United States
Environmental Protection
Agency

Research and
Development
Washington, D.C. 20460

EPA 600/9-79-016
August 1979

Energy, Minerals and Industry

EPA

Decision Series

Fiscal Year 1977 Research Program Abstracts

of the

Interagency Energy/Environment R&D Program

The Energy/Environment R&D Decision Series

Some of the basic problems facing our society today involve the use of our energy resources and the consequent effects on our environment. These problems affect everyone, and everyone has an interest in their resolution. But the technical aspects of these problems make it difficult for a major portion of the interested public to understand and participate in the decision-making process. This volume contributes to the bridging of this information gap.

The Energy/Environment R&D Decision Series was inaugurated late in 1976. The series presents, in an easily understood and informative manner, selected key issues and findings of the Federal Interagency Energy/Environment Research and Development Program, which was initiated in fiscal year 1975. Planned and coordinated by the Environmental Protection Agency (EPA), the Interagency Program sponsors more than 1,000 research projects ranging from the analysis of health and environmental effects of energy systems to the development of pollution control technologies.

If you have any comments, please write to Editor, RD-681, US EPA, Washington, DC 20460. This document is available through the National Technical Information Service, Springfield, VA 22161. Mention of trade names and commercial products herein does not constitute EPA endorsement or recommendation for use.

All sources contained in this document have been updated and verified as of April 20, 1979. We welcome your suggestions.

Editor: Francine Sakin Jacoff
Design & Text: Peter J. Mavraganis

Fiscal Year 1977 Research Program Abstracts

of the

Interagency Energy/Environment R&D Program

United States Environmental Protection Agency
Office of Research and Development
Office of Energy, Minerals and Industry

August 1979

Table of Contents

Introduction 1

Control Technology Program 9

- Fuel Processing, Preparation and Advanced Combustion 15
- Fuel Extraction 35
- Environmental Impacts of Conventional and Advanced Energy Systems 53
- Flue Gas Sulfur Oxide Control 95
- Nitrogen Oxide Control 103
- Flue Gas Particulate Control 109

Health and Environmental Effects 121

- Ecological Effects 125
- Transport and Fate 151
- Measurement Systems and Instrumentation 167
- Health Effects 185

Project Title Index 211

Introduction

Administered by the Office of Energy, Minerals and Industry within EPA's Office of Research and Development, the Interagency Energy/Environment Program plans, coordinates, and funds research and development on the health and environmental effects and on control technologies related to all forms of energy development.

This document contains the project-level descriptions of most of the $96 million in research and development projects funded by the Interagency Program during FY 1977.

The two major sections of this document are (1) Environmental Control Technology and (2) Health and Environmental Effects, which correspond to the two major program research areas. These research sections are further divided into the specific research categories shown below:

Control Technology

- Fuel Processing, Preparation, and Advanced Combustion
- Fuel Extraction
- Environmental Impacts of Conventional and Advanced Energy Systems
- Flue Gas Sulfur Oxide Control
- Nitrogen Oxide Control
- Flue Gas Particulate Control

Health and Environmental Effects

- Ecological Effects
- Transport and Fate
- Measurement Systems and Instrumentation
- Health Effects

Pertinent information contained within each project description includes project title, funding, project officer and affiliation, principal investigator and affiliation, project milestones, and abstract. The project descriptions are obtained by accessing the Office of Research and Development Information System and Project Tracking System (ORDIS/PTS).

One of the main thrusts of the Interagency Program is to improve information transfer between the technical community, decisionmakers, and the public.

In adhering to this policy, this document has been designed to be used with the following three companion documents, each of which highlight different aspects of the program.

> *Interagency Energy/Environment R&D Program Status Report,* EPA-600/9-79-014. This report covers, in executive summary format, the scope of the Interagency Program. Included are descriptions of the program history, current efforts, and future goals and directives.

Who's Who V—Interagency Energy/Environment R&D Program Directory and Index, EPA-600/9-79-017. This directory lists about 500 key Federal officials involved in various fields of energy-related research. *Who's Who V* identifies all R&D areas in the Interagency Program as well as the names, addresses, and phone numbers of the individuals responsible for each project. Through use of this effective reference tool, decisionmakers as well as interested citizens can easily obtain information on any part of the program and related efforts.

Bibliography of the Interagency Energy/Environment R&D Program, EPA-600/9-79-015. This document lists publications resulting from research and development performed under the auspices of the Interagency Program. The listed publications range from the most current research and development and date back to the research projects initiated at the program's inception in 1975.

For FY 1977 the Control Technology portion of the Interagency Program consisted of 61.5 percent of the program budget for a total $59 million and the Health and Environmental Effects segment contained the remaining 38.5 percent or $37 million. The following table shows a breakdown of the funding for each specific research category:

Table 1. Funding by Research Category (FY 1977)

Category	Funding ($ million)
CONTROL TECHNOLOGY	
Fuel Processing, Preparation and Advanced Combustion	19.4
Fuel Extraction	7.1
Environmental Impact of Conventional and Advanced Energy Systems	10.7
Flue Gas Sulfur Oxide Control	11.3
Nitrogen Oxide Control	6.1
Flue Gas Particulate Control	4.4
Total	59.0
HEALTH AND ENVIRONMENTAL EFFECTS	
Ecological Effects	12.0
Transport and Fate	4.0
Measurement Systems and Instrumentation	8.3
Health Effects	12.7
Total	37.0

Table 2 shows total program funding for FY 1977 by participating agency.

Table 2. Funding by Agency (FY 1977)

Agency	Funding ($ thousand)
EPA	69983
DOE	5196
TVA	4387
NIEHS	3172
NOAA	3153
USDA	2929
FWS	2343
NIOSH	2230
NBS	1072
USGS	989
NASA	546
	96000

Tables 3 and 4 show program funding by research category across agency and by research category across fuel source, respectively.

Table 3. Funding by Research Category Across Agency (FY 1977) ($ thousand)

	EPA	DOE	TVA	NIEHS	NOAA	USDA	FWS	NIOSH	NBS	USGS	NASA	Total
Control Technology												
Fuel Processing, Preparation and Advanced Combustion	17,290	1,235	880	-	-	-	-	-	-	-	-	19,405
Fuel Extraction	5,980	-	-	-	-	1,120	-	-	-	-	-	7,100
Environmental Impact of Conventional and Advanced Energy Systems	9,776	290	238	-	-	396	-	-	-	-	-	10,700
Flue Gas Sulfur Oxide Control	10,109	-	1,191	-	-	-	-	-	-	-	-	11,300
Nitrogen Oxide Control	5,950	-	150	-	-	-	-	-	-	-	-	6,100
Flue Gas Particulate Control	4,400	-	-	-	-	-	-	-	-	-	-	4,400
Subtotal	53,505	1,525	2,459	-	-	1,516	-	-	-	-	-	59,005
Health and Environmental Effects												
Ecological Effects	4,734	615	1,085	179	1,628	1,413	2,343	-	-	-	-	11,997
Transport and Fate	2,455	470	600	-	475	-	-	-	-	-	-	4,000
Measurement Systems and Instrumentation	3,632	427	243	-	1,050	-	-	341	1,072	989	546	8,300
Health Effects	5,657	2,159	-	2,993	-	-	-	1,889	-	-	-	12,698
Subtotal	16,478	3,671	1,928	3,172	3,153	1,413	2,343	2,230	1,072	989	546	36,995
Program Totals	69,983	5,196	4,387	3,172	3,153	2,929	2,343	2,230	1,072	989	546	96,000

Table 4. Funding by Research Category Across Fuel Source (FY 1977) ($ thousand)

	Coal	Oil/ Gas	Oil Shale	Nuclear	Goeth.	Solar	Waste-Fuel	Conserve	Multi-Fuel	Total
Control Technology										
Fuel Processing, Preparation and Advanced Combustion	16,665	1,434	906	-	-	-	400	-	-	19,385
Fuel Extraction	4,790	2,110	200	-	-	-	-	-	-	7,100
Environmental Impact of Conventional and Advanced Energy Systems	618	3,045	-	240	375	220	2,850	858	2,494	10,700
Flue Gas Sulfur Oxide Control	11,300	-	-	-	-	-	-	-	-	11,300
Nitrogen Oxide Control	6,100	-	-	-	-	-	-	-	-	6,100
Flue Gas Particulate Control	4,400	-	-	-	-	-	-	-	-	4,400
Subtotal	43,873	6,589	1,106	240	375	220	3,250	858	2,494	59,005
Health and Environmental Effects										
Ecological Effects	6,095	4,857	100	-	-	-	-	-	945	11,997
Transport and Fate	1,056	625	-	44	-	-	-	-	2,275	4,000
Measurements Systems and Instrumentation	3,447	960	175	333	-	-	-	-	3,385	8,300
Health Effects	-	-	-	-	-	-	-	-	12,698	12,698
Subtotal	10,598	6,442	275	377	-	-	-	-	19,303	36,995
Program Total	54,471	13,031	1,381	617	375	220	3,250	858	21,797	96,000

Control Technology

Control Technology Program

The Control Technology Program encompasses six major research areas, each playing an important role in developing an environmentally sound plan for extracting and utilizing our country's energy resources, as well as addressing the probable environmental impacts of emerging energy technologies such as coal gasification and liquefaction, oil shale, and geothermal.

The program is designed to provide information on the types and quantities of pollutants released through extraction and combustion processes, and to develop or stimulate the development of control options where necessary.

The following descriptions of the Control Technology Program component categories explain the research and development ongoing in each section, highlighting typical research.

Fuel Processing, Preparation and Advanced Combustion

This research area involves the development of advanced technologies for fossil fuel processing by providing environmental assessments, bench scale research, technology assessments, and guidance in process control technology.

EPA is working closely with the Department of Energy in examining the environmental impacts of the development and commercialization of fluidized bed combustors, synthetic fuels from coal, oil shale development, and coal cleaning.

In cooperation with the Department of Interior (DOI), EPA has developed several coal cleaning processes, one of which is being demonstrated on a commercial scale at the GPU-PennElectric Power Plant in Homer City, Pennsylvania.

In the area of fluidized bed combustion (FBC), tests on the pressurized FBC miniplant, operated by Exxon in Linden, New Jersey, and tests at EPA's IERL-RTP miniplant point to an optimistic future for FBC combustors, with test results showing major reductions in sulfur dioxide (SO_2) removal and low nitrogen oxide (NO_x) emissions.

In the area of synthetic fuels from coal, an EPA funded synthetic fuels environmental control facility was dedicated at North Carolina State University. Tests have been initiated to evaluate control techniques for the generation of clean gaseous synthetic fuels. In addition, the solvent refined coal (SRC) liquefaction process is being studied.

For oil shale, the methodology and results of sampling and analysis of waste streams at the Paraho oil shale demonstration are being studied and documented.

Fuel Extraction

Research and development in the fuel extraction category is directed toward the prevention, alleviation, and abatement of pollution caused by all forms of fuel extraction and its associated transportation activities.

Through an ambitious cooperative program with the Department of Agriculture, EPA is examining improved methods of reclaiming land disturbed by coal and oil shale strip mining in the eastern and western portions of our country, as well as seeking new methods and providing training courses to combat the problem of acid mine drainage from abandoned mines.

Oil transportation is another main concern of the Interagency Program. The U.S. Coast Guard in concert with EPA and the National Oceanic and Atmospheric Administration has been instrumental in developing techniques for handling oil spills and in documenting oil spill contingency planning.

Environmental Impact of Conventional and Advanced Energy Systems

This program includes environmental assessments of conventional combustion in electric utility and industrial power production, energy conservation, solar energy and geothermal energy systems, and Integrated Technology Assessment.

This research area consists of four subcategories: (1) Waste Heat/Waste Products; (2) Conventional Combustion Environmental Assessment; (3) Conservation and Advanced Systems; and (4) Integrated Technology Assessment.

Waste Heat/Waste Products

The overall objective of this program is the identification, characterization, and assessment of liquid and solid effluents (including waste heat) from electrical generating facilities and development, where appropriate, of control technologies for environmentally sound disposal of these effluents. Specifics include the identification of potential environmental effects to be used as a basis for promulgating EPA effluent guidelines for the industry and for improvement of power plant waste disposal options.

Conventional Combustion Environmental Assessment

The objective of this program is the comprehensive assessment of the environmental, economic, and energy impacts of multimedia emissions of pollutants from stationary, industrial, utility, residential, and commercial conventional combustion processes. These assessments seek to integrate data, which heretofore had been separated into specific environmental efforts (i.e., SO_x and NO_x R&D programs), into a systematic, coordinated environmental assessment structure.

Energy Conservation Methods and Advanced Energy Systems

The general objectives of this program are to develop environmental assessments of energy conservation methods and advanced energy systems and to contribute to the development of pollution control technologies for resource recovery, energy-conserving industrial processes, advanced energy conversion cycles, and advanced energy systems (solar and geothermal energy). Techniques and technologies are under development by the Department of Energy, the Department of Housing and Urban Development, and other agencies including EPA in the resource recovery area. Outputs will support two interagency working groups—the Interagency Task Force on Energy Conservation in Buildings and the Interagency Task Force on Energy Conservation in Industry, as well as EPA regulatory responsibilities, by assuring the environmental compatibility of techniques and technologies in each subject energy area.

Within this program, there are economic, technical, and environmental evaluations of eight resource recovery systems, refuse-derived processing, and energy recovery equipment and systems. These evaluations are assessing the potential for successful, environmentally compatible implementation of the numerous systems being developed by EPA, DOE, and private industry.

Integrated Technology Assessment (ITA)

The overall objective of the ITA program is to identify environmentally, socially, and economically acceptable alternatives for meeting national energy objectives and to assist in the selection of optimum policies for the attainment of associated environmental quality goals.

A noteworthy area of the ITA program is the Ohio River Basin Energy Study (ORBES). This comprehensive study is in the process of defining the social, economic, environmental, institutional and public health impacts of energy development in the Ohio River Basin.

Another important aspect of the program is that it provides the information transfer vehicle for the entire Interagency Program.

In an area as crucial and timely as energy-related environmental research, there are two key communications links which must be formed in order to make our efforts both relevant and more efficient. The first link is within the research community itself, the second is between that community and the policy level decisionmakers and interested public.

Communicating with the research community is the cornerstone of the Interagency Energy/ Environment Research and Development Program. Through reports, seminars, and conferences the Interagency Program brings together the key participants in various aspects of energy/environment research and development. Such direct contact is an effective way to coordinate the Federal research effort and to avoid unnecessary duplication of research.

Flue Gas Sulfur Oxide (SO_X) Control

This program develops and evaluates alternative technologies for the removal of sulfur oxide emissions from flue gas at fossil fuel power plants and industrial boilers. The aim of the program is to develop technical data on which to establish emission standards for sulfur-emitting sources. Efforts are underway to evaluate existing sulfur oxide removal installations, to assess other impacts of flue gas desulfurization (FGD) technology, and to assess the applicability of FGD technology to industrial boilers and other sulfur oxide sources.

Major efforts are directed toward FGD technology assessment and development, assessment of the capital and operating costs of FGD systems, research and development on improving FGD systems reliability and capability, and transferring the technological innovations to the public sector.

Nitrogen Oxide (NO_X) Control

This is a program to develop the best practicable combustion technology for the control of NO_X emissions from stationary sources. Stationary source categories include utility boilers, commercial/ industrial boilers, residential heating systems, stationary engines, and advanced combustion processes. Advanced combustion processes such as advanced coal burners and coal burner systems are being

studied and fundamental engineering and analytical support studies are also being conducted to evaluate the potential of these advanced methods for NO_x emission control and energy conservation. The research on controlled combustion also includes fuel conditioning for NO_x removal.

Successful conduct of the NO_x control program is crucial because of the alarming projected increase in emissions from stationary sources (primarily the increased combustion of coal) in the next 2 decades.

Flue Gas Particulate Control

This research program identifies and develops practical and effective control technologies for aerosol emissions from manmade sources such as industrial processes and power plants.

Major efforts include assessment of conventional abatement system capabilities (such as electrostatic precipitators, scrubbers, and baghouses), exploration of new control methods, and bench-scale investigation of specific control methods for major problem sources such as low sulfur coal. Such information will be funneled to EPA's standard setting departments for formulating applicable New Source Performance Standards (NSPS).

