to the Recommendations

The President's interest in the health of Federal laboratories has caused the Packard Report to receive top management attention in the Federal agencies. In general, the agencies have been very responsive in implementing the White House Science Council's recommendations, especially when the agency head has been directly involved. Perhaps the most pervasive impact of the Science Council's report has been a heightened awareness on the part of top management in Federal agencies of the need to focus on laboratories, in terms of both their output and their institutional needs. The appropriate management attention has brought about, and will continue to bring about, a variety of improvements.

The recommendations addressed all Federal laboratories and necessarily had to deal for the most part with norms rather than specific institutions or agencies. Consequently, the responses varied from agency to agency, depending on a variety of factors. In no case did an agency disagree with the merit of the management principles or the spirit of the recommendations. The differences in degree of implementation reflect that: (1) some agencies had internal parallel studies under way and began early to effect management improvements once the Packard Report was published; (2) others had completed major related actions a few months prior to the report; and (3) some view their existing processes as already highly consistent with many of the recommendations.

³See Appendix B for a list of Committee members.

The most difficult recommendations to implement are those involving the legislative process: creating a separate scientific/technical personnel system and instituting multiyear funding for R&D. Since they affect almost all Federal agencies involved in R&D, they are being handled jointly on a government-wide basis.

In the chapters that follow, the recommendations are discussed in the same order and groupings as they appear in the White House Science Council's report. Progress on each recommendation is summarized and, where applicable, selected agency accomplishments are presented as examples. Finally, a discussion of future directions summarizes recommendations for follow-on efforts.

1. MISSION

DEFINITION OF MISSION

Recommendation 1-1: As a top management priority, Federal agencies should re-examine the missions of their laboratories with the laboratory directors. The agencies should redefine the missions as necessary to ensure that they are consistent with the appropriate roles for Federal laboratories. The missions must be made sufficiently clear and specific to guide the agencies and the laboratories in setting the goals against which the laboratories' performance can be measured.

PROGRESS SUMMARY

Defining the mission of the laboratories is a difficult task requiring that the agency's mission is clear and that the laboratories receive adequate attention from top management. Some of the agencies and laboratories have missions defined by their statutes (e.g., the National Institutes of Health and the National Bureau of Standards) and believe that unclear mission is not a problem.

All agencies made an effort to implement this recommendation. Most have existing procedures for reviewing their activities, and the report's recommendations were considered in the review processes. Several agencies took additional measures specifically to implement the recommendations.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- The Agricultural Research Service (ARS) developed a long-term research plan identifying areas for increased emphasis for the 1980s as well as research possibilities for the next 20 to 50 years. Such long-term planning had been lacking before. The plan reflects the best thinking of some 500 ARS scientists and members of its National Planning Staff on how ARS can meet the USDA's short- and long-term needs most effectively and efficiently. It will serve to guide the missions and performance evaluation of the ARS laboratories.
- The Administrator of the National Oceanographic and Atmospheric Administration (NOAA) had the mission statements of all the NOAA laboratories and Fisheries Centers revised and updated in response to the report.
- In July 1983, the Secretary of Energy issued the Department's policy guidance on the role and missions of the multiprogram laboratories consistent with the National Energy Policy Plan. In February 1984, the Department of Energy's Laboratory Management Council developed a generic laboratory role statement and reviewed and revised all proposed laboratory mission statements. An established institutional planning process will ensure annual review of laboratory missions projected 5 years into the future.

- The Secretary of Transportation appointed a new Science and Technology Advisor for the Department and directed him to oversee implementation of the report. The operating administrations have evaluated laboratory operations and are instituting changes necessary to ensure consistency with new laboratory mission statements and performance goals. The Department recently completed a study that identified various options for privatizing operation of the Transportation System Center. Discussions on the practicability of these options are ongoing.
- In addition to continually reviewing and revising the mission of its laboratories, the Environmental Protection Agency's Office of Research and Development plans to establish a Strategic Planning Staff whose function will be to study emerging environmental problems and determine: (1) whether research is warranted, (2) where research efforts should be focused, and (3) perhaps even how the research results would relate to current or proposed policy direction. The laboratories' missions will be redefined as necessary to accommodate the research efforts identified by the Strategic Planning Staff.

FUTURE DIRECTIONS

While direct agency response to this recommendation has been good, there obviously is a need to continually re-examine the laboratories' missions. Such activities should be carried out in conjunction with the oversight function discussed under Recommendation 4-1.

SIZE OF LABORATORIES

Recommendation 1-2: The size of each Federal laboratory should be determined by its missions and the quality of its work. That size should be allowed to increase or decrease (to zero, if necessary) depending on mission requirements, but it should not fluctuate randomly. Preservation of the laboratory is not a mission.

PROGRESS SUMMARY

The Panel did not expect that special and immediate actions be taken to implement this recommendation. The agencies have mechanisms established for reviewing the staffing of the laboratories. These reviews have taken place in conjunction with the agencies' annual budget review, which is an acceptable approach as long as the budget allocation reflects careful evaluation of the agencies' missions and performance.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- Recent mission redefinitions in the Department of Energy have resulted in significant decreases in laboratory size in the area of applied technologies, particularly those viewed as having near-term commercial benefits. The Laboratory Management Council, as part of its evaluation of laboratory 5-year institutional plans, will review the proposed size of laboratories based on approved missions.

