DOE/EV-0024/1

Inventory of Federal Energy-Related Environment and Safety Research for FY 1977

Volume I—Executive Summary

July 1978

U.S. Department of Energy
Assistant Secretary for Environment
Division of Environmental Impacts

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DOE/EV-0024/1

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UC-11, 41

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Volume I—Executive Summary

By
George R. Shepard
Susan L. Rose

July 1978

U.S. Department of Energy
Assistant Secretary for Environment
Division of Environmental Impacts
Washington, D.C. 20545

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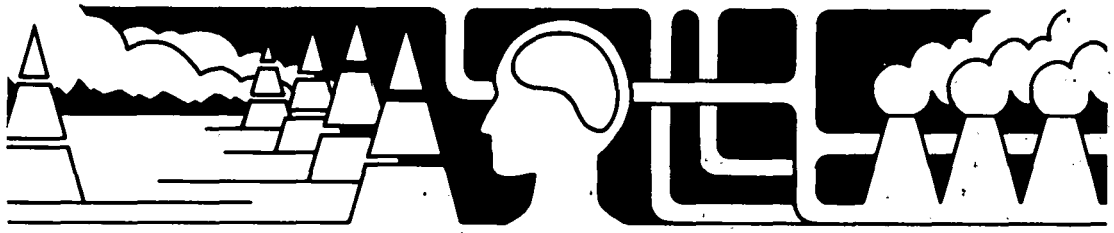

PREFACE

This Inventory provides a listing of federally funded energy-related environment and safety (E&S) research projects for FY 1977. Volume I is the Executive Summary; Volume II is a catalog of project listings; Volume III is the Inventory Index; Volume IV is the Interactive Terminal Users Guide. The project listings include Biomedical and Environmental Research, Environmental Control Technology Research, and Operational Safety Research. These listings are arranged numerically, by agency with an inventory log number (Agency abbreviations used in figures and tables are found in Appendix B.)

This edition of the Inventory contains research being reported by the following agencies, each of which has been assigned a block of log numbers to facilitate recordkeeping and searching.

Department of Agriculture
Department of Commerce
- Office of Environmental Affairs
- National Bureau of Standards
- National Oceanic and Atmospheric Administration

Department of Defense
Department of Health, Education, and Welfare
- National Institute of Dental Research
- National Institute of General Medical Sciences
- Division of Research Resources
- National Institute of Neurological Communicative Disorders and Stroke
- National Institute of Child Health and Human Development
- National Heart, Lung and Blood Institute
- National Institute of Aging
- National Institute of Arthritis, Metabolism and Digestive Diseases
- National Institute of Occupational Safety and Health
- National Institute for Environmental Health Sciences
- National Cancer Institute

Department of the Interior
- Fish and Wildlife Services
- Bureau of Reclamation
- Bureau of Land Management
- United States Geological Survey
- Bonneville Power Administration*

Department of Transportation
- Assistant Secretary for Environment, Safety, Consumer Affairs
- Federal Aviation Administration
- Federal Railroad Administration
- Urban Mass Transportation Administration
- National Highway Traffic Safety Administration

Environmental Protection Agency
National Science Foundation
Tennessee Valley Authority
Nuclear Regulatory Commission
Federal Energy Administration*
Energy Research and Development Administration*

- Assistant Administrator for Planning, Analysis, and Evaluation
- Assistant Administrator for Nuclear Energy
- Assistant Administrator for Fossil Energy
- Assistant Administrator for Environment and Safety
- Assistant Administrator for Solar, Geothermal and Advanced Energy Systems
- Assistant Administrator for Conservation

* Now Department of Energy.

ACKNOWLEDGMENTS

We acknowledge with thanks the cooperation of Ms. Nevaire Serrajian and Mr. Ed Miller, Division of Environmental Impacts (DEI), in the conduct of this project.

The many staff members of the Department of Energy (DOE) Technical Information Center (TIC), Oak Ridge National Laboratory (ORNL), and the Aerospace Corporation who were involved in the various stages of completing this project, also deserve a special thank you. In particular, recognition and appreciation go to Ms. Margaret L. Pflueger, Mr. David Bost, Mr. Noboru Kawakami, and Ms. Mickey M. Moore of DOE TIC, and to Mr. Larry Peck and Ms. Carole Shriner of ORNL. Thanks also go to Mr. Jim Chalmers and Mr. Ed Wright of the Aerospace Corporation.

Needless to say, without the help and contributions of the staff members and principal investigators of each of the participating Federal agencies, this data base could not have been compiled.

George R. Shepherd
Susan L. Rose

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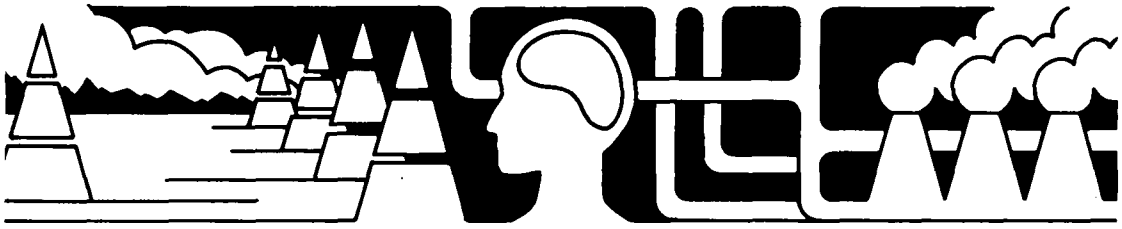
CONTENTS

Tables*

* Tables and Figures provided by Oak Ridge National Laboratory.



I. INTRODUCTION

A. Purpose of the Inventory

This inventory is collected and maintained to provide the data necessary to conduct overviews of the Federal effort in energy-related Environment, Health, and Safety research; to provide investigators with information on the location and nature of specific R&D activities; and to provide Federal, state, and other interested organizations with information for planning environmental research efforts. It also provides industrial users with a resource for locating Federal expertise and for determining levels of environment and health R&D for each technologies

B. Background

The Energy Reorganization Act of 1974, PL 93-438, authorized the Administrator of the Energy Research and Development Administration (ERDA) to establish programs to minimize the adverse environmental effects of energy development and utilization. It further directed that these programs utilize research and development efforts supported by other Federal agencies in a cooperative manner to avoid unnecessary duplication.

In addition, the Federal Nonnuclear Energy Research and Development Act of 1974, PL 93-577, Section 6, required that the Administrator of ERDA submit a comprehensive energy research, development, and demonstration plan and a companion comprehensive nonnuclear energy program to Congress on an annual basis. This annual report includes relative financial contributions by the agencies of the Federal Government.

In order to comply with the requirements of these Acts, an initial inventory effort, the Federal Inventory of Energy-Related Biomedical and Environmental Research for FY 1974 and FY 1975 (ERDA-110) was published and distributed in October 1975.

This annual inventory, now published by the Department of Energy, continues to be improved and expanded each year. The questionnaire used to gather information for the FY 1977 inventory was modified slightly to obtain more uniform and relevant information. (A copy of the FY 1977 questionnaire, ERDA Form 294, appears in Appendix A.) The FY 1977 edition of the Inventory includes several Federal organizations not previously represented, provides updated information on continuing projects, and also presents new data on several hundred projects initiated in FY 1977. The use of a new computerized retrieval system (System 1022) will improve access to the data base and provide better serivce to Inventory users.

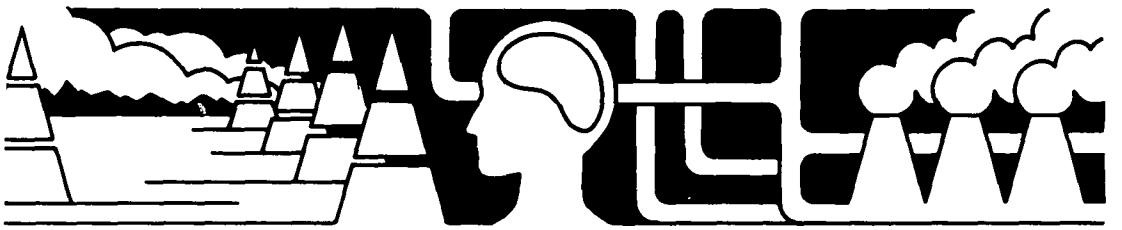
C. Analysis

It is anticipated that the Department of Energy will conduct an analysis of the data contained within the FY 1977 Inventory and subsequently report on the results in 1978. Other Federal agencies, as well as state and regional authorities, can use the Inventory and the analysis to evaluate present efforts and plan future research and development activities in the energy-related environment, health, and safety areas.

D. Computer Access (Users/RECON/1022)

The Inventory will be maintained on the DECsystem-10 computer at Oak Ridge National Laboratory for on-line retrieval using System

1022. Volume IV of the FY 1977 Inventory publication is the Interactive Terminal Users' Guide for System 1022 and should be consulted prior to accessing the data base. While the FY 1976 Inventory resided solely on RECON (the DOE on-line retrieval system), the FY 1977 Inventory will be available on both System 1022 *and* RECON. Access to this Inventory data base can be obtained through Susan Rose or Nevaire Serrojian, Division of Environmental Impacts, DOE. (Telephone: (202) 252-2000.) Access to the Inventory on the RECON system can be obtained through Mr. C. M. Gottschalk, Office of Technical Information, DOE. (Telephone: (202) 252-2000.)



II. INVENTORY SUMMARY

Twelve Federal agencies have provided information included in the FY 1977 Inventory for only those research projects performed and funded in FY 1977. Approximately 3,200 research projects are listed in the Inventory. This does not represent 100 percent of the Federal effort in this area. Relevant projects were inadvertently excluded for a variety of mechanical, semantic, and philosophical reasons. Currently, a commonly accepted definition for energy-related research does not exist among Federal agencies. For example, while a project studying the toxicities of effluents from coal fired power plants can easily be classified as "energy-related," projects dealing with the same toxic substances from nonenergy sources (e.g., tobacco smoking) are much more difficult to collect.

It is important to note that many questionnaires were returned with some portions left unanswered, thereby rendering summary information inaccurate or incomplete for some fields. With these limitations in mind, the information remains a useful source document and guide.

This executive summary provides tables and figures derived from the *"Inventory of Energy-Related Environment and Safety Research for FY 1977."* These tables and figures have been selected, and the material arranged, to answer potential user questions. Several definitions may prove useful in the interpretation of the tables and figures which follow. Bear in mind when using the tables and figures that projects supporting more than one technology will be recounted for each technology they address. The *funding* field for all these projects however was apportioned among the technologies to reflect the precent effort reported on the questionnaire.