Fuel Processing, Preparation and Advanced Combustion

**PROJECT: 00307-CONTROL TECHNOLOGY SURVEY OF PARAHO RETORT

```
                    STARTING/ COMPLETION DATE : 07/77   11/77     FUNDING    ESTIMATED   FY77  / $   31000
                    TASK CODE=B623A-T51     **EPA=68-03-2560  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.: TJ POWERS                  EPA/IERL   CINC
INVESTIGATOR.: J  COTTER                  THOMPSON RAMO WOOLDRIDGE INC
MILESTONES...: 07/77 -FUNDING PACKAGE SUBMITTED
               07/77 -AWARD FUNDS FOR PROJECT
               08/77 -SAMPLING & ANALYSIS
               11/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-000307            SSIE-GMA  4386        EPA -68-03-2560       TASK-B623A-T51
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT.....: A TOTAL ENVIRONMENTAL CHARACTERIZATION OF AIR EMISSIONS, LIQUID EFFLUENTS AND SOLID WASTES IS THE
                OBJECTIVE SOUGHT FOR THE PARAHO SURFACE RETORT AT ANVIL POINTS, COLORADO. THERE ARE TWO 2-WEEK
                PERIODS OF SURVEY WHICH WILL OCCUR IN AUGUST 1977 AND SEPTEMBER 1977. THE WORK WILL BE PERFORMED AT
                THE SITE AT THE SAME TIME OTHER EPA, ERDA, AND DOD ENVIRONMENTAL AND PROCESS SAMPLING AND ANALYSIS
                WORK IS IN PROGRESS. THE SAMPLING AND ANALYSIS WILL INCLUDE "ON-SITE" GAS CHROMATOGRAPHY TO MEASURE
                INORGANIC AND LIGHT-END HYDROCARBONS IN RECYCLE GAS STREAMS AS WELL AS ALL PREVIOUS "ON-SITE"
                ANALYSES.
```

**PROJECT: 00308-ENVIRONMENTAL ASSESSMENT OF OIL SHALE PROCESSES

```
                    STARTING/ COMPLETION DATE : 01/75   05/78 :   FUNDING    ESTIMATED   FY77  / $  413000
                    TASK CODE=B623A-365     **EPA=68-02-1881  ** (CNTR.)      PRIOR       FY76  / $  872000
EPA  OFFICER.. TJ POWERS                  EPA/IERL   CINC
INVESTIGATOR.. J  COTTER                  THOMPSON RAMO WOOLDRIDGE INC
               C  PRIEN                   UNIVERSITY OF DENVER
MILESTONES...  01/75 -FUNDING PACKAGE SUBMITTED
               01/76 -AWARD FUNDS FOR PROJECT
               10/76 -FUNDING INCREMENT
               12/76 -FUNDING INCREMENT
               05/78 -FINAL REPORT RECEIVED
PLAN ID......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..  RECN-000308            SSIE-GMA  4382        EPA -68-02-1881       TASK-B623A-365
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT.....  THE MAJOR OBJECTIVES OF THIS PROJECT INCLUDE THE ACQUISITION OF THE NECESSARY BACKGROUND DATA ON THE
                PRINCIPAL INDUSTRIAL SHALE RECOVERY PROCESSES AND U.S. SHALE RESOURCES, A COMPARATIVE ASSESSMENT OF
                THEIR ENVIRONMENTAL ACCEPTABILITY AND AN EVALUATION OF TECHNOLOGIES AVAILABLE FOR THE CONTROL OF
                AIR, WATER, AND SOLID WASTE EMISSIONS. SHALE OIL PRODUCTION REQUIRES CHEAP, LARGE-SCALE MATERIALS
                HANDLING METHODS AT ALL STAGES OF MINING, RETORTING, AND RETORTED SHALE DISPOSAL; MAXIMUM HEAT
                ECONOMY IN RETORTING AND UPGRADING; AND MINIMUM WATER AND POWER CONSUMPTION. A NUMBER OF PROCESSING
                SEQUENCES ARE AVAILABLE, EACH WITH ITS OWN ACCOMPANYING ENVIRONMENTAL IMPACTS. THE EVALUATION AND
                ASSESSMENT PROGRAM INVOLVES SIX TASKS: 1. PROJECT MANAGEMENT; 2. OIL SHALE AND RECOVERY PROCESS
                CHARACTERIZATION; 3. ENGINEERING ANALYSIS AND PROBLEM DEFINITION; 4. FIELD TESTING AND LABORATORY
                ANALYSIS; 5. ENVIRONMENTAL EVALUATION; 6. EVALUATION OF EXISTING ENVIRONMENTAL CONTROL TECHNOLOGY.
                THIS PROJECT WILL PROVIDE A BASIS FOR THE ESTABLISHMENT OF RATIONAL DESIGN, MANAGEMENT, AND
                MONITORING PROCEDURES TO MITIGATE UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS. THE TYPE AND MAGNITUDE
                OF THESE IMPACTS SHOULD BE DETERMINED PRIOR TO THE DEVELOPMENT OF A FULL-SCALE OIL SHALE INDUSTRY.
```

**PROJECT: 00309-OIL SHALE SAMPLING AND ANALYSIS REVIEW

```
                    STARTING/ COMPLETION DATE : 05/77   07/77 :   FUNDING    ESTIMATED   FY77  / $    5000
                    TASK CODE=B623A-527     **EPA=CA7-2912-A  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.: TJ POWERS                  EPA/IERL   CINC
INVESTIGATOR.: J  JONES                   DEV ENGINEERS INC
MILESTONES.... 03/77 -FUNDING PACKAGE SUBMITTED
               05/77 -AWARD FUNDS FOR PROJECT
               07/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-000309            SSIE-GMA  4532        EPA -CA7-2912-A       TASK-B623A-527
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT...... A TWO-PHASE EFFORT SHALL BE CONDUCTED BY THE CONTRACTOR. PHASE 1: ANALYSIS OF RESULTS OF SAMPLING
                AND ANALYSIS ACTIVITIES PERFORMED AT PARAHO SITE (ANVIL POINTS, COLORADO) INCLUDES: (A) REVIEW OF
                PROCESS OPERATING PARAMETERS AT TIME OF SAMPLE COLLECTION; AND (B) VERIFICATION OF REASONABLENESS
                OF SAMPLING RESULTS BASED ON (A). PHASE 2: DEVISE PLAN FOR FUTURE SAMPLING REQUIREMENTS AT ANVIL
                POINTS AND SCHEDULE FOR SAME TO ACHIEVE SAMPLING AND ANALYSIS RESULTS REPRESENTATIVE OF
                STEADY-STATE OPERATION OF A PARAHO-TYPE RETORTING PROCESS.
```

**PROJECT: 00310-MACROECONOMIC STUDY BIOMASS VS. COAL

```
                    STARTING/ COMPLETION DATE · 06/77   08/78 :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=B623A-528     **EPA=68-02-2616  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.  TJ POWERS                  EPA/IERL   CINC
INVESTIGATOR.  RT MILLIGAN                BECHTEL NATIONAL INC
MILESTONES...  04/77 -FUNDING PACKAGE SUBMITTED
               06/77 -AWARD FUNDS FOR PROJECT
               03/78 -FINAL REPORT RECEIVED
PLAN ID.......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES...  RECN-000310           SSIE-GMA  4537        EPA -68-02-2616       TASK-B623A-528
                AP  -623A             DU  -N105             LABT-EMI
ABSTRACT......  THE CONTRACTOR IS TO COMPARE MULTIMEDIA ENVIRONMENTAL IMPACTS AND THE COST OF CLEAN ENERGY
                 GENERATION FROM THE PRODUCTION AND UTILIZATION OF SYNTHETIC FUELS FROM BIOMASS, FROM BIOMASS ENERGY
                 CROPS AND FROM COAL. A REPORT ON POLLUTANT EMISSIONS AND CONTROL TECHNOLOGY ASSESSMENT WILL ADDRESS
                 THE ECONOMIC AND ENVIRONMENTAL COMPARISONS OF COAL USE VERSUS SYNTHETIC FUELS FROM BIOMASS VERSUS
                 USING "ENERGY CROPS" DIRECTLY FROM ENERGY GENERATION. CROP TYPES RECEIVING ATTENTION INCLUDE
                 AGRICULTURAL CROPS (MARSH PLANTS, SUGAR CANE, SUGAR BEETS, ETC.) SILVICULTURAL CROPS (VARIOUS
                 HIGH-VOLUME PRODUCTION TREE CROPS, OTHER FOREST MATERIAL, ETC.); AND AQUACULTURAL CROPS (HYACINTH,
                 SEAWEED, ALGAE, KELP, ETC.). IN GENERAL, PROCESSES UNDER DEVELOPMENT IN WASTE-AS-FUEL RESEARCH WILL
                 PROBABLY BE APPLICABLE TO ANY BIOMASS OR BIOMASS-DERIVED FEEDSTOCKS. THEREFORE, THE APPLICABILITY
                 OF EXISTING PROCESSES WILL BE EVALUATED, EMPHASIZING TECHNOLOGY REQUIREMENTS, AND THE COSTS OF
                 POLLUTION CONTROL AND ENERGY PRODUCTION WILL BE COMPARED TO THAT OF COAL.
```

**PROJECT: 00312-PREPARATION OF PLANS & SPECIFICATIONS FOR MERL/IERL T&E FACILITY

```
                    STARTING/ COMPLETION DATE : 04/77   08/77 :   FUNDING    ESTIMATED   FY77  / $   63000
                    TASK CODE=B623A-577     **EPA=68-03-1241  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER..  VF JELEN                  EPA/IERL   CINC
INVESTIGATOR..     UNKNOWN                MALCOM PIRNIE INC
MILESTONES....  03/77 -AWARD CONTRACT
                08/77 -COMPLETE PLANS & SPECS PROVIDED
PLAN ID......   (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..   RECN-000312           SSIE-GMA  3705        EPA -68-03-1241       TASK-B623A-577
                AP  -623A             DU  -N105             LABT-EMI
ABSTRACT......  DEVELOP PLANS & SPECIFICATIONS FOR A MUNICIPAL AND INDUSTRIAL TEST AND EVALUATION FACILITY.
```

**PROJECT: 00313-ENVIRONMENTAL PROBLEM-SOLVING FOR COMMERCIAL DEVELOPMENT OF OIL SHALE

```
                    STARTING/ COMPLETION DATE : 04/77   07/77     FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=B623A-595     **EPA=68-03-1250  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER..  TJ POWERS                 EPA/IERL   CINC
INVESTIGATOR..  HF COFFER                 GEO ENERGY CORP
MILESTONES....  03/77 -FUNDING PACKAGE SUBMITTED
                04/77 -AWARD FUNDS FOR PROJECT
                12/77 -FINAL REPORT RECEIVED
PLAN ID.......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES...  RECN-000313           SSIE-GMA  4534        EPA -68-03-1250       TASK-B623A-595
                AP  -623A             DU  -N105             LABT-EMI
ABSTRACT......  THE OBJECTIVE OF THIS PROJECT IS TO RECOMMEND THE RESPECTIVE ROLES OF INDUSTRY AND GOVERNMENT
                 RELATED TO ENVIRONMENTAL POLLUTION PROBLEM-SOLVING ASSOCIATED WITH THE DEVELOPING OIL SHALE
                 INDUSTRY. INDUSTRY REPRESENTATIVES WILL BE SURVEYED TO COLLECT THEIR ATTITUDES REGARDING POTENTIAL
                 JOINT INDUSTRY-GOVERNMENT PROGRAMS RELATED TO POLLUTION CONTROL PROBLEM-SOLVING.
```

**PROJECT: 00314-MONITORING OF TRACE COMPONENTS FROM THE HANNA IV IN SITU COAL GASIFICATION TEST

```
                    STARTING/ COMPLETION DATE : 07/77   07/78 :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=B623A-619     **EPA=D7-01185    ** ( IAG )      PRIOR       FY76  /
EPA  OFFICER..  GL HUFFMAN                EPA/IERL   CINC
INVESTIGATOR..  D  FISCHER                US DOE                                LARAMIE ENERGY RES CTR
MILESTONES...   07/77 -FUNDING PACKAGE SUBMITTED
                07/77 -AWARD FUNDS FOR PROJECT
                07/78 -FINAL REPORT RECEIVED
PLAN ID.......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES...  RECN-000314           SSIE-GMA  3783        EPA -D7-01185         TASK-B623A-619
                AP  -623A             DU  -N105             LABT-EMI
ABSTRACT......  THE LINKED VERTICAL WELL IN SITU COAL GASIFICATION PROCESS IS BEING DEVELOPED BY ERDA LARAMIE ENERGY
                 RESEARCH CENTER AT HANNA, WYOMING. THE OBJECTIVE OF THIS RESEARCH WORK IS TO CHARACTERIZE GASEOUS
                 EMISSIONS FOR THIS PROCESS. THE APPROACH CONSISTS OF MONITORING THE LOW BTU GAS DURING THE FULL
                 LIFETIME OF THE HANNA IV IN SITU COAL GASIFICATION TEST TO DETERMINE THE CONCENTRATIONS OF SPECIFIC
                 TRACE COMPONENTS AND THEIR VARIATION AS A FUNCTION OF TIME. CURRENT PLANS ARE TO CONDUCT
                 INVESTIGATIONS BEGINNING SEPTEMBER 1, 1977 AND CONCLUDING ON FEBRUARY 28, 1
```

**PROJECT: 01411-MINIPLANT STUDIES IN SUPPORT OF THE FLUIDIZED-BED COMBUSTION PROGRAM

```
                    STARTING/ COMPLETION DATE : 01/77   02/79 :   FUNDING    ESTIMATED   FY77  / $ 1805500
                    TASK CODE=F623A-004     **EPA=68-02-1312  ** (CNTR.)      PRIOR       FY76  / $ 5042000
EPA  OFFICER.. DB HENSCHEL                EPA/IERL   RTP
INVESTIGATOR.  RR BERTRAND                EXXON RESEARCH & ENGINEERING CO
               RC HOKE                    EXXON RESEARCH & ENGINEERING CO
               MS NUTKIS                  EXXON RESEARCH & ENGINEERING CO
               LA RUTH                    EXXON RESEARCH & ENGINEERING CO
MILESTONES.... 11/75 -DEMONSTRATE OPERABILITY OF MINIPLANT WITH 240-HOUR RUN
               12/76 -COMPLETE FIRST PHASE TESTING-SO2 AND NOX EMISSIONS
               08/77 -COMPLETE LEVEL 1 COMPREHENSIVE ANALYSIS ON MINIPLANT COMBUSTOR
               07/78 -COMPLETE FIRST PHASE TESTING OF GRANULAR BED FILTER ON MINIPLANT
               06/82 -COMPLETE ENVIRONMENTAL TESTING ON MINIPLANT COMBUSTOR/REGENERATIO
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001411           SSIE-GMA  4162        EPA -68-02-1312       TASK-F623A-004
               AP  -623A             DU  -N105             LABT-EMI
ABSTRACT.....: OBJECTIVES: TO CONDUCT COMPREHENSIVE ANALYSIS OF EMISSIONS FROM A PRESSURIZED FLUIDIZED-BED
                COMBUSTOR, AND TO IDENTIFY THE EFFECTS OF PROCESS OPERATING CONDITIONS ON EMISSIONS; TO STUDY THE
                POTENTIAL AND ENVIRONMENTAL IMPACT OF SORBENT REGENERATION; AND TO STUDY ADD-ON DEVICES FOR
                PARTICULATE CONTROL. APPROACH: A 480 LB/HR (218 KG/HR) PRESSURIZED FLUIDIZED-BED COAL COMBUSTION
                MINIPLANT, AND A 25 LB COAL/HR (13 KG/HR) BENCH-SCALE UNIT, ARE BEING OPERATED. PLANS/PROGRESS:
                COMPREHENSIVE ANALYSIS OF EMISSIONS FROM THE MINIPLANT COMBUSTOR HAVE BEEN COMPLETED AT ONE SET OF
                CONDITIONS; FUTURE ANALYSES ARE ALSO PLANNED TO FURTHER DEFINE BEST TECHNOLOGY. A 100-HOUR
                MINIPLANT COMBUSTION/REGENERATION DEMONSTRATION RUN HAS BEEN COMPLETED; FURTHER SHORT-DURATION
                TESTS ARE PLANNED. SHAKEDOWN OF A GRANULAR BED FILTER IS UNDERWAY ON THE MINIPLANT TO CONTROL
                PARTICULATE EMISSIONS AT HIGH TEMPERATURE AND PRESSURE.
```

**PROJECT: 01412-DEVELOPMENT OF THE CAFB GASIFIER FOR GENERATION OF CLEAN FUEL GAS FOR USE IN AN EXISTING OR NEW COMBUSTOR

```
                    STARTING/ COMPLETION DATE : 05/76   05/79     FUNDING    ESTIMATED   FY77  / $  450000
                    TASK CODE=F623A-006     **EPA=68-02-2159  ** (CNTR.)      PRIOR       FY76  / $  529000
EPA  OFFICER.: SL RAKES                   EPA/IERL   RTP
INVESTIGATOR.: M  ALPHANDARY              ESSO PETROLEUM CO LTD
               GL JOHNES                  ESSO PETROLEUM CO LTD
               Z  KOWSZUN                 ESSO PETROLEUM CO LTD
               D  LYON                    ESSO PETROLEUM CO LTD
               G  MOSS                    ESSO PETROLEUM CO LTD
               A  RAMSDEN                 ESSO PETROLEUM CO LTD
               BE RINGROSE                ESSO PETROLEUM CO LTD
               AL SAXTON                  ESSO PETROLEUM CO LTD
MILESTONES...: 08/76 -COMPLETE MINI-RUN ON COAL
               09/77 -REPORT ON MINI-RUN ON COAL
               10/77 -PROVIDE INPUT TO FWEC-OPERATING MANUAL-OIL FEED INPUT
               01/78 -TOPICAL REPORT   SOLID FUELS BATCH TESTS
               05/78 -TOPICAL REPORT   RUN 11 PILOT UNIT
               10/78 -TOPICAL REPORT   RUN 12 PILOT UNIT
               05/79 -TOPICAL REPORT   RUN 13 PILOT UNIT
               03/78 -AID IN START UP DEMONSTRATION UNIT AT LA PALMA
PLAN ID......: (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..: RECN-001412           SSIE-GMA  3351 1      EPA -68-02-2159       TASK-F623A-006
               AP  -623A             DU  -N105             LABT-EMI
ABSTRACT...... THE WORK BELOW COVERS ALL ASPECTS OF THE ATMOSPHERIC CAFB DEVELOPMENT PROGRAM REQUIRED TO SUPPORT A
                FOSTER WHEELER ENERGY CORPORATION DEMONSTRATION OF THE CAFB PROCESS AT THE LA PALMA STATION OF
                CENTRAL POWER AND LIGHT COMPANY (CPL) IN SAN BENITO, TEXAS, UNDER CONTRACT 68-02-2106. THIS
                INCLUDES OPERATION OF AN 0.75MWE CHEMICALLY ACTIVE FLUID BED (CAFB) PILOT PLANT IN THREE PERIODS OF
                EXTENDED DURATION, TO TEST SELECTED DESIGN FEATURES AND MODES OF OPERATION FOR THE 20MW CAFB
                DEMONSTRATION, PARTICULARLY AS THEY RELATE TO OPERATION ON COAL AND PITCH FUELS, AND BED MATERIALS
                AVAILABLE FOR THE CPL PLANT. OTHER WORK INVOLVES BATCH GASIFICATION TEST, DEVELOPMENT OF PROCESS
                FOR REDUCING COAL ASH RETENTION IN THE FLUID BED, AND ASSISTANCE TO FOSTER WHEELER AND CPL IN
                DEVELOPMENT OF PLANT OPERATIONAL PROCEDURES AND TEST PROGRAMS, AND IN SELECTION OF EQUIPMENT AND
                MATERIALS FOR HIGH TEMPERATURE FLUID BED OPERATIONS.
```