- In the Department of Transportation, the Federal Aviation Administration's Technical Center has reduced functions not considered essential to the National Airspace System Plan and increased its staffing for testing and evaluation of new computers and automated systems, consistent with the plan. Changes in Administration priorities have also been reflected in the staffing levels and skill mix of the Transportation System Center. The Transportation Test Center of the Federal Railroad Administration has been operated for several years by the private sector; its operators are free to implement staffing adjustments based on anticipated mission requirements.

FUTURE DIRECTIONS

Linking laboratory staffing review to budget reviews assures that the size of the laboratories is re-examined annually. However, it does not assure that this size reflects the missions of the laboratories or the quality of their work, particularly in times of prosperity. The agencies must continue to focus on laboratory missions and quality of work rather than size of the budget. There will always remain external factors affecting laboratory staffing. Also, the creation of new laboratories has not always been based on the agency's determination of need. Decisions to close or consolidate laboratories have been politically difficult and will likely remain so.

2. RESOURCES: PERSONNEL

SCIENTIFIC/TECHNICAL PERSONNEL SYSTEM

Recommendation 2-1: Administrative and legislative actions should be initiated now to create, at government-operated laboratories, a scientific/technical personnel system that is independent of current Civil Service personnel systems. The experimental system for managing scientific and technical personnel at the Naval Weapons Center and Naval Ocean Systems Center is an example of how this can be approached.

PROGRESS SUMMARY

Since this recommendation applies to all agencies with R&D activities, and proposed legislation requires coordination across these agencies, the working group on personnel issues approached it as a joint effort rather than on an agency-by-agency basis. The major achievements of the working group are:

- Development of model legislation;
- Assessment of actions that could and should be taken that do not require legislation;
- An examination of the government-owned, contractor-operated (GOCO) laboratory modus operandi based on the Department of Energy's experience with the GOCO concept; and
- Collection of appropriate statistical information.

The proposed legislation is undergoing review at senior levels in the agencies and in the Office of Personnel Management. Actions that do not require legislation have been recommended by the working group and are under consideration by the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB). Examination of the GOCO option is provided as an alternative to operating the laboratories with Federal Government employees.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- *Key features of draft model personnel legislation.* The legislative model produced by the interagency working group embodies the following concepts:
 - Permits agencies to establish alternative personnel systems;
 - Applies to scientific and technical personnel in the Federal laboratories, and to similar personnel throughout an agency if broader coverage is deemed essential to mission accomplishment;
 - Bases pay on performance rather than on longevity;
 - Creates broad pay bands;
 - Simplifies job classification;

- Allows the pay cap to be waived for up to 5% of the covered positions—these uncapped positions are limited to specially qualified scientific and technical personnel;
- Permits the agency head to classify positions and fix compensation so as to make positions competitive with rates and practices for comparable positions outside of the Federal Government;
- Allows the inclusion of positions now in the Senior Executive Service (SES); and
- Permits the Naval Weapons Center and Naval Ocean Systems Center personnel systems to become permanent.

The draft model legislation does not describe a personnel system in great detail. It provides some general guidelines. In spirit, the model legislation is very similar to the demonstration project section (5 USC 4703) of the Civil Service Reform Act of 1978. The model legislation provides the Office of Personnel Management (OPM) and the agencies the authority to develop alternate personnel systems for scientific and technical personnel at Federal laboratories and, under appropriate conditions, outside of Federal laboratories. These systems can be tailored to the peculiar needs of a given agency or of a given laboratory. It is anticipated that any changes in agency personnel systems would be accomplished, over time, within existing budget resources and be the basis for improving the use of those resources.

- *Personnel actions not requiring legislation.* A number of actions were also considered within existing statutory authority to improve the ability of government-operated laboratories to attract, retain, and motivate scientific and technical personnel. Actions recommended by the interagency working group are:
 - Exclude laboratories from the current proposal to reduce the number of employees in Civil Service grades 11 through 15; the technical work of the laboratories is performed almost entirely by personnel in grades 11 through 15, and entry into, and promotion within, these grades should be facilitated, not impeded;
 - Allocate to the laboratories more positions for specially qualified scientific and technical personnel under provisions of 5 USC 3104, and allow some supervisory responsibility for such positions;
 - Provide government-operated laboratories with blanket, permanent direct hire authority for all professional scientific and technical positions in the laboratories;
 - Provide government-operated laboratories with blanket, direct hire Excepted Service Appointment Authority for research associates;
 - Exempt laboratory summer hires in technical positions from manpower ceilings in order to bring in new ideas and provide a source of potential recruits for laboratory staff positions;
 - Include special rate schedules, for engineers and other manpower shortage occupations, in annual cost of living adjustments that are applied to other Federal pay scales; and
 - Increase the probationary period for scientific and technical personnel from one year to a more suitable period, such as 3 years.

FUTURE DIRECTIONS

Further consideration of the draft model legislation as a basis for legislation that might be recommended by the Administration needs to reflect the official views of the Office of Personnel Management and the heads of the affected departments and agencies. The appropriate next step would be for OPM to consider the proposed model legislation and, if it concurs, to submit a proposed bill to the Office of Management and Budget for legislative clearance by the affected agencies. This process should be completed by the beginning of the next Congress.

Actions not requiring legislation can be given further consideration by OPM for agency and OMB/Office of Science and Technology Policy review while the model legislation discussed above is under review.

