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NATIONAL LABORATORIES

David A. Shirley

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R & D IN THE FY 1983 BUDGET: IMPACTS ON
THE NATIONAL LABORATORIES

DAVID A. SHIRLEY, DIRECTOR
LAWRENCE BERKELEY LABORATORY

(PREPARED FOR THE SEVENTH ANNUAL AAAS COLLOQUIUM ON R&D
AND PUBLIC POLICY, WASHINGTON, D.C., JUNE 23-24, 1982)

THIS TALK WILL HAVE TWO MAJOR OBJECTIVES. FIRST, AS DIRECTOR OF A DEPARTMENT OF ENERGY NATIONAL LABORATORY I SHALL PRESENT A FACTUAL REPORT ON THE IMPACT UPON OUR LABORATORY OF THE POLICY CHANGES AND BUDGET ACTIONS IN DEPARTMENT OF ENERGY PROGRAMS SINCE EARLY 1981. SECOND, I SHALL OFFER SOME PERSONAL VIEWS ON MORE GENERAL PROBLEMS THAT APPEAR TO UNDERLIE THE IMMEDIATE TOPIC OF THIS YEAR'S SYMPOSIUM: NAMELY, THE INTERACTION BETWEEN THE FEDERAL GOVERNMENT, WHICH SUPPORTS RESEARCH, AND THE SCIENTIFIC COMMUNITY, WHICH PERFORMS IT.

A MAJOR SHARE OF THE RESEARCH AND DEVELOPMENT PROGRAM CONDUCTED BY THE DEPARTMENT OF ENERGY IS CARRIED OUT IN ITS NATIONAL LABORATORIES, WHICH ARE GOVERNMENT-OWNED CONTRACTOR-OPERATED (GOCO) FACILITIES. THE MULTIPROGRAM NATIONAL LABORATORIES FORM A SUBSET OF THESE. EACH LABORATORY HAS ITS OWN ROLE AND "PERSONALITY". IN

DISCUSSING THE PROSPECTS FOR THE LABORATORIES IN THE FY 1983 FEDERAL BUDGET. WE ARE THEREFORE DEALING WITH A VERY COMPLEX ISSUE. NEVERTHELESS, SOME GENERALIZATIONS CAN BE MADE.

TO START WITH AN OVERVIEW, WE CAN LOOK AT TABLE 4-4 FROM THIS YEAR'S "RESEARCH & DEVELOPMENT AAAS REPORT VII; FEDERAL BUDGET--FY 1983 IMPACT AND CHALLENGE", BY W. H. SHAPLEY, A. H. TEICH, AND J. P. WEINBERG. FROM THIS TABLE WE NOTE THAT THE 12 MULTIPROGRAM LABORATORIES SHOW AN AVERAGE DECREASE OF 20% IN THEIR BUDGETS IN CONSTANT DOLLARS FROM FY 1981 TO FY 1983. THE MAGNITUDE OF THE CUT VARIES SUBSTANTIALLY FROM LABORATORY TO LABORATORY. THIS IS A CONSEQUENCE OF THEIR BEING MULTIPROGRAM IN NATURE, AND THEREFORE BEING AFFECTED DIFFERENTLY BY THE SELECTIVE PHILOSOPHY OF FEDERAL PROGRAM SUPPORT OF R&D BY THE REAGAN ADMINISTRATION. IN GENERAL, DEFENSE PROGRAMS AND NUCLEAR ENERGY PROGRAMS ARE BEING INCREASED. THERE IS A SMALL DOLLAR INCREASE IN SUPPORT OF BASIC ENERGY RESEARCH, WITH A CONCOMITANT SMALL REDUCTION IN REAL SUPPORT. THE ENERGY TECHNOLOGY PROGRAMS (CONSERVATION, SOLAR, GEOTHERMAL, FOSSIL ENERGY, AND ENERGY STORAGE) ARE EXPERIENCING SUBSTANTIAL BUDGET CUTS.

THESE CHANGES OF EMPHASIS ARE OF COURSE ENTIRELY WITHIN THE PREROGATIVES OF THE ADMINISTRATION, AS PART OF THE POLITICAL PROCESS. IT IS VERY UNUSUAL FOR THE R AND D PROGRAMS AT MULTIPROGRAM LABORATORIES TO BE SO CLOSE TO THE POLITICAL FIRING LINE AS TO WREAK SUCH HARDSHIP ON THE LABORATORIES, BUT THE

TRANSITION FROM THE CARTER TO THE REAGAN ADMINISTRATION WAS UNIQUE IN MANY RESPECTS. IF THESE BUDGET FIGURES WERE THE FINAL VALUES, THE EFFECT ON THE LABORATORIES WOULD BE PAINFUL BUT DEFINITIVE. THE LABORATORIES EXIST TO CONDUCT R AND D TO FILL NATIONAL NEEDS. THEY WOULD ADJUST TO CARRY OUT THEIR NEWLY-DEFINED MISSIONS.