**PROJECT: 01413-ENGINEERING SUPPORT OF THE CAFB DEMONSTRATION PLANT PROGRAM

```
                    STARTING/ COMPLETION DATE : 02/76   08/78     FUNDING    ESTIMATED   FY77  / $  118000
                    TASK CODE=F623A-008     **EPA=68-02-2142  ** (CNTR.)      PRIOR       FY76  / $  481000
EPA  OFFICER.. SL RAKES                  EPA/IERL   RTP
INVESTIGATOR.: DL KEAIRNS                WESTINGHOUSE ELECTRIC CORP          R & D CTR
MILESTONES.... 03/77 -TOPICAL REPORT ON CANDIDATE STONES, CAFB DEMO
               07/77 -SPENT SORBENT CHARACTERIZATION
               07/77 -MARKET POTENTIAL SPENT SORBENTS DETERMINED
               10/77 -ISSUE ANNUAL REPORT
               10/78 -FINAL REPORT
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001413          SSIE-GMA  4166        EPA -68-02-2142       TASK-F623A-008
               AP  -623A            DU  -N105             LABT-EMI
ABSTRACT...... THE CONTRACTOR WILL PERFORM EXPERIMENTAL AND ENGINEERING STUDIES TO SUPPORT THE CAFB DEMONTRATION
                PLANT PROGRAM, TO DEVELOP THE FLUIDIZED BED GASIFICATION PROCESS, AND TO PROVIDE PROGRAM ASSISTANCE
                TO EPA. THE TASKS INCLUDE WORK ON THE HIGH-TEMPERATURE SULFUR REMOVAL SYSTEM, INCLUDING SORBENT
                SELECTION, SPENT SORBENT PROCESSING, SPENT SORBENT UTILIZATION, AND SPENT SORBENT DISPOSAL;
                ALTERNATE CONCEPTS, INCLUDING SORBENTS, FUELS, APPLICATIONS, AND PROCESS DESIGN; CONTROL
                TECHNOLOGY; ENVIRONMENTAL IMPACT; AND SYSTEMS EVALUATION. THE PROGRAM WILL EXTEND PREVIOUS WORK
                CARRIED OUT BY WESTINGHOUSE IN ALL OF THE AREAS IDENTIFIED. THE PROGRAM WILL DEVELOP DESIGN AND
                OPERATING DATA, IDENTIFY TEST PROGRAMS, TEST ALTERNATIVE SYSTEM COMPONENTS, PROVIDE TECHNICAL
                SUPPORT, AND PROVIDE EVALUATION OF TEST DATA.
```

**PROJECT: 01414-CAFB DEMONSTRATION

```
                    STARTING/ COMPLETION DATE : 06/76   03/79     FUNDING    ESTIMATED   FY77  / $  300000
                    TASK CODE=F623A-009     **EPA=68-02-2106  ** (CNTR.)      PRIOR       FY76  / $ 4055000
EPA  OFFICER.. SL RAKES                  EPA/IERL   RTP
INVESTIGATOR.. F  ZOLDAK                 FOSTER WHEELER ENERGY CORP
               B  HALLIDAY               FOSTER WHEELER ENERGY CORP
               E  DAMON                  FOSTER WHEELER ENERGY CORP
MILESTONES.... 12/75 -PRELIMINARY DESIGN MANUAL
               03/75 -PRELIMINARY PROCESS MANUAL
               04/76 -DEFINITIVE DESIGN MANUAL
               06/76 -IDENTIFY PRIMARY SOLID FUEL
               12/76 -IDENTIFY PRIMARY LIQUID FUEL
               12/76 -IDENTIFY PRIMARY BED MATERIAL
               05/77 -START CONSTRUCTION
               01/78 -COMPLETE CONSTRUCTION
               05/78 -START UP
               10/79 -COMPLETE TEST PROGRAM
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001414          SSIE-GMA  4150        EPA -68-02-2106       TASK-F623A-009
               AP  -623A            DU  -N105             LABT-EMI
ABSTRACT...... THE OBJECTIVE IS TO DEMONSTRATE, ON A COMMERCIAL SCALE (ABOUT 20 MW), THE CAFB PROCESS AND TO
                PERFORM ENVIRONMENTAL ASSESSMENT OF THE PROCESS. APPROACH: TASK I   DESIGN PREPARATION AND REVIEW:
                DESIGN, DEVELOPMENT, FUEL SELECTION, DEFINITIVE DESIGN PROCESS, DESIGN MANUAL. TASK II
                CONSTRUCTION PLANNING: SITE PLANNING AND APPROVAL, CONSTRUCTION AND FABRICATION DRAWINGS,
                CONSTRUCTION PROGRESS. TASK III   EXPERIMENTAL TEST PROGRAM: OPERATING VARIABLES OF PRIMARY FUEL,
                PERFORMANCE PARAMETERS, OPERATING VARIABLES OF SECONDARY FUELS, OPERATING VARIABLES OF SOLID FUELS.
                TASK IV   PERFORMANCE AND EMISSION TESTING: RECORDS, BASELINE CORRELATIONS, SPENT MATERIAL STUDIES.
                TASK V -SYSTEM EVALUATION: PROCESS DESIGN MANUAL UPDATE. TASK VI   REPORTS OF WORK: CONCEPTUAL
                DESIGN OF COMMERCIAL SYSTEMS (ABOUT 250 MW). OUTPUTS/PROGRESS & PLANS: DEFINITIVE DESIGN REPORT, A
                PRELIMINARY PROCESS DESIGN MANUAL AND A FINAL REPORT ARE EXPECTED. IN ADDITION, DESIGN DRAWINGS,
                REPORTS OF RESEARCH AND OPERATING REPORTS ARE EXPECTED. A CONCEPTUAL DESIGN FOR A 250 MW UNIT WILL
                BE DEVELOPED.
```

**PROJECT: 01415-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS AND PROGRAM SUPPORT FOR FLUIDIZED-BED COMBUSTION

```
                    STARTING/ COMPLETION DATE : 01/76   02/78 :   FUNDING    ESTIMATED   FY77  / $  294000
                    TASK CODE=F623A-01      **EPA=68-02-2138  ** (CNTR.)      PRIOR       FY76  / $ 1713000
EPA  OFFICER.. DB HENSCHEL               EPA/IERL   RTP
INVESTIGATOR.. H  NACK                   BATTELLE MEMORIAL INST
               KS MURTHY                 BATTELLE MEMORIAL INST
               JM ALLEN                  BATTELLE MEMORIAL INST
MILESTONES.... 09/76 -COMPLETE INITIAL REVIEW OF AVAILABLE DATA
               10/76 -COMPLETE INITIAL ATTEMPT AT ENVIRONMENTAL GOALS-SETTING (MEG)
               04/77 -COMPLETE LEVEL 1 COMPREHENSIVE ANALYSIS ON 18-INCH MERC UNIT
               06/77 -COMPLETE PREPARATION OF INITIAL POLLUTANT LIST, & PRELIMINARY PRI
               08/77 -COMPLETE LEVEL 1 COMPREHENSIVE ANALYSIS ON MINIPLANT
               10/77 -COMPLETE STANDARDS SUPPORT PLAN FOR FLUIDIZED-BED COMBUSTION
               12/77 -COMPLETE SKELETON STANDARDS DEVELOPMENT RESEARCH DATA BASE REPORT
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..: RECN-001415          SSIE-GMA  2749 1      EPA -68-02-2138       TASK-F623A-01
               AP  -623A            DU  -N105             LABT-EMI
```

ABSTRACT..... OBJECTIVES: TO ESTABLISH ENVIRONMENTAL GOALS FOR THE FLUIDIZED-BED COMBUSTION PROCESS BASED ULTIMATELY ON HEALTH/ECOLOGICAL EFFECTS. TO OBTAIN COMPREHENSIVE ANALYSIS OF EMISSIONS FROM EXISTING FLUIDIZED-BED COMBUSTORS. BY COMPARISON OF GOALS WITH MEASURED EMISSIONS, TO DESIGN A CONTROL TECHNOLOGY PROGRAM TO MEET THE GOALS. APPROACH: PAPER STUDIES, DATA EVALUATION WILL DEVELOP HEALTH/ ECOLOGICAL GOALS, AND WILL ASSESS EXISTING DATA ON EMISSIONS AND CONTROL TECHNOLOGY FOR FLUIDIZED-BED COMBUSTION. COMPREHENSIVE ANALYSES OF EMISSIONS FROM EXISTING FBC UNITS WILL BE CONDUCTED AS SOON AS UNITS ARE AVAILABLE. PLANS/PROGRESS: INITIAL LIST OF POTENTIAL POLLUTANTS OF CONCERN DEVELOPED, WITH PRELIMINARY PRIORITIZATION. HAVE PARTICIPATED IN DEVELOPMENT OF METHODOLOGY FOR ENVIRONMENTAL ASSESSMENT. HAVE COMPLETED INITIAL EMISSION/CONTROL TECHNOLOGY DATA REVIEW. HAVE COMPLETED SAMPLING COMPREHENSIVE ANALYSIS ON TWO EXPERIMENTAL FLUIDIZED COMBUSTION UNITS.

****PROJECT: 01416-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS AND PROGRAM SUPPORT FOR FLUIDIZED-BED COMBUSTION**

STARTING/ COMPLETION DATE : 12/77 12/81 : FUNDING ESTIMATED FY77 / $ 706000
TASK CODE=F623A-02 **EPA=68-02-2138 ** (CNTR.) PRIOR FY /

EPA OFFICER.: DB HENSCHEL EPA/IERL RTP
INVESTIGATOR.: UNKNOWN BATTELLE MEMORIAL INST
MILESTONES...: 02/78 -PREPARE ENVIRONMENTAL ASSESSMENT METHODOLOGY STATUS REPORT
02/78 -PREPARE FBC ENVIRONMENTAL SCIENCES RESEARCH NEEDS REPORT
09/78 -COMPLETE INITIAL STANDARDS DEVELOPMENT RESEARCH DATA BASE
09/79 -PREPARE STANDARDS OF PRACTICE MANUAL FOR ATMOSPHERIC FBC
06/81 -REVISE ATMOSPHERIC FBC DATA BASE REPORTS AND PRACTICE MAN
09/81 -PREPARE DATA BASE REPORT AND PRACTICE MANUAL FOR PRESSURIZE
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001416 SSIE-GMA 4688 EPA -68-02-2138 TASK-F623A-02
AP -623A DU -N105 LABT-EMI
ABSTRACT.....: OBJECTIVES: TO ESTABLISH ENVIRONMENTAL GOALS FOR THE FLUIDIZED-BED COMBUSTION PROCESS BASED ULTIMATELY ON HEALTH/ECOLOGICAL EFFECTS. TO OBTAIN COMPREHENSIVE ANALYSIS OF EMISSIONS FROM EXISTING FLUIDIZED-BED COMBUSTORS, BY COMPARISON OF GOALS WITH MEASURED EMISSIONS. TO DESIGN A CONTROL TECHNOLOGY DEVELOPMENT PROGRAM TO MEET THE GOALS. APPROACH: PAPER STUDIES INVOLVING ANALYSIS/EVALUATION OF AVAILABLE DATA WILL BE EMPLOYED TO DEVELOP ENVIRONMENTAL ASSESSMENT METHODOLOGY, TO ESTABLISH ENVIRONMENTAL GOALS, TO ASSESS AVAILABLE CONTROL TECHNOLOGY, AND TO IDENTIFY OPTIMUM CONTROL TECHNOLOGY COMBINATIONS FOR COST-EFFECTIVE MINIMIZATION OF ENVIRONMENTAL IMPACT. COMPREHENSIVE ANALYSES OF EMISSIONS FROM AVAILABLE FBC UNITS WILL PROVIDE EMISSION DATA. PLANS: AN INITIAL STANDARDS DEVELOPMENT RESEARCH DATA BASE REPORT WILL BE PREPARED VIA THE ABOVE EFFORT AS SOON AS COMPREHENSIVE ANALYSES CAN BE COMPLETED ON THE 30 MW ATMOSPHERIC FBC AT RIVESVILLE. UPDATED RESEARCH DATA BASE REPORTS AND STANDARDS OF PRACTICE MANUALS WILL BE PREPARED FOR ATMOSPHERIC AND PRESSURIZED FBC AS FURTHER DATA

****PROJECT: 01420-NOX EMISSIONS FROM FLUIDIZED COMBUSTION**

STARTING/ COMPLETION DATE : 10/76 05/79 FUNDING ESTIMATED FY77 / $ 150000
TASK CODE=F623A-05 **EPA=R804978 ** (GRANT) PRIOR FY76 / $ 100000

EPA OFFICER.. W STEEN EPA/IERL RTP
INVESTIGATOR.. JM BEER MIT
MILESTONES.... 04/77 -INSTALLATION OF 7.5 CM BATCH TYPE COMBUSTOR
09/77 -DESIGN AND INSTALLATION OF 30 X 30 CM AFB AND SAMPLING TRAIN
10/78 -DESIGN AND CONSTRUCT 10 CM PFB
04/79 -COMPLETE DATA ANALYSIS
05/79 -COMPLETE MATHEMATICAL MODEL DEVELOPMENT
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES..: RECN-001420 SSIE-GMA 3458 EPA -R804978 TASK-F623A-05
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVES OF THE PROGRAM ARE. 1. TO DEVELOP A MECHANISTIC MATHEMATICAL MODEL FOR THE PREDICTION OF NO EMISSION FROM COAL BURNING FLUIDIZED BEDS. 2. TO PROVIDE PHYSICAL-CHEMICAL INPUT PARAMETERS FOR THE MODEL BY AN EXPERIMENTAL STUDY OF THE NO FORMATION-DESTRUCTION PROCESSES IN FLUIDIZED BEDS. 3. TO GENERATE INFORMATION NECESSARY FOR THE DEVELOPMENT OF NEW CONTROL TECHNOLOGY OF NOX EMISSION BASED ON DETAILED PILOT PLANT SCALE AND BENCH SCALE STUDIES AT BOTH ATMOSPHERIC AND ELEVATED PRESSURE. 4. TO TEST THE MATHEMATICAL MODELS SEVERELY OVER SUFFICIENTLY WIDE RANGES OF OPERATING VARIABLES. APPROACH TO BE USED: THE EXPERIMENTAL STUDY CONSISTS OF TWO PARALLEL INVESTIGATIONS· 1. THE STUDY OF THE NO FORMATION-DESTRUCTION PROCESSES IN CONTINUOUSLY OPERATED FLUIDIZED COMBUSTORS; 2. BATCH TYPE KINETIC STUDIES CARRIED OUT WITH THE 7.5 CM DIA EXTERNALLY HEATED FLUIDIZED BED AND THE 10 CM DIA PFB. IN THE CONTINUOUS FLUIDIZED COMBUSTION EXPERIMENTS THE SPATIAL DISTRIBUTIONS OF THE GASEOUS AND SOLID SPECIES CONCENTRATIONS AND OF TEMPERATURE WILL BE DETERMINED IN THE FLUIDIZED BED AND THE FREEBOARD FOR THE VARIATION OF OPERATIONAL AND DESIGN PARAMETERS. A BATCH TYPE COMBUSTOR WILL BE USED TO INVESTIGATE THE CHAR OXIDATION REACTION. THE EXPERIMENTAL DATA FROM THE CONTINUOUS COMBUSTOR AND THE BATCH COMBUSTOR WILL BE USED TO TEST THE MODEL FOR THE FORMATION AND DEFORMATION OF NO IN FLUIDIZED BED COMBUSTORS. EXPECTED OUTPUTS ARE: 1. AN UNDERSTANDING OF THE MECHANISM OF FORMATION AND DESTRUCTION OF "FUEL NO" IN FLUIDIZED BEDS. 2. THE MODEL OF NO EMISSION WILL PROVIDE INFORMATION FOR THE SCALING UP AND FURTHER DEVELOPMENT OF FLUIDIZED COMBUSTION PLANTS.

