



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 19 1981

Mr. John B. Wachtman, Jr.
Director, Center for Materials Science
National Bureau of Standards
Building 223
US Department of Commerce
Washington, DC 20234

Dear Mr. Wachtman:

In response to Mr. Edward A. Frieman's letter of December 2, 1980, we are pleased to provide the Nuclear Regulatory Commission contribution to the 1980 Federal Committee on Materials (COMAT) Inventory. We have provided updated information for Tables 1, 3, 5, 7, 8, 10 and 11.

If you have questions regarding the NRC material, please contact Dr. John T. Lorkins (427-4344).

Sincerely,

ORIGINAL SIGNED BY: O. L. BASSETT

for Robert B. Minogue, Director
Office of Nuclear Regulatory Research

Enclosure:
Markup of COMAT Inventory
Tables



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COMAT has recognized that proper management of the Federal materials R&D program can only be made by using knowledge of the total program, i.e., not only that part supported by the Federal Government, but also the part supported by industry, academia, foreign sources and others. COMAT concerns itself with all funding sources; it should be noted, however, that the present report is limited to the Federally funded program.

COMAT Task Force 1

COMAT activities are divided into three tasks as noted above; the present report is concerned only with the Task 1 study.

The Federal departments and agencies that comprise Task Force 1 are given in Table 1; 18 separate departments and agencies are represented.

Each Task Force member was charged with representing their entire department or agency and with providing the required inventory information on their agency's pertinent programs. Information was requested in two forms: (1) a broad statement of the major thrust(s) of the department or agency materials R&D program, and (2) detailed descriptions at a level providing sufficient individuality for cataloguing by the COMAT method. In some instances, this required "project-level" detail and in others "program-level" descriptions. It was requested that all descriptions be from the FY76 budget; however, because of the time period during which the inventory was conducted (September–November 1975), some members were unable to provide complete 1976 program descriptions and, instead, supplemented their input with FY75 data – assuming that for the purposes of the inventory program differences from one year to the next would be minor.

TABLE 1. COMAT TASK FORCE 1 MEMBERS

(T. V. Falkie, Chairman)

Department of Agriculture	A. M. Cowan and J. I. Zerbe
Department of Commerce	I. R. Bartky
Department of Defense	J. Persh and J. Ayers
Department of Health, Education and Welfare	F. D. Altieri
Department of Housing and Urban Development	K. Credle
Department of the Interior	C. Rampacek, M. A. Schwartz, R. C. Kirby
Department of Labor	S. Urman and D. Welsh
Department of State	O. H. Ganley
Department of Transportation	R. E. Hay
Department of the Treasury	S. Gordon
Energy Research & Development Administration	D. K. Stevens and R. L. Coble
Environmental Protection Agency	G. Rausa
General Services Administration	M. Bozzelli
National Aeronautics and Space Administration	G. C. Deutsch and J. J. Gangler
National Science Foundation	R. E. Kogut
Nuclear Regulatory Commission	M. L. Picklesimer and G. L. Bennett
Office of Management and Budget	J. Appleman
Smithsonian Institution	D. E. Appleman
Tennessee Valley Authority	W. Dickenson

delete G. L. Bennett
add J. T. Larkins

ANALYSIS OF THE FEDERAL FY76 COMMITMENT TO MATERIALS R&D AS CONTAINED IN THE COMAT INVENTORY

The COMAT inventory identified that eighteen Federal departments and agencies are supporting a total of almost \$1 billion in materials R&D in fiscal year 1976. On the basis of an estimated total Federal R&D budget for the current year of \$20 billion,⁽⁸⁾ the materials effort amounts to about 5 percent.

Of this amount, three agencies fund more than 65 percent, with ERDA supporting 34.6%, DOI 17.2%, and DOD 13.7%. The amount of funds budgeted by the individual agencies for the current fiscal year are summarized in Table 3 below. Appendix E provides a summary description of the mission of each agency, and further detail on its current materials R&D program. By using recently published data on funding levels for all types of Federal agencies,⁽⁸⁾ it is found that the Department of Defense spends about 1.3% of its total R&D funds on materials; NASA similarly commits approximately 1.6% of its R&D budget to materials work; ERDA, however, spends nearly 15% of its R&D funds on materials programs.