- Funding Agency—The agency that directly receives funds appropriated by Congress (this is not necessarily the agency that monitors or performs the research); i.e., EPA may receive appropriated money which is then "passed through" to DOE to do certain kinds of work. In that case, EPA is the funding agency, DOE the performing and/or monitoring agency.
- Log Agency or Responding Agency—The agency reporting a project for inclusion in the DOE Federal Inventory. The FY 1977 Inventory is ordered by Inventory log number which automatically separates the projects into blocks by log agencies.
- Principal Investigator—The person actually performing the experiment or having direct supervisory responsibility for the performance of the research project. Normally the Principal Investigator (PI) will be affiliated with the Performing Organization.
- Performing Organization—The agency or organization that provides the principal investigator with administrative, facility, and logistic support.
- Monitoring Agency—The Federal agency responsible for direct contact with the principal investigator and the performing organization.
- General Projects—In the energy technology categories, the general projects (i.e., nuclear *general*, solar *general*) are those supportive to a particular technology, but not necessarily applicable to a specific subtechnology.
- General Science—describes research that is supportive in nature and is not directly related to specific technologies.

The data shown in the following tables and figures are related to the total Federal Inventory and are presented to show the overall patterns of the funding and technology distribution among the various Federal agencies.

Table 2.1 lists the log agencies, the number of projects and the funding level.

Table 2.2 shows the reported project relationship between monitoring and funding agencies.

Table 2.3 summarizes, by monitoring agency, the number of projects and funding for each technology that the agency is addressing.

Figure 2.1 shows the estimated total combined funds for energy-related Environment Health and Safety Research and the amount allocated to each technology.

Figure 2.2 shows the funds spent for each type of pollutant as a percent of the total being spent on energy-related pollution research.

Figure 2.3 depicts, by agency, the total money being spent for energy-related Environment and Safety Research for each technology.

TABLE 2.1 Federal Agency Responses

Log agency	Number of projects reported	Level of funding reported (dollars in millions)
Department of Agriculture	11	7.7
Department of Commerce	112	35.0
Department of Defense	7	0.2
Department of Health, Education and Welfare	331	33.4
Department of Interior	68	14.7
Department of Transportation	38	4.5
Environmental Protection Agency	1013	90.9
Energy Research and Development Administration	1474	287.5
Federal Energy Administration	6	0.2
National Science Foundation	72	4.7
Nuclear Regulatory Commission	101	91.6
Tennessee Valley Authority	63	9.7
Total	3296	580.1

TABLE 2.2 Distribution of Responses

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
DOA	15	7.7	DOA	2	0.5	DOA	1	0.4
						EPA	1	0.1
			DOA/FS	2	3.0	DOA/FS	2	3.0
			EPA	10	4.1	DOA	4	1.4
						EPA	3	1.1
						FDA	1	0.5
			HEW/NCI	1	0.03	HEW/NCI	1	0.03
DOC	98	35.0	DOC	3	0.1	DOC	3	0.1
			DOC/NBS	2	0.3	DOC/NBS	2	0.3
			DOC/NOAA	37	2.1	DOC/NOAA	36	2.0
						DOI	1	0.1
			DOI/BLM	5	21.7	DOC/NOAA	1	0.2
						DOI	1	0.3
						DOI/BLM	3	21.2
			EPA	17	6.6	DOC	1	0.05
						DOC/NOAA	4	0.7
						EPA	12	5.9
			ERDA	17	2.7	DOC/NOAA	3	0.7
						DOI/BLM	1	0.2
						DOI/NMFS	2	0.1
						ERDA	11	1.7
			FEA	1	0.5	FEA	1	0.5
			NRC	3	0.3	ERDA	1	0.2
						NRC	2	0.1
			Other	13	0.5	Other	13	0.5
DOI	60	14.7	DOI/BLM	4	0.5	DOI/BLM	4	0.5
			DOI/USGS	28	11.2	DOI	1	0.3
						DOI/USGS	22	8.9
						NASA	1	0.05
						Other	4	2.2
			EPA	10	1.8	DOI/FWS	9	1.7
						DOI/USGS	1	0.1
			Other	18	1.2	Other	18	1.2

Figure 2.4 shows how much of the energy-related Environment and Safety Research funding is being spent for each of the three categories; Operational and Environmental Safety, Biomedical and Environmental Research and Environmental Control Technology.

Figure 2.5 illustrates on a global basis, the regions of interest of the energy-related Environment and Safety research.

Figure 2.6 shows the funding distribution by geographic region of interest.

Figure 2.7 provides the funding distribution by hydrographic areas of interest.

Figure 2.8 presents the distribution of funds by coastal regions of the United States.

Figure 2.9 presents the funding by ecological arenas.

TABLE 2.2 (continued)

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
DOT	37	4.6	DOT	37	4.6	DOT	37	4.6
EPA	954	91.0	EPA	954	91.0	EPA	950	90.6
						Other	4	0.2
ERDA	1474	287.0	EPA	18	1.9	EPA	1	0.1
						ERDA	16	1.8
			ERDA	1426	283.3	UC	9	0.6
						GU	3	0.3
						ERDA	1371	278.1
						ERDA/ANL	13	1.2
						ERDA/BNL	4	0.2
						ERDA/CRBR	2	0.3
						ERDA/LASL	4	0.8
						ERDA/ORNL	12	1.1
						ERDA/PNL	4	0.5
						Other	4	0.2
			NSF	6	0.3	ERDA	5	0.3
						NSF	1	0.02
			Other	24	1.5	Other	24	1.5
HEW	345	33.3	EPA	50	4.7	EPA	1	0.1
						HEW/NIEHS	38	2.8
						HEW/NIOSH	7	1.1
						HEW/PHS	4	0.6
			HEW/NCI	69	9.3	HEW/NCI	69	9.3
			HEW/NHLB	10	3.0	HEW/NHLB	10	0.3
			HEW/NIEHS	202	15.3	HEW/NIEHS	202	15.3
			Other	14	1.0	Other	14	1.0
NRC	96	91.6	ERDA	2	19.4	NRC	2	19.4
			NRC	94	72.2	ERDA	1	0.1
						NRC	93	72.1
NSF	57	4.7	NSF	57	4.7	NSF	57	4.7

TABLE 2.2 (continued)

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
TVA	61	9.7	EPA	30	7.4	EPA	25	6.9
						GTC	1	0.1
						TVA	4	0.4
			EPRI	2	0.2	EPRI	2	0.2
			TVA	29	2.1	EPA	3	0.2
						TVA	26	1.9
Other	2	0.5	Other	2	0.5	Other	2	0.5

TABLE 2.3 Projects and Dollars by Monitoring Agency and Technology

Monitoring agency	Technology	Number of projects reported	Funding (dollars in millions)
ERDA	Fossil	646	61.0
	Nuclear	591	156.6
	General Science	488	44.7
	Other	310	18.4
	Total	2035	280.7
EPA	Fossil	736	72.4
	Nuclear	71	4.1
	General Science	318	20.8
	Other	140	6.2
	Total	1265	103.5
NRC	Nuclear	77	88.0
	General Science	22	3.5
	Total	99	91.5
DOI/BLM	Fossil	7	21.7
	Total	7	21.7
HEW/NIEHS	Fossil	76	5.5
	General Science	153	11.7
	Other	16	0.6
	Total	245	17.8
Other	Fossil	226	31.0
	Nuclear	78	4.3
	General Science	112	13.5
	Other	57	4.9
	Total	473	53.7