NO DISCUSSION OF THE FY 1983 BUDGET WOULD BE COMPLETE, HOWEVER, WITHOUT NOTING THAT THE FIGURES GIVEN ABOVE WOULD FOLLOW FROM THE BUDGET PROPOSED BY THE ADMINISTRATION. THE CONGRESS HAS A SOMEWHAT DIFFERENT PERSPECTIVE, PARTICULARLY ON THE ENERGY TECHNOLOGY PROGRAMS, AND THEY ARE PRONE TO AUGMENT THE BUDGET SUBSTANTIALLY IN THESE AREAS, ALBEIT NOT TO ANYWHERE NEAR THE LEVELS OF FY 1981 AND BEFORE. A MAJOR PROBLEM FACED BY THE LABORATORIES IN LATE JUNE IS THE LACK OF ANY REALLY ACCURATE PROJECTION OF THE SIZE AND DISTRIBUTION AMONG PROGRAMS OF THEIR ACTUAL BUDGETS FOR FY 1983, WHICH STARTS OCTOBER 1. BECAUSE THE SIZE AND COMPOSITION OF THE WORK FORCE WHICH WILL BE REQUIRED TO CARRY OUT THE DOE PROGRAMS IN FY 1983 IS STILL UNKNOWN, THE LABORATORIES ARE UNABLE TO PLAN OR ACT REALLY EFFECTIVELY. THIS UNCERTAINTY WAS THE SUBJECT OF A RECENT HEARING OF THE HOUSE SCIENCE AND TECHNOLOGY COMMITTEE ON JUNE 2, 1982. REPRESENTATIVES OF THE FOUR MULTIPROGRAM NATIONAL LABORATORIES, INCLUDING OURS, TESTIFIED AS TO THE MAGNITUDE OF REDUCTION IN FORCE ON LABORATORY EMPLOYEES THAT WAS REQUIRED ON THE BASIS OF THE ADMINISTRATION BUDGET AND ON THE CONTINUING RESOLUTION. INASMUCH AS THESE FIGURES ARE PART OF THE PUBLIC

RECORD, I HAVE SET THEM OUT IN TABLE 1. BECAUSE OF THE FLUIDITY OF THE BUDGET SITUATION, THESE FIGURES HAVE ONLY TRANSIENT VALUE. THE REAL SITUATION IS WORSE THAN THE NUMBERS ALONE WOULD IMPLY BECAUSE DIFFERENT EMPLOYEES WOULD BE AFFECTED BY THE TWO OUTCOMES, REFLECTING THE ADMINISTRATION-CONGRESSIONAL SCHISM IN DOE PROGRAMS.

TABLE 1. REDUCTIONS IN FORCE AT FOUR MULTIPROGRAM
NATIONAL LABORATORIES REQUIRED BY FY 1983 DOE BUDGET¹

LABORATORY	PRESIDENT'S BUDGET CASE	CONTINUING RESOLUTION CASE
BROOKHAVEN	250	450
LAWRENCE BERKELEY	500	200
LOS ALAMOS	370	500
OAK RIDGE	400*	200

* "MOST LIKELY" CASE, NOT PRESIDENT'S BUDGET CASE.