TABLE 3. DISTRIBUTION OF MATERIALS R&D FUNDS BY PARTICIPATING
FEDERAL AGENCIES

Funding Agency	Materials R&D Funds (\$1000)	Percent of Total
ERDA	332,897	34.6
DOI	165,350	17.2
DOD	131,881	13.7
EPA	95,399	10.3
NSF	68,700	7.1
NASA	51,533	5.4
USDA	38,254	4.0
DOC	21,080	2.2
HEW	16,625	1.7
TVA	9,226	1.0
→ NRC	7,020 13674	← To be added by NBS
HUD	6,669	0.6
DOT	6,153	0.6
DOL	4,063	0.4
Smithsonian	1,000	0.1
Treasury	790	0.1
DOS	540	—
GSA	132	—
Totals	\$961,320	100.0

Two points need emphasis regarding the levels of funding shown by this inventory. First, they present a considerably larger Federal commitment than any previous inventory due in part to the broad definition of materials used for the present inventory, and further, due to the availability to COMAT of substantially more data from the Federal agencies. Secondly, the present inventory effort is only the first step toward an assessment of the Nation's total materials R&D commitment. Complete and valid analysis of "gaps, opportunities and roadblocks" will not be possible until data on the content of the total program which includes that supported by industry and other sources become available for inclusion in the inventory.

TABLE 5. DISTRIBUTION OF MATERIALS R&D FUNDS SPONSORED BY PARTICIPATING FEDERAL AGENCIES IN SUPPORT OF NATIONAL GOALS (\$1000)

Agency	National Goal							
	National Security	Materials Supplies	Energy	Standards of Living	Environment	Transportation	Communication	Science & Technology
Department of Commerce	—	—	1993	1495	918	5430	—	5292
Department of Defense	131,663	—	2245	40	—	—	929	7521
Department of Interior	—	59429	94816	31295	18337	200	—	16158
Department of State	—	5	—	—	95	—	—	—
Department of Transportation	—	505	—	75	—	6078	—	—
Environmental Protection Agency	—	989	12319	35218	68775	—	—	—
Energy Research and Development Administration	58800	14573	194,203	750	26622	—	875	12728
General Services Administration	132	—	—	—	—	—	—	—
Department of Health, Education and Welfare	—	—	—	16585	55	—	—	140
Department of Housing and Urban Development	—	3500	200	2692	—	—	—	595
National Aeronautics and Space Administration	277	2324	350 13674 6928	—	—	9437	—	11401
Nuclear Regulatory Commission	—	6100	3400	—	5800	—	985	44700
National Science Foundation	—	—	—	—	—	—	—	1000
Smithsonian Institution	—	7023	1288	6944	925	—	9	—
Tennessee Valley Authority	—	469	3180	2477	7893	5	—	186
Department of Agriculture	—	—	—	4063	—	—	—	—
Department of Labor	—	—	—	125	—	—	—	—
Department of the Treasury	—	—	—	—	—	—	—	—
Totals	190,672	94,917	320,922	101,759	129,420	21,151	2,798	99,799

Note: Totals are not additive. Funds may be attributed to more than one goal where appropriate.

TABLE 7. DISTRIBUTION OF MATERIALS R&D FUNDS RELATED TO FUNCTION (STAGE IN MATERIALS CYCLE) BY SPONSORING AGENCY, (\$1000)

Sponsoring Agency	Exploration for Resources	Extraction of Raw Materials	Processing of Raw Materials	Manufacture and Fabrication	Application and Utilization	Evaluation of Properties	Development of Materials	Waste Management	Unspec- ified	Total
Department of Commerce	—	—	72	708	3812	7194	1979	151	7164	21080
Department of Defense	—	—	184	2776	29390	25410	57373	60	16688	131881
Department of Interior	38308	80908	16100	375	2584	900	845	14105	11225	165350
Department of State	—	—	—	—	415	95	—	—	30	540
Department of Transportation	505	—	—	—	655	2370	2304	319	—	6153
Environmental Protection Agency	—	2879	4116	5187	2017	62394	—	21332	1474	99399
Energy Research and Develop- ment Administration	14000	152	30420	3240	124658	69089	7075	45485	38778	332897
General Services Administration	—	—	—	—	42	—	—	—	90	132
Department of Health, Educa- tion and Welfare	—	80	130	198	1179	13610	1039	95	293	16625
Department of Housing and Urban Development	—	—	—	—	2364	3850	325	100	30	6669
NASA	2324	—	—	—	26	11117	37639	—	427	51523
Nuclear Regulatory Commission	—	—	—	—	8774 ²⁶ 8684	4940 ²⁶ 4817	—	746 ²⁶ 745	—	4460 ²⁶ 4460
National Science Foundation	4800	—	500	690	8000	19305	2680	6100	26525	68700
Smithsonian Institution	—	—	—	—	—	—	—	—	1000	1000
Tennessee Valley Authority	—	—	—	—	220	211	7266	1095	434	8226
Department of Agriculture	11	5064	8875	3070	8576	601	4208	4321	528	38254
Department of Labor	—	—	—	—	63	—	—	—	4000	4063
Department of the Treasury	—	—	—	—	81	525	45	—	139	790
Totals	59,948	89,083	60,497	16,244	187,583	219,488	122,778	93,873	111,825	961,320
Percent ^(a)	7.0	10.5	7.1	1.9	22.1	25.8	14.5	11.1	—	100.0