FIGURE 2.1 Technology Funding Total for All Agencies Combined

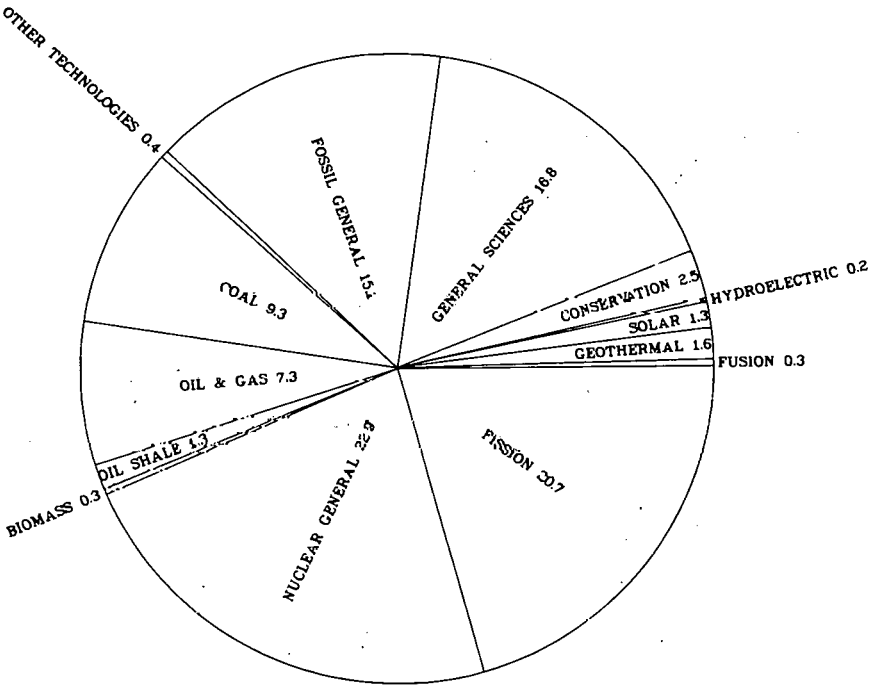


FIGURE 2.2 Total Funding by Pollutant Category

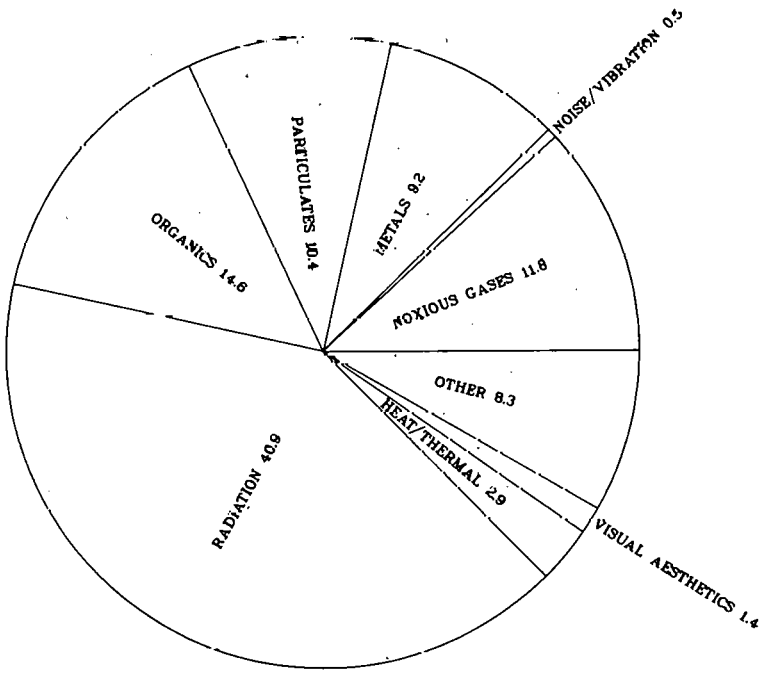


FIGURE 2.3 Monitoring Agency Funding by Energy Technology

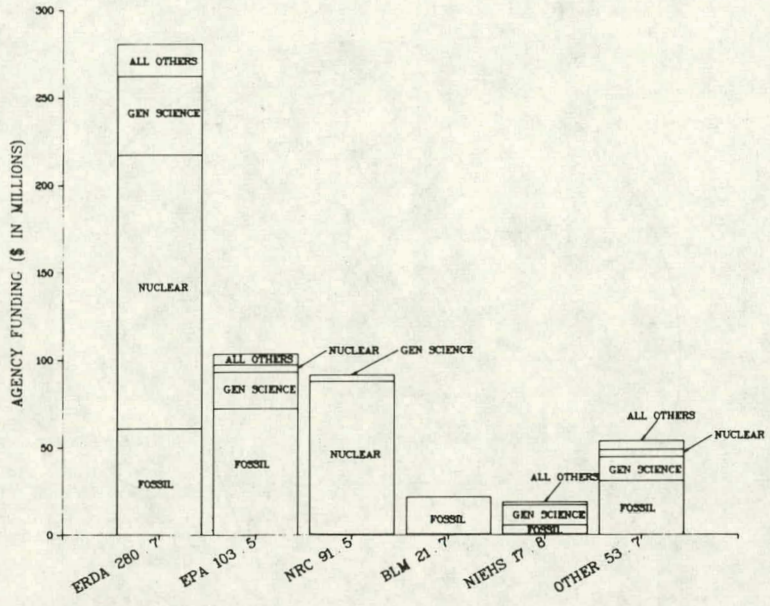


FIGURE 2.4 Funding by Research Category

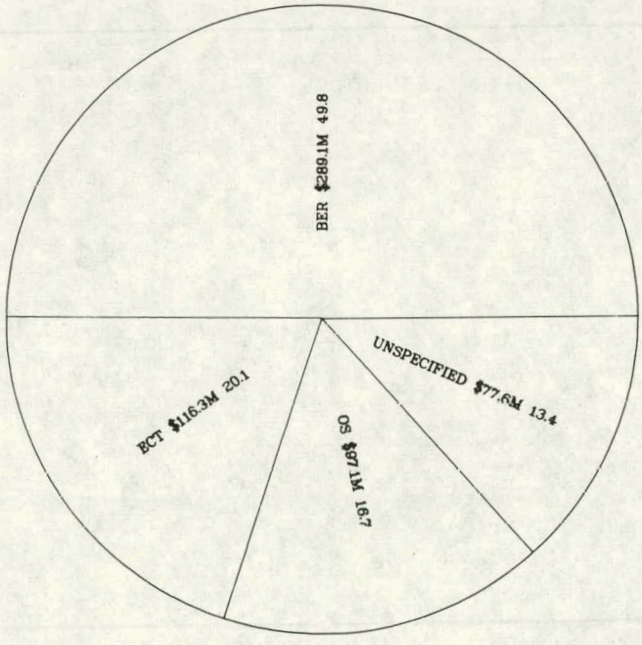


FIGURE 2.5 Funding by Global Regions

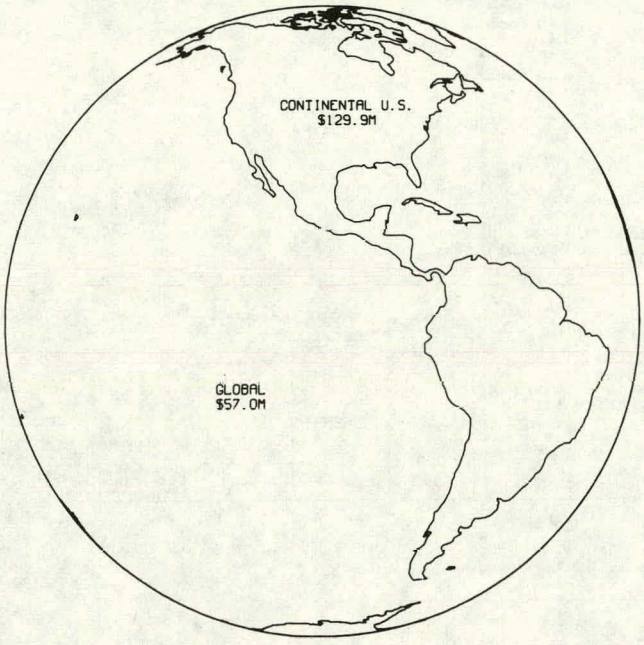


FIGURE 2.6 Funding by Geographic Regions

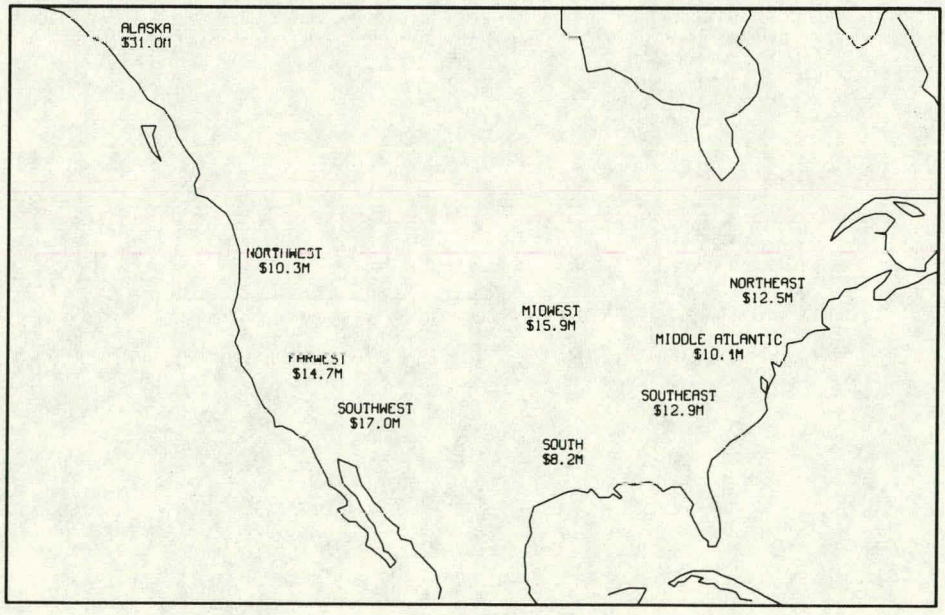


FIGURE 2.7 Funding by Hydrographic Regions

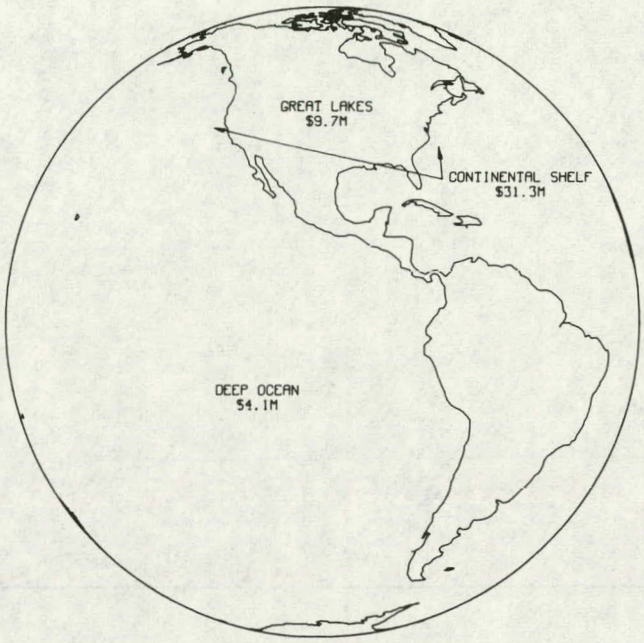


FIGURE 2.8 Funding by U.S. Coastal Regions

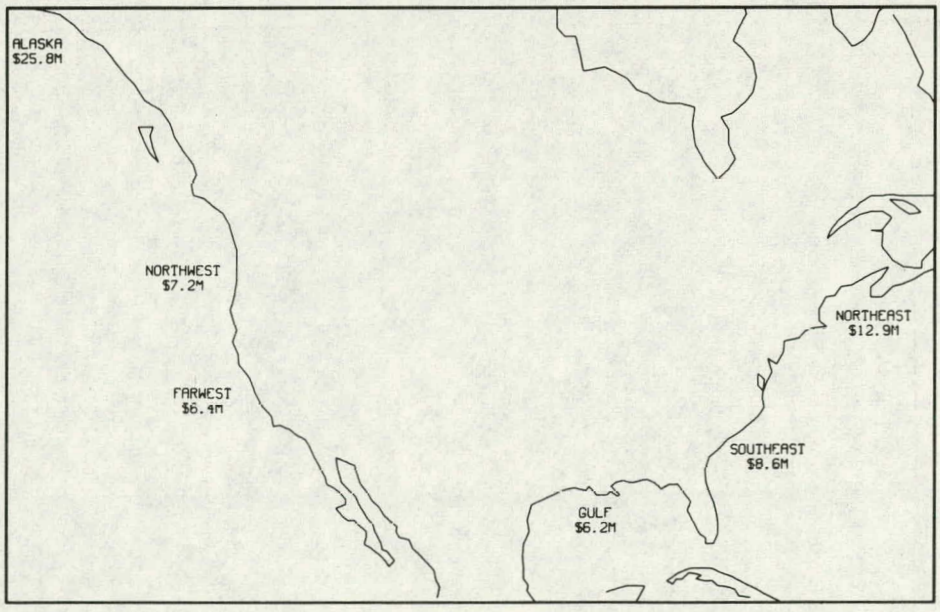
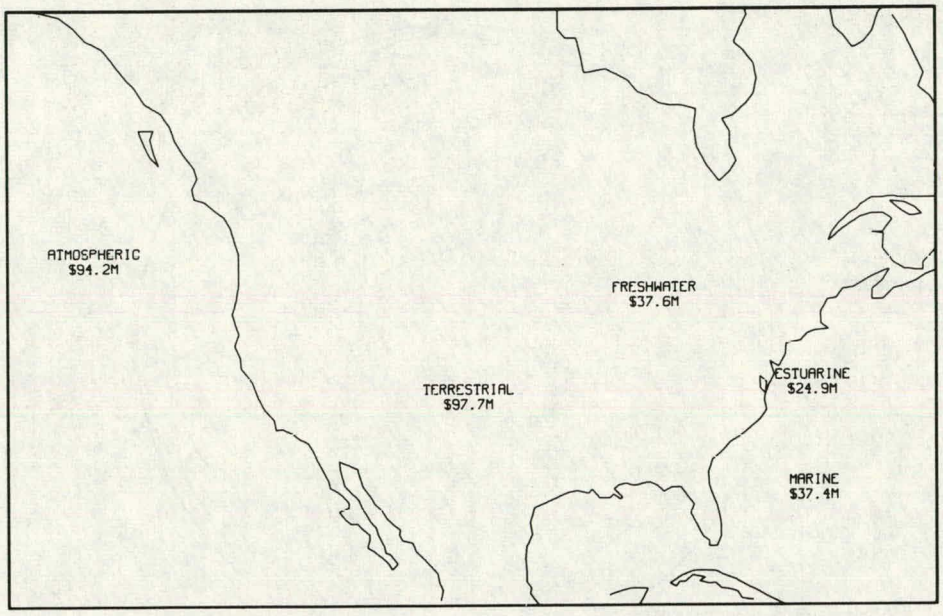


FIGURE 2.9 Funding by Ecological Arenas



III. BIOMEDICAL AND ENVIRONMENTAL RESEARCH SUMMARY

This section contains data only on those research efforts designated as being applicable entirely or in part to the category of Biomedical and Environmental Research (BER). This category is further subdivided into five subcategories: (1) Characterization, Measurement and Monitoring; (2) Environmental Transport, Physical and Chemical Processes and Effects; (3) Health Effects; (4) Ecological Processes and Effects; and (5) Integrated Assessment. The questionnaire in Appendix A provides a further breakdown of these subcategories.