**PROJECT: 01422-PRELIMINARY ENVIRONMENTAL ASSESSMENT OF CAFB LIGNITE AND COAL

```
                    STARTING/ COMPLETION DATE . 02/77   04/78 ·   FUNDING    ESTIMATED   FY77  / $  110000
                    TASK CODE=F623A-07      **EPA=68-02-2632  ** (CNTR.)     PRIOR       FY    /
EPA  OFFICER   S  RAKES                  EPA/IERL   RTP
INVESTIGATOR.. AS WERNER                 G C A CORP                          TECH DIV
               RM BRADWAY                G C A CORP                          TECH DIV
MILESTONES.... 01/77 -COMPLETE SITE VISIT SURVEY & PLANNING
               03/77 -SUBMIT SAMPLING PLAN
               03/77 -COMPLETE PRELIMINARY ENGINEERING ANALYSIS
               11/77 -COMPLETE FIELD TESTING
               01/78 -COMPLETE LAB ANALYSES
               02/78 -COMPLETE ENGINEERING ANALYSIS
               04/78 -SUBMIT FINAL REPORT
PLAN ID......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001422            SSIE-GMA  3594        EPA -68-02-2632       TASK-F623A-07
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVES: THE CHEMICALLY ACTIVE FLUID BED PROCESS (CAFB) IS TO BE EVALUATED TO DETERMINE AIR,
                WATER AND SOLID EMISSIONS TO THE ENVIRONMENT RESULTING FROM GASIFICATION AND COMBUSTION OF LIGNITE
                AT THE ESSO RESEARCH CENTRE, ABINGDON (ERCA), ENGLAND, PILOT PLANT. RECOMMENDATIONS WILL BE
                DEVELOPED FOR CONTROL REQUIREMENTS FOR A DEMONSTRATION PLANT UNDER CONSTRUCTION IN TEXAS. APPROACH:
                THIS ENVIRONMENTAL ASSESSMENT WILL BE CARRIED OUT ACCORDING TO EPA'S LEVEL L PROCEDURES. AN
                EXTENSIVE FIELD AND LABORATORY PROGRAM IS PLANNED TO DETERMINE ORGANIC AND INORGANIC EMISSIONS FROM
                THE STACK, BOILER BLOWDOWN AND SOLID WASTE. THE FIELD MEASUREMENT PROGRAM WILL DETERMINE TOTAL
                PARTICULATE, PARTICULATE SIZE DISTRIBUTIONS, CO, CO2, O2, C1-C6 HYDROCARBONS, NOX, SO2 AND SO3 FROM
                THE STACK. IN ADDITION, ALL GAS, PARTICULATE, SOLID AND WATER SAMPLES WILL BE ANALYZED BY GAS
                CHROMATOGRAPHY, LIQUID CHROMATOGRAPHY, INFRARED SPECTROSCOPY AND LOW RESOLUTION MASS SPECTROMETRY
                FOR ORGANIC FUNCTIONAL GROUPS. THESE SAMPLES WILL ALSO BE ANALYZED FOR TRACE ELEMENTS BY SPARK
                SOURCE MASS SPECTROMETRY AND ATOMIC ABSORPTION SPECTROSCOPY. PARTICULATE AND SOLIDS WILL BE
                ANALYZED BY X-RAY PHOTOELECTRON SPECTROSCOPY (ESCA) FOR SURFACE ELEMENTS AND COMPOUNDS, WITH
                PARTICULAR ATTENTION PAID TO VANADIUM AND SULFUR SPECIES. CURRENT PLANS AND PROGRESS: THE PILOT
                PLANT IS SCHEDULED FOR CONTINUOUS OPERATION DURING THE SECOND WEEK IN OCTOBER. THE FIELD PROGRAM
                WILL TAKE PLACE DURING THIS PERIOD.
```

**PROJECT: 01425-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS UTILIZING RESIDUAL OIL

```
                    STARTING/ COMPLETION DATE : 06/76   09/79     FUNDING :  ESTIMATED   FY77  / $  250000
                    TASK CODE=F623A-10      **EPA=68-02-2155  ** (CNTR.)      PRIOR       FY76  / $  425000
EPA  OFFICER.. SL RAKES                  EPA/IERL   RTP
INVESTIGATOR.  MF TYNDALL                CATALYTIC INC
MILESTONES...  08/76 -SET UP INFORMATION STORAGE AND RETRIEVAL SYSTEM
               11/76 -DEFINE CATEGORIES OF USAGE FOR RESIDUAL AID
               02/77 -SELECT UNITS FOR SAMPLING AND TESTING
               03/77 -MAKE SITE VISIT TO DETERMINE DATA AND DATA GAPS
               08/77 -ISSUE TECHNOLOGY BACKGROUND REPORT
               11/77 -COMPLETE PRELIMINARY PREPARATION FOR SAMPLING   LEVEL 1 & 2
               04/78 -MAKE SAMPLING TRIP
               08/78 -ISSUE EA ANNUAL REPORT
               12/79 -ISSUE STANDARDS OF PRACTICE MANUALS
PLAN ID......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..  RECN-001425            SSIE-GMA  3378 1      EPA -68-02-2155       TASK-F623A-10
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVES: CATALYTIC, INC. WILL MAKE AN ASSESSMENT OF ALL RESIDUAL FUEL OIL DESULFURIZATION
                PROCESSES IN ORDER TO DETERMINE THE COSTS AND EFFICIENCIES FOR REDUCTION OF POLLUTION. APPROACH:
                THE STUDY WILL START WITH A LITERATURE SEARCH OF ALL COMMERCIAL PROCESSES NOW IN OPERATION AND
                THOSE WHICH MAY BE PLACED IN OPERATION DURING THE NEXT THREE YEARS. THE COMMERCIAL PROCESSES TO BE
                STUDIED ARE PARTIAL OXIDATION, HYDRODESULFURIZATION AND FLUE GAS SCRUBBING. DEMONSTRATION PLANTS
                WILL THEN BE STUDIED INCLUDING THE CHEMICALLY ACTIVE FLUID BED PROCESS (CAFB). THE STUDY WILL
                INCLUDE ONLY PRODUCTION OF FUEL FOR BOILERS, PIPELINE GAS AND COMBINED CYCLE TURBINES. CURRENT
                PLANS: A REVEIW AND ANALYSIS OF ALL ENVIRONMENTAL DATA, INCLUDING HEALTH ASPECTS HAS BEEN MADE FOR
                EACH PROCESS. THIS WILL BE FOLLOWED BY PLANT TESTING. THE ANALYSIS WILL INCLUDE SULFUR COMPOUNDS,
                NOX, PARTICULATES, TRACE ELEMENTS, CO, HYDROCARBONS AND CARCINOGENIC COMPOUNDS.
```

**PROJECT: 01426-HAZARDOUS SUBSTANCES IN RESIDUAL OIL

STARTING/ COMPLETION DATE : 05/77 05/79 FUNDING ESTIMATED FY77 / $ 106000
TASK CODE=F623A-11 **EPA=68-02-2638 ** (CNTR.) PRIOR FY76 / $ 164000
EPA OFFICER.. SL RAKES EPA/IERL RTP
INVESTIGATOR.. CR WOLFE WESTINGHOUSE ELECTRIC CORP R & D CTR
MILESTONES.... 07/77 -SUBMIT WORK PLAN
10/77 -COMPLETE SURVEY AVAILABLE DATA
11/77 -SAMPLES SELECTED, TEST PLAN COMPLETE
12/77 -FIRST SAMPLES GROUP ACQUIRED
03/78 -SAMPLE COLLECTION COMPLETED
06/79 -ANALYSIS OF SAMPLES COMPLETED
09/79 -FINAL REPORT ISSUED
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001426 SSIE-GMA 4151 EPA -68-02-2638 TASK-F623A-11
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVES: THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE COMPREHENSIVE CHEMICAL ANALYSES OF UP TO 100 RESIDUAL OIL SAMPLES, ACHIEVING PARTS PER MILLION RESOLUTION WHERE POSSIBLE OF BOTH ORGANIC AND INORGANIC CONSTITUENTS. IN ADDITION, MUTAGENIC TESTING OF SELECTED SAMPLES AND ISOLABLE COMPONENTS OF THE OILS WILL BE PERFORMED. RECOMMENDATIONS WILL BE MADE FOR THE BEST USE OF EACH OF THE VARIOUS RESIDUAL OILS BASED ON AN EVALUATION OF THE POTENTIAL ENVIRONMENTAL PROBLEMS SEEN AS A RESULT OF THE ANALYSES AND INTERPRETATION OF THE BIOASSAY TESTS. APPROACH: BRIEFLY, THE APPROACH INVOLVES EXTENSIVE USE OF GAS CHROMATOGRAPHY (GC), GC-MASS SPECTROMETRY, INFRARED, RAMAN, FOURIER-TRANSFORM SPECTROSCOPY, LIQUID CHROMATOGRAPHY, DERIVATIVE PREPARATION, AND VARIOUS EXTRACTION PROCEDURES IN ORDER TO ISOLATE AND MEASURE ORGANIC COMPONENTS OF THE OILS. THE INORGANIC ANALYSES WILL BE OBTAINED BY EXTENSIVE USE OF ATOMIC ABSORPTION SPECTROSCOPY, OPTICAL EMISSION SPECTROSCOPY, SPECTROPHOTOMETRY, ELECTROANALYTICAL TECHNIQUES, AND WET CHEMICAL TECHNIQUES. INORGANIC COMPOUND IDENTIFICATION WILL BE ACCOMPLISHED BY UTILIZING INFRARED, X-RAY DIFFRACTION AND AUGER SPECTROSCOPY. PROGRESS/PLANS: THE BIOASSAY TESTING WILL BE ACCOMPLISHED BY A COMBINATION OF SUBCONTRACTS TO LITTON BIONETICS AND STANFORD RESEARCH AND CONCURRENT WORK AT WESTINGHOUSE RESEARCH. E. COLI, SALMONELLA, AND SACCHAROMYCES TEST SYSTEMS WILL BE UTILIZED. THE RADIONUCLIDE ANALYSES WILL BE SUBCONTRACTED TO EBERLINE LABORATORIES OF ALBUQUERQUE, NEW MEXICO. THE ELEMENTAL ANALYSES OF THE MAJOR CONSTITUENTS OF THE OILS WILL BE SUBCONTRACTED TO GALBRAITH LABORATORIES OF KNOXVILLE, TENNESSEE.

**PROJECT: 01428-DESIGN AND CONSTRUCTION OF A FLUIDIZED-BED COAL COMBUSTION SAMPLING AND ANALYTICAL TEST RIG

STARTING/ COMPLETION DATE : 08/76 01/79 : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=F623A-12 **EPA=68-02-2170 ** (CNTR.) PRIOR FY76 / $ 330000
EPA OFFICER.: JH WASSER EPA/IERL RTP
INVESTIGATOR.: KJ CLARK ACUREX CORP AEROTHERM DIV
MILESTONES.... 09/76 -PRELIMINARY DESIGN
02/77 -FINAL DESIGN
07/77 -INSTALLATION
09/77 -ACCEPTANCE TEST
01/78 -FINAL REPORT
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES..: RECN-001428 SSIE-GMA 3033 1 EPA -68-02-2170 TASK-F623A-12
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE. THE OBJECTIVE OF THE PROJECT IS TO DESIGN, FABRICATE, AND INSTALL IN THE HIGH BAY AREA (WING G) OF THE INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY (IERL), A FLUIDIZED BED COMBUSTION SAMPLING AND ANALYTICAL TEST RIG AND AUXILIARY EQUIPMENT THAT SHALL BE USED FOR IERL IN-HOUSE RESEARCH PROGRAMS. THIS TEST RIG IS FUNDAMENTALLY A RESEARCH TOOL. THEREFORE, THE DESIGN PHILOSOPHY UTILIZED SHALL BE BASED ON CONSIDERATIONS OF FLEXIBILITY, ACCURACY, AND UTILITY. APPROACH: THE APPROACH CONSISTS OF DESIGNING A TEST RIG WITH A WIDE RANGE OF SAMPLING ACCESS LOCATION SUITABILITY FOR USE OF ALTERNATIVE SAMPLING AND ANALYTICAL TECHNIQUES, AND TO BUILD THE RIG IN A MODULAR CONFIGURATION TO PERMIT EVALUATION OF ALTERNATIVE CONTROL DEVICES. SPECIFICALLY, THE FBC TEST RIG WILL BE DESIGNED WITH THE FLEXIBILITY TO EVALUATE VARIABLES IN THE SUBSYSTEM. COAL AND SORBENT SYSTEM (BED RATE, INJECTION POINT AND METHOD, TYPE, SIZE); START-UP TECHNIQUE; AIR SYSTEM (FLOW AND FGR RATE, EXCESS AIR); DISTRIBUTION CONFIGURATION; HEAT REMOVAL (BED AND FLUE GAS); BED CONDITIONS (TEMPERATURE, FLUIDIZING VELOCITIES, DEPTH, AREA); FREEBOARD; WASTE SOLIDS. CURRENT PLANS: AEROTHERM WILL DEVISE A CONCEPTUAL DESIGN BASED ON THE RESULTS OF INPUT/OUTPUT DATA GATHERING. A FINAL DESIGN WILL BE COMPLETED AFTER ANALYSIS REVIEW AND APPROVAL OF THE CONCEPTUAL DESIGN. THE TEST RIG WILL THEN BE FABRICATED AND INSTALLED AT THE EPA FACILITY, RESEARCH TRIANGLE PARK, NORTH CAROLINA. ACCEPTANCE TESTING AND PERSONNEL TRAINING WILL BE PERFORMED. AN OPERATING MANUAL AND AS-BUILT DRAWINGS WILL BE DELIVERED.

**PROJECT: 01429-CATALYTIC DESULFURIZATION AND DENITROGENATION

STARTING/ COMPLETION DATE : 08/75 07/78 : FUNDING ESTIMATED FY77 / $ 70360
TASK CODE=F623A-14 **EPA=R804123-03 ** (GRANT) PRIOR FY76 / $ 91878

EPA OFFICER.: TW PETRIE EPA/IERL RTP
INVESTIGATOR.: CN SATTERFIELD MIT
M MODELL MIT
JF COCCHETTO MIT

MILESTONES... 10/75 -REPORT ON HDS OF THIOPHENE AND HDN OF PYRDINE
09/76 -REPORT ON EXTENSION TO HIGH PRESSURE OF HDS AND HDN
09/77 -REPORT ON EXTENSION TO MORE COMPLEX SUBSTANCES
09/78 -SUMMARY REPORT INCLUDING MODEL OF HDS-HDN INTERACTION

PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING

ORDIS CODES... RECN-001429 SSIE-GMA 4209 EPA -R804123-03 TASK-F623A-14
AP -623A DU -N105 LABT-EMI

ABSTRACT..... CATALYTIC HYDRODESULFURIZATION (HDS) AND HYDRODENITROGENATION (HDN) REACTIONS FOR THE REMOVAL OF ORGANIC SULFUR AND NITROGEN COMPOUNDS FROM LIQUID FUELS ARE BECOMING INCREASINGLY IMPORTANT AS STRICT SULFUR AND NITROGEN OXIDE EMISSION STANDARDS ARE SET, AND "DIRTIER" OILS DERIVED FROM SHALE AND COAL ATTAIN WIDER USE. A QUANTITATIVE DESCRIPTION OF THE INTERFERENCES BETWEEN THESE TWO REACTIONS, WHICH HAVE ONLY RECENTLY BEGUN TO BE STUDIED, IS NECESSARY FOR OPTIMAL DESIGN OF COMMERCIAL PROCESSING UNITS. TO DATE, WE HAVE STUDIED THIOPHENE, PYRIDINE AND QUINOLINE AS REPRESENTATIVE SULFUR AND NITROGEN COMPOUNDS IN A CONTINUOUS FLOW MICROREACTOR TO MODEL BASIC INTERACTIONS. PYRIDINE INHIBITS THIOPENE HDS UNDER ALL EXPERIMENTAL CONDITIONS USED. SULFUR COMPOUNDS EXHIBIT A DUAL EFFORT ON THE HDN OF PYRIDINE; A REACTION RATE INHIBITION GIVES WAY TO AN ENHANCEMENT AT MORE SEVERE REACTION CONDITIONS. THEORETICAL CONSIDERATIONS HAVE BEEN PRESENTED TO ACCOUNT FOR EACH OF THESE EFFECTS. REACTIONS OF MORE COMPLEX COMPOUNDS AND THEIR INTERACTIVE REACTION KINETICS ARE CURRENTLY UNDER INVESTIGATION

**PROJECT: 01431-DEMETALLIZATION OF RESIDUAL OILS (PHASE V DENITROGENATION CATALYST EVALUATION)

STARTING/ COMPLETION DATE : 12/72 09/77 : FUNDING ESTIMATED FY77 / $ 91000
TASK CODE=F623A-16 **EPA=68-02-0293 ** (CNTR.) PRIOR FY76 / $ 479120

EPA OFFICER.. TW PETRIE EPA/IERL RTP
INVESTIGATOR. CC KANG HYDROCARBON RESEARCH INC
J GENDLER HYDROCARBON RESEARCH INC
C WEBER HYDROCARBON RESEARCH INC
P MARUHNIC HYDROCARBON RESEARCH INC

MILESTONES.... 12/73 -COMPLETED FIRST TEST OF CATALYSTS TO PROMOTE DEMETALLIZATION
12/74 -FINISHED EXTENDED TEST
12/75 -FOREIGN RESIDUAL OILS TESTED
12/76 -WORK WITH RUSSIAN CATALYSTS COMPLETED
09/77 -OPTIMUM CATALYST INDENTIFIED

PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING

ORDIS CODES... RECN-001431 SSIE-GMA 4187 EPA -68-02-0293 TASK-F623A-16
AP -623A DU -N105 LABT-EMI

ABSTRACT..... PHASE V OF THIS RESEARCH PROGRAM AIMS TO TEST THE RELATIVE WORTH OF VARIOUS METALS USED IN CURRENT DENITROGENATION CATALYSTS. ANOTHER AIM IS TO EXAMINE THE EFFECT OF INCREASING MACROPORES IN THE CATALYSTS. POSSIBLY, THE EFFECT OF HYDROGEN PARTIAL PRESSURE MAY BE TESTED. INTERACTIONS AMONG THESE VARIABLES ARE OF INTEREST. ESPECIALLY MANUFACTURED CATALYSTS WILL BE USED IN THE SERIES OF EXPERIMENTS WITH COAL LIQUIDS. THE DATA SHOULD HELP IN THE DEVELOPMENT OF MORE EFFECTIVE CATALYSTS TO DENITROGENATE COAL LIQUIDS. COMPLETED PHASES OF THIS PROGRAM HAVE BEEN DESCRIBED IN PREVIOUS NOTICES OF THIS RESEARCH PROJECT.

**PROJECT: 01430-INTERIM SUPPORT FOR HOMER CITY COAL CLEANING DEMONSTRATION

STARTING/ COMPLETION DATE : 04/77 04/78 FUNDING ESTIMATED FY77 / $ 225000
TASK CODE=F623A-15 **EPA=68-02-2639 ** (CNTR.) PRIOR FY /

EPA OFFICER.: JP KILGROE EPA/IERL RTP
INVESTIGATOR.: LH WEISS CHEMICAL SYSTEMS INC
JF MCCONNELL CHEMICAL SYSTEMS INC

MILESTONES.... 03/78 -DRAFT REPORT OF INTERIM PREPARATION PLANT TESTS

PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING

ORDIS CODES.. RECN-001430 SSIE-GMA 4194 EPA -68-02-2639 TASK-F623A-15
AP -623A DU -N105 LABT-EMI

ABSTRACT..... THIS PROJECT PROVIDES INTERIM SERVICES FOR THE PLANNED COAL CLEANING DEMONSTRATION PROGRAM, WHOSE OVERALL OBJECTIVES ARE TO: QUANTIFY THE PERFORMANCE OF THE SYSTEM AND ITS COMPONENTS AS A MEANS OF CONTROLLING EMISSIONS TO MEET BOTH EXISTING AND NEW SOURCE PERFORMANCE STANDARDS; MEASURE THE EFFECTS OF CLEANED COAL ON ELECTROSTATIC PRECIPITATOR AND BOILER PERFORMANCE AND AVAILABILITY; COMPARE ITS COST EFFECTIVENESS WITH THE ALTERNATIVE OF FLUE GAS DESULFURIZATION; DETERMINE MEANS OF PREDICTING AND CONTROLLING THE CLEANABILITY OF COAL RESERVES; CHARACTERIZE ANCILLIARY ENVIRONMENTAL EFFECTS. THESE INTERIM TASKS ARE: 1. PROVIDE TECHNICAL SUPPORT AND ANALYTICAL SERVICES TO THE HEAVY MEDIUM CYCLONE PILOT PLANT TEST LOOP OPERATED IN CONJUNCTION WITH THE USBM AT BRUCETON, PA., THROUGH OCTOBER 1977. 2. CONDUCT INITIAL TESTS (MASS, SULFUR, AND ENERGY BALANCES) ON THE INITIAL PORTION OF THE COAL PREPARATION PLANT STARTING UP IN SEPTEMBER 1977. 3. DEVELOP THE OVERALL THREE YEAR DEMONSTRATION PROGRAM PLAN. 4. OBTAIN AND ANALYZE FACE SAMPLES FROM THE HELEN AND HELVETIA MINES FOR EVALUATION OF THE INSEAM VARIATION OF SULFUR AND TRACE ELEMENTS IN THE HOMER CITY COAL RESERVE IN CONJUNCTION WITH THE U.S. GEOLOGICAL SURVEY.