(a) Excluding "Unspecified"

TABLE 8. DISTRIBUTION OF FEDERALLY FUNDED MATERIALS R&D BY PERFORMING ORGANIZATION

Organization	\$1000							Total
	Federal Government	National Laboratories	Private	Academic	Not-for-Profits	State/Local	Unspecified (a)	
Department of Commerce	16650	—	4530	900	—	—	—	21,080
Department of Defense (b)	—	—	—	—	—	—	131881	131,881
Department of Interior	100440	—	3054	2027	—	583	59246	165,350
Department of State	325	—	133	—	82	—	—	540
Department of Transportation	1498	—	1869	428	141	1618	599	6,153
Environmental Protection Agency (c)	44245	—	14284	25495	11606	3769	—	99,399
Energy Research and Development Administration	2780	221878	82224	18152	6238	—	1625	332,897
General Services Administration	42	—	60	30	—	—	—	132
Department of Health, Education and Welfare	1446	125	2079	10800	2089	—	86	16,625
Department of Housing and Urban Development	1320	—	1749	100	—	—	3500	6,669
National Aeronautics and Space Administration	33383	2553	7326	4465	463	—	3338	51,533
Nuclear Regulatory Commission	1410	11104	195	370	595	—	—	13,674
National Science Foundation	—	3200	2100	58500	4900	—	—	68,700
Smithsonian Institution	1000	—	—	—	—	—	—	1,000
Tennessee Valley Authority	8553	92	521	10	40	10	—	9,226
Department of Agriculture	33704	—	60	4425	65	—	—	38,254
Department of Labor	63	—	4000	—	—	—	—	4,063
Department of the Treasury	674	—	—	—	116	—	—	790
Totals	245,548	232,858	124,520	125,519	26,620	6,980	200,275	961,320
Percent (d)	32.2	30.6	16.4	16.5	3.5	0.8	—	100

(a) Includes all foreign.

(b) Distribution of DoD programs was not available for the inventory.

(c) EPA distribution provided as a percent of its total program; the performer for each program is not included in the COMBAT data base.

(d) Excluding "Unspecified" category.

Fuel Materials — Fuel Materials was especially chosen for analysis because most previous materials R&D inventories did not include this class of materials. A total of \$197.8 million of the FY76 Federally funded materials R&D program was identified as being specifically directed toward fuel materials. This is distributed among the general classes of fuel materials as shown in Table 9.

TABLE 9. DISTRIBUTION OF MATERIALS R&D FUNDS ON FUEL MATERIALS

Fuel Material	Amount of Funding by Agency (\$1000)							Totals
	DOD	DOI	ERDA	TVA	USDA	EPA	NRC	
Fossil	—	6079	370	—	60	5409	—	11918
Coal	120	72207	4093	203	2725	2571	—	81919
Petroleum	—	—	—	—	—	1707	—	1707
Oil Shale	—	5139	—	—	—	66	—	5205
Gas	—	—	10416	—	—	—	—	10416
Nuclear	—	6117	75763	15	—	—	3000	82192
Waste and Refuse	—	80	—	50	—	579	—	709
Unspecified	110	1689	2	30	14	1901	—	3746
Totals	230	91311	90644	298	2799	12233	295	197810
Percent	0.1	46.2	45.8	0.1	1.4	6.2	0.1	100.0

Again, for example purposes, the effort directed towards oil shale was chosen for further analysis. Five projects were identified, four funded by DOI, BuMines, and one funded by EPA. Two of the DOI programs, totaling \$4,615,000, involve oil shale extraction, and two, totaling \$524,000, involve oil shale waste management. The mission of the latter two programs was in "Environmental Quality: Mining and Beneficiation Impacts" and both are continuing (multi-year) projects; the function of both is "Waste Management: Ecological Restoration", and the objective is "Environmental Protection". The project funded by EPA, \$66,000, involves waste product characterization in processing fuel from oil shale. The mission is "Environmental Quality" and the function is "Waste".