Table 3.1 lists the log agencies, the number of projects and funding level reported for the BER category.

Table 3.2 shows the reported project relationship between monitoring and funding agencies for the BER category.

Table 3.3 summarizes, by monitoring agency, the number of projects and funding for each technology that each agency is addressing in the BER category.

Table 3.4 provides a breakdown (by BER subcategory) of the projects and funding and technology effort of each agency.

Table 3.5 shows the total agency funding by technology for each of five BER subcategories.

Figure 3.1 shows that share of the total BER funding being spent for each technology (all agencies combined).

Figure 3.2 shows the biomedical and environmental funds spent for each type of pollutant as a percent of the total being spent on pollution research.

Figure 3.3 depicts the total funds being spent for BER by agency and by technology.

TABLE 3.1 Federal Agency Responses for the Biomedical and Environmental Research Category

Log agency	Number of projects reported	Level of funding reported (dollars in millions)
Department of Agriculture	6	3.8
Department of Commerce	81	34.0
Department of Health, Education and Welfare	249	23.5
Department of Interior	56	10.9
Department of Transportation	22	2.4
Environmental Protection Agency	439	42.4
Energy Research and Development Administration	1115	162.4
Federal Energy Administration	3	0.1
National Science Foundation	23	2.2
Nuclear Regulatory Commission	26	3.9
Tennessee Valley Authority	29	3.5
Total	2049	289.1

TABLE 3.2 Distribution of Responses in the Biomedical and Environmental Research Category

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
DOA	8	3.7	DOA	1	0.1	EPA	1	0.1
			DOA/FS	1	0.8	DOA/FS	1	0.8
			EPA	6	2.8	DOA	3	1.2
						EPA	3	1.0
DOC	95	34.8	DOC/NBS	3	0.3	DOC/NBS	3	0.3
			DOC/NOAA	35	2.0	DOC/NOAA	33	1.9
						Other	2	0.1
			DOI/BLM	5	21.7	DOC/NOAA	1	0.2
						DOI	1	0.3
						DOI/BLM	3	21.7
			EPA	17	6.6	DOC	1	0.06
						DOC/NOAA	4	0.7
						EPA	12	5.9
			ERDA	17	2.7	DOC/NOAA	3	0.6
						DOI/NMFS	2	0.2
						ERDA	11	1.7
						ERDA/BNL	1	0.2
			FEA	1	0.5	FEA	1	0.5
			Other	19	1.0	Other	19	1.0
DOI	57	12.1	DOI/USGS	25	8.6	DOI/USGS	20	8.5
						Other	5	0.1
			EPA	10	1.8	DOI/FWS	9	1.7
						DOI/USGS	1	0.1
			Other	22	1.7	Other	22	1.7
DOT	22	2.2	DOT	22	2.4	DOT	22	2.4
HEW	267	23.6	EPA	49	4.6	HEW/NIEHS	38	2.8
						HEW/NIOSH	7	1.2
						HEW/PHS	4	0.6
			HEW/NCI	15	3.7	HEW/NCI	15	3.7
			HEW/NIEHS	202	15.3	HEW/NIEHS	202	15.3
			Other	1	0.06	Other	1	0.06

TABLE 3.3 Projects and Dollars by Monitoring Agency and Technology for Biomedical and Environmental Research

Monitoring agency	Technology	Number of projects reported	Funding (dollars in millions)
ERDA	Fossil	560	49.8
	Nuclear	481	61.6
	General Science	414	36.5
	Other	250	16.1
	Total	1705	164.0
EPA	Fossil	379	39.3
	General Science	97	7.8
	Other	71	4.4
	Total	547	51.5
DOI/BLM	Fossil	7	21.7
	Total	7	21.7
HEW/NIEHS	Fossil	76	5.5
	General Science	156	11.8
	Other	26	0.6
	Total	258	17.9
Other	Fossil	203	15.5
	General Science	92	11.9
	Other	78	4.8
	Total	373	32.2

TABLE 3.4 Biomedical and Environmental Research Subcategory Funding by Agency and Technology—(Individual Agency)

Subcategory	Agency	Technology	Number of projects reported	Funding (dollars in millions)
Characterization, Measurement and Monitoring	ERDA	Fossil	169	17.2
		Nuclear	118	11.9
		Geothermal	34	3.4
		General Science	58	5.4
		Other	46	2.4
		Total	425	40.3
	EPA	Fossil	268	29.2
		Nuclear	18	0.9
		Geothermal	13	1.0
		General Science	50	4.7
		Other	17	0.8
		Total	366	36.6
	DOI/BLM	Fossil	5	21.6
		Total	5	21.6
	DOI/USGS	Fossil	7	3.2
		General Science	4	1.1
		Other	6	0.9
		Total	17	5.2
	Other	Fossil	37	3.9
		Nuclear	16	1.1
		Geothermal	15	1.0
		General Science	28	1.7
		Other	9	0.8
		Total	105	8.5
Environmental Transport	ERDA	Fossil	145	16.5
		Nuclear	126	15.8
		Geothermal	18	2.6
		Solar	24	1.3
		Conservation	22	1.8

TABLE 3.4 (continued)

Subcategory	Agency	Technology	Number of projects reported	Funding (dollars in millions)
Environmental Transport (continued)	ERDA	General Science	75	6.8
		Other	3	0.1
		Total	413	44.9
	EPA	Fossil	91	22.6
		General Science	57	3.3
		Other	40	2.1
		Total	188	28.0
	DOI/BLM	Fossil	5	21.6
		Total	5	21.6
	Other	Fossil	37	4.2
		General Science	22	3.1
		Other	24	1.9
		Total	83	9.2
Health Effects	ERDA	Fossil	238	19.2
		Nuclear	256	41.3
		Solar	37	1.5
		Conservation	16	0.9
		General Science	252	25.4
		Other	23	1.6
		Total	822	89.9
	EPA	Fossil	47	4.6
		Conservation	6	0.8
		Other	20	1.2
		Total	73	6.6
	HEW/NIEHS	Fossil	71	5.3
		General Science	149	11.6
		Other	26	0.6
		Total	246	17.5

TABLE 3.4 (continued)

Subcategory	Agency	Technology	Number of projects reported	Funding (dollars in millions)
Health Effects (continued)	Other	Fossil	22	2.7
		Other	18	2.9
		Total	40	5.6
Ecological Processes and Effects	ERDA	Fossil	125	12.6
		Nuclear	115	10.7
		Geothermal	14	1.3
		Solar	31	2.3
		General Science	112	8.4
		Other	29	1.5
		Total	426	36.8
	EPA	Fossil	197	26.5
		Nuclear	19	1.1
		Conservation	13	1.1
		General Science	48	2.4
		Other	14	0.9
		Total	291	32.0
	DOI/BLM	Fossil	6	21.7
		Total	6	21.7
	Other	Fossil	49	6.4
		General Science	34	2.7
		Other	19	1.5
		Total	102	10.6
Integrated Assessment	ERDA	Fossil	131	13.8
		Nuclear	79	7.8
		Geothermal	23	1.9
		Solar	31	1.1
		Conservation	33	1.6
		General Science	56	4.6
		Total	353	30.8

TABLE 3.4 (continued)

Subcategory	Agency	Technology	Number of projects reported	Funding (dollars in millions)
Integrated Assessment (continued)	EPA	Fossil	129	20.1
		General Science	41	3.2
		Other	39	2.6
		Total	209	25.9
	DOI/BLM	Fossil	2	21.1
		Total	2	21.1
	Other	Fossil	37	4.9
		General Science	16	2.2
		Other	25	1.8
		Total	78	8.9

TABLE 3.5 Biomedical and Environmental Research Subcategory Funding by Energy Technology—(Combined Agency)

Technology	Characterization, measurement, and monitoring	Environmental Transport	Health Effects	Ecological processes and effects	Integrated assessment	Subcategory not specified	Total
Fossil general	27.4	4.8	14.5	3.4	5.3	31.7	87.1
Coal	19.6	3.9	5.6	3.9	5.9	14.6	53.5
Oil & gas	25.8	2.7	1.8	4.8	2.4	4.3	41.8
Oil shale	2.5	0.6	1.3	0.8	1.3	1.2	7.7
Biomass	0.4		0.2	0.2	0.2	0.7	1.7
Nuclear general	8.3	4.2	21.7	2.8	2.5	93.0	132.5
Fission	5.8	2.8	13.8	1.8	1.8	93.9	119.9
Fusion	0.2		0.7			0.6	1.5
Hydroelectric	0.4			0.1	0.2	0.1	0.6
Geothermal	5.0	0.2	0.5	0.1	1.5	2.3	9.6
Solar	1.6	0.6	1.3	1.9	1.1	1.5	8.0
Conservation	2.4	1.0	1.6	1.0	2.2	6.1	14.3
General Science	13.0	7.1	35.1	7.4	6.0	28.3	96.9
Other Technologies	0.1	0.9	0.9	0.1			2.0
Total	112.5	28.8	99.0	28.3	30.4	278.3	577.1

FIGURE 3.1 Distribution of Biomedical and Environmental Research Funding by Energy Technology

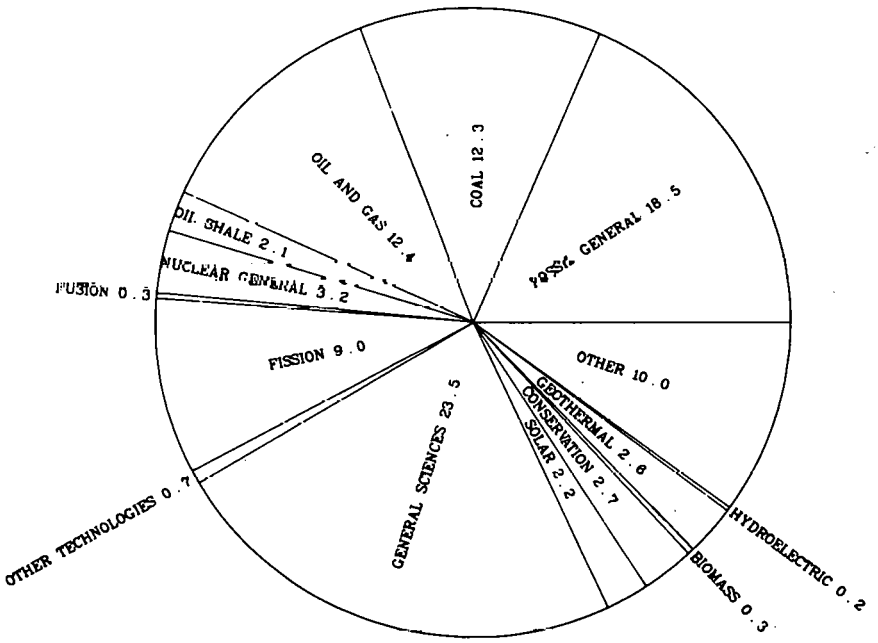


FIGURE 3.2 Distribution of Biomedical and Environmental Research Funding by Pollutant