**PROJECT: 01435-CONTROL TECHNOLOGY DEVELOPMENT FOR THE PRODUCTS AND BY-PRODUCTS OF FUEL CONVERSION/FUEL UTILIZATION SYSTEMS

STARTING/ COMPLETION DATE : 09/76 09/79 : FUNDING ESTIMATED FY77 / $ 300000
TASK CODE=F623A-18 **EPA=68-02-2167 ** (CNTR.) PRIOR FY76 / $ 410000

EPA OFFICER.: CA VOGEL EPA/IERL RTP
INVESTIGATOR.: AB CHERRY CATALYTIC INC
MILESTONES...: 09/76 -CONTRACT SIGNING
01/78 -REPORT ON CONTROL ASSAY DEVELOPMENT
06/78 -APPLICABILITY OF COKE OVEN CONTROLS TO SYNTHETIC FUELS
09/79 -EVALUATION OF ALL APPLICABLE CONTROLS
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES.. RECN-001435 SSIE-GMA 3102 1 EPA -68-02-2167 TASK-F623A-18
AP -623A DU -N105 LABT-EMI
ABSTRACT..... CATALYTIC, INC. SHALL CONDUCT A PROGRAM THAT WILL RESULT IN THE DEVELOPMENT OF TECHNOLOGY FOR THE CONTROL OF ENVIRONMENTAL POLLUTION FROM UTILIZATION OF THE PRODUCTS AND BY-PRODUCTS OF FUEL CONVERSION/FUEL UTILIZATION SYSTEMS BASED ON COAL. THE OBJECTIVE OF THIS PROJECT IS TO ASSESS THE DEGREE OF REMOVAL AND RECOVERY OR DESTRUCTION OF CONTAMINANTS THAT CAN OCCUR DURING PROCESSING FOR UPGRADING THE PRODUCTS AND BY-PRODUCTS TO MAKE THEM SUITABLE FOR MARKETING. PRODUCTS OF FUEL SYSTEMS ARE DEFINED TO ENCOMPASS THE PRIMARY MARKETABLE MATERIALS FROM FUEL SYSTEMS. BY-PRODUCTS OF FUEL SYSTEMS ARE DEFINED TO ENCOMPASS ALL OTHER USEABLE OR POTENTIALLY USEABLE COMPONENTS OF A FUEL SYSTEM OUTPUT SLATE. FUEL SYSTEM PRODUCTS OR BY-PRODUCTS WHICH EITHER (1) ARE TOTALLY CONSUMED WITHIN THE BASIC PRODUCTION SYSTEM (AS FOR STEAM-RAISING) OR (2) ARE TOTALLY CONSUMED AS A PETROCHEMICAL FEEDSTOCK SHALL NOT BE CONSIDERED FOR CONTROL TECHNOLOGY DEVELOPMENT.

**PROJECT: 01436-BENCH SCALE STUDY OF THE MEYERS PROCESS FOR COAL DESULFURIZATION

STARTING/ COMPLETION DATE : 11/75 09/77 : FUNDING ESTIMATED FY77 / $ 175421
TASK CODE=F623A-19 **EPA=68-02-2121 ** (CNTR.) PRIOR FY76 / $ 321569

EPA OFFICER. RD TAMNIG EPA/IERL RTP
INVESTIGATOR. RA MEYERS THOMPSON RAMO WOOLDRIDGE INC
EP KOUTSOUKOS THOMPSON RAMO WOOLDRIDGE INC
JW HAMERSMA THOMPSON RAMO WOOLDRIDGE INC
R ORSINI THOMPSON RAMO WOOLDRIDGE INC
MJ SANTY THOMPSON RAMO WOOLDRIDGE INC
MILESTONES.... 03/75 -COMPLETE LITERATURE SURVEY
07/75 -COMPLETE COAL PROCESSING CHARACTERIZATION
08/75 -COMPLETE CHEMICAL ANALYSES OF COAL SAMPLES
09/75 -COMPLETE PRODUCT RECOVERY ANALYSES
01/77 -COMPLETE COAL SAMPLE DEPYRITIZATION
05/77 -COMPLETE DATA ANALYSIS
07/77 -COMPLETE ENGINEERING ANALYSIS
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001436 SSIE-GMA 4190 EPA -68-02-2121 TASK-F623A-19
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE CONTRACTOR SHALL PROCESS DIFFERENT TYPES OF RAW COAL THROUGH A BENCH SCALE FACILITY FOR CHEMICAL LEACHING OF PYRITIC SULFUR FROM COAL. THE CONTRACTOR SHALL COMPLETELY CHARACTERIZE THE RAW COAL SAMPLES AND SHALL DETERMINE AT LEAST PROXIMATE AND ULTIMATE ANALYSES AND SULFUR FORMS ANALYSES. THE CONTRACTOR SHALL ALSO EXAMINE THE RAW COAL SAMPLES FOR TRACE CONSTITUENTS. THE CONTRACTOR SHALL, AS A MINIMUM, GATHER THE FOLLOWING DATA: 1. SULFUR REMOVAL BY CHEMICAL LEACHING AS A FUNCTION OF TIME. 2. CHARACTERIZATION OF THE PRODUCTS. 3. TRACE ELEMENT DISTRIBUTION IN THE PRODUCTS.

**PROJECT: 01437-REACTOR TEST PROJECT FOR CHEMICAL REMOVAL OF PYRITIC SULFUR FROM COAL

STARTING/ COMPLETION DATE : 05/76 04/78 : FUNDING ESTIMATED FY77 / $ 980700
TASK CODE=F623A-20 **EPA=68-02-1880 ** (CNTR.) PRIOR FY76 / $ 1750000

EPA OFFICER.. RD TAMNIG EPA/IERL RTP
INVESTIGATOR.. RA MEYERS THOMPSON RAMO WOOLDRIDGE INC
LJ VANNICE THOMPSON RAMO WOOLDRIDGE INC
MJ SANTY THOMPSON RAMO WOOLDRIDGE INC
LP KOUTSOUKOS THOMPSON RAMO WOOLDRIDGE INC
WM BOWES THOMPSON RAMO WOOLDRIDGE INC
MILESTONES.... 10/78 -INITIAL TEST OPERATION OF REACTOR TEST UNIT SCHEDULED
10/79 -LONG-TERM CONTINUOUS OPERATION (120 HR.) OF REACTOR TEST UNIT
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES..: RECN-001437 SSIE-GMA 4189 EPA -68-02-1880 TASK-F623A-20
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE CONTRACTOR WILL CONSTRUCT A REACTOR TEST UNIT FOR EVALUATION OF THE PYRITE LEACHING FROM FINE COAL, LEACH SOLUTION REGENERATION, AND INITIAL FILTRATION OPERATIONS OF THE MEYERS PROCESS FOR COAL DESULFURIZATION. THE REACTOR TEST UNIT WILL BE CAPABLE OF CONTINUOUS OPERATION AT THE NOMINAL RATE OF 250-750 POUNDS OF COAL PER HOUR. THE INPUT MATERIAL TO THE TEST REACTOR SYSTEM IS PROPERLY SIZED COAL, EITHER CLEANED OR UNCLEANED; THE OUTPUT MATERIAL IS THE REACTED COAL WHICH HAS BEEN FILTERED AND WASHED ON THE FILTER. THIS TEST UNIT WILL BE CONSTRUCTED IN ACCORDANCE WITH THE PREDESIGN SPECIFICATIONS PREPARED UNDER CONTRACT 68-02-1335 FOR THE REACTOR TEST UNIT (OMITTING THE COARSE COAL REACTOR SYSTEM). THE REACTOR TEST UNIT WILL BE ERECTED AT A SITE PROVIDED BY THE CONTR

**PROJECT: 01438-DEVELOPMENT PROGRAM FOR TREATMENT OF COAL TO PRODUCE LOW-SULFUR, SOLID FOSSIL FUEL

STARTING/ COMPLETION DATE : 11/75 09/77 : FUNDING ESTIMATED FY77 / $ 161046
TASK CODE=F623A-21 **EPA=68-02-2126 ** (CNTR.) PRIOR FY76 / $ 208000

EPA OFFICER.. RD TAMNIG EPA/IERL RTP
INVESTIGATOR.. DK FLEMING INST. OF GAS TECHNOLOGY
RD SMITH INST. OF GAS TECHNOLOGY
MR AQUINO INST. OF GAS TECHNOLOGY
MILESTONES.... 10/76 -COAL SAMPLE TEST BATCH REACTOR OPERATIONAL
10/76 -COAL SAMPLE SELECTION FOR BATCH TEST FINALIZED
10/76 -COAL SAMPLE THERMOBALANCE TEST UNIT OPERATIONAL
07/77 -COAL SAMPLE BATCH REACTOR UNIT TESTS COMPLETED
09/77 -ANALYSIS OF BATCH REACTOR UNIT TESTS COMPLETED
08/77 -COAL SAMPLE REACTOR TEST RUNS GAS SAMPLE ANALYSIS INITIATED
09/77 -PREPARED FOR INCLUSION IN FINAL REPORT
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001438 SSIE-GMA 2850 1 EPA -68-02-2126 TASK-F623A-21
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS TO DETERMINE ON A BENCH- AND PILOT-UNIT SCALE THE OPERATING PARAMETERS FOR THE IGT PROCESS TO DESULFURIZE COAL BY THERMAL AND CHEMICAL MEANS. COAL WILL BE TREATED WITH A REDUCING ATMOSPHERE IN THE PRESENCE OF A SULFUR GETTER. SULFUR REMOVAL WILL BE DETERMINED AS A FUNCTION OF TEMPERATURE, RESIDENCE TIME, COAL/GETTER RATIO, COAL COMPOSITION, AND PARTICLE SIZE. IN WORK TO DATE UNDER EARLIER CONTRACTS, MIDWESTERN COAL WITH 3.5-4% SULFUR CONTENT HAS BEEN CONVERTED INTO SOLID FOSSIL FUEL THAT CAN BE BURNED DIRECTLY IN CONFORMANCE WITH FEDERAL EPA NEW SOURCE PERFORMANCE STANDARDS FOR SULFUR EMISSION.

**PROJECT: 01439-COAL DESULFURIZATION BY MICROWAVE ENERGY

STARTING/ COMPLETION DATE : 07/76 09/77 : FUNDING ESTIMATED FY77 / $ 147068
TASK CODE=F623A-22 **EPA=68-02-2172 ** (CNTR.) PRIOR FY76 / $ 80000

EPA OFFICER.. LD TAMNIG EPA/IERL RTP
INVESTIGATOR.. PD ZAVITSANOS GENERAL ELECTRIC CO
PD GORSUCH GENERAL ELECTRIC CO
JA GOLDEN GENERAL ELECTRIC CO
H THAL GENERAL ELECTRIC CO
MILESTONES.... 08/76 -SELECTION OF COAL SAMPLES WITH REACTION CHARACTERISTICS SUITABLE
10/76 -EVALUATION OF THE EFFECTIVENESS OF VARIOUS MICROWAVE FREQUENCIES
03/77 -EVALUATION OF SULFUR REACTION TO VARIOUS LENGTHS OF EXPOSURE
06/77 -EVALUATION OF BENEFITS RECEIVED FROM COAL WASH WITH SODIUM H
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001439 SSIE-GMA 3030 1 EPA -68-02-2172 TASK-F623A-22
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS TO CONDUCT RESEARCH AND DEVELOPMENT WHICH WILL LEAD INTO A COST EFFECTIVE METHOD FOR REDUCING SULFUR OXIDE EMISSIONS (DURING COAL COMBUSTION) TO ENVIRONMENTALLY ACCEPTABLE LEVELS. THE APPROACH IS BASED ON THE USE OF MICROWAVE ENERGY WHICH CAN BE COUPLED PREFERENTIALLY INTO IRON PYRITES AND LEACHANTS AND INDUCE REACTIONS WHICH PRODUCE SULFUR COMPOUNDS WHICH CAN EITHER BE SEPARATED EASILY FROM COAL OR DO NOT CONVERT INTO SULFUR OXIDES DURING COMBUSTION. RESULTS TO DATE SHOW THAT IRON PYRITE (FES2) AND NAOH DO INDEED COUPLE WITH MICROWAVE EFFICIENTLY AND REACT TO FORM WATER SOLUBLE SULFUR PRODUCTS. COAL ON THE OTHER HAND IS A LOW LOSS MATERIAL. THE PLAN IS TO INVESTIGATE THE MECHANISM OF ENERGY ABSORPTION AND IMPORTANT REACTIONS INVOLVING SULFUR REARRANGEMENT.

**PROJECT: 01440-PROGRAM SUPPORT IN FOSSIL FUEL PROCESSING AND SYNTHETIC FUELS

STARTING/ COMPLETION DATE : 04/76 02/77 : FUNDING ESTIMATED FY77 / $ 9400
TASK CODE=F623A-23 **EPA=68-02-2152 ** (CNTR.) PRIOR FY76 / $ 320600

EPA OFFICER. LD TAMNY EPA/IERL RTP
INVESTIGATOR. T BORER CAMERON ENGINEERS INC
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES..: RECN-001440 SSIE-GMA 4406 EPA -68-02-2152 TASK-F623A-23
AP -623A DU -N105 LABT-EMI
ABSTRACT..... CAMERON ENGINEERS WILL PROVIDE TO EPA SYSTEMS ANALYSIS AND PROGRAM SUPPORT PRIMARILY IN THE AREAS OF COAL PROCESSING, COAL LIQUEFACTION, COAL GASIFICATION, AND SHALE OIL PROCESSING. INCLUDED IN THESE AREAS ARE THE ENVIRONMENTAL ASSESSMENT OF BOTH TECHNOLOGIES AND UTILIZATION OF PRODUCTS AND BYPRODUCTS AS WELL AS THE ENVIRONMENTAL ASSESSMENT OF ENVIRONMENTAL CONTROL TECHNOLOGY BYPRODUCTS. CAMERON ENGINEERS IS TO PROVIDE A VIEWPOINT INDEPENDENT FROM THAT OF EPA CONTRACTORS THAT ARE WORKING IN THE ENVIRONMENTAL ASSESSMENT, ENVIRONMENTAL CONTROL TECHNOLOGY DEVELOPMENT, AND PROCESS TECHNOLOGY DEVELOPMENT AREAS. CAMERON ENGINEERS' PRIMARY ROLE IS TO PROVIDE TECHNICAL INFORMATION TO THE EPA TECHNICAL PROJECT MANAGEMENT TEAM IN ITS DECISION MAKING ROLE. THIS WILL BE ACCOMPLISHED THOUGH BACKGROUND FUNCTIONS (SUCH AS LITERATURE SURVEYS AND REVIEWS OF TECHNICAL REPORTS), COORDINATION FUNCTIONS, COMMUNICATION FUNCTIONS AND PROGRAM PLANNING SUPPORT. THIS TECHNICAL ASSISTANCE WILL BE PROVIDED ON AS REQUESTED BASIS BY TASK ORDER.