Both legislative and administrative changes in personnel systems for agency laboratories operated with Federal employees will need to be assessed in the review process in light of:

- The extent of the problems faced by the laboratories and the potential impact of changes;
- The effect of special treatment of laboratory personnel on the Civil Service system in general; and
- The impact of legislation and administrative changes on broader Administration efforts to restrict overall Federal employment, to hold down average grades, etc.

SALARY ADMINISTRATION AT CONTRACTOR- OPERATED LABORATORIES

Recommendation 2-2: Contracts governing government-owned, contractor-operated laboratories should be rewritten to permit the contractor to establish and carry out an independent salary administration.

PROGRESS SUMMARY

The Air Force contract with the Massachusetts Institute of Technology does permit the university to establish and carry out an independent salary administration at Lincoln Laboratory. For salaries subject to Department approval, the Department of Energy (DOE) has increased the salary cap on the directors of GOCO laboratories. At the present time, applicable salary actions in excess of \$50,000 still require DOE approval. In the case of the Jet Propulsion Laboratory, the National Aeronautics and Space Administration (NASA) reviews annually the average salaries for various categories of employees. DOE and NASA do not require prior approval of GOCO laboratory job offers.

FUTURE DIRECTIONS

DOE is increasing the threshold for salary approvals by \$10,000, where applicable, and thereby delegating approval authority to the laboratories for salaries up to \$60,000. DOE will review periodically the threshold levels to

ensure that there is no increase in the percentage of total salary actions reviewed by the Department. DOE will also continue to refine and clarify criteria for market basing of salary structures to facilitate the review and approval of periodic salary adjustments with only minimal discussions with the Department.

CONTROL OF MANPOWER LEVELS

Recommendation 2-3: Personnel ceilings at government-operated laboratories should not be used in addition to budgetary control. Federal agencies should provide budget constraints and give the laboratory directors freedom to decide how to meet them. Laboratory directors should also be allowed to make the final decisions on contracting for support services at the laboratories.

PROGRESS SUMMARY

The situation is quite mixed across the government. Most Federally operated laboratories find themselves under some form of personnel ceilings in addition to fiscal constraints. To remain within necessary overall limits on Federal manpower for an entire agency, and to properly carry out responsibilities for overall agency management, agency heads often find it necessary to allocate specific manpower resource levels to subordinate laboratories. In some cases, the personnel ceilings are on the total laboratory population. In other cases, the total number of high grades (GS-13 through 15) have been under a separate ceiling. At times, laboratories have found themselves simultaneously under all of the above constraints. There has been a growing awareness within the Federal agencies that these multiple constraints result in lack of flexibility and the creation of non-productive bureaucratic processes. The final result is often a workforce that is not optimum for the current mission of the laboratory. There is a need, therefore, to strive for a better balance between the controls necessary for agency heads to meet their responsibilities for overall agency management and a Federal laboratory director's need for sufficient flexibility to permit optimum laboratory management.

The Department of Defense industrially funded laboratories are no longer operating under total personnel ceiling control. Other DOD activities and other agencies currently are operating under some form of total ceiling control.

The April 1984 report of the House Armed Services Committee on the Department of Defense Authorization Act, 1985, recommends waiver of civilian personnel ceilings for fiscal year 1985. The report states: "The Committee was greatly encouraged by the results of the industrial fund test. Facing a total workload that was little changed from 1982, industrial fund managers did not significantly expand the overall work force in fiscal year 1983. Thus the most important result of the test is what did not happen—managers, unconstrained by ceilings, did not engage in unwarranted hiring." (p. 246)

FUTURE DIRECTIONS

On the assumption that personnel ceilings for agencies will need to be retained to meet overall Federal employment goals of the Administration, agency heads should allow maximum flexibility to laboratory directors in the control of staffing at laboratories, including the use of contract support personnel.

3. RESOURCES: FUNDING

MULTIYEAR FUNDING FOR R&D

Recommendation 3-1: The Congress and Office of Management and Budget should authorize funding for R&D programs on a predictable multiyear basis so that staffing levels and research activities at Federal laboratories can be properly planned.

PROGRESS SUMMARY

An interagency working group addressed this recommendation as a joint issue since it involved almost all agencies. When the working group examined trends in R&D funding at the agency level, it found that for both basic and applied research, funding is surprisingly stable for most agencies and has shown a steady increase in the past years. However, when agency funding is disaggregated and examined at the component and laboratory level, the fluctuations are larger. In the views of the working group, major factors contributing to these fluctuations are:

- Late Congressional appropriations and agency reviews, and reprogramming actions that cause uncertainty until late in the fiscal year;
- Congressional and Administration changes in focus and areas of interest;
- Continuing resolution authority in lieu of Congressional appropriations; and
- Unpredictable Federal civilian pay raises that have to be paid for out of R&D funds.

Thus, agency operating procedures as well as the appropriation process require modification in order to implement this recommendation.

The interagency working group on funding believes that the Packard Report recommendation can best be implemented if funding for R&D is appropriated on a 2-year basis.

FUTURE DIRECTIONS

Where appropriate, the Administration should encourage Congressional interest in, and actions to provide for, multiyear authorizations and appropriations for R&D programs. In addition, agencies should review their own operating procedures to minimize internally generated uncertainties in funding laboratories.

While improvements in funding and personnel planning and management are the focus of Packard Report recommendations, future thrusts must also include upgrading laboratory facilities and equipment as an appropriate trade-off against operating funds within total available funds. Continuous, rapid changes in the state-of-the-art make it essential that Federal laboratories be equipped with modern buildings and tools.