1. SOURCE: HOUSE SCIENCE AND TECHNOLOGY COMMITTEE HEARING, JUNE 2, 1982.

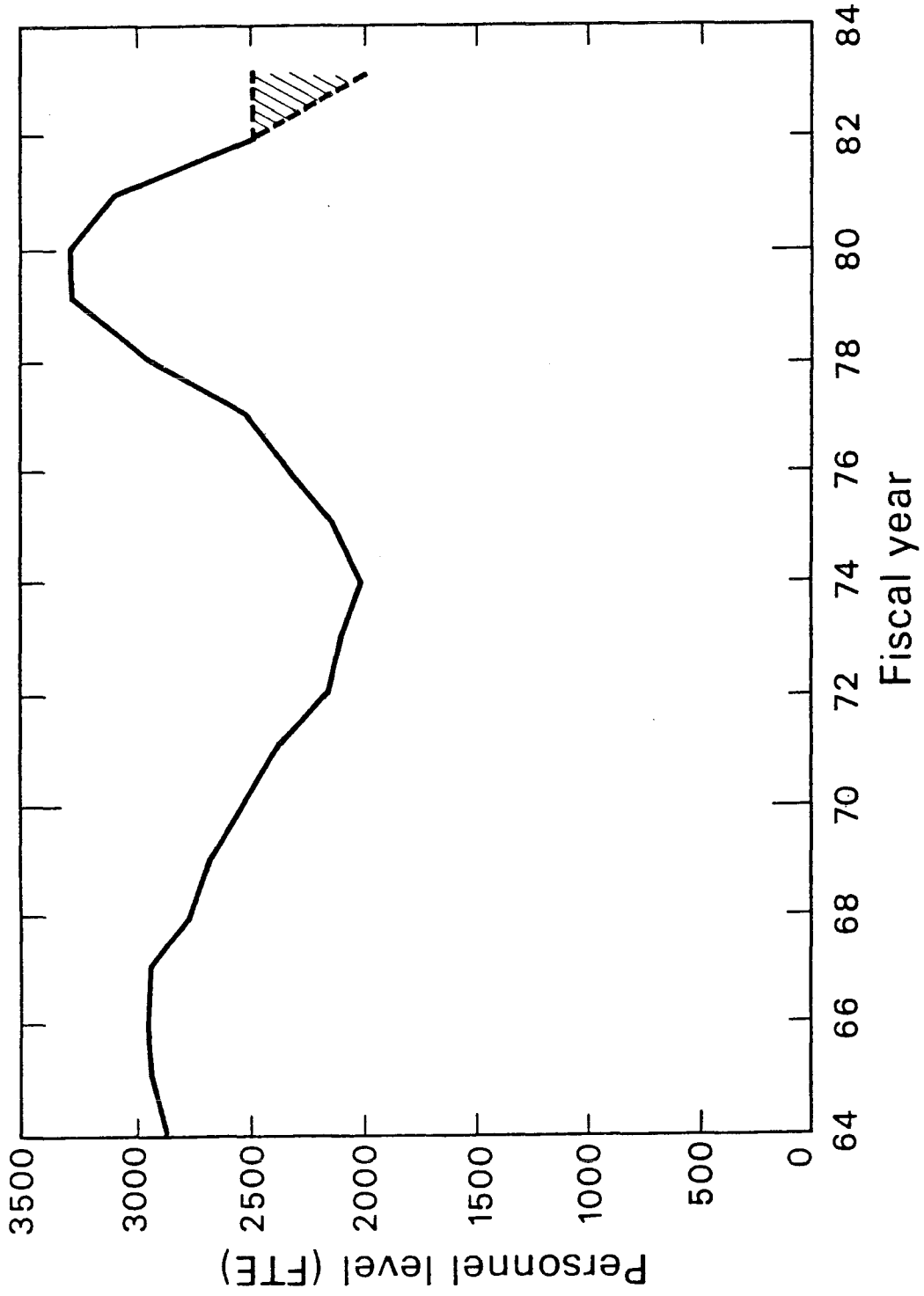
THE ABOVE COMMENTS APPLY TO MULTIPROGRAM LABORATORIES GENERALLY. WE CONCLUDE THAT THE LABORATORIES ARE HETEROGENEOUS, THAT THEIR R&D PROGRAMS ARE BEING REDUCED SUBSTANTIALLY ON THE AVERAGE, AND THAT WE ARE IN A PERIOD OF TREMENDOUS BUDGET UNCERTAINTY. I'D LIKE NOW TO FOCUS ON ONE PARTICULAR LABORATORY -- THE LAWRENCE BERKELEY LABORATORY.

LAWRENCE BERKELEY LABORATORY IS A MULTIPROGRAM NATIONAL LABORATORY SITUATED IN THE BERKELEY HILLS CONTIGUOUS TO THE CAMPUS OF THE UNIVERSITY OF CALIFORNIA, BERKELEY. IT IS UNIQUE AMONG THE NATIONAL LABORATORIES IN THAT APPROXIMATELY HALF OF ITS SENIOR SCIENTIFIC STAFF ARE FACULTY OF UC BERKELEY. WITH 600 RESIDENT GRADUATE STUDENTS, LAWRENCE BERKELEY LABORATORY IS THE LARGEST SINGLE PROVIDER OF SCIENTIFIC AND TECHNICAL PH.D. TALENT TRAINED IN ENERGY RESEARCH PROGRAMS. THE FELICITOUS COMBINATION OF INTELLECTUAL STIMULATION AND RENEWAL PROVIDED BY THE BERKELEY CAMPUS TOGETHER WITH THE CAPABILITY TO UNDERTAKE MAJOR INTERDISCIPLINARY RESEARCH PROJECTS HAS ALLOWED LAWRENCE BERKELEY LABORATORY TO ACHIEVE A UNIQUELY DISTINGUISHED RESEARCH RECORD OVER THE YEARS. AMONG ITS MAJOR ACTIVITIES ARE HIGH ENERGY PHYSICS, NUCLEAR PHYSICS, NUCLEAR MEDICINE, MATERIALS SCIENCE, CHEMISTRY, ENERGY EFFICIENT BUILDING RESEARCH, AND NUCLEAR WASTE ISOLATION RESEARCH.