**PROJECT: 01442-POLLUTANTS FROM SYNTHETIC FUELS PROCESSES

```
                    STARTING/ COMPLETION DATE : 11/76   10/81 :   FUNDING    ESTIMATED   FY77  / $  829856
                    TASK CODE=F623A-24      **EPA=R804979-02  ** (GRANT)      PRIOR       FY76  / $  300000
EPA  OFFICER.. TW PETRIE                EPA/IERL   RTP
INVESTIGATOR.. FO MIXON                 RESEARCH TRIANGLE INST
               J  CLELAND               RESEARCH TRIANGLE INST
               D  WAGONER               RESEARCH TRIANGLE INST
               D  ROSENTHAL             RESEARCH TRIANGLE INST
               R  ZWEIDINGER            RESEARCH TRIANGLE INST
               C  SPARICINO             RESEARCH TRIANGLE INST
MILESTONES.... 07/77 -REACTOR FACILITY AND ANALYSIS EQUIPMENT OPERATIONAL
               12/77 -TEST PLAN FORMULATED
               12/78 -KINETICS OF POLLUTANT FORMATION SCREENED
               10/79 -KINETICS OF POLLUTANT FORMATION MEASURED THOROUGHLY
               11/80 -ENVIRONMENTAL ASSESSMENT COMPLETED
               07/81 -RECOMMENDATIONS FOR CONTROL STRATEGIES MADE
PLAN ID......  (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..  RECN-001442          SSIE-GMA  2318 2      EPA -R804979-02       TASK-F623A-24
               AP  -623A            DU  -N105             LABT-EMI
ABSTRACT...... THE PURPOSE OF THE RESEARCH IS TO DEVELOP A FUNDAMENTAL UNDERSTANDING OF THOSE FACTORS AND
                CONDITIONS WHICH CAUSE THE PRODUCTION OF ENVIRONMENTAL POLLUTANTS IN SYNFUELS PROCESSES AND TO
                PROVIDE TO EPA AND TO THE SCIENTIFIC AND TECHNICAL COMMUNITY THE INFORMATION NEEDED TO GUIDE THE
                CONTROL OF POTENTIALLY HAZARDOUS MATERIALS FROM SYNFUELS PLANTS OF THE FUTURE. THE RESEARCH PLAN
                INCLUDES BOTH AN EXPERIMENTAL AND AN ANALYTICAL STUDY. THE EXPERIMENTAL STUDY INCLUDES FIRST THE
                DESIGN, FABRICATION AND OPERATION OF ONE OR MORE LABORATORY REACTORS TO SIMULATE CONDITIONS WHICH
                MAY BE UTILIZED IN ACTUAL SYNFUELS PLANTS, THE DEVELOPMENT AND IMPLEMENTATION OF CHEMICAL ANALYSIS
                PROCEDURES FOR THE EVALUATION OF ELEMENTS AND COMPOUNDS THAT RESULT, FOR SCREENING OF THE MAJOR
                COALS WHICH ARE AVAILABLE IN THE U.S., AND FOR THE DETERMINATION OF THE KINETICS OF FORMATION OF
                THE POLLUTANTS OF SIGNIFICANCE. THE ANALYTICAL STUDY PROVIDES FOR UTILIZING RESULTS OF THE
                SCREENING TESTS TO (1) PROJECT POTENTIAL HUMAN EXPOSURE TO EFFLUENTS AND EMISSIONS FROM THESE
                PLANTS AND (2) ESTABLISH PRIORITY RATINGS FOR THE VARIOUS POLLUTANTS BASED UPON THE EXTENT TO WHICH
                PROJECTED EXPOSURES ARE HAZARDOUS.
```

**PROJECT: 01443-IN SITU FINE PARTICULATE MEASUREMENT

```
                    STARTING/ COMPLETION DATE : 10/77   04/79 :   FUNDING    ESTIMATED   FY77  / $  162259
                    TASK CODE=F623A-25      **EPA=68-02-2668  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: WB KUYKENDAL             EPA/IERL   RTP
INVESTIGATOR.:    UNKNOWN               PARTICLE MEASURING SYSS
MILESTONES...: 02/78 -COMPLETION OF DESIGN STUDY
               10/78 -COMPLETION OF LABORATORY DEVELOPMENT
               04/79 -COMPLETION OF FIELD EVALUATION
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001443          SSIE-GMA  4685        EPA -68-02-2668       TASK-F623A-25
               AP  -623A            DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVE: THIS PROJECT WILL DESIGN, DEVELOP, AND DEMONSTRATE AN IN SITU INSTRUMENT FOR REAL-TIME
                PARTICLE SIZING IN STATIONARY SOURCES. APPROACH: THREE APPROACHES WILL BE PURSUED TO DEVELOP A
                REAL-TIME INSTRUMENT: (1) A PURELY OPTICAL PARTICLE-SIZING INSTRUMENT, (2) AN ACOUSTIC APPROACH TO
                SIZING PARTICLES, AND (3) AN IMPACTOR BASED INSTRUMENT WITH AN OPTICAL READOUT. OUTPUT: PROTOTYPE
                INSTRUMENT AND RESEARCH REPORTS.
```

**PROJECT: 01445-MEASUREMENT OF HIGH TEMPERATURE, HIGH PRESSURE PROCESSES

```
                    STARTING/ COMPLETION DATE : 03/76   03/78 :   FUNDING    ESTIMATED   FY77  / $   85000
                    TASK CODE=F623A-26      **EPA=68-02-2153  ** (CNTR.)      PRIOR       FY76  / $  578000
EPA  OFFICER.. WB KUYKENDAL             EPA/IERL   RTP
INVESTIGATOR.. F  MORENO                ACUREX CORP                          AEROTHERM DIV
               C  HARTMAN               ACUREX CORP                          AEROTHERM DIV
               DR BLANN                 ACUREX CORP                          AEROTHERM DIV
               J  STEINER               ACUREX CORP                          AEROTHERM DIV
MILESTONES.... 05/77 -DEMONSTRATION OF PROBE SYSTEM FOR FLUIDIZED BED COMBUSTION
               02/78 -DESIGN OF PROBE SYSTEM FOR COAL GASIFICATION
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001445          SSIE-GMA  2347 2      EPA -68-02-2153       TASK-F623A-26
               AP  -623A            DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVE: THE OBJECTIVE IS TO DEVELOP MEASUREMENT TECHNIQUES TO GENERATE ENGINEERING DATA FOR
                ENVIRONMENTAL ASSESSMENT AND CONTROL TECHNOLOGY DEVELOPMENT PROJECTS EVALUATING HIGHER TEMPERATURE,
                HIGH PRESSURE PROCESSES. THE TWO PROCESSES OF INITIAL INTEREST ARE HIGH PRESSURE FLUIDIZED BED
                COMBUSTION AND COAL GASIFICATION. EPA IN-HOUSE RESEARCH PROJECTS WILL BE SUPPORTED THROUGH REVIEW
                OF PROGRAM PLANS AND TEST PLANS IN THE AREA OF HIGH TEMPERATURE, HIGH PRESSURE PROCESSES AND DESIGN
                AND CONSTRUCUTION OF AN EPA IN-HOUSE SAMPLING TEST RIG. APPROACH: THE PROGRAM WILL FIRST ESTABLISH
                A BASELINE TECHNOLOGY EFFORT TO PROVIDE THE RESOURCES FOR CONTINUAL PROBLEM SOLVING. THIS BASELINE
                PROGRAM WILL BE SUPPLEMENTED WITH SPECIFIC ASSIGNMENTS BY THE EPA PROJECT OFFICER. THE TECHNICAL
                LEVEL OF EFFORT WILL BE MAINTAINED RELATIVELY CONSTANT. OUTPUT: A PROBING SYSTEM HAS BEEN DESIGNED,
                FABRICATED, AND DEMONSTRATED ON A PRESSURIZED FLUIDIZED BED COMBUSTOR. THE SYSTEM MEASURES PARTICLE
                SIZE AND MASS AS WELL AS PROVIDES A GAS SAMPLE.
```

**PROJECT: 01448-STUDIES RELATED TO THE ORGANIC CHEMICAL ANALYSIS OF INDUSTRIAL SAMPLES

STARTING/ COMPLETION DATE : 09/77 10/79 : FUNDING ESTIMATED FY77 / $ 28000
TASK CODE=F623A-28 **EPA=R805494-01 ** (GRANT) PRIOR FY /

EPA OFFICER. LD JOHNSON EPA/IERL RTP
INVESTIGATOR.. CH LOCHMULLER DUKE UNIV
MILESTONES... 09/77 -GRANT STARTS
11/79 -FINAL REPORT
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES.. RECN-001448 SSIE-GMA 4170 EPA -R805494-01 TASK-F623A-28
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: THE OBJECTIVE OF THESE STUDIES IS TO PROVIDE A FIRMER UNDERSTANDING OF THE BEHAVIOR OF POROUS POLYMER SORBENTS IN SOURCE SAMPLING EFFORTS. APPROACH: PREVIOUS WORK HAS DEALT WITH THE EFFECTS OF REACTION WITH ACIDS AND ACID GASES ON THE SORPTION CAPACITY AND SELECTIVITY OF THESE MATERIALS. RESULTS TO DATE INDICATE THAT SULFONATION AND NITRATION CAN INDEED AFFECT BOTH THE AMOUNT AND THE RELATIVE DISTRIBUTION OF REPRESENTATIVE ORGANIC COMPOUNDS ON THESE SORBENTS. THIS EFFECT WILL BE ESPECIALLY SIGNIFICANT IF THE SAMPLING EFFORT IS CARRIED OUT PAST "BREAKTHROUGH"; THAT IS, IF THE SORBENT TRAP CAPACITY IS EXCEEDED BY THE CHALLENGE CONCENTRATION. POROUS POLYMER SORBENTS HAVE BEEN USED TO SAMPLE AMBIENT AIR AND SOURCES AT TEMPERATURES IN WHICH THE PRINCIPAL SORPTION MECHANISM IS GAS-SOLID ADSORPTION. MORE RECENTLY, THESE SORBENTS HAVE BEEN USED IN SOURCE SAMPLING AT TEMPERATURES WHICH CAUSE THE CONDENSATION OF SIGNIFICANT AMOUNTS OF WATER. THIS REDUCES THE PROBABILITY OF ACID-POLYMER MECHANISM. IN THE WORK PROPOSED BOTH DYNAMIC (LIQUID CHROMATOGRAPHY) AND STATIC METHODS WILL BE EXAMINED AS METHODS FOR THE LABORATORY MEASUREMENT OF SORPTION CAPACITY AND SELECTIVITY AS A FUNCTION OF PH AND TEMPERATURE. IN ADDITION, THE RELATION BETWEEN WATER-BENZENE DISTRIBUTION AND WATER-STYRENE POLYMER (XAD-2) ADSORPTION WILL BE EXAMINED. INFORMATION OBTAINED FROM LITERATURE VALUES FOR BENZENE-WATER-SOLUTE SYSTEMS AND LABORATORY-MEASURED POLYMER STUDIES WILL BE USED TO ATTEMPT TO DEVELOP A PREDICTIVE MODEL FOR SAMPLING PURPOSES. OUTPUT: FINAL REPORT TO BE ENTERED INTO ORD SYSTEM. OF DIRECT USE TO IERL BUT ALSO OF INTEREST TO SCIENTIFIC COMMUNITY.

**PROJECT: 01449-DEVELOPMENT OF HIGH-TEMPERATURE/HIGH-PRESSURE ELECTROSTATIC PRECIPITATOR

STARTING/ COMPLETION DATE : 06/75 10/77 : FUNDING ESTIMATED FY77 / $ 49826
TASK CODE=F623A-29 **EPA=68-02-2104 ** (CNTR.) PRIOR FY74 / $ 137612

EPA OFFICER.. LE SPARKS EPA/IERL RTP
INVESTIGATOR.: P FELDMAN COTTRELL ENV SYSS
MILESTONES...: 06/75 -AWARD CONTRACT
10/77 -ISSUE FINAL REPORT CONTAINING DATA NEEDED TO DESIGN HIGH TEMPERAT U
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001449 SSIE-GMA 4405 EPA -68-02-2104 TASK-F623A-29
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVES ARE TO DETERMINE THE FEASIBILITY OF USING ELECTROSTATIC PRECIPITATORS FOR PARTICULATE COLLECTION AT HIGH TEMPERATURES AND PRESSURES AND TO DEVELOP BASIC DATA ON ELECTRICAL CONDITIONS AT HIGH TEMPERATURES/PRESSURES TO ENABLE ONE TO DESIGN HIGH-TEMPERATURE/PRESSURE ELECTROSTATIC PRECIPITATOR. DATA WILL BE OBTAINED BY CONDUCTING EXPERIMENTS IN SMALL SCALE WIRE-PIPE ELECTROSTATIC PRECIPITATOR UNDER NO-FLOW CONDITIONS. END ITEMS AND USERS: REPORT ON ELECTRICAL CHARACTERISTICS TO BE EXPECTED IN HIGH-TEMPERATURE/PRESSURE ELECTROSTATIC PRECIPITATORS. USERS INCLUDE ALL ORGANIZATIONS (ERC/EPA/ETC.) AND INDIVIDUALS INTERESTED IN PARTICULATE COLLECTION AT HIGH TEMPERATURES/PRESSURES.

**PROJECT: 01450-REVIEW OF CONTROL TECHNOLOGIES FOR OPEN SOURCES OF PARTICULATE EMISSIONS

STARTING/ COMPLETION DATE : 07/77 07/78 FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=F623A-30 **EPA=R805294-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. DC DREHMEL EPA/IERL RTP
INVESTIGATOR. DW COOPER HARVARD UNIV PUBLIC HEALTH/PHYS DEPT
DW MOELLER HARVARD UNIV PUBLIC HEALTH/PHYS DEPT
MILESTONES.... 07/77 -AWARD GRANT
07/78 -COMPLETE RANKING OF CONTROL TECHNOLOGY
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001450 SSIE-GMA 4140 EPA -R805294-01 TASK-F623A-30
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: TO ASSESS CONTROL TECHNOLOGY FOR OPEN SOURCES. APPROACH: THIS WORK WILL IDENTIFY, DESCRIBE, AND ANALYZE EXISTING METHODS FOR THE CONTROL OF OPEN SOURCES OF PARTICULATE EMISSIONS. FROM THE ANALYSIS OF THE STATE OF THE ART AND OF THE AREAS OF NEED, THE INVESTIGATORS WILL DETERMINE PRIORITIES FOR RESEARCH, DEVELOPMENT, AND APPLICATION IN THE CONTROL OF OPEN SOURCE EMISSIONS. OUTPUT: REVIEW AND RANKING OF OPEN SOURCE CONTROL PROCEDURES AND DEVICES.

**PROJECT: 01453-THE EFFECTS OF HIGH TEMPERATURE AND PRESSURE ON PARTICLE COLLECTION MECHANISMS

STARTING/ COMPLETION DATE : 12/75 04/78 : FUNDING ESTIMATED FY77 / $ 10000
TASK CODE=F623A-31 **EPA=68-02-2137 ** (CNTR.) PRIOR FY76 / $ 350000

EPA OFFICER.. DC DREHMEL EPA/IERL RTP
INVESTIGATOR.. S CALVERT AIR POLLUTION TECH INC
R PARKER AIR POLLUTION TECH INC
MILESTONES.... 12/75 -CONTRACT AWARD
01/77 -COMPLETE THEORETICAL REVIEW
09/77 -COMPLETE STUDY OF COLLECTION REQUIREMENT FOR VARIOUS APPLICATION
04/78 -COMPLETE BENCH SCALE VERIFICATION THEORY
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001453 SSIE-GMA 3011 1 EPA -68-02-2137 TASK-F623A-31
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: TO CONDUCT A THEORETICAL AND EXPERIMENTAL INVESTIGATION TO DETERMINE THE EFFECTS OF HIGH TEMPERATURE (1,100 DEGREES C), HIGH PRESSURE (15 ATM), AND PARTICLE DIAMETER ON PARTICULATE COLLECTION MECHANISMS, AND TO IDENTIFY MECHANISMS THAT MIGHT BE USED TO REMOVE PARTICLES FROM HIGH-TEMPERATURE AND/OR HIGH-PRESSURE GAS STREAMS. EXISTING AND PROPOSED ENERGY PROCESSES REQUIRING HIGH-TEMPERATURE AND/OR HIGH-PRESSURE PARTICULATE CLEANUP WILL ALSO BE STUDIED TO DETERMINE THE IMPORTANT CHARACTERISTICS, CLEANUP REQUIREMENTS, AND POTENTIAL PROBLEMS OF EACH PROCESS. APPROACH: THE INVESTIGATION WILL INCLUDE A THOROUGH LITERATURE SEARCH, SURVEY, AND EVALUATION OF THE PRESENT STATE OF KNOWLEDGE CONCERNING HIGH-TEMPERATURE AND -PRESSURE AEROSOL MECHANICS AND COLLECTION MECHANISMS. LABORATORY-SCALE EXPERIMENTS WILL BE CONDUCTED TO OBTAIN NECESSARY DATA ON THE BEHAVIOR OF AEROSOLS IN HIGH TEMPERATURE AND PRESSURE ENVIRONMENTS, AND THE RESULTS WILL BE USED TO IMPROVE PRESENT THEORY, TO IDENTIFY USEFUL HIGH TEMPERATURE AND HIGH PRESSURE COLLECTION MECHANISMS FOR PARTICULATE REMOVAL, AND TO RECOMMEND PROGRAMS FOR THE DEVELOPMENT AND DEMONSTRATION OF PARTICULATE CONTROL DEVICES BASED UPON THESE MECHANISMS. OUTPUTS: REVIEW OF THEORY AND BENCH SCALE VERIFICA

**PROJECT: 01457-NEW CONCEPT FOR FINE PARTICLE CONTROL AT HIGH TEMPERATURE AND PRESSURE

STARTING/ COMPLETION DATE : 08/76 08/78 : FUNDING ESTIMATED FY77 / $ 330000
TASK CODE=F623A-32 **EPA=68-02-2164 ** (CNTR.) PRIOR FY76 / $ 100000

EPA OFFICER.. DC DREHMEL EPA/IERL RTP
INVESTIGATOR.. S CALVERT AIR POLLUTION TECH INC
RG PATTERSON AIR POLLUTION TECH INC
MILESTONES.... 08/76 -CONTRACT AWARD
08/77 -COMPLETE STUDY OF COMPONENTS OF NEW DEVICE
08/78 -COMPLETE FEASIBILITY TESTS OF INTEGRATED SYSTEM
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001457 SSIE-GMA 3024 1 EPA -68-02-2164 TASK-F623A-32
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: THE DEVELOPMENT OF ADVANCED ENERGY SOURCES SUCH AS COAL AND SHALE OIL GASIFICATION RESULTS IN HIGH TEMPERATURE AND PRESSURE PROCESS GAS STREAMS WHICH REQUIRE REMOVAL OF PARTICULATES BEFORE UTILIZATION. THE OBJECTIVE OF THIS RESEARCH IS TO EVALUATE A NOVEL CONCEPT FOR FINE PARTICLE CONTROL IN THESE SYSTEMS. THE APPARATUS WOULD COLLECT FINE PARTICLES BY MECHANISMS SUCH AS DIFFUSION, INERTIAL IMPACTION, INTERCEPTION AND ELECTROPHORESIS. APPROACH: A PRELIMINARY EVALUATION OF THE NEW CONCEPT WILL BE PERFORMED, FOLLOWED BY EXPERIMENTAL VERIFICATION OF FINE PARTICLE COLLECTION. PRESENTLY THEORETICAL CALCULATIONS ARE BEING PERFORMED FOR MECHANISMS INVOLVED IN PARTICLE COLLECTION AND SYSTEM REGENERATION. THE POWER AND RESIDENCE TIME REQUIREMENTS FOR PARTICLE CAPTURE WILL BE PREDICTED FOR THE MOST PROMISING MECHANISMS. BASED ON THESE CALCULATIONS, PRELIMINARY BENCH-SCALE EXPERIMENTS WILL BE PERFORMED TO DEMONSTRATE THE FEASIBILITY OF FINE PARTICLE CAPTURE IN THE PROPOSED PARTICLE COLLECTION SYSTEM. THIS WILL BE FOLLOWED BY THE ECONOMIC ANALYSIS AND RECOMMENDATIONS. THE SECOND PHASE OF THE PROJECT WILL CONSIST OF THE CONSTRUCTION AND TESTING OF A MODEL OF THE NEW CONCEPT WITH AT LEAST 500 SCFM CAPACITY. OUTPUTS: PROVE FEASIBILITY OF DRY SCRUBBER CONCEPT FOR CONTROL OF PARTICULATE AT HIGH TEMPERATURE AND PRESSURE. THIS CONCEPT WILL BEAR ON THE ECONOMIC SUCCESS OF THE ADVANCED ENERGY PROCESSES.