DISCRETIONARY FUNDS

Recommendation 3-2: At least 5 percent, and up to 10 percent, of the annual funding of the Federal laboratories should be devoted to programs of independent research and development at the laboratory directors' discretion. Federal agencies should establish a mechanism to evaluate the results of such work, with the size and continuation of discretionary funds related to laboratory performance. In order to encourage cooperative research programs, the laboratory directors should have the authority, and be encouraged, to spend part of the discretionary funds at appropriate universities and industries.

PROGRESS SUMMARY

Most agencies reviewed have a discretionary funding program in effect or will institute such a program in the near future. Current status of discretionary funding is:

<i>Agency</i>	<i>Status</i>	<i>Planned Action</i>
USDA	No explicit discretionary funds	Will establish guidelines to meet recommendation's intent
DOC/NBS	About 6%	None
DOC/NOAA	No explicit discretionary funds	Discretionary funds will be requested as part of future budget initiatives
DOD/Army	10% of basic research None for applied research	None
DOD/Navy	7% of basic research 2% of applied research	Increase to 5% of applied research
DOD/Air Force	7% of basic research None for applied research	Begin 0.5% of applied research in FY 85. Increase to 4% by FY 89
DOE	Up to about 5% in addition to significant flexibility	Implementation of new policy statement with emphasis on results-oriented review
HHS/NIH	All funds considered discretionary	None
DOI/BOM	No explicit discretionary funds	None
DOI/USGS	5-10%	None
DOT	No specific percentage used as guidelines. New policy being reviewed	Policy supporting the recommendation planned for next budget cycle
EPA	No explicit discretionary funds	Laboratory directors will be given greater flexibility in conducting projects
NASA	About 4% excluding salaries	None

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- The Office of Naval Research has agreed to maintain discretionary funds as a constant percentage of basic research funds (about 7%). The Office of Naval Technology has agreed to increase the percentage of discretionary funds as a part of applied research funds (from 2% to about 5%).

- The Air Force currently maintains discretionary funds in basic research equal to 7% of basic research budget. In fiscal year 1985 the Air Force will establish applied research discretionary funds equal to 1/2% of applied research budget, growing to 4% of applied research in fiscal year 1989.
- The Department of Energy issued a policy statement in December 1983 that clearly established policy and uniform guidelines for use of exploratory research and development funds at multiprogram laboratories. Under this policy, laboratories may use a reasonable amount of operating funds for early explorations and exploitation of creative and innovative scientific and technological concepts arising in the course of the laboratory's work. The laboratory directors exercise authority in choosing projects for funding.

FUTURE DIRECTIONS

Where providing more discretionary funds comes as a new concept, and where such funds are in constant competition with directed funding, agencies need to be continually aware of the need to foster independent research, consistent with established overall agency roles and missions, as a means of stimulating innovation.

CARRYOVER FUNDING

Recommendation 3-3: Federal laboratories should be allowed to carry forward remaining funds into the next fiscal year. This would eliminate the wasteful practice of hurried spending at the end of each fiscal year.

PROGRESS SUMMARY

There is a wide variation among agencies in the length of time allowed for obligation of R&D funds. The current status is:

<i>Agency</i>	<i>Obligation Authority Time Limit</i>
USDA	1 year
DOC	No time limit
DOD	2 years
DOE	No time limit on R&D appropriations
HHS/NIH	1 year
DOI/BOM	No time limit on research funds
DOI/USGS	1 year
DOT	No time limit
EPA	2 years
NASA	2 years

While the Department of Defense (DOD) has 2-year obligation authority from Congress, agency policy requires that laboratory directors obligate up to 97% of their budgets by the end of the first fiscal year and 100% by the end of the following quarter. Difficulties arising from this approach are further compli-

cated when appropriation action is delayed beyond the start of the fiscal year. No action has been taken by DOD to modify the policy. There are no plans at present on the part of agencies with 1-year authority to ask Congress for more flexibility.

FUTURE DIRECTIONS

Where agency policies cause inflexibility and inefficiencies in the obligation of laboratory funds, the responsible R&D managers must take the initiative in making reforms. Agencies with only 1-year obligation authority must likewise take the initiative in their budget proposals to request a longer period.

4. MANAGEMENT

OVERSIGHT OF LABORATORIES

Recommendation 4-1: For each Federal laboratory, there should be an oversight function responsible for assuring the continuing excellence of the laboratory. This function could be performed by an external committee which should include strong industry and university representation. This committee would spend enough time at the laboratory to become familiar with the laboratory's strengths and weaknesses. It would focus on productivity and on the excellence, relevance, and appropriateness of research. The oversight committee would make recommendations to the agency and inform the laboratory director of these recommendations. Those recommendations would be taken into account by the agency and laboratory in their budget decisions. In addition, the committee would give special attention to reducing micromanagement by the sponsoring agency.