FIGURE 1 SHOWS THE MANPOWER LEVELS AT LAWRENCE BERKELEY

LABORATORY OVER THE LAST TWO DECADES. THE DYNAMIC RANGE OF 1000 COMPARED TO A MEAN VALUE OF 2500 IS TOO LARGE FOR SUPPORTING A STABLE RESEARCH PROGRAM WITH MAXIMUM EFFICIENCY, NOT TO MENTION BEING INCONSISTENT WITH THE CAREER PATTERNS OF SCIENTISTS. THE DECREASE FROM 1968 TO 1973 WAS PART OF A GENERAL DECLINE IN SUPPORT OF AMERICAN SCIENCE, AND SIMILAR DECLINES ARE DOCUMENTED IN THE HISTORIES OF OTHER NATIONAL LABORATORIES. THE RELATIVELY RAPID INCREASE IN THE LATE 1970'S FOLLOWING THE OIL EMBARGO IS ILLUSTRATIVE OF THE ABILITY OF NATIONAL LABORATORIES TO RESPOND TO NATIONAL EMERGENCIES. THIS RAPID GROWTH WAS CARRIED OUT AT GREAT COST TO THE LABORATORY, AND UNDER GREAT PRESSURE FROM THE DEPARTMENT OF ENERGY. IN THE SUMMER OF 1980, DURING THE FINAL MONTHS OF THE CARTER ADMINISTRATION, IT WAS ALREADY CLEAR THAT AMERICAN SCIENCE WAS HEADED FOR ANOTHER AUSTERITY PERIOD. ON MARCH 10, 1981, THE REAGAN ADMINISTRATION SUBMITTED ITS FIRST FY 1982 BUDGET. THIS BUDGET EXPRESSED VERY CLEARLY A NEW PHILOSOPHY IN THE NEW ADMINISTRATION. DEFENSE RESEARCH WAS TO BE STRONGLY SUPPORTED, AS WAS RESEARCH IN NUCLEAR ENERGY. OTHER BASIC RESEARCH WOULD BE SUPPORTED AT APPROXIMATELY A CONSTANT DOLLAR LEVEL. EXCISED OR REDUCED IN THE NEW BUDGET WERE ACTIVITIES IN OTHER ENERGY TECHNOLOGIES, PARTICULARLY THOSE INVOLVING DEVELOPMENT AND DEMONSTRATION WHICH WERE FELT TO BE THE PREROGATIVES OF THE PRIVATE SECTOR. THE INSTRUCTIONS WERE CLEAR, AND THE LABORATORIES HAD NEARLY SIX MONTHS TO CONSOLIDATE IN PREPARATION FOR FY 1982. AT LAWRENCE BERKELEY LABORATORY THIS ENTAILED A REDUCTION IN FORCE OF

FIGURE 1. PERSONNEL LEVELS AT
LAWRENCE BERKELEY LABORATORY, 1964 - 1983.



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APPROXIMATELY 300 PEOPLE, OR 10% OF OUR WORK FORCE. AN ADJUSTMENT OF THIS MAGNITUDE IS WITHIN THE DYNAMIC RANGE OF A NATIONAL LABORATORY, AND THE CHANGES WERE CARRIED OUT SMOOTHLY.

ON SEPTEMBER 24, 1981, A REVISED ADMINISTRATION BUDGET WAS ISSUED IN WHICH 12% CUTS WERE ALLOCATED TO MOST DOMESTIC PROGRAMS. OF COURSE, A SUDDEN CUT OF THIS MAGNITUDE SENT SHOCK WAVES THROUGH THE DOMESTIC PROGRAMS, INCLUDING THE SCIENTIFIC COMMUNITY. BECAUSE THE CUT WAS ANNOUNCED IMMEDIATELY BEFORE THE BEGINNING OF THE FISCAL YEAR, LONG AFTER MOST PLANNING AND COMMITMENTS FOR SCIENTIFIC PROGRAMS HAD ALREADY BEEN IRREVERSIBLY MADE, THE PROPOSED 12% REDUCTION HAD A VERY DISRUPTIVE EFFECT INDEED. IN THE FINAL ANALYSIS, THE 12% CUT WAS ACTUALLY AMELIORATED BY APPROXIMATELY A FACTOR OF 2 THROUGH REDISTRIBUTION OF CUTS WITHIN DOMESTIC PROGRAMS AND THROUGH CONGRESSIONAL ACTION, WITH SOME AGENCIES BEING TREATED QUITE DIFFERENTLY FROM OTHERS. THE SHORT TERM EFFECT WAS MOST SEVERE AT THE NATIONAL LABORATORIES, WHERE MANAGEMENT WAS FACED WITH THE CHOICE OF PARING ITS WORK FORCE BY A SUBSTANTIAL AMOUNT IMMEDIATELY, OR OF TAKING A CHANCE AND WAITING, WITH A POSSIBLE CONSEQUENCE OF THEN HAVING TO PARE ITS WORK FORCE TO A MUCH GREATER EXTENT BECAUSE OF HAVING WAITED. AMONG THE NATIONAL LABORATORIES, LAWRENCE BERKELEY LABORATORY WAS MOST SEVERELY IMPACTED. WE WERE FORCED TO REDUCE OUR STAFF BY ANOTHER 300 EMPLOYEES, BRINGING THE TOTAL REDUCTION TO 600 OR APPROXIMATELY 19% OF OUR INITIAL WORK FORCE. IT IS IMPORTANT TO NOTE THAT THIS REDUCTION AT LAWRENCE BERKELEY