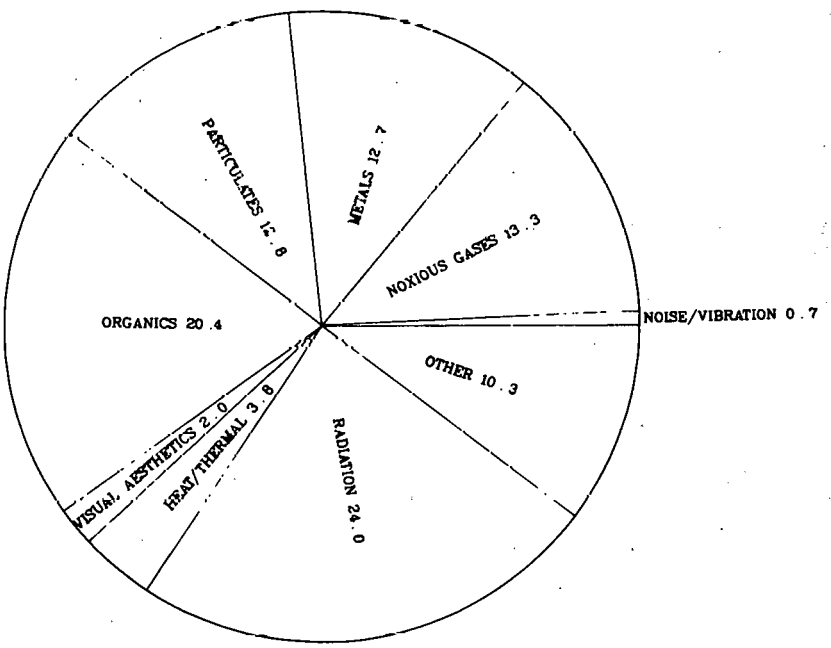
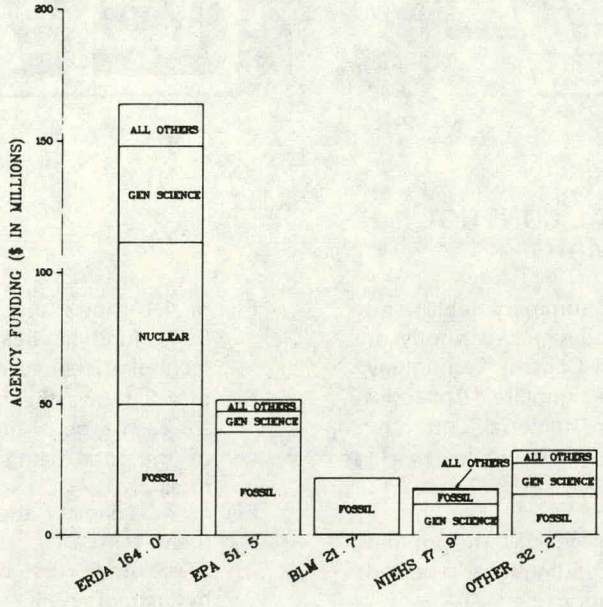
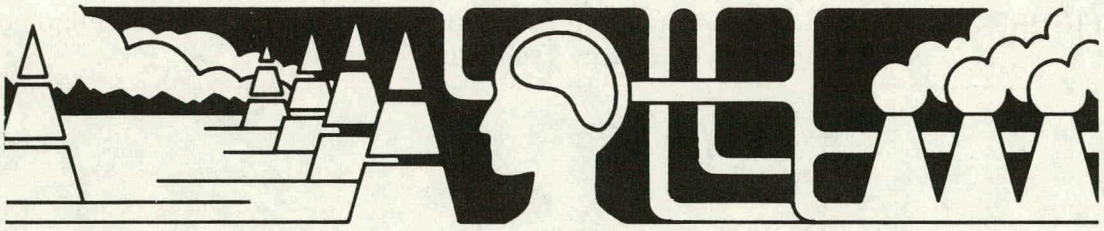


FIGURE 3.3 Distribution of Federal Biomedical and Environmental Research Funding Among Agencies, by Energy Technology





IV. ENVIRONMENTAL CONTROL TECHNOLOGY SUMMARY

This section provides summary tables and figures for those projects designated wholly or partially as Environmental Control Technology research. The sample questionnaire (Appendix A) provides descriptive material on the Environmental Control Technology (ECT) subcategories.

Table 4.1 lists the log agencies, the number of projects and funding level reported for the ECT category.

Table 4.2 shows the reported project relationship between monitoring and funding agencies for the ECT category.

Table 4.3 summarizes by monitoring agency, the number of projects and funding for each technology that each agency is addressing in the ECT category.

Figure 4.1 shows that share of the total ECT funding being spent for each technology (all agencies combined).

Figure 4.2 shows the funds spent on ECT for each type of pollutant as a percent of the total being spent on pollution research.

Figure 4.3 depicts the total funds being spent for ECT and the distribution of these funds, first by agency and then by technology.

TABLE 4.1 Federal Agency Responses for Environmental Control Technology Category

Log agency	Number of projects reported	Level of funding reported (dollars in millions)
Department of Agriculture	3	3.8
Department of Commerce	20	0.4
Department of Interior	8	2.9
Environmental Protection Agency	79	7.2
Energy Research and Development Administration	130	95.1
Federal Energy Administration	3	0.1
National Science Foundation	9	0.4
Nuclear Regulatory Commission	3	0.2
Tennessee Valley Authority	31	6.1
Total	286	116.2

TABLE 4.2 Distribution of Responses in the Environmental Control Technology Category

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
DOA	5	3.8	DOA	1	0.4	DOA	1	0.4
			DOA/FS	1	2.2	DOA/FS	1	2.2
			EPA	3	1.2	DOA	1	0.2
						DOA/FS	1	0.5
						HEW/FDA	1	0.5
DOC	21	0.9	DOC/NCAA	17	0.7	DOC/NOAA	17	0.7
			ERDA	2	0.1	DOC/NOAA	1	0.1
						ERDA	1	0.01
			Other	2	0.1	Other	2	0.1
DOI	8	3.4	DOI/BPA	1	0.1	DOI/BPA	1	0.1
			DOI/USGS	7	3.3	DOI/USGS	5	1.1
						NASA	1	0.05
						Unspecified	1	2.1
EPA	79	11.0	EPA	79	11.0	EPA	79	11.0
ERDA	142	98.0	DOI/BLM	2	0.1	ERDA	2	0.1
			EPA	6	0.8	EPA	1	0.1
						ERDA	5	0.7
			ERDA	127	96.8	EPA	1	0.1
						ERDA	125	96.7
			Other	7	0.3	Other	7	0.3
FEA	3	0.2	FEA	3	0.2	FEA	3	0.2
NRC	3	0.6	NRC	3	0.6	NRC	3	0.6
NSF	9	1.0	NSF	9	1.0	NSF	9	1.0
TVA	31	6.2	EPA	11	4.9	EPA	10	4.8
						GTC	1	0.1
			EPRI	1	0.1	EPRI	1	0.1
			TVA	19	1.2	TVA	19	1.2

TABLE 4.3 Projects and Dollars by Monitoring Agency and Technology for Environmental Control Technology

Monitoring agency	Technology	Number of projects reported	Funding (dollars in millions)
ERDA	Fossil	65	7.6
	Nuclear	56	85.8
	Other	35	1.3
	Total	156	94.7
EPA	Fossil	86	11.0
	Other	24	1.1
	Total	110	12.1
Other	Fossil	49	6.2
	Other	28	0.5
	Total	77	6.7

FIGURE 4.1 Distribution of Environmental Control Technology Funding by Energy Technology