PROGRESS SUMMARY

The Packard Panel did not intend to dictate a single form of oversight for all laboratories in all agencies. The important features sought of this oversight are that (1) it provide a broad, laboratory-wide evaluation, (2) this evaluation go beyond the scientific merit of individual research areas, as is usually the case, to cover the appropriateness of the laboratory work and the management of the laboratory, and (3) the oversight body report to the parent agency rather than the laboratory director alone. Most of the agencies have existing oversight mechanisms that could fulfill the above expectations.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- The National Oceanographic and Atmospheric Administration plans to establish an Advisory Group for the oceanic and atmospheric research laboratories, reporting to the Oceanic and Atmospheric Research Assistant Administrator.
- At the Department of Defense, the Services were requested to form external advisory groups for their laboratories under the aegis of their Scientific Advisory Boards and to provide plans for how these groups would operate to perform the oversight functions. These plans have been submitted to the Secretary of Defense.
- The Army Materiel Development and Readiness Command has initiated an independent assessment of its laboratories using members of the Army Science Board. Peer reviews are to be completed in 1984 at the Army Tank-Automotive Command and at the Army Avionics Research and Development Activity. This peer review process will be institutionalized to cover 4 to 5 laboratories per year. The assessments, scheduled for 3 to 5 days at each laboratory, will review the quality of the staff, facility, and technical program; examine how productive the laboratory is

in accomplishing its mission; and assess how relevant the laboratory's work is to key Army problems.

- The Department of Energy's (DOE's) Laboratory Management Council is working on ways to implement effectively the oversight function appropriate to each laboratory's circumstance, utilizing existing organizations and boards where effective, and modifying processes where necessary. Oversight panels exist for Argonne National Laboratory and Brookhaven National Laboratory; the new Oak Ridge National Laboratory contract includes a provision for an oversight panel. Weapons laboratories have similar panels reporting to the University of California. Plans are being developed to ensure that these groups can and will effectively perform the required oversight functions.

FUTURE DIRECTIONS

Agencies that have not yet established oversight mechanisms need to continue movement in this direction. There are a number of successful models that can be emulated.

COMPETITIVE PEER REVIEW FOR FUNDING LABORATORY BASIC RESEARCH

Recommendation 4-2: Federal agencies should rely to a greater extent on the competitive peer review process for funding basic research at their laboratories.

PROGRESS SUMMARY

Some form of peer review takes place at most laboratories. Additional actions are under way in several agencies to respond to this recommendation.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- The Department of Energy's proposal preparation and approval process within the laboratories has many features comparable to traditional peer review, including extensive review by advisory committees to the laboratories. In addition, DOE has established a working group to propose guidance on how best to accomplish competitive peer review of basic research performed by the laboratories and by universities. The Laboratory Management Council will review the proposed actions and recommend any necessary changes in Departmental policy.

FUTURE DIRECTIONS

The concept of peer review is becoming more widely accepted as a form of competition and quality control. Agencies that have long-established peer review systems must re-examine them periodically to ensure that they are functioning effectively.

**APPOINTMENT AND
EVALUATION OF
LABORATORY
DIRECTORS**

Recommendation 4-3: The laboratory director must be held accountable for the quality, relevance, and productivity of the laboratory. Appointment of the director should be for a finite term, with the option of extending or abbreviating the term depending on the performance of the director and the laboratory.

PROGRESS SUMMARY

Most of the agencies have government-operated laboratories whose directors are members of the Senior Executive Service (SES). The military directors of the Department of Defense laboratories have 3-year terms. The agencies feel that the SES system provides them with sufficient flexibility. DOE, which principally utilizes GOCO laboratories, has taken action in this area.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- A DOE Order on uniform laboratory appraisal, issued in October 1983, requires annual results-oriented appraisals at all the major multiprogram laboratories, including laboratory director accountability.
- At the National Institutes of Health, a new proposed pay and personnel system recommends renewable terms for laboratory and branch chiefs (5-year terms; after age 70, 1-year terms). One of the institutes has already implemented a policy of appointing new laboratory/branch chiefs to 7-year terms.

FUTURE DIRECTIONS

Even where laboratory directors are in the Senior Executive Service and subject to annual performance appraisals, agencies are beginning to recognize the advantages of having fixed-term appointments. Such appointments establish a planning and performance framework that benefits both the laboratory director and parent agency. Indications are that further progress in the spirit of this recommendation will be made.

**REPORTING TO
CONGRESS**

Recommendation 4-4: The above recommendations apply to all Federal agencies. The management of the Department of Energy presents an additional special problem, and the Panel recommends that the Administration and Congress work together to stabilize and strengthen DOE management and to define and affirm its mission. Congress should also refocus its oversight of DOE R&D into a significantly smaller number of committees.

PROGRESS SUMMARY

Compared to other departments, DOE has undergone the most changes in missions in the past 5 years, evolving from the Atomic Energy Commission to the Energy Research and Development Administration/Federal Energy Ad-

ministration to DOE. Recent reductions in near-term renewable energy, and demonstration and commercialization activities, coupled with the Secretary of Energy's statement on Federal and DOE laboratories' roles, have put the Department in the best position to date to communicate and affirm DOE missions and to participate in discussions with Congress regarding simplifying or refocusing legislative oversight of the Department's research and development.

5. INTERACTION WITH UNIVERSITIES, INDUSTRY, AND USERS OF RESEARCH RESULTS

ACCESS TO FEDERAL LABORATORIES

Recommendation 5-1: Federal laboratories should encourage much more access to their facilities by universities and industry.