LABORATORY WAS NOT THE RESULT OF A PEER REVIEW PROCESS OR, INDEED, OF ANY RATIONAL PROCESS. IT WAS SIMPLY THE CONSEQUENCE OF THE PARTICULAR DISTRIBUTION OF DOE PROGRAMS WHICH THE LABORATORY WAS CONDUCTING. ABOUT 70% OF THESE PROGRAMS WERE IN THE BASIC RESEARCH AREA, AND APPROXIMATELY 30% WERE IN THE AREAS OF ENERGY TECHNOLOGY. THE FORMER WAS REDUCED SLIGHTLY, AND THE LATTER REDUCED SEVERELY. THESE SAME PROGRAMS SUFFERED SIMILAR FATES IN OTHER LABORATORIES, BUT IN MOST OTHER LABORATORIES THE TOTAL IMPACT ON THE LABORATORY WAS AMELIORATED BY THE PRESENCE OF PROGRAMS IN WEAPONS RESEARCH OR NUCLEAR ENERGY.

IT MAY BE USEFUL TO POINT OUT AT THIS JUNCTURE THAT THE NATIONAL LABORATORIES SERVE AS SOMETHING OF A BELLWETHER FOR DOMESTIC SCIENTIFIC PROGRAMS BECAUSE OF THEIR INSTITUTIONAL STRUCTURE. THUS, WHILE IT WAS NECESSARY FOR LAWRENCE BERKELEY LABORATORY TO RESPOND TO THE PROPOSED 12% CUTS WITHIN APPROXIMATELY 6 DAYS, REDUCING ITS WORK FORCE AND SCIENTIFIC PROGRAMS IMMEDIATELY, IN OTHER INSTITUTIONS SUPPORTED BY GRANTS AND CONTRACTS FROM OTHER AGENCIES THE IMPACT WILL BE FELT OVER THE NEXT TWO OR THREE YEARS AS GRANTS COME UP FOR RENEWAL. BECAUSE IT IS THE NATURE OF FEDERAL PROGRAMS TO BUILD EACH YEAR ON THE BASE OF THE PREVIOUS YEAR, THE LONG TERM EFFECT OF THE SEPTEMBER, 1981, REDUCTION IS UNMISTAKABLE: IT IS A DOWNWARD RENORMALIZATION OF THE TOTAL FEDERALLY SUPPORTED NONDEFENSE R&D EFFORT IN THIS COUNTRY.

NOW WE ARE EXPERIENCING THE THIRD WAVE OF PROPOSED PROGRAM REDUCTIONS SINCE MARCH, 1981. IN A SENSE THIS ONE IS THE MOST DISRUPTIVE OF ALL. IN THE FIRST CUTS, IN MARCH, 1981, IT WAS QUITE CLEAR WHAT THE LABORATORIES HAD TO DO. THE NEW ADMINISTRATION HAD EXPRESSED ITS PHILOSOPHY AND SELECTIVE REDUCTIONS WERE NECESSARY. THE SECOND CUTS, IN SEPTEMBER, 1981, WERE QUITE UNSELECTIVE AND OF SOMEWHAT UNCERTAIN MAGNITUDE, BUT AGAIN IT WAS CLEAR THAT ACROSS-THE-BOARD CUTS HAD TO BE MADE. AS WE NOW LOOK AHEAD TO THE FY 1983 BUDGET, WE SEE UNPRECEDENTED UNCERTAINTY. WE KNOW THAT SUBSTANTIAL CUTS WILL BE NECESSARY, BUT WE DO NOT KNOW THEIR MAGNITUDE, NOR DO WE AS YET KNOW IN WHAT AREAS THE CUTS WILL BE NECESSARY BECAUSE OF THE SUBSTANTIAL DIFFERENCE IN ADMINISTRATION AND CONGRESSIONAL INTENTIONS. ANOTHER 20% REDUCTION IN FORCE WOULD BE REQUIRED AT OUR LABORATORY TO FIT THE ADMINISTRATION BUDGET. AT THE OTHER EXTREME, A CONTINUING RESOLUTION (WHICH AT THIS TIME IS REGARDED AS RATHER LIKELY) WOULD IMPLY A MUCH SMALLER REDUCTION IN STAFF, IN SOMEWHAT DIFFERENT AREAS, AND ONE WHICH COULD BE DEALT WITH IN LARGE MEASURE BY ATTRITION.

LET ME NOW BRIEFLY COMMENT ON SOME MORE GENERAL ISSUES THAT FALL WITHIN THE PURVIEW OF THIS SYMPOSIUM.