**PROJECT: 01458-FINE PARTICLE CONTROL BY HOT FILTRATION

STARTING/ COMPLETION DATE : 08/76 08/78 : FUNDING ESTIMATED FY77 / $ 400000
TASK CODE=F623A-33 **EPA=68-02-2169 ** (CNTR.) PRIOR FY76 / $ 200000

EPA OFFICER.. DC DREHMEL EPA/IERL RTP
INVESTIGATOR.. FE MORENO ACUREX CORP AEROTHERM DIV
C HARTMAN ACUREX CORP AEROTHERM DIV
MILESTONES.... 08/76 -CONTRACT AWARD
12/77 -COMPLETE MATRIX OF BENCH SCALE TESTS ON CANDIDATE FILTRATION
08/78 -COMPLETE LIFE TESTING OF BEST MATERIALS
PLAN ID.....: (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES..: RECN-001458 SSIE-GMA 3098 1 EPA -68-02-2169 TASK-F623A-33
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: TO DEMONSTRATE THE TECHNICAL AND ECONOMIC VIABILITY OF FABRIC FILTRATION AS A MEANS OF FINE PARTICLE CONTROL AT HIGH TEMPERATURES (1,500 DEGREES F) AND PRESSURES (10 ATM). APPROACH: PHASE I CONSISTS OF A MATRIX OF BENCH-SCALE TESTS DESIGNED TO DEMONSTRATE THE BASIC FEASIBILITY OF CANDIDATE MATERIALS AND REGENERATION MECHANISMS. THESE MATERIALS WILL BE DEVELOPED BY A COMBINATION OF IN-HOUSE EXPERTISE AND SUBCONTRACTED WORK TO A FABRIC WEAVER. THE PROGRAM WILL INCLUDE THE DEVELOPMENT OF A HIGH-TEMPERATURE/PRESSURE FILTRATION THEORY; A THOROUGH SEARCH FOR VIABLE MATERIALS TO SUPPLEMENT THOSE ALREADY IDENTIFIED; AND THE DESIGN, FABRICATION AND USE OF A BENCH-SCALE TESTING APPARATUS. WITH THE IDENTIFICATION OF THE MOST PROMISING MATERIALS SYSTEMS AN ECONOMIC ANALYSIS WILL BE PERFORMED AND RECOMMENDATIONS MADE FOR THE CONTINUATION OF THE DEVELOPMENT PROGRAM, I.E., PHASE II. PHASE II OF THE PROPOSED PROGRAM WILL CONTINUE THE DEVELOPMENT OF THE PROMISING CONCEPTS IDENTIFIED IN PHASE I. A PILOT SCALE (500 SCFM) FACILITY WILL BE CONSTRUCTED AT AEROTHERM TO DEMONSTRATE THE RELIABILITY OF THESE CONCEPTS. OUTPUTS: PHASE I WAS INITIATED 8/76 AND WILL REQUIRE 16 MONTHS FOR COMPLETION. PHASE II IS ANTICIPATED TO BE AN 8-MONTH EFFORT.

**PROJECT: 01461-THE USE OF ELECTROSTATICALLY CHARGED FOG FOR CONTROL OF DUST FROM OPEN SOURCES

STARTING/ COMPLETION DATE · 06/77 06/79 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=F623A-34 **EPA=R805228 ** (GRANT) PRIOR FY /

EPA OFFICER. DC DREHMEL EPA/IERL RTP
INVESTIGATOR.: SA HOENIG UNIV OF ARIZONA SCH OF ENG
MILESTONES...: 06/77 -GRANT AWARD
06/78 -COMPLETE LABORATORY STUDY OF CONTROLLING PARAMETERS
06/79 -COMPLETE FIELD TESTS
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001461 SSIE-GMA 4137 EPA -R805228 TASK-F623A-34
AP -623A DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE· TO CONTINUE THE STUDIES OF INDUSTRIAL DUSTS AND FUMES AND THE DEVELOPMENT OF APPARATUS FOR INDUCING THESE POLLUTANTS TO AGGLOMERATE AND FALLOUT. ALSO TO INVESTIGATE THE PHENOMENA INVOLVED IN DUST/FUME CHARGING WITH THE HOPE OF PROVIDING BETTER DUST CONTROL SYSTEMS. APPROACH: THE STUDIES WILL BE PRIMARILY EXPERIMENTAL AND WILL GENERATE THE APPROPRIATE DUSTS AND FUMES UNDER CONTROLLED CONDITIONS TO DETERMINE THE PARAMETERS INVOLVED IN CHARGING PHENOMENA. UNIVERSITY OF ARIZONA WILL MAKE APPROPRIATE INDUSTRIAL MEASUREMENTS AND STUDIES TO EVALUATE CHARGING AND DUST CONTROL TECHNIQUES IN THE FACTORY ENVIRONMENT. CURRENT STATUS: UNIVERSITY OF ARIZONA HAS INVESTIGATED THE CHARGING BEHAVIOR OF A VARIETY OF DUSTS AND FUMES. MOST MATERIALS SEEM TO HAVE NEGATIVE CHARGES, AT LEAST FOR THE RESPIRABLE MATERIAL, BUT THERE ARE SOME NOTABLE EXCEPTIONS, I.E., MAGNETITE. IT HAS BEEN DEMONSTRATED THAT THESE DUSTS AND FUMES CAN BE INDUCED TO AGGLOMERATE AND FALLOUT WHEN EXPOSED TO PROPERLY CHARGED WATER FOG. A NUMBER OF INDUSTRIAL TESTS ARE UNDERWAY TO TEST PROTOTYPE FOG GENERATORS AS MECHANISMS FOR DUST CONTROL. UNIVERSITY OF ARIZONA HAS DONE SOME PRELIMINARY WORK ON CONTROL OF POWER PLANT FLY ASH AND COAL TAR VOLATILES (FROM COKE OVENS). HERE AGAIN IT APPEARS THAT THE CHARGED FOG SYSTEM HAS SIGNIFICANT POTENTIAL AS A CONTROL TECHNIQUE.

**PROJECT: 01463-PHOTOCHEMICAL STUDY OF NOX REMOVAL FROM STACK GASES

STARTING/ COMPLETION DATE : 11/76 12/78 FUNDING ESTIMATED FY77 / $ 38551
TASK CODE=F623A-35 **EPA=R804740-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. JA MCSORLEY EPA/IERL RTP
INVESTIGATOR.. DL FOX UNIV OF NORTH CAROLINA SCH OF PUBLIC HLTH
MILESTONES.... 11/76 -GRANT AWARD
12/78 -RESEARCH COMPLETE
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001463 SSIE-GMA 3539 EPA -R804740-01 TASK-F623A-35
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO EVALUATE THE FEASIBILITY OF NOX REMOVAL FROM FLUE GASES BY PHOTOCHEMICAL CONVERSION OF NO TO ND2 FOLLOWED BY AQUEOUS SCRUBBING. THE PROPOSED RESEARCH HAS THE POTENTIAL FOR REMOVAL OF FINE PARTICULATES AND SOX AS WELL AS NOX. THERE IS A GOOD PROBABILITY THAT THE FINE PARTICULATE WITH THE HIGH HUMIDITY OF A STACK GAS WILL ACT AS NUCLEATION SITES FOR NITRIC AND SULFURIC ACID MIST FORMATION. THE FORMATION OF AEROSOLS WOULD BE ENHANCED BY ANY PHOTOCHEMICALLY ACTIVE HYDROCARBONS THAT MAY BE IN THE FLUE GAS.

**PROJECT: 01464-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

STARTING/ COMPLETION DATE : 02/77 02/79 : FUNDING ESTIMATED FY77 / $ 671853
TASK CODE=F623A-37 **EPA=68-02-2612 ** (CNTR.) PRIOR FY /

EPA OFFICER.. JA MCSORLEY EPA/IERL RTP
INVESTIGATOR. FO MIXON RESEARCH TRIANGLE INST
MILESTONES... 03/77 -CONTRACT AWARD
03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-001464 SSIE-GMA 3617 EPA -68-02-2612 TASK-F623A-37
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THE ENVIRONMENTAL PROTECTION AGENCY'S INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY HAS THE MISSION TO SUPPORT AND ENCOURAGE THE DEVELOPMENT OF TECHNOLOGY FOR THE CONTROL OF AIR POLLUTION FROM ALL SOURCES. THE ACTIVITIES OF THE LABORATORY RANGE FROM THE IDENTIFICATION OF EMISSIONS SOURCES AND QUANTIFICATION OF THE EMISSIONS THEREFROM, THROUGH THE DEVELOPMENT OF CONTROL TECHNOLOGY FROM CONCEPTUAL IDEAS TO FULL-SCALE IMPLEMENTATION, TO THE EVALUATION OF THE ECONOMIC AND ENVIRONMENTAL IMPACT OF APPLICATIONS TO THE TECHNOLOGY. THIS PROJECT IS FOR SUPPORT OF THE TECHNICAL ACTIVITIES OF THE LABORATORY IN THE FOLLOWING AREAS: (1) ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF POLLUTION CONTROL SYSTEMS AS THEY BECOME COMMERCIALLY AVAILABLE TO USER INDUSTRIES; (2) PROCESS ANALYSIS; (3) COST ESTIMATION OF POLLUTION CONTROL SYSTEMS THAT ARE BEING DEVELOPED BY EPA; (4) PROCESS RESEARCH; (5) EVALUATION OF THE ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES; (6) ENGINEERING ANALYSIS; (7) ASSESSMENT OF R&D PROGRAMS IN COAL LIQUEFACTION, LOW, MEDIUM, AND HIGH BTU GASIFICATION, ADVANCED COMBINATION RESEARCH, AND IMPROVED COAL EXTRACTION AND RECLAMATION TECHNIQUES; (8) PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEYS; (9) IDENTIFICATION OF NEW ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF FOSSIL FUELS; (10) ASSOCIATED TECHNICAL SERVICES; AND (11) REGIONAL ASSISTANCE AND STATE IMPLEMENTATION PLANNING.

**PROJECT: 01468-METHODOLOGIES FOR UTILIZATION OF ENVIRONMENTAL-IMPACT-ASSESSMENT DATA

```
                    STARTING/ COMPLETION DATE : 00/77   UNK       FUNDING :  ESTIMATED   FY77  / $   59529
                    TASK CODE=F623A-38      **EPA=R805476-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. CT RIPBERGER              EPA/IERL   RTP
INVESTIGATOR.. LR BABCOCK                UNIV OF ILLINOIS                     MED CTR/ENV HLTH SCI
               RA WADDEN                 UNIV OF ILLINOIS                     MED CTR/ENV HLTH SCI
MILESTONES.... 10/78 -COMPLETE RESEARCH RELATED TO HEALTH EFFECT LINKAGES
               10/79 -COMPLETE RESEARCH RELATED TO TRANSPORT-TRANSFORMATION
               10/80 -COMPLETE INTEGRATION STUDIES
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001468            SSIE-GMA  4132        EPA -R805476-01       TASK-F623A-38
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT...... THE PROPOSED RESEARCH SEEKS TO DEFINE METHODOLOGICAL APPROACHES FOR USE WITHIN EPA WHICH WOULD
                FACILITATE THE IDENTIFICATION OF HAZARDS AND SETTING OF STANDARDS AND CONTROL PRIORITIES. A NEW
                COMPREHENSIVE TYPE OF ASSESSMENT DATA IS BEING GENERATED WITHIN EPA, AND THE PROPOSED RESEARCH, IN
                PART, WOULD ATTEMPT TO DEFINE HOW SUCH INFORMATION MIGHT BE BEST UTILIZED BY HEALTH-EFFECTS,
                ATMOSPHERIC-CHEMISTRY AND OTHER INVOLVED GROUPS IN ORDER TO GENERATE MEANINGFUL CAUSE-EFFECT
                RESULTS IN THE SHORTEST TIME. THE RESEARCH WILL INCLUDE DEFINITION OF PERTINENT EPA UNITS AND
                PROCEDURES AND OBSTACLES TO INTERCHANGE OF RESEARCH RESULTS. METHODS FOR IMPROVING KNOWLEDGE
                TRANSFER WILL BE PROPOSED. COMPREHENSIVE ALTERNATIVES TO "SINGLE-POLLUTANT" METHODS WILL BE
                DEVELOPED. SEVERAL APPROACHES WILL BE CONSIDERED INCLUDING, BUT NOT LIMITED TO, THOSE BASED ON
                PREVIOUSLY-DEVELOPED AIR QUALITY INDEXES, PRIORITIZATION METHODOLOGIES, AND ASSESSMENTS OF
                HYPERSENSITIVE POPULATIONS. THE FIRST YEAR WILL EMPHASIZE LINKAGES BETWEEN THE INDUSTRIAL
                ENVIRONMENTAL RESEARCH LABORATORY AND HEALTH EFFECTS AND STANDARDS-SETTING UNITS OF EPA. THE SECOND
                YEAR WOULD EMPHASIZE LINKAGES WITH TRANSPORT-AND-TRANSFORMATION RESEARCH. THE THIRD YEAR WOULD
                EMPHASIZE INTEGRATION OF DIVERSE ASPECTS OF THE ENVIRONMENTAL MANAGEMENT SYSTEM.
```

**PROJECT: 01469-ENVIRONMENTAL STUDIES OF COAL CLEANING PROCESSES

```
                    STARTING/ COMPLETION DATE : 09/77   10/78 :   FUNDING    ESTIMATED   FY77  / $   80000
                    TASK CODE=F623A-90      **EPA=D8-E721-GA  ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. JD KILGROE                EPA/IERL   RTP
INVESTIGATOR.. RM COLE                   US TVA
               RJ RUANE                  US TVA
               HG MOORE                  US TVA
PLAN ID......: (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES..: RECN-001469            SSIE-GMA  4697        EPA -D8-E721-GA       TASK-F623A-90
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT...... DEVELOP A PLAN AND PRELIMINARY COST ESTIMATES FOR A PROGRAM TO EVALUATE METHODS TO MINIMIZE
                ENVIRONMENTAL PROBLEMS FROM COAL CLEANING PLANT RESIDUALS, INCLUDING METHODS TO MINIMIZE REFUSE BY
                INCREASED COAL BTU RECOVERY AND SULFUR REMOVAL. TASK 1 WILL INVOLVE ENVIRONMENTAL EVALUATIONS OF
                THE CLEANING CIRCUITS FOR BRECKENRIDGE, PARADISE, AND POSSIBLY OTHERS, AND DEVELOPMENT OF
                RECOMMENDATIONS FOR BENCH-, PILOT-, AND FULL-, SCALE STUDIES.
```

**PROJECT: 01471-ASSESSMENT AND CONTROL OF WASTEWATER CONTAMINANTS ORIGINATING FROM THE PRODUCTION OF SYNTHETIC FUELS FROM COAL

```
                    STARTING/ COMPLETION DATE : 11/76   10/81     FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=F623A-91      **EPA=R804917-02  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.: TW PETRIC                 EPA/IERL   RTP
INVESTIGATOR.: PC SINGER                 UNIVERSITY OF NORTH CAROLINA
               JC LAMB                   UNIVERSITY OF NORTH CAROLINA
               RF CHRISTMAN              UNIVERSITY OF NORTH CAROLINA
               FK PFAENDER               UNIVERSITY OF NORTH CAROLINA
MILESTONES.... 11/76 -PROJECT INITIATION
               10/81 -PROJECT TERMINATION
PLAN ID....... (AP-623A)(DU-N105)  FUEL PROCESSING
ORDIS CODES... RECN-001471            SSIE-GMA  4821        EPA -R804917-02       TASK-F623A-91
               AP  -623A              DU  -N105             LABT-EMI
ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE PURPOSE OF THIS
                PROJECT IS TO ASSESS THE ENVIRONMENTAL IMPACT OF WASTEWATER CONTAMINANTS ORIGINATING FROM THE
                PRODUCTION OF SYNTHETIC FUELS FROM COAL, AND TO EVALUATE ALTERNATIVE WASTEWATER TREATMENT
                TECHNOLOGIES FOR THE CONTROL OF THESE CONTAMINANTS. THE PROJECT IS CARRIED OUT IN SEVERAL PHASES
                OVER A 5-YEAR PERIOD CONSISTING OF (A) A LITERATURE REVIEW AND SURVEY OF PILOT- AND FULL-SCALE COAL
                CONVERSION FACILITIES TO IDENTIFY SPECIFIC CONTAMINANTS WHICH MIGHT BE FOUND IN COAL PROCESSING
                WASTEWATERS, (B) A STUDY OF THE BIODEGRADABILITY OF SELECTED ORGANIC CONSTITUENTS FROM SUCH
                WASTEWATERS INCLUDING AN ASSESSMENT OF THE AQUATIC IMPACT OF THESE CONSTITUENTS AND BIODEGRADATION
                PRODUCTS, (C) BIOLOGICAL AND PHYSICAL-CHEMICAL TREATABILITY STUDIES OF SELECTED ORGANIC
                CONSTITUENTS AND IDENTIFICATION OF THE RESIDUALS FOLLOWING TREATMENT, (D) ANIMAL TOXICOLOGY STUDIES
                TO EVALUATE THE POTENTIAL HEALTH EFFECTS OF THOSE WASTEWATER COMPONENTS FOR WHICH SUFFICIENT
                INFORMATION IS NOT AVAILABLE IN THE LITERATURE, (E) TREATABILITY STUDIES OF COMPOSITE SYNTHETIC AND
                REAL COAL-PROCESSING WATERS INCLUDING ANALYTICAL CHARACTERIZATION AND AQUATIC IMPACT ASSESSMENT OF
                THE TREATED WATERS, AND (F) DEVELOPMENT OF DESIGN CRITERIA TREATMENT OF WASTEWATERS FROM
                COAL-CONVERSION FACILITIES.
```