PROGRESS SUMMARY

Implementation has been strong and widespread. Some Federal laboratories have a long tradition of providing access to their facilities and have already compiled an outstanding record of achievement. Many others are displaying a renewed commitment to this goal and are making good progress toward attaining their individual objectives. A primary reason for this progress is the fact that provision of access to facilities lies almost entirely within the jurisdiction and the means of the laboratories themselves.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- *New construction of joint facilities.* The Department of Commerce's National Bureau of Standards has teamed with the University of Maryland and the Montgomery County Government to form the Center for Advanced Research in Biotechnology. Scientists from academia, industry, and government will conduct joint research in this laboratory to be built by Montgomery County on land donated by a private foundation. The Department of Agriculture's Beltsville Agricultural Research Center will also participate in research at the Center.
- *Support to education.* The Department of Defense (DOD)-sponsored High School Science and Engineering Apprenticeship program has, over the past 4 years, given more than 2,000 young people the opportunity for summer research in DOD laboratories or with university researchers under contract to DOD. Summer research programs in DOD laboratories support approximately 50 graduate students and 300 university faculty members each year. In 1984, DOD will test a new program to give summer research experiences to high school teachers of science and mathematics.
- *Facilities directory.* A "User's Guide to Department of Energy (DOE) Facilities" was published in January 1984 to provide information about unique laboratory facilities and equipment available to industry and universities for conducting their own research on-site at the laboratories using equipment available only at DOE laboratories. In addition, about 5,000 students and university faculty will participate in DOE-sponsored research and training programs at the laboratories in 1984.
- *Facilities for advanced training.* In collaboration with The Johns Hopkins University, the Foundation for Advanced Education in the Sciences at the National Institutes of Health supports a program that permits Ph.D.

students enrolled at Johns Hopkins to carry out advanced thesis research under NIH supervision.

- *Interaction with universities.* The Department of the Interior maintains strong, two-way ties with universities through the U.S. Geological Survey (USGS) and the Bureau of Mines (BOM). USGS graduate internships are awarded to some 30 research students yearly, and over 50 USGS scientists serve as adjunct professors at universities around the country. Most BOM laboratories are located close to university campuses; cooperative agreements are in effect with seven universities for fellowships or for the sharing of facilities. Plans are now under way for a USGS lecture program at historically Black colleges and universities. In the Department of Commerce, the National Oceanic and Atmospheric Administration's (NOAA's) Environmental Research Laboratories and Fisheries Centers are located on or near campuses of major universities. Long-term agreements in the form of cooperative institutes have been established between NOAA and several of these universities.
- *Space Shuttle launches as forum for education.* The National Aeronautics and Space Administration (NASA) has supported five conferences for "Distinguished Educators" at Shuttle launches, each targeted at specific segments of the educational community offering high-impact opportunities. These include women and minorities, science and technology, elementary education, and physics training. The conferences provide curriculum supplements and skills development for elementary and secondary school teachers and university faculty.
- *Visiting scientist programs.* In addition to on-going activities aimed at encouraging university and industry access to their facilities, the Environmental Protection Agency (EPA) recently implemented a new "Senior Visiting Scientists" program. This program is designed to bring some of the leading names in environmental science from universities and other institutions into EPA laboratories to conduct research. These scientists will help promote those areas of environmental science that are most significant to the Agency, and the program will help build closer working relationships between EPA laboratories and leading environmental scientists. At the Department of Commerce, a substantial number of leading senior scientists are also brought into NOAA's research activities.

FUTURE DIRECTIONS

While there is much ongoing activity and a heightened awareness of the need for more access to Federal laboratory facilities by universities and industry, more can be done. Specific recommendations for further action within overall agency manpower ceilings and budgetary constraints are:

- Seek ways to expand current programs that provide students and faculty with opportunities to work in Federal laboratories, particularly cooperative job programs and summer jobs for high school and college students;
- Expand current programs aimed at increasing interchanges among university and laboratory personnel, especially those that bring career laboratory staff to university and other educational environments; and

- Consider legislative action to permit continuity of pension plans for scientists and engineers who move between Federal laboratories and universities.

R&D INTERACTIONS

Recommendation 5-2: R&D interactions between Federal laboratories and industry should be greatly increased by more exchange of knowledge and personnel, collaborative projects, and industry funding of laboratory work, provided an oversight mechanism is established to prevent unfair competitive practices.

PROGRESS SUMMARY

Many instances of technology transfer from Federal laboratories to industry already exist, and some of them are crucial components of national technology, contributing positively to our international balance of payments. On the other hand, more can and should be done in this area. Progress toward promoting more R&D interaction with industry has been less apparent and more uneven than in the case of providing greater access to laboratory facilities. However, implementation of Recommendation 5-2 has been impeded by substantive legal and policy issues lying outside laboratory jurisdiction and control, such as government patent policy and the details of enabling legislation. Many such issues are now being addressed by the Department of Commerce, which has lead responsibility for implementation of the Stevenson-Wydler Technology Innovation Act of 1980. Additional helpful proposals have been prepared by the Department of Energy in response to the 1982 study of DOE multiprogram laboratories by the Energy Research Advisory Board. These two developments, together with the influence of the Packard Report, have produced a renewed commitment by Federal laboratories to help increase our industrial competitiveness.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- *Private sector utilization of DOD-developed equipment.* In May 1984, the Assistant Secretary of the Army for Research, Development and Acquisition signed landmark licensing agreements with two industrial corporations to manufacture products developed by in-house research programs at the U.S. Army Construction Engineering Research Laboratory. The two products, a ceramic anode used in corrosion protection and a weld quality monitor, are not military-unique hardware but have wide application in the construction field. The licensing agreement provides for commercialization of the products, with royalties paid to the Government for sales to the private sector.
- *Improving technology transfer mechanisms.* One of the more effective technology transfer mechanisms is the use of person-to-person interactions. In this way, the knowledge of scientists, engineers, and inventors about products and processes is directly coupled to individuals in other sectors of the economy whose skills and interest lie in the development of those products and processes for the marketplace. Involvement by labo-

ratory staff members is not only a means of implementing this principle, but it can also contribute to professional development of the individuals involved. The Department of Energy has informed the directors of its multiprogram laboratories that the Department's policy is to encourage technology transfer, consulting arrangements between laboratory employees and the private sector, and improved relations with industry. To facilitate these efforts, DOE has issued a class patent waiver policy for inventions arising from reimbursable work for others and for work at DOE user facilities.