FIRST, WE MUST REACH CONCURRENCE ON THE ROLE OF OUR NATIONAL LABORATORIES. THESE LABORATORIES COMPRISE A GREAT NATIONAL ASSET,

BUT THEIR PROPER ROLE IN THE CONTEXT OF NATIONAL NEEDS OF THE 1980'S AND 1990'S HAS NOT YET BEEN CLEARLY DEFINED. FOR HISTORICAL REASONS THEY WERE CREATED UNDER THE AEGIS OF THE ATOMIC ENERGY COMMISSION AND HAVE BEEN INHERITED BY THE DEPARTMENT OF ENERGY: NEVERTHELESS, THEY ARE IN EVERY SENSE OF THE WORD OUR REAL NATIONAL LABORATORIES. IN 1982 IT SHOULD NOT BE NECESSARY TO JUSTIFY THE EXISTENCE OF SUCH RESEARCH INSTITUTIONS: THIS NECESSITY HAS BEEN PROVED REPEATEDLY DURING THE LAST 50 YEARS. TO STATE THE CASE BRIEFLY, A SOCIETY BASED ON HIGH TECHNOLOGY REQUIRES RESEARCH AND DEVELOPMENT LABORATORIES IN WHICH LARGE INTERDISCIPLINARY TEAMS OF SCIENTISTS AND ENGINEERS CAN ADDRESS PROBLEMS RELATED TO NATIONAL NEED. NEITHER UNIVERSITIES NOR INDUSTRY COULD FILL THIS ROLE SATISFACTORILY. OF COURSE, THE DETAILED MISSIONS OF NATIONAL LABORATORIES SHOULD BE REVIEWED CONTINUOUSLY AS NATIONAL NEEDS AND PRIORITIES CHANGE. IT WOULD ADD GREATLY TO THE INSTITUTIONAL HEALTH OF THE LABORATORIES, AND, MORE IMPORTANT, TO THE OVERALL HEALTH OF THE AMERICAN SCIENTIFIC RESEARCH PROGRAM, IF FUNDAMENTAL ROLES OF THE LABORATORIES COULD BE DEFINED AND AGREED UPON BY ALL SECTORS OF THE SCIENTIFIC COMMUNITY, RATHER THAN BEING REGARDED AS A "PROBLEM". THEN SCIENTISTS IN UNIVERSITIES, INDUSTRY, AND NATIONAL LABORATORIES WOULD HAVE A SECURE INSTITUTIONAL CONTEXT IN WHICH TO CONDUCT THEIR REAL WORK OF SCIENTIFIC RESEARCH AND DEVELOPMENT. I AM PLEASED TO NOTE THAT ROLE DEFINITION IS UNDERWAY THROUGH REVIEWS OF THE NATIONAL LABORATORIES BOTH BY THE ENERGY RESEARCH ADVISORY BOARD AND BY OSTP.

HAVING ACCESS TO THIS PODIUM, I WOULD BE REMISS IF I FAILED TO ADDRESS A PROBLEM OF SUCH TRANSCENDENT NATIONAL IMPORTANCE THAT IT SUBSUMES BOTH THE IMMEDIATE QUESTION OF THE FY 1983 FEDERAL R&D BUDGET AND THE ROLE DEFINITION OF NATIONAL LABORATORIES. THIS IS THE PROBLEM OF A CONTINUING PHILOSOPHICAL GAP BETWEEN THE PERFORMERS OF SCIENTIFIC RESEARCH, ESPECIALLY IN THE UNIVERSITY SECTOR, AND THOSE IN THE ADMINISTRATION AND CONGRESS WHO ALLOCATE RESOURCES FOR FEDERALLY FUNDED R&D.

LET ME DIGRESS BRIEFLY TO STATE MY CREDENTIALS FOR ADDRESSING THIS TOPIC, WHICH WOULD BE OF ONLY INDIRECT INTEREST TO MOST LABORATORY DIRECTORS. I AM BASICALLY AN ACADEMIC, A MEMBER OF THE BERKELEY FACULTY FOR OVER TWENTY YEARS, WITH A CONTINUING PERSONAL INVOLVEMENT IN RESEARCH AND GRADUATE EDUCATION. I HAVE EVEN BEEN A DEPARTMENT CHAIRMAN. AT PRESENT I SERVE ON THE ACADEMY COMMITTEE ON "GOVERNMENT-UNIVERSITY RELATIONS IN SUPPORT OF SCIENCE (GURSS)". IN ADDITION, MY LABORATORY IS EMBEDDED IN AN ACADEMIC MILIEU, AS DESCRIBED ABOVE. THUS I SPEAK FROM EXPERIENCE OF THE UNIVERSITY PERSPECTIVE.