Waste Materials — An effort totaling \$115,404,000 (excluding R&D on pollutants as a waste material) is being conducted within the Federally funded materials R&D program on waste materials. This effort, accounting for about 12% of the total program, is shown in Table 10 by class of waste material and agencies funding the program. As shown, some programs were classified according to the type of waste (i.e., gaseous, liquid, solid, or composite) and for others according to the source of the waste (i.e., industrial, commercial, agricultural, nuclear, space, and municipal). A third classification category was "Waste as a Resource". There are no double entries in the tables, so summations can be made. As shown, over 82 percent of the effort is supported by ERDA and EPA, with 60% and 22%, respectively, of the total. Also of interest is the fact that eleven separate agencies have R&D programs involving eleven different classes of waste materials.

To illustrate the detail of analysis possible, one of these, the liquid waste class, was further analyzed. This revealed that there are five separate projects being conducted in this area as follows: —

TABLE 10. DISTRIBUTION OF FEDERAL MATERIALS R&D FUNDS IN WASTE MATERIALS (\$1000)

Agency	Gaseous Waste	Liquid Waste	Solid Waste	Composite Waste	Industrial Waste	Commercial Waste	Agricultural Waste	Nuclear Waste	Space Waste	Municipal Waste	Waste Resources	Pollutants As Waste	Waste As Fuels	Other	Totals
Department of Defense	-	-	-	60	-	-	-	-	-	-	-	-	-	-	60
Department of Commerce	46	-	-	-	-	-	-	-	-	-	-	-	-	528	574
Department of Interior	5427	275	-	-	815	-	-	-	-	-	680	-	80	-	7347
Department of Transportation	-	-	319	-	-	-	-	-	-	-	-	-	-	-	319
Environmental Protection Agency	12427	2944	282	8553	-	-	1475	179	-	2138	2095	37900	579	438	68910
ERDA	127	-	27	-	-	-	-	25915	-	-	463	-	-	-	26532
NASA	-	-	-	-	-	-	-	-	123	-	-	-	-	-	123
National Science Foundation	-	-	-	-	-	300	-	-	-	-	-	-	-	5800	6100
→ Nuclear Regulatory Commission	-	-	-	-	-	-	-	746 460	-	-	-	-	-	-	746
Tennessee Valley Authority	141	-	30	-	-	-	92	-	-	80	-	108	0	-	501
Department of Agriculture	-	1	-	24	-	107	1122	-	-	-	49	-	-	125	1428
HEW	-	-	-	-	-	-	-	-	-	-	-	3050	-	-	3050
Totals	18238	3220	658	8637	815	407	2689	26554	123	2218	3287	41058	709	6891	115404

TABLE 11. SOURCES OF FUNDING DATA USED IN COMPILING COMAT INVENTORY

AGENCY	FISCAL YEAR FUNDING INFORMATION	SOURCE OF FUNDING DATA
Department of Agriculture	1975	Work Reporting Unit (WRU) Report Plan
Department of Commerce	1976	NBS Project Report Forms
Department of Defense	1976	Materials Technology Coordinating Papers (TCP), Form 1498, Form 1634, and other budget documents.
Department of Interior	1976	Budget estimates
Department of Labor	1976	Budget estimates
Department of State	1976	Contract award information
Department of the Treasury	1976	Budget authorizations
Department of Transportation	1976	Planning and budget documents
Environmental Protection Agency	1976	EPA/ORD budget estimates
Energy Research and Development Administration	1976 and 1975	Form 189 budget requests and other sources
General Services Administration	1976	Budget authorizations
Department of Health, Education, and Welfare	1975	Research Objective forms
Department of Housing and Urban Development	1976	Project Development and Research (PD and R) and Project Information reports
National Aeronautics and Space Administration	1976	Research and Technology Operating Plan (RTOP) documents
→ Nuclear Regulatory Commission	1976 ← 1980	Form 189 budget requests ← budget estimates
National Science Foundation	1976	Budget estimates
Smithsonian Institution	1976	Budget estimates
Tennessee Valley Authority	1976	Budget estimates