- *Speeding delivery of research discoveries to users.* The Department of Agriculture is implementing a new plan for technology transfer that involves a newly appointed national technology transfer coordinator and a nationwide computer network. The network will transmit current research information from Federally sponsored researchers to computer terminals at land-grant universities and other users in all 50 states.
- *Expanding interaction with industry.* The National Bureau of Standards plans to double (to about 200) the number of industrial research associates working in its laboratories. Additional collaborations with industry include automated manufacturing, electronics, computer standards, and several projects in materials science. A proposal to upgrade the research reactor includes dedicating one-third of the new ports to industrial use. The Bureau received approval from the Department of Commerce in May 1984 to allow use of selected facilities by the private sector for proprietary research.
- *Sharing of health-care technology with industry.* The National Institutes of Health have formed a Committee on Joint NIH-Private Sector Endeavors to promote collaboration with commercial organizations and speed two-way technology transfer. Through July 1983, some 54 non-exclusive licenses and an additional 10 exclusive licenses were granted to industry for patented inventions made in NIH laboratories. Conversely, a recent agreement between the National Cancer Institute and an industrial biotechnology firm will permit NCI to explore industrially developed technology in Federal cancer research programs.
- *Federal technology for pollution control.* The Environmental Protection Agency has established collaborative programs with industry as a major component of the EPA research program to develop pollution-control systems. The products produced by this government-industry partnership include fabric filters, limestone injection scrubbers, sequencing batch reactors, mobile waste treatment facilities, and hazardous-waste disposal techniques.
- *Increasing the availability of data to industry and the public.* NOAA's Space Environment Research Laboratory has recently initiated a contract with a private company to provide real-time solar data and forecasts to the public over WEST STAR 4 satellites. Doppler radar and lightning information gathered by the National Severe Storms Laboratory is being sent in real time via the National Weather Service to local broadcasters.
- *Development and application of carbon-fiber composite materials to replace aluminum in aircraft.* NASA laboratories were instrumental in

developing carbon-fiber composite materials, offering direction-tailored strength equal to that of aluminum at less weight, for flight-critical components of commercial aircraft designs. Three major aerospace firms participate with the NASA laboratories in continuing refinements of this technology and will validate its use for very large wing-box and fuselage structures this year. Several general-aviation aircraft incorporating this technology should attain Federal Aviation Administration flight worthiness certification in 1985.

FUTURE DIRECTIONS

The varied origins and missions of the laboratories have resulted in different degrees of involvement with industry. In some cases, close collaboration with industry has always been part of day-to-day operations. In others, it is a fairly new concept, and some deep-seated institutional attitudes need to be modified. Further actions that need to be taken, for example, are:

- Where it is not stated explicitly, incorporate contribution to U.S. industrial competitiveness as a laboratory mission;
- Formalize the authority of laboratories to enter into cooperative research projects with industry, universities, and non-profit organizations;
- Extend the authority of government-operated laboratories to grant patent rights to private sector organizations in order to encourage external cooperation in Federal laboratory research;
- Establish guidelines for Federal laboratories concerning technology transfer to foreign organizations; and
- Maintain focus on R&D appropriate for Federal support so as to not overtake the role of the private sector in pursuing commercial opportunities created by Federally sponsored research.

FEDERAL PROCUREMENT PROCEDURES

Recommendation 5-3: Contracting by agencies and laboratories for universities and industry to conduct R&D should be encouraged by simplifying the necessary Federal procurement procedures. The procurement process should give laboratory directors greater flexibility in contracting.

PROGRESS SUMMARY

Only limited progress has been made by individual laboratories in implementing this recommendation, since revision of Federal procurement procedures lies almost completely beyond the control of the laboratories themselves and largely beyond the control of entire agencies. The time required to award a contract for basic research continues to increase in most agencies. The remedial action required is government-wide in scope, and enormously complex. Fortunately, there is promise of improvement in response to recommendations of a November 1983 report of the National Academy of Public Administration (*Revitalizing Federal Management: Managers and Their Overburdened Systems*, Chapter 4). These recommenda-

tions are widely supported by Federal procurement executives and appear to offer the best available approach to continued, systematic progress in this area.

Achieving a procurement policy that is both equitable and efficient requires a balance between measures to ensure adequate competition and procedures that allow timely and flexible action by laboratory managers. Recent actions by both the Executive and Legislative branches have expanded measures to ensure increased competition for Federal contract awards, particularly through restrictions on accepting unsolicited proposals and discouraging sole source contracts. However, these actions may also reduce the flexibility and timeliness of contracting for basic research with universities and industry.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- *Simplifying procedures for contracting with universities.* The Department of Energy has established a working group to recommend ways to simplify contracting procedures for university research. As part of this process, DOE is converting many university awards from contracts to grants. Also, emphasis has been placed on consistent interpretation of DOE university procurement regulations and procedures by all field elements.