RETURNING TO THE IMMEDIATE PROBLEM, IT IS WELL-KNOWN THAT WE AMERICANS ARE PRAGMATISTS. FEDERAL RESOURCES TEND TO BE ALLOCATED TO SOLVE NATIONAL PROBLEMS. WITNESS THAT THE FOUR LARGEST BUDGET CATEGORIES LISTED IN TABLE 1-4 OF "RESEARCH AND DEVELOPMENT AAAS REPORT VII" ARE DEFENSE, SPACE, HEALTH, AND ENERGY, WITH GENERAL

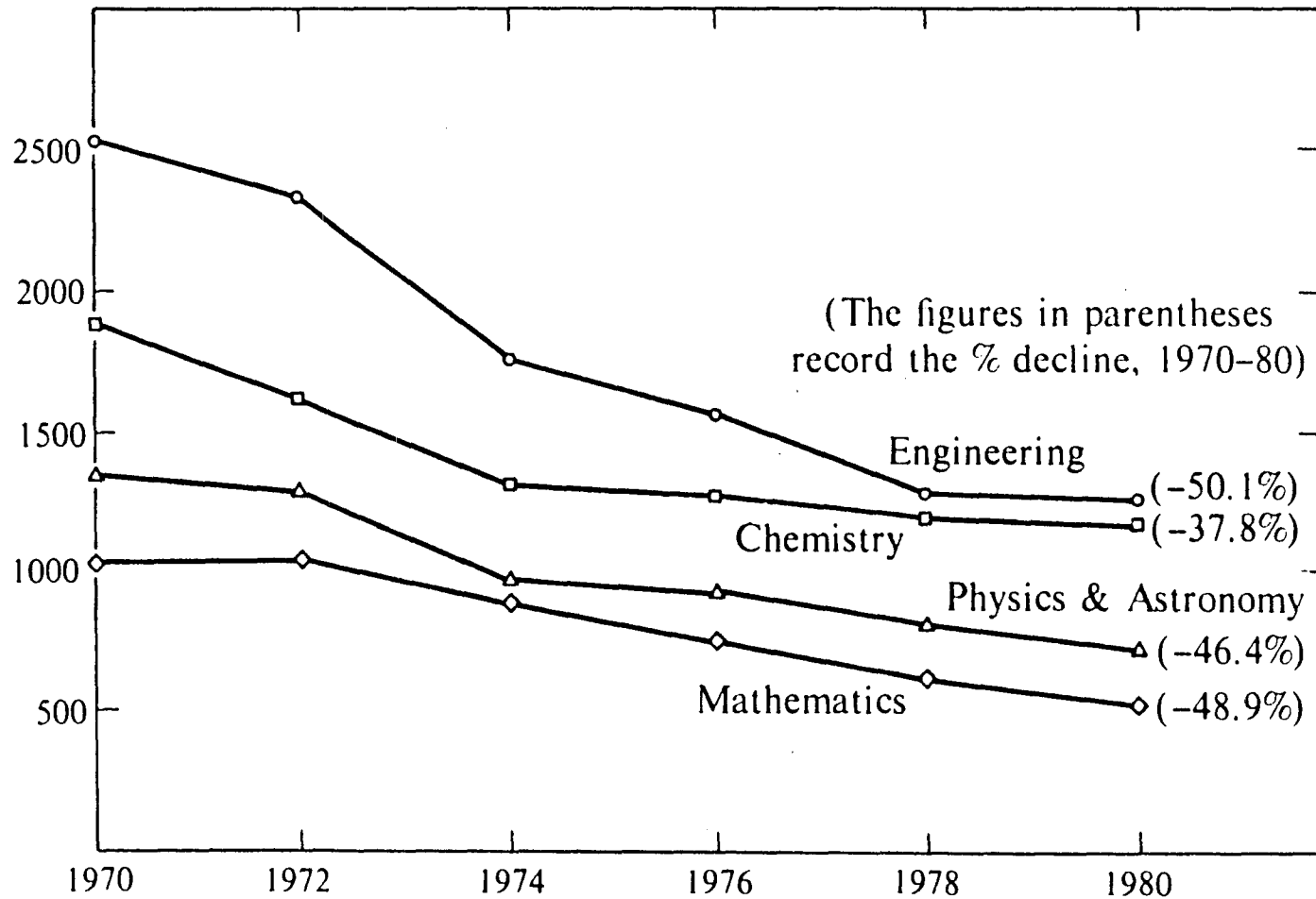
SCIENCE IN FIFTH PLACE. GIVEN THESE FACTS, IT IS SURPRISING THAT MANY UNIVERSITY REPRESENTATIVES DO NOT REFER MORE EXPLICITLY TO NATIONAL NEEDS IN THEIR REQUESTS FOR MORE FEDERAL SUPPORT. THEY TEND TO MISREAD THE POLITICAL PROCESS, IN MY OPINION, AND TO IDENTIFY THEIR SUPPORT WITH THE ENTITLEMENTS PORTION OF THE FEDERAL BUDGET. ON THE OTHER SIDE OF THE GAP THOSE IN GOVERNMENT WHO BEAR THE RESPONSIBILITY OF ALLOCATING RESOURCES TO ADDRESS NATIONAL NEEDS APPEAR SOMETIMES TO INTERPRET THAT JOB TOO NARROWLY, WITHOUT DUE CONSIDERATION OF THE INSTITUTIONAL INFRASTRUCTURE NEEDED TO DO THE R AND D WORK.