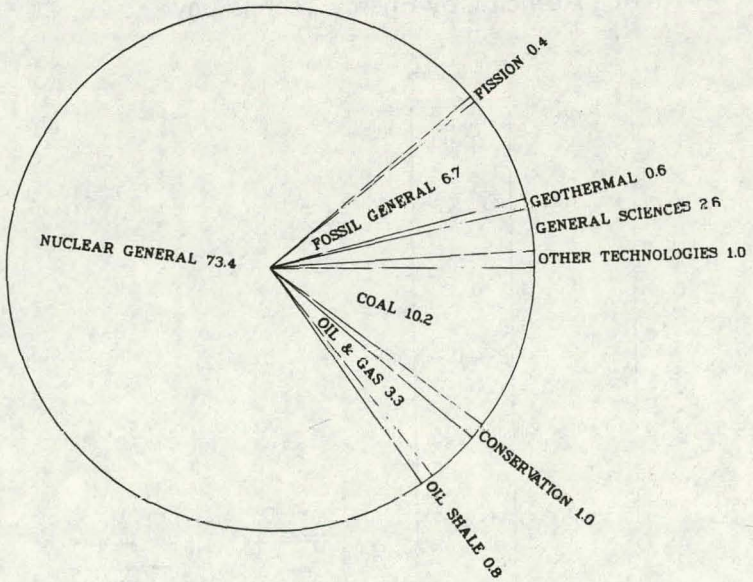


FIGURE 4.2 Distribution of Environmental Control Technology Funding by Pollutant

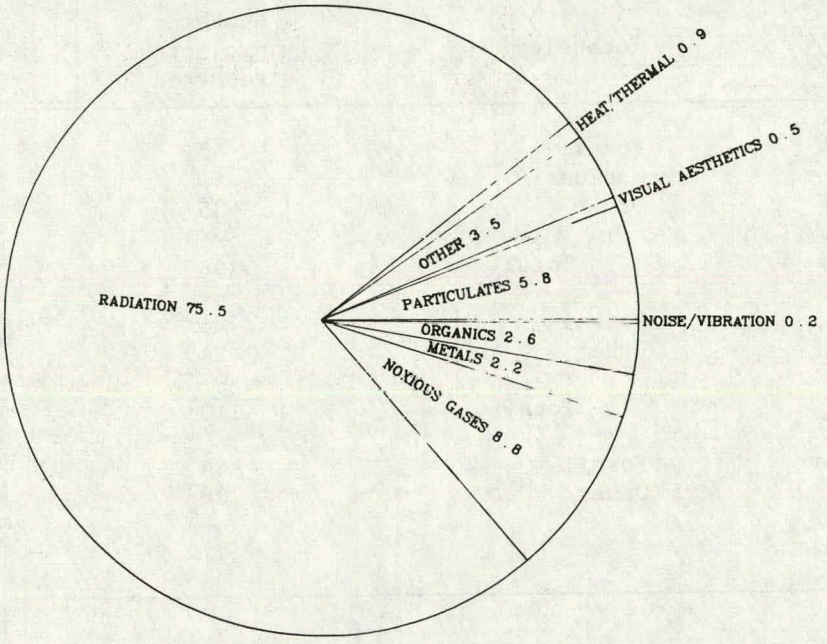
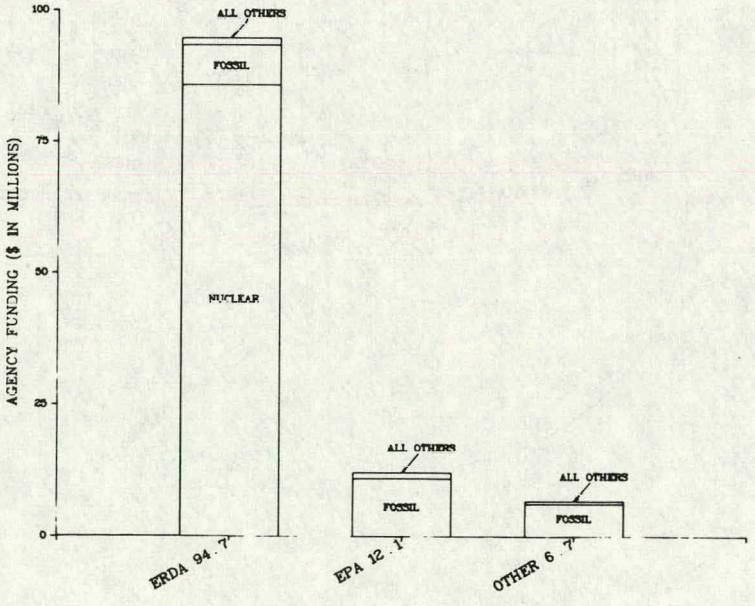
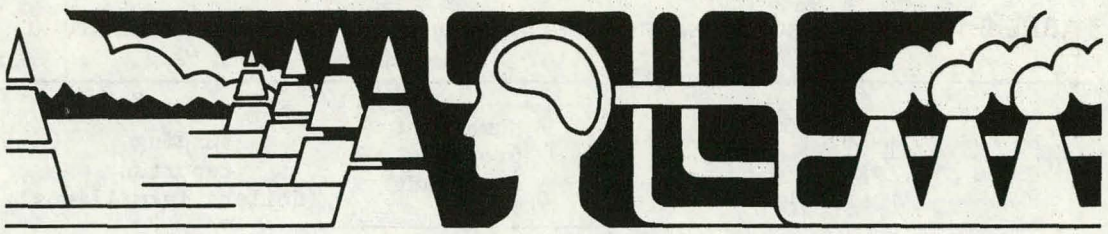


FIGURE 4.3 Distribution of Federal Environmental Control Technology Funding Among Agencies, by Energy Technology





V. OPERATIONAL AND ENVIRONMENTAL SAFETY SUMMARY

Summary figures and tables are presented in this section for those projects designated applicable, wholly or partially, to the category of Operational Safety research. The subcategories of Operational and Environmental Safety (OES) research are defined in the FY 1977 sample questionnaire (see Appendix A).

Table 5.1 lists the log agencies, the number of projects and funding level reported for the OES category.

Table 5.2 shows the reported project relationship between monitoring and funding agencies for the OES category.

Table 5.3 summarizes the number of projects and funding for each technology that each monitoring agency is addressing in the OES category.

Figure 5.1 shows that share of the total Operational and Environmental Safety funding being spent for each technology (all agencies combined).

Figure 5.2 shows the OES funds spent for each type of pollutant, as a percent of the total being spent on pollution research.

Figure 5.3 depicts by agency, the total money being spent for Operational and Environmental Safety for each technology.

TABLE 5.1 Federal Agency Responses for Operational and Environmental Safety

Log agency	Number of projects reported	Level of funding reported (dollars in millions)
Department of Commerce	10	0.5
Department of Health, Education, and Welfare	5	0.5
Department of Interior	4	0.9
Department of Transportation	9	1.6
Environmental Protection Agency	4	0.2
Energy Research and Development Administration	63	6.5
National Science Foundation	6	0.2
Nuclear Regulatory Commission	71	86.6
Tennessee Valley Authority	2	0.1
Total	174	97.1

TABLE 5.2 Distribution of Responses for Operational and Environmental Safety Category

Responding agency	Number of projects reported	Funding (dollars in millions)	Funding agency	Number of projects reported	Funding (dollars in millions)	Monitoring agency	Number of projects reported	Funding (dollars in millions)
DOC	10	1.2	DOC/NBS	1	0.07	DOC/NBS	1	0.07
			DOC/NOAA	4	0.2	DOC/NOAA	4	0.2
			ERDA	3	0.8	DOC/NOAA	1	0.1
						ERDA	2	0.7
			NRC	2	0.1	NRC	2	0.1
DOI	4	1.9	DOI/USGS	4	1.9	DOI	1	0.04
						DOI/USGS	2	1.8
						NASA	1	0.05
DOT	9	1.6	DOT	9	1.6	DOT	9	1.6
EPA	4	0.5	EPA	4	0.5	EPA	4	0.5
ERDA	64	7.5	ERDA	63	7.5	ERDA	63	7.5
			Other	1	0.006	Other	1	0.006
HEW	7	0.7	EPA	3	0.4	EPA	1	0.1
						HEW/NIEHS	2	0.3
			HEW/NIEHS	3	0.1	HEW/NIEHS	3	0.1
			HEW/NIOSH	1	0.2	HEW/NIOSH	1	0.2
NRC	72	87.0	ERDA	1	19.2	NRC	1	19.2
			NRC	71	67.8	NRC	71	67.8
NSF	6	0.7	NSF	6	0.7	NSF	6	0.7
TVA	2	0.1	EPA	2	0.1	EPA	2	0.1

TABLE 5.3 Projects and Dollars by Monitoring Agency and Technology for Operational and Environmental Safety Category

Monitoring agency	Technology	Number of projects reported	Funding (dollars in millions)
ERDA	Nuclear	42	5.2
	Other	43	1.7
	Total	85	6.9
NRC	Nuclear	69	86.3
	General Science	5	0.3
	Total	74	86.6
Other	General Science	13	1.7
	Other	22	1.2
	Total	35	2.9

FIGURE 5.1 Distribution of Operational and Environmental Safety Funding by Energy Technology

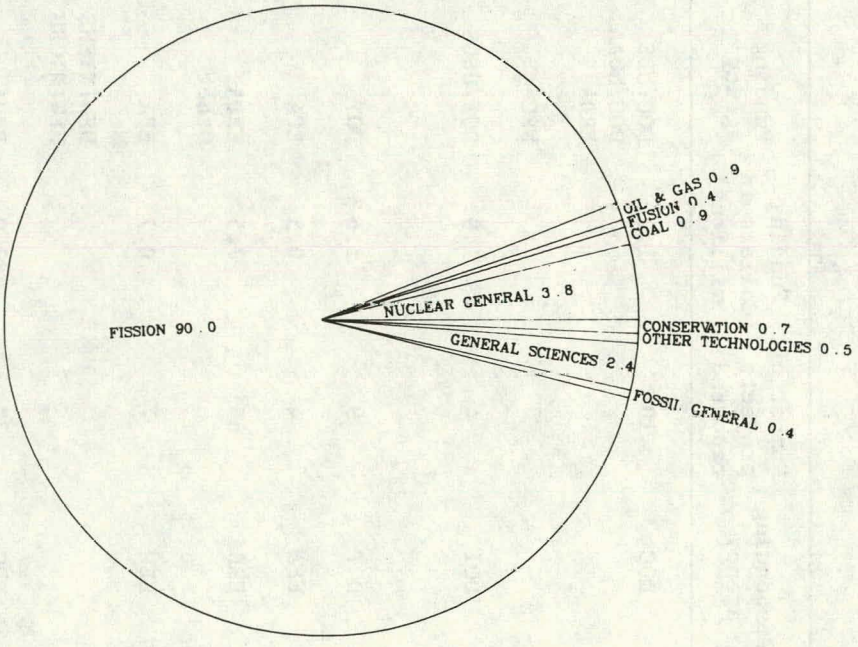


FIGURE 5.2 Distribution of Operational and Environmental Safety Funding by Pollutant

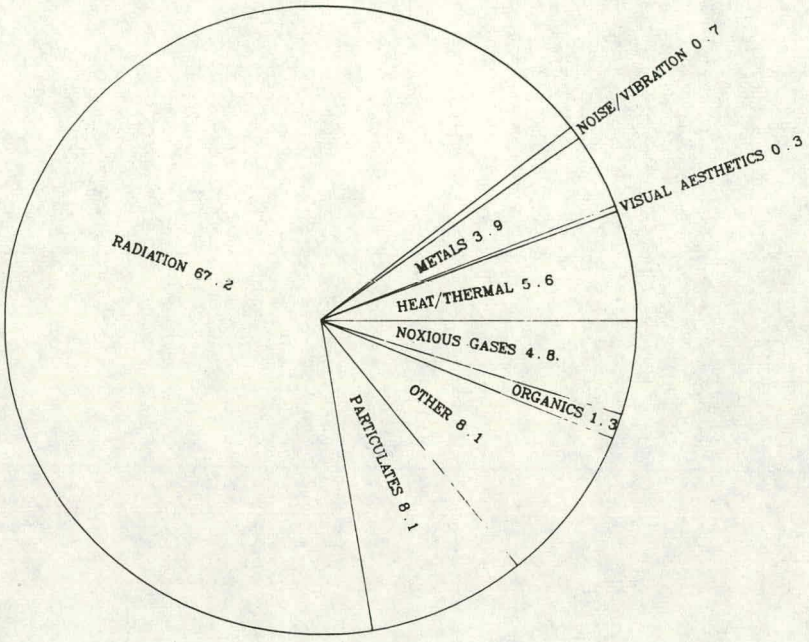
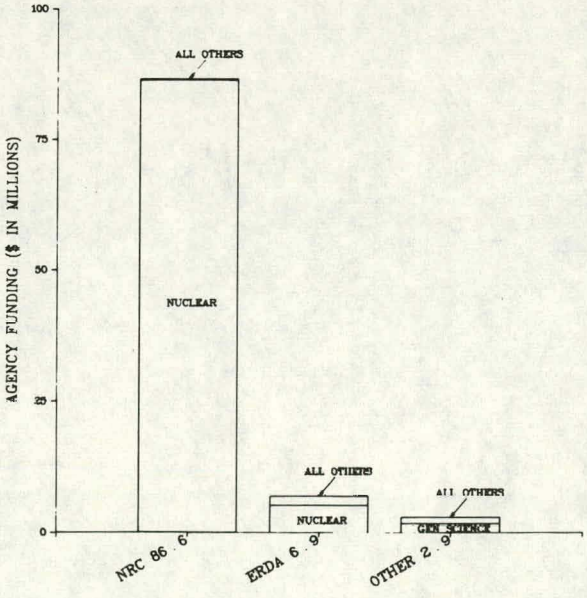


FIGURE 5.3 Distribution of Federal Operational and Environmental Safety Funding Among Agencies, by Energy Technology



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APPENDIX A. INVENTORY QUESTIONNAIRE (Form 294-FY 1977)

FORM ERDA-294
(1-77)

FORM APPROVED
OMB NO.038-R0188

Inventory of Federal Energy-Related Environment and Safety Research

FY 1977

Energy Research and Development Administration
Office of the Assistant Administrator
for Environment and Safety

INSTRUCTIONS

for

Project Documentation

Energy-Related Environment and Safety Projects

For purposes of this Inventory, a project is defined as an investigation with a specific objective to be met within prescribed time and dollar limitations (normally planned on a fiscal year basis). It may be a theoretical or analytical study. It may be basic or applied research or development. It will generally be the lowest level or an agency's work breakdown structure. More detailed breakdowns of a work unit by a contractor are not generally considered to be a project. A contract may cover multiple projects, however, a project would not involve more than one contract.