FUTURE DIRECTIONS

Difficulties with the Federal procurement process are not going to be overcome in a short time. Progress in this area requires continuing and relentless effort on the part of both the government and the private sector.

The peer-review system, long used by the scientific research community to ensure the relevance and worth of unsolicited research proposals, is a form of competition, albeit one operating very differently from the price competition appropriate to military hardware acquisitions. This fact needs to be more widely understood and supported within the government.

Some specific actions that need to be taken by the Federal Government are:

- Continue support of the recommendations contained in Chapter 4 of the 1983 report, *Revitalizing Federal Management: Managers and Their Overburdened Systems*, which are aimed at a systematic reduction in the complexity of Federal procurement regulations;
- Ensure that legislation and executive orders designed to increase competition for Federal contract awards do not hinder the procurement of unique and innovative basic research, particularly through rapid response to unsolicited proposals;
- Recognize the peer review system as a form of selection appropriate to the procurement of basic scientific research, and hence satisfying the concern for competition in procurement now prevalent within government; and

**SUPPORT TO
MILITARY OPERATING
FORCES**

- Establish the following objectives for all agencies in funding basic research:
 - (1) Encourage concise proposals (usually under 15 pages) depending on the complexity and size of the project;
 - (2) Safeguard the technical proposal as property of the proposer; and
 - (3) Make award or reject within 6 months of proposal receipt.

Recommendation 5-4: Support to the military operating forces should be an important criterion among others for measuring performance at the DOD laboratories.

PROGRESS SUMMARY

Each of the Armed Services has means for both formal and informal communication between the DOD laboratories and the operating forces. The more formal procedures ensure that operational needs are incorporated into laboratory plans through the budgetary process and are prioritized within available resources. The less formal procedures apply laboratory capabilities to meet the urgent technical needs of the operating forces.

A task force formed by the Office of the Secretary of Defense is considering new approaches to provide closer coupling of the Service laboratories with the operating forces. The task force has identified a number of Service programs wherein the laboratories provide support to the operating forces.

SELECTED HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

- The Army Materiel and Readiness Command (DARCOM) has a number of programs to identify requirements for R&D support of the operating commands. Teams of DARCOM scientists regularly conduct fact-finding missions to field units for the purpose of identifying problems in the operational use of communications equipment that require R&D solutions. DARCOM maintains 19 detachments of on-site liaison representatives at Army training centers and schools to identify problems requiring R&D support. These needs are communicated directly to the appropriate DARCOM laboratories.
- The Naval Material Command co-locates approximately 30 scientists and engineers on a rotating basis with their operational commands under the Navy Science Assistance Program. The rotational assignments provide the scientists and engineers with operational experience and improve communications with the laboratories in operational problems.
- The Air Force has a variety of procedures for identifying the R&D needs of the operating commands. Formal documents to identify logistics needs, research needs, and R&D objectives are developed through cooperation among Air Force Logistics Command, Air Force Systems Command, and the operational commands. The Strategic Air Command hosts an annual, week-long conference with laboratory participants to identify R&D

objectives and to foster informal cooperation. The Tactical Air Command has a point of contact for each development program element and is consulted for comments on relevant exploratory and advanced development programs. The Chief Scientist of the Air Force has initiated a program whereby the Chief Scientists of Air Force organizations meet semi-annually at locations of the operating forces. The goal of these meetings is to enhance interactions between the operating forces and the Air Force R&D community.

FUTURE DIRECTIONS

The DOD plans to form external advisory groups for its laboratories under the aegis of the Services' Scientific Advisory Boards. These external advisory groups will be asked to include support of operating forces among the important criteria against which they measure the performance of the DOD laboratories.

APPENDIX A

THE WHITE HOUSE

WASHINGTON

August 5, 1983

MEMORANDUM TO THE HEADS OF DEPARTMENTS AND AGENCIES

SUBJECT: Report of the White House Science Council
Federal Laboratory Review Panel

The White House Science Council has recently completed a review of Federal laboratories. The report of that review notes that our Federal laboratories have great potential but that they could play a far greater role in meeting national needs if certain management and operating improvements can be made.

As we enter an era of increasing dependence on our science and technology, it is essential that we make better use of our Federal laboratories. I am directing the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) to lead an interagency effort to respond to the central thrust of the report.

A report on actions taken by the agencies in this effort should be presented to me by OSTP and OMB no later than July 1, 1984. Agency heads with responsibilities for Federal laboratories are directed to work with these offices in addressing the Science Council's recommendations.

Ronald Reagan

<i>DOE</i>	Ms. Toni Joseph Director Office of Field Operations Management Department of Energy
<i>EPA</i>	Dr. Donald J. Ehreth Deputy Assistant Administrator Office of Research and Development Environmental Protection Agency
<i>OSTP</i>	Dr. James G. Ling, Chairman Assistant Director Office of Science and Technology Policy Executive Office of the President

WORKING GROUP CHAIRMEN

Ms. Toni Joseph
Director
Office of Field Operations Management
Department of Energy

Dr. Tim P. Coffey
Director of Research
Naval Research Laboratory

Dr. Robert B. Oswald
Technical Director
U.S. Army Electronics Research and Development Command

Dr. Frank B. McDonald
Chief Scientist
National Aeronautics and Space Administration