THAT THERE ARE REAL ISSUES IS EVIDENT: ON THE ONE HAND, THERE EXIST SERIOUS NATIONAL NEEDS AND NATIONAL SECURITY ISSUES WHICH SHOULD BE ADDRESSED BY THE BEST BRAINS IN THE COUNTRY. ON THE OTHER HAND, THERE ARE SERIOUS INSTITUTIONAL NEEDS RELATED TO THE LONG TERM SUPPORT AND HEALTH OF OUR UNIVERSITIES AND OTHER RESEARCH INSTITUTIONS. UNFORTUNATELY, WE HEAR VERY LITTLE DIALOGUE ON THESE REAL ISSUES. RATHER, THE INTERACTION IS TRIVIALIZED BY DISPUTES OVER SUCH ITEMS AS OMB CIRCULAR A-21 AND THE EXTENT TO WHICH INFORMATION TRANSFER MUST BE CONTROLLED IN THE INTERESTS OF NATIONAL SECURITY. THE RESULT IS THAT INSTEAD OF ROLLING UP OUR SLEEVES AND BUILDING AMERICA'S SCIENTIFIC ENTERPRISE TO DEAL WITH NATIONAL PROBLEMS TOGETHER, WE TEND TO DISSIPATE OUR ENERGIES IN BICKERING OVER PERIPHERAL ISSUES. ONE SYMPTOM OF THIS PHENOMENON IS THE OFT-QUOTED OVERSUPPLY OF LAWYERS. ANOTHER IS THE TENDENCY TO TREAT

THE SUPPORT OF SCIENTIFIC RESEARCH AS A PROCUREMENT ACTIVITY. MORE SERIOUS THAN EITHER OF THESE ARE THE INSULARITY OF SOME OF OUR MAJOR FEDERAL R&D PROGRAMS, WHICH DO NOT MAKE FULL USE OF THE BEST BRAINS AVAILABLE IN THE AMERICAN SCIENTIFIC COMMUNITY, AND A GROWING DECLINE IN THE REAL SUPPORT OF BASIC SCIENTIFIC RESEARCH, MOST POIGNANTLY EVIDENT IN THE CONTINUING DISINTEREST OF YOUNG PEOPLE IN PURSUING CAREERS IN BASIC RESEARCH. THIS LAST FACT IS PERHAPS MOST ALARMINGLY DOCUMENTED BY FIGURE 2 IN WHICH I HAVE PLOTTED THE DECLINE IN PH.D.S DEGREES AWARDED TO AMERICAN CITIZENS IN THE PHYSICAL SCIENCES AND IN ENGINEERING, TAKEN FROM "SUMMARY REPORT 1980: DOCTORATE RECIPIENTS FROM UNITED STATES UNIVERSITIES" PUBLISHED BY THE COMMISSION ON HUMAN RESOURCES, NATIONAL RESEARCH COUNCIL. THE DECREASE OF A FACTOR OF 2 IN PH.D. PRODUCTION BETWEEN 1970 AND 1980 IS TOTALLY INAPPROPRIATE FOR A COUNTRY THAT DEPENDS IN LARGE MEASURE ON ITS HIGH TECHNOLOGY FOR WORLD LEADERSHIP. FOR A HEALTHY AMERICA, AND FOR THE HEALTHY SCIENCE AND TECHNOLOGY BASE ON WHICH IT DEPENDS, IT IS ESSENTIAL THAT WE REACH A NATIONAL RESOLUTION OF THE ISSUES THAT HAVE LED TO THIS DECLINE.

FIGURE 2. DECLINE IN DOCTORATES
IN SCIENCE AND ENGINEERING. 1970 - 1980.

NUMBER OF DOCTORATES IN SCIENCE AND ENGINEERING
AWARDED TO U.S. CITIZENS BY U.S. UNIVERSITIES, 1970-1980



Source: NRC, 1981

XBL 824 . 345

**Department of Energy Funding to Multiprogram Laboratories,
FY 1981-1983 (obligations in millions).**

	FY 1981	FY 1982	FY 1983	Percent change FY 81-83 Current dollars	Percent change FY 81-83 Constant dollars
Ames Laboratory	\$ 16	\$ 15	\$ 14	-12.5%	-24.8%
Argonne National Laboratory	234	221	183	-21.8	-32.8
Brookhaven National Laboratory	173	154	150	-13.3	-25.4
Hanford Engineering Development Laboratory	195	201	168	-13.8	-26.0
Idaho National Engineering Laboratory	91	100	79	-13.2	-25.4
Lawrence Berkeley Laboratory	111	102	86	-22.5	-33.4
Lawrence Livermore Laboratory	459	516	461	+0.4	-13.7
Los Alamos Scientific Laboratory	401	464	444	+10.7	-4.9
Oak Ridge National Laboratory	298	297	243	-18.5	-29.9
Pacific Northwest Laboratory	92	69	30	-67.4	-72.0
Sandia Laboratories	553	588	571	+3.3	-11.3
Savannah River Laboratory	36	57	46	+27.8	+9.8
TOTAL	2659	2784	2475	-6.9	-20.0

Source: Department of Energy, Office of Energy Research.