- **The agency performing the research in-house or directly contracting for the research effort will report on the project. They will also report the source(s) and types of funds which pay for the project.**

SECTION I - ADMINISTRATIVE

Item 1	Please use full project title. Do not abbreviate.
Item 2	This will be the identification number of the responsible federal agency for both new and continuing projects. (In the case of ERDA projects, use the Research Project Identification System (RPIS) number, if known.)
Item 3	Date of completion of questionnaire.
Items 4 through 6	Self explanatory.
Item 7	If project is being performed in a foreign country, insert country's name under Item 7 - STATE.
Items 8 and 9	Self explanatory.
Item 10	FTS - Federal Telecommunications System
Item 11	Monitoring Agency is the federal agency responsible for interfacing with the contractor and directly monitoring the contracted work. (This may or may not be the funding agency)
Items 12 through 15	Self explanatory.
Item 16	In most cases, the Funding Agency is the same as the monitoring agency. If funding is received from more than one agency, please list each agency's funding separately.
Item 17	Enter scientific and technical manpower only; do not include management, secretarial, and administrative support (graphics, publishing, etc.).
Item 18	If current activity is a continuation of a previous project, the start date should indicate the initiation of the prior work. Thus, the duration should cover the time from the start of previous work to the expected completion date. If the project is a continuing activity with no set completion date, enter N/A for not applicable.

(Instructions are continued on inside back cover)

Form ERDA-294
(1-77)

INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT DOCUMENTATION - FY 1977

(Please print in black ink or type)

SECTION I - ADMINISTRATIVE

PROJECT TITLE

1. PROJECT TITLE

	2. PROJECT NUMBER	3. DATE *(Day, month, year)*

PRINCIPAL INVESTIGATOR

4. NAME *(Last, first, initials)*

5. BUSINESS ADDRESS

6. CITY	7. STATE	8. ZIP

9. INVESTIGATOR'S AFFILIATION *(Full name)*

10. TELEPHONE (Area) _____ ◯ FTS ◯ Commercial

PROJECT MONITOR

11. MONITORING AGENCY(s) *(Full name)*

12. MONITORING AGENCY DIVISION OR OFFICE *(Full name)*

13. MONITOR'S PROJECT OFFICER *(Last, first, initials)*	14. TELEPHONE (Area) _____	◯ FTS ◯ Commercial

PROJECT ACCOUNTING

15. TYPE OF FUNDING ACTIVITY *(Check one)*

a. ◯ Contract No. _____
b. ◯ Grant No. _____
c. ◯ Agency in-house effort
d. ◯ EPA "pass-thru" funding
e. ◯ Interagency agreement _____ (funding agency)

16. FUNDING *($ thousands)*

Funding Agency(s)	FY 76	FY 77
	$	$
	$	$

17. SCIENTIFIC AND TECHNICAL MANPOWER *(Man Years)*

a. FY 76 _____ b. FY 77 _____

18. PROJECT SCHEDULE

a. Duration: _____ months
b. Start date: _____ (day, month, year)
c. Expected completion date (if not applicable, enter N/A) _____ (day, month, year)

Form ERDA-294
(1-77)

INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

SECTION IIA — GENERAL CATEGORIES
(Enter project percentages in applicable boxes and check applicable circles)

TECHNOLOGY

19. FOSSIL FUELS (including synfuel)
- a. [ ] Fossil Fuels (general)
- b. [ ] Coal
  - 1) ○ Conversion - Liquefaction
  - 2) ○ Conversion - Gasification
- c. [ ] Oil and Gas
- d. [ ] Oil Shale
- e. [ ] Biomass - pyrolysis

20. NUCLEAR
- a. [ ] Nuclear (general)
- b. [ ] Fission
  - 1) ○ Converters
  - 2) ○ Breeders
- c. [ ] Fusion
  - 1) ○ Magnetic
  - 2) ○ Laser

21. [ ] HYDROELECTRIC

22. GEOTHERMAL
- a. [ ] Geothermal (general)
- b. [ ] Hydrothermal
- c. [ ] Geopressurized
- d. [ ] Hot dry rock

23. SOLAR
- a. [ ] Solar (general)
- b. [ ] Direct heat/cool
- c. [ ] Electric
- d. [ ] Ocean, wind
- e. [ ] Biomass

24. CONSERVATION
- a. [ ] Conservation (general)
- b. [ ] End use
- c. [ ] Improved conversion efficiency
- d. [ ] Energy storage

25. Reserved

26. [ ] GENERAL (OR BASIC) SCIENCE

27. Reserved

28. Reserved

TOTAL to 100% (items 19 through 28)

ENERGY CYCLE

29. [ ] Extraction
30. [ ] Combustion in situ
31. [ ] Transportation
32. [ ] Storage
33. [ ] Processing, Conversion
34. [ ] Combustion or End-use
35. [ ] Electricity generation
36. [ ] Electrical transmission
37. [ ] Waste management
38. [ ] Does not apply

TOTAL to 100% (items 29 through 38)

POLLUTANTS (specify)

39. [ ] Noxious gases _____
40. [ ] Metals _____
41. [ ] Particulates _____
42. [ ] Organics _____
43. [ ] Radiation _____
44. [ ] Noise/Vibration _____
45. [ ] Heat/Thermal _____
46. [ ] Visual Aesthetics _____
47. [ ] Other _____
48. [ ] None

TOTAL to 100% (items 39 through 48)

CHARACTER OF STUDY

49. [ ] Research
- 1) ○ Theoretical
- 2) ○ Laboratory
- 3) ○ General
- 4) ○ Applied

50. [ ] Development
- 1) ○ Laboratory Scale
- 2) ○ Pilot Plant

51. [ ] Full Scale Demonstration

52. [ ] Production

53. [ ] Analytical/"Paper" Study)

TOTAL to 100% (items 49 through 53)

REGIONS OF INTEREST
(Check applicable circles)

54. Biomes
- a. ○ Atmospheric
- b. ○ Terrestrial
- c. ○ Freshwater
- d. ○ Estuarine
- e. ○ Marine
- f. ○ Does not apply

55. Geographic Areas
- a. ○ Northeast
- b. ○ Midwest
- c. ○ Southeast
- d. ○ Middle Atlantic
- e. ○ South
- f. ○ Southwest

55. (continued)
- g. ○ Far west
- h. ○ Northwest
- i. ○ Alaska
- j. ○ Continental
- k. ○ Global
- l. ○ Site specific _____ (specify)
- m. ○ Does not apply

56. Reserved

57. Coasts
- a. ○ Northeast
- b. ○ Southeast
- c. ○ Gulf

57. (continued)
- d. ○ Far west
- e. ○ Northwest
- f. ○ Alaska
- g. ○ Other _____ (specify)
- h. ○ Does not apply

58. Reserved

59. Hydrographic Areas
- a. ○ Deep ocean
- b. ○ Continental shelf
- c. ○ Great Lakes
- d. ○ Other _____ (specify)
- e. ○ Does not apply

Form ERDA-294
(1-77)

INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

SECTION IIB BIOMEDICAL AND ENVIRONMENTAL RESEARCH CATEGORIES
(Enter project percentages in applicable boxes)

CHARACTERIZATION, MEASUREMENT, AND MONITORING

60. Characterization of source terms and pollutants
   a. [ ] Baseline measurements
   b. [ ] Operating site measurements

61. Measurement technology
   a. [ ] Advanced concepts, components and systems
   b. [ ] Applied systems
   c. [ ] Quality assurance and standards

62. Monitoring
   a. [ ] Occupational health
   b. [ ] Public health

ENVIRONMENTAL TRANSPORT - PHYSICAL AND CHEMICAL PROCESSES AND EFFECTS

63. [ ] Environmental transport, dispersion and diffusion of pollutants (including modeling and geochemical cycling).
64. [ ] Physical and chemical transformation of pollutants (e.g., photochemical reactions in atmosphere, adsorption of pollutants by soil particles).
65. [ ] Processes by which pollutants are removed from air, land and water.
66. [ ] Pollutant effects on materials.
67. [ ] Terrestrial disturbances resulting from resource extraction (e.g., seismic activity, surface modification, aquifer disruption).
68. [ ] Meteorological/climatic effects of heat, moisture, and pollutant releases.

HEALTH EFFECTS

69. [ ] Screening for hazardous agents (toxicity, teratogens, carcinogens, etc.)
70. [ ] Determine disposition, metabolism, turnover, and elimination of hazardous agents.
71. [ ] Determine processes of damage, repair, recovery, protection, and amelioration.
72. Determine effects of energy-related pollutants on man
   a. [ ] Epidemiological studies
   b. [ ] Clinical studies
   c. [ ] Biological dose-effect studies (non-human experimental research models).

ECOLOGICAL PROCESSES AND EFFECTS

73. [ ] Baseline measurements and determination of ecological parameters.
74. [ ] Ecological impacts related to physical disturbances (e.g., injection of waste heat, land disruption-reclamation, offshore drilling).
75. Ecological impacts related to chemical disturbances
   a. [ ] Absorption and toxicity of pollutants
   b. [ ] Cycling of pollutants in the biosphere
   c. [ ] Biotransformation of pollutants.

INTEGRATED ASSESSMENT

76. [ ] Environmental Data Integration
77. [ ] Health Assessment Methodology (includes transport models)
78. [ ] Environmental Assessment Methodology (includes socio/economic and cultural implications, and regional coordination and case studies)
79. [ ] National/Regional Energy Technology Assessments
80. [ ] Environmental Policy Analysis

Total to 100% (Items 60 thru 80)

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INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

SECTION IIC ENVIRONMENTAL CONTROL TECHNOLOGY R&D CATEGORIES
(Enter project percentages in applicable boxes and check applicable circles)

Environmental Control

Development of procedures, processes, and systems which are designed to mitigate the environmental, health and safety impact of emissions and discharges and energy system wastes.

81. ☐ Air Quality Controls

82. ☐ Solid Waste Management and Land Reclamation

83. ☐ Water Control and Protection

84. ☐ Other (Explain) _____

85. ☐ Disposal of surplus contaminated equipment and facilities.

Energy Materials Transport

86. ☐ Development of procedures, processes, and systems for the safe, secure, and operationally efficient handling, packaging, and transport of fuel cycle materials in accordance with environmental, health, and safety standards.

_____

TOTAL to 100% (items 81 through 86)

SECTION IID OPERATIONAL SAFETY R&D CATEGORIES
(Enter project percentages in applicable boxes and check applicable circles)

87. ☐ Preparation and distribution of safety methods, standards, and regulations.

88. ☐ Evaluation and monitoring of plant and site operations and safety compliance.

89. ☐ Accident prevention programs, including training programs in health and safety.

90. ☐ Reactor safety programs, including decontamination and disposal.

91. ☐ Risk assessment

1) ○ Data collection

2) ○ Statistical data analysis

3) ○ Accident investigation

92. ☐ Other safety programs _____ (specify)

_____

TOTAL to 100% (items 87 through 92)

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INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

SECTION III PROJECT DESCRIPTION

93. PROJECT SUMMARY (200 words or less)

a. Objective:

b. Approach:

c. Product/Results Expected:

94. PROJECT MILESTONES

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INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

SECTION III PROJECT DESCRIPTION (continued)

95. KEY WORDS

In the Key Word List below, please circle up to six key words that best characterize your project. If the Key Word List is inadequate, provide up to three additional words which describe your project (maximum total six words). List and define additional words in space provided at bottom of this page.

Aerosols	Flora	Noise
Aging	Food	Oil Spills
Air	Forests	Oxidation
Americium	Gamma Ray	Pathogenesis
Animal	Genetics	Photosynthesis
Antimony	Glands	Plants
Arsenic	Heart	Plumes
Bacteria	Hormones	Plutonium
Biochemistry	Human	Radionuclide
Biomass	Hydrocarbon	Reproduction
Biopsy	Immunology	Respiration
Blood	Infrared	RNA
Bone	Ingestion	Safety
Cancer	Inhalation	Scrubber
Carcinogens	Instrumentation	Selenium
Cells	Invertebrates	Sewage
Chlorine	In vitro	Sociology
Chromium	In vivo	Soils
Climates	Iodine	Somatic
Computer Codes	Kidneys	Subsidence
Construction	Land	Sulfur Compound
Copper	Lead	Synthetic Fuels
Diseases	Lungs	Teratogenesis
DNA	Magnetic Fields	Thyroid
Economics	Medicine	Tissues
Ecosystem	Mercury	Toxicology
Effluents	Metabolism	Toxins
Electromagnetic	Meteorology	Tritium
Element (Specify)_____	Microwave	Ultraviolet
Emissions	Mining	Virus
Enzymes	Molecular	Waste
Epidemiology	Mutagenesis	Water
Fate	Mutation	Weather
Fauna	Neoplasms	X-ray
Financial	Neurology	Xenon
Fishes	Nitrogen Compounds	Zinc

ADDITIONAL KEY WORDS AND DEFINITIONS

a) _____ _____

_____

b) _____ _____

_____

c) _____ _____

_____

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INVENTORY OF FEDERAL ENERGY-RELATED ENVIRONMENT AND SAFETY RESEARCH

PROJECT NUMBER _____

ADDITIONAL INFORMATION

96. COMMENTS OR REMARKS

SECTION IIA - GENERAL PROJECT CATEGORIZATION

Items 19 through 28 — Taking the whole scope of your project as 100%, estimate the percentage of the funding which applies to each of the numbered Technology Categories and write the percentage in the appropriate box. For those categories (such as Fossil Fuels) having further subcategorization (such as Conversion-Liquefaction), check in the appropriate circles. The sum of the percentages under Technology boxes should total to 100%.

Insert a percentage figure in the General Science box (item 26) only if your project, or some portion, is basic in nature and not directly related to any specific energy technology.

Items 29 through 59 — Proceed in a similar fashion to allocate a percentage of total effort being devoted to the various sequences of the ENERGY CYCLE (items 29 through 38), and also estimate the percentage applicable to the various POLLUTANTS (items 39 through 48). In each case, total to 100% as indicated. Under CHARACTER OF STUDY (items 49 through 53), the Analytical or "Paper" study (item 53) is defined as the compilation, evaluation, and/or synthesis of secondary data and information. These studies are not involved with the actual generation of original data. Under REGIONS OF INTEREST (items 54 through 59), check the applicable circles.

SECTIONS IIB, IIC, AND IID - ENVIRONMENT AND SAFETY CATEGORIES

Items 60 through 92 — Complete Section IIB, IIC, or IID, whichever applies to your project. If you believe your project is applicable to more than one section, complete those sections. Enter estimated percentages in the appropriate boxes, check appropriate circles, and total each section to 100% as indicated.

SECTION III - PROJECT DESCRIPTION

Item 93 — Enter a Project Summary (limit 200 words) covering the following:

Objective(s). State project objectives, quantifying where possible (e.g., "demonstrate 95% recovery of sulfur from raw gas with molten salt recycling at a rate of one gallon per minute").

Approach. Describe the technical approach to the project, i.e., how the work is to be done. (See Supplemental Instructions applicable only to Biomedical and Environmental Research projects.)

Expected Product/Results. Describe the final products or results expected from the project and their importance and relevance.

Item 94 — A milestone is defined as a recognizable, project-important event that is expected to occur at a future point in time. An example might be "first launch of a fully instrumented balloon" or "interim report distributed." Milestones also include scheduled decision dates important to the design of an experiment or to the direction of research.

Item 95 — Self explanatory.

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SUPPLEMENTAL INSTRUCTIONS FOR SECTION III, ITEM 93

(APPLICABLE TO BIOMEDICAL AND ENVIRONMENTAL RESEARCH CATEGORIES)

Characterization, Measurement, and Monitoring

The requirements for information to be included in descriptions of projects under Characterization, Measurement, and Monitoring are very sensitive to the subcategory involved. If a project is directed toward the Characterization of Source Terms and Pollutants, the description should provide information of the instrumentation, the range, type, and number of measurements involved in the characterization of elemental, molecular, and particulate species, as well as the efforts being made to describe such agents as radiation, pressure, temperature, and electromagnetic fields.

If the project is in the Measurement Technology area, the description should indicate whether the project is intended to explore new and advanced approaches for pollutant detection, specification and measurement, or to develop specific measurement systems. In the latter instance the specific pollutant and the method of detection should be identified.

In the Monitoring area, descriptions should be provided of advanced strategies, techniques, and procedures for quantifying estimates of both occupational and general population exposure to energy-related pollutants.

Environmental Transport - Physical and Chemical Processes and Effects

Descriptions for projects in these areas should describe the design of the experiment, including such items as the pollutants involved, concentration and duration of exposure to toxic agents or pollutants, test organisms, methods of measurement, and environmental characteristics of test sites (if applicable).

Health Effects

The experimental design should be described, including:

a) test system(s): in vivo (species); in vitro (cell(s), organs, etc.)

b) exposure conditions: identity of chemical, biological or physical agents where pertinent, route of administration, dose and duration of exposure; acute, chronic, intermittent (cite time regimens)

c) biological endpoints to be assessed: metabolic, physiologic or pathologic changes, target organ, cellular or molecular species, developmental, mutagenic or carcinogenic effects.

Ecological Processes and Effects

See instructions for Environmental Transport - Physical and Chemical Processes and Effects.

Integrated Assessments

State issues of problems to be solved. Give results where possible. Where alternatives are developed, specify them. State technologies to which the project is related. For case studies, suggest possible wider application and do the same for any methodology developed.

Where models or data bases are used, they should be identified. Relation to other assessments should be stated, particularly if done by other agencies, or if aggregation or disaggregation is involved in which other assessments are used. Specific sites should be identified, as should states, river basins, mountain ranges or valleys, etc., where project work was done. If results of assessments are being used by state or regional commissions, offices, etc., or are directed toward their use, describe such use. Indicate relation to, or impact on, policy.

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APPENDIX B

RESPONDING AGENCY ABBREVIATIONS

Department of Agriculture	DOA
Department of Commerce	DOC
Department of Interior	DOI
Department of Transportation	DOT
Environmental Protection Agency	EPA
Energy Research and Development Administration	ERDA
Department of Health, Education and Welfare	HEW
Nuclear Regulatory Commission	NRC
National Science Foundation	NSF
Tennessee Valley Authority	TVA

FUNDING AGENCY ABBREVIATIONS

Department of Agriculture	DOA
Forest Service	DOA/FS
Department of Commerce	DOC
National Bureau of Standards	DOC/NBS
National Oceanographic and Atmospheric Administration	DOC/NOAA
Department of Health, Education and Welfare	HEW
National Cancer Institute	HEW/NCI
National Institute of Environmental Health Sciences	HEW/NIEHS
National Heart, Lung and Blood Institute	HEW/NHLB
Department of Interior	DOI
Bureau of Land Management	DOI/BLM
U.S. Geological Survey	DOI/USGS
Department of Transportation	DOT
Environmental Protection Agency	EPA
Energy Research and Development Administration	ERDA
Electric Power Research Institute	EPRI
Federal Energy Administration	FEA
National Science Foundation	NSF

MONITORING AGENCY ABBREVIATIONS

Department of Agriculture	DOA
Forest Service	DOA/FS
Department of Commerce	DOC
National Bureau of Standards	DOC/NBS
National Oceanographic and Atmopsheric Administration	DOC/NOAA

Department of Health, Education and Welfare	HEW
National Institute for Occupational Safety and Health	HEW/NIOSH
National Cancer Institute	HEW/NCI
National Institute of Environmental Health Sciences	HEW/NIEHS
National Heart, Lung and Blood Institute	HEW/NHLB
Public Health Services	HEW/PHS
Department of Interior	DOI
Fish and Wildlife Services	DOI/FWS
Bureau of Land Management	DOI/BLM
U.S. Geological Survey	DOI/USGS
National Marine Fisheries Service	DOI/NMFS
Department of Transportation	DOT
Environmental Protection Agency	EPA
Energy Research and Development Administration	ERDA
Argonne National Laboratory	ERDA/ANL
Brookhaven National Laboratory	ERDA/BNL
Clinch River Breeder Reactor	ERDA/CRBR
Los Alamos Scientific Laboratory	ERDA/LASL
Oak Ridge National Laboratory	ERDA/ORNL
Pacific Northwest Laboratory	ERDA/PNL
Electric Power Research Institute	EPRI
Federal Energy Administration	FEA
Food and Drug Administration	FDA
Georgia University	GU
General Technologies Corp.	GTC
National Science Foundation	NSF
RANN	NSF/RANN
Director of Research	
National Aeronautics and Space Administration	NASA
Tennessee Valley Authority	TVA
Nuclear Regulatory Commission	NRC

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