**PROJECT: 03997-REDUCE ADVERSE ENVIRONMENTAL EFFECTS FROM URANIUM MILL WASTES

STARTING/ COMPLETION DATE : 07/75 10/80 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=V623A-05 **EPA=D6-E681-FP ** (IAG) PRIOR FY /

EPA OFFICER. C HALL EPA/HDQTRS- OEMI
INVESTIGATOR. FF HAYWOOD U.S. DEPT. OF ENERGY
WA GOLDSMITH U.S. DEPT. OF ENERGY
RW LEGGETT U.S. DEPT. OF ENERGY
PLAN ID..... (AP-623A)(DU-N105) FUEL PROCESSING
ORDIS CODES... RECN-003997 SSIE-GMA 5364 EPA -D6-E681-FP TASK-V623A-05
AP -623A DU -N105 LABT-EMI
ABSTRACT..... THIS PROJECT WAS ORGANIZED TO CHARACTERIZE THE CURRENT RADIOLOGICAL CONDITION OF 23 INACTIVE URANIUM MILLS IN THE WESTERN UNITED STATES. AT EACH SITE, A SERIES OF MEASUREMENTS WERE MADE TO ESTABLISH THE BOUNDARIES OF AREAS CONTAMINATED WITH TAILING MATERIAL WHICH HAD BEEN BLOWN OR WASHED FROM THE ORIGINAL TAILINGS PILE. HOLES WERE BORED THROUGH TAILING PILES AND GAMMA RAY MEASUREMENTS WERE MADE AS A FUNCTION OF DEPTH IN ORDER TO DETERMINE THE DEPTH OF RADIONUCLIDE MIGRATION BENEATH THE TAILINGS. IN ORDER TO QUANTIFY THE OFF-SITE MIGRATION OF TAILINGS RADIONUCLIDES, ENVIRONMENTAL SAMPLES (SOIL, WATER, SEDIMENT, AND VEGETATION) WERE COLLECTED AND ANALYZED FOR 226RA, 238U, 230TH, AND 210PB. CONCENTRATIONS OF RADON AND PROGENY WERE DETERMINED IN SOME EXISTING MILL STRUCTURES AND IN SOME STRUCTURES WHERE TAILINGS MATERIAL HAD BEEN USED AS CONSTRUCTION MATERIAL. REPORTS OF THE FINDINGS OF THE RADIOLOGICAL SURVEY AT EACH MILL SITE ARE BEING PREPARED AND WILL BE ISSUED BY SEPTEMB

**PROJECT: 01472-FIELD TESTING APPLICATION OF COMBUSTION MODIFICATION TECHNIQUES TO CONTROL POLLUTANT EMISSIONS FROM INDUSTRIAL BOILERS

STARTING/ COMPLETION DATE : 06/73 08/77 : FUNDING ESTIMATED FY77 / $ 29260
TASK CODE=F624A-001 **EPA=68-02-1074 ** (CNTR.) PRIOR FY76 / $ 834910

EPA OFFICER.. RE HALL EPA/IERL RTP
INVESTIGATOR. RE THOMPSON K V B ENG INC
SC HUNTER K V B ENG INC
MILESTONES.... 06/73 -CONTRACT START DATE
10/73 -SUBMIT BOILER SURVEY
07/74 -PHASE I 50 SHORT TERM BOILER FIELD TESTS COMPLETED
09/74 -PHASE I FINAL REPORT COMPLETED
10/74 -PHASE II WORK PLAN SUBMITTED
08/75 -PHASE II 20 LONG TERM BOILER FIELD TESTS COMPLETED
03/76 -PHASE II FINAL REPORT COMPLETED
12/76 -INDUSTRIAL BOILER OPERATOR GUIDELINE COMPLETED
06/77 -PHASES I & II DATA SUPPLEMENT COMPLETED
08/77 -INDUSTRIAL BOILER DESIGN GUIDELINE COMPLETED
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001472 SSIE-GMA 4193 EPA -68-02-1074 TASK-F624A-001
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE PURPOSE OF THIS WORK IS TO DETERMINE THE EFFECTIVENESS OF KNOWN COMBUSTION MODIFICATION TECHNIQUES TO CONTROL POLLUTANT EMISSIONS FROM INDUSTRIAL BOILERS. IN ADDITION, THE EFFORT WILL ESTABLISH WHAT THE BOILER MANUFACTURERS AND USERS CAN DO TO CONTROL EMISSIONS WITH EXISTING STATE-OF-THE-ART TECHNOLOGY AND WHERE COMBUSTION RESEARCH ACTIVITIES SHOULD BE CONCENTRATED. AN EXPERIMENTAL FIELD TEST PROGRAM WAS CARRIED OUT TO INVESTIGATE THE EFFECTS OF OPERATING VARIABLES AND COMBUSTION MODIFICATION (E.G., EXCESS AIR LEVEL, LOAD, FLUE GAS RECIRCULATION, STAGED COMBUSTION, FUEL TEMPERATURE AND BURNER DESIGN) ON AIR POLLUTANT EMISSIONS FROM INDUSTRIAL BOILERS OF VARIOUS DESIGN FIRED WITH COAL, OIL, GAS AND MIXED FUELS. THE POLLUTANTS OF INTEREST IN THIS STUDY WERE OXIDES OF NITROGEN, OXIDES OF SULFUR, HYDROCARBONS, CARBON MONOXIDE, SMOKE, COMBUSTIBLE AND NON-COMBUSTIBLE PARTICULATE AND TRACE ELEMENTS. FINAL REPORTS PROVIDING THE DATA AND CONCLUSIONS FROM THE TESTING OF MORE THAN SIXTY INDUSTRIAL BOILERS UNDER A VARIETY OF CONDITIONS HAVE BEEN ISSUED. AT PRESENT, AN INDUSTRIAL BOILER OPERATOR'S MANUAL AND A MANUFACTURER'S MANUAL ARE BEING PREPARED AND ARE EXPECTED TO BE COMPLETED IN THE FIRST HALF OF 1977.

**PROJECT: 01476-DEVELOPMENT OF CRITERIA FOR EXTENSION OF APPLICABILITY OF LOW-EMISSION, HIGH-EFFICIENCY COAL BURNERS IN PROGRESS

STARTING/ COMPLETION DATE : 10/77 10/80 : FUNDING ESTIMATED FY77 / $ 950000
TASK CODE=F624A-005 **EPA=68-02-2667 ** (CNTR.) PRIOR FY /

EPA OFFICER.. GB MARTIN EPA/IERL RTP
INVESTIGATOR.. UNKNOWN ENERGY & ENVIRON. RES. CORP
MILESTONES.... 10/77 -INITIATE CONTRACT
10/79 -CRITERIA FOR EASTERN AND WESTERN COALS
10/80 -CRITERIA FOR PHYSICAL/CHEMICAL CLEANED COALS
PLAN ID.....: (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001476 SSIE-GMA 4691 EPA -68-02-2667 TASK-F624A-005
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS STUDY IS TO EXTEND THE APPLICABILITY OF ADVANCED PULVERIZED COAL BURNER CONCEPTS TO THE FULL RANGE OF U.S. COALS AND TO A VARIETY OF BOILER FIRING CONFIGURATIONS. THE APPROACH UTILIZES SEVERAL SCALES OF COMBUSTION SYSTEMS TO DERIVE SCALE-UP CRITERIA FOR BURNERS OF PRACTICAL SIZE. THE EFFECTS OF FUEL CHARACTERISTICS AND BURNER DESIGN PARAMETERS ARE STUDIED IN A SYSTEMATIC FASHION FOR A WIDE RANGE OF COAL TYPES. IN-FLAME PROBING IS USED TO EXTEND THE UNDERSTANDING OF CRITICAL PROCESSES IN COAL COMBUSTION. BURNER CONCEPTS THAT SHOW PROMISE ARE TESTED ON A PRACTICAL SCALE (120 TIMES 10 TO THE 6TH POWER BTU/HR.).

**PROJECT: 01488-ORGANIZATION OF CLEAN COAL COMBUSTION CONFERENCE

```
                    STARTING/ COMPLETION DATE : 04/77    10/77 :   FUNDING    ESTIMATED   FY77  / $    9975
                    TASK CODE=F624A-015     **EPA=            ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. GB MARTIN                 EPA/IERL   RTP
INVESTIGATOR.: VS ENGLEMAN               SCI APPLICATIONS INC
MILESTONES.... 04/77 -INITIATE CONTRACT
               08/77 -HOLD MEETING
               10/77 -PROCEEDINGS ISSUED
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001488           SSIE-GMA  4409        TASK-F624A-015        AP  -624A
               DU  -L110             LABT-EMI
ABSTRACT...... THE PURPOSE OF THIS PROJECT WAS TO ORGANIZE A CONFERENCE COVERING ALL ASPECTS OF ENVIRONMENTALLY
                ACCEPTABLE AND ENERGY-EFFICIENT TECHNOLOGY FOR DIRECT UTILIZATION OF COAL. THE FIVE-DAY MEETING WAS
                STRUCTURED TO COVER: 1) ENERGY AND ENVIRONMENTAL POLICY; 2) PRE-COMBUSTION FUEL CLEANING; 3)
                COMBUSTION TECHNOLOGY; 4) POST-COMBUSTION FLUE GAS CLEANING TECHNOLOGY; 5) TRENDS AND FUTURE
                DIRECTIONS. THE CONFERENCE WAS HELD FROM AUGUST 1 TO 5, 1977 AS A PART OF THE ENGINEERING
                FOUNDATION CONFERENCE SERIES AND A PROCEEDINGS IS IN PREPARATION.
```

Fuel Extraction

**PROJECT: 00330-FUGITIVE DUST FROM OIL SHALE EXTRACTION

```
                    STARTING/ COMPLETION DATE : 07/77   04/78 :   FUNDING    ESTIMATED   FY77  / $   63000
                    TASK CODE=B623B-T52     **EPA=68-03-2560  ** (CNTR )     PRIOR       FY76  /
EPA  OFFICER.. ER BATES                    EPA/IERL   CINC
INVESTIGATOR.: I  ZUCKERMAN                THOMPSON RAMO WOOLDRIDGE INC
MILESTONES...: 07/77 -FUNDING PACKAGE SUBMITTED
               07/77 -AWARD FUNDS FOR PROJECT
               08/77 -INITIATE SAMPLE COLLECTION
               10/77 -COMPLETE SAMPLE COLLECTION
               11/77 -COMPLETE ANALYSES
               01/78 -DRAFT FINAL REPORT
               04/78 -COMPLETE FINAL REPORT
PLAN ID....... (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000330            SSIE-GMA  3687        EPA -68-03-2560       TASK-B623B-T52
               AP  -623B              DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVE: TO CONDUCT A SURVEY OF THE QUANTITY OF FUGITIVE DUST PRODUCED BY OIL SHALE EXTRACTION AT
                THE ANVIL POINTS, COLORADO FACILITY. TO DETERMINE SOME OF THE MAJOR INORGANIC COMPONENTS OF THE
                DUST. APPROACH: HIGH VOLUME SAMPLES WILL BE USED TO COLLECT FUGITIVE DUST AT THE MINE, ALONG THE
                HAUL ROAD, NEAR THE CRUSHER, AND NEAR THE SPENT SHALE DISPOSAL AREA. MASS SOURCE SPECTROMETRY WILL
                BE USED FOR ELEMENTAL ANALYSIS. PARTICLE SIZE DISTRIBUTION WILL BE DETERMINED BY CASCADE IMPACTORS.
                PROGRESS: STUDY IS TO COMMENCE IN SEPTEMBER, 1977.
```

**PROJECT: 00332-REMOVAL OF TOXIC MATERIAL FROM MINE DRAINAGE

```
                    STARTING/ COMPLETION DATE : 08/77   03/78 :   FUNDING    ESTIMATED   FY77  / $   50000
                    TASK CODE=B623B-T71     **EPA=68-03-2568  ** (CNTR.)     PRIOR       FY76  /
EPA  OFFICER.. RC WILMOTH                  EPA/IERL   CINC
INVESTIGATOR.: MA ZEITOUN                  DOW CHEMICAL CO
MILESTONES...: 08/77 -FUNDING PACKAGE SUBMITTED
               08/77 -AWARD FUNDS FOR PROJECT
               08/77 -BEGIN ON SITE INVESTIGATION
               10/77 -COMPLETE ON SITE WORK
               01/78 -DRAFT FINAL REPORT
               01/78 -EXECUTIVE SUMMARY
               02/78 -REVISE REPORT
               03/78 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000332            SSIE-GMA  4387        EPA -68-03-2568       TASK-B623B-T71
               AP  -623B              DU  -N105             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THE PROJECT IS TO STUDY REMOVAL OF TOXIC MATERIALS FROM ACID MINE DRAINAGE BY THREE
                PROCESSES: REVERSE OSMOSIS, ION EXCHANGE, AND LIME NEUTRALIZATION. THE ANTICIPATED APPROACH IS TO
                INJECT SPECIFIED TOXIC MATERIALS FROM A BULK SOLUTION INTO AN AMD PROCESS STREAM AT THE EPA CROWN
                FIELD SITE NEAR MORGANTOWN, WEST VIRGINIA. THE TOXIC MATERIALS TO BE USED FOR THE STUDY ARE:
                ARSENIC, BORON, CADMIUM, CHROMIUM, COPPER, LEAD, MERCURY, NICKEL, PHOSPHORUS, SELENIUM, AND ZINC.
```

**PROJECT: 00334-EFFECTIVENESS OF SURFACE MINE SEDIMENTATION PONDS

```
                    STARTING/ COMPLETION DATE : 10/74   11/77 :   FUNDING    ESTIMATED   FY77  / $    2000
                    TASK CODE=B623B-319     **EPA=68-03-2139  ** (CNTR.)     PRIOR       FY76  / $   99000
EPA  OFFICER.. RD HILL                     EPA/IERL   CINC
INVESTIGATOR.. B  BECKER                   HITTMAN ASSOCIATES INC
MILESTONES.... 07/74 -FUNDING PACKAGE SUBMITTED
               10/74 -AWARD FUNDS FOR PROJECT
               03/77 -FUNDING INCREMENT
               11/77 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000334            SSIE-GMA  3685        EPA -68-03-2139       TASK-B623B-319
               AP  -623B              DU  -N105             LABT-EMI
ABSTRACT...... AN IN-FIELD EVALUATION OF THE EFFECTIVENESS OF SEDIMENT PONDS IN REDUCING SUSPENDED SOLIDS IN THE
                RUNOFF FROM SURFACE MINING ACTIVITIES WAS PERFORMED. NINE SELECTED SEDIMENTATION PONDS IN THE THREE
                EASTERN COAL-MINING STATES OF PENNSYLVANIA, WEST VIRGINIA, AND KENTUCKY WERE SAMPLED UNDER TWO
                DIFFERENT OPERATING CONDITIONS--A BASE LINE AND A RAINFALL EVENT. THEIR THEORETICAL AND ACTUAL
                EFFICIENCY OF REMOVAL OF SUSPENDED SOLIDS WERE COMPUTED AND COMPARED. IN GENERAL, POOR CONSTRUCTION
                AND INADEQUATE MAINTENANCE OF THESE PONDS WERE FOUND TO BE THE MAJOR PROBLEM AREAS. THE PONDS HAD
                GENERALLY HIGHER REMOVAL EFFICIENCIES DURING THE BASELINE SAMPLING PERIOD AND MUCH LOWER
                EFFICIENCIES DURING THE STORM EVENT. THE THEORETICALLY PREDICTED EFFICIENCY OF THE PONDS WAS
                ESSENTIALLY THE SAME AS THE ACTUAL EFFICIENCY UNDER BASE LINE CONDITIONS. DURING THE RAINFALL
                EVENT, THERE WAS GENERALLY LITTLE OR NO CORRELATION BETWEEN THE THEORETICAL AND ACTUAL
                EFFICIENCIES. THE PREDICTED EFFICIENCIES WERE FOUND TO BE MUCH HIGHER THAN THE ACTUAL EFFICIENCIES
                DURING THE RAINFALL EVENT IN MOST CASES.
```

**PROJECT: 00335-COAL AND THE ENVIRONMENT ABSTRACT BIBLIOGRAPHIES

STARTING/ COMPLETION DATE : 05/77 10/78 FUNDING ESTIMATED FY77 / $ 33000
TASK CODE=B623B-320 **EPA=R805336-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. RD HILL EPA/IERL CINC
INVESTIGATOR.. JF BOYER BITUMINOUS COAL RES INC
VE GLEASON BITUMINOUS COAL RES INC
MILESTONES.... 05/77 -FUNDING PACKAGE SUBMITTED
06/77 -AWARD FUNDS FOR PROJECT
10/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000335 SSIE-GMA 3730 EPA -R805336-01 TASK-B623B-320
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE IS TO PROVIDE EASY ACCESSIBILITY TO THE SPECIFIC LITERATURE ON THE ENVIRONMENTAL PROBLEMS RELATED TO COAL PRODUCTION. THE PROBLEMS COVERED ARE COAL MINE DRAINAGE, DISPOSAL OF THE REFUSE MATERIAL GENERATED BY COAL MINES AND COAL CLEANING PLANTS, AND SURFACE MINE RECLAMATION. THIS OBJECTIVE WILL BE ATTAINED BY COLLECTING ALL RELEVANT INFORMATION AND PREPARING, ON AN ANNUAL ROTATING BASIS, ABSTRACT BIBLIOGRAPHIES OF THE LITERATURE FOR EACH SUBJECT AREA. THE REFUSE BIBLIOGRAPHY WILL BE AVAILABLE EARLY IN 1978 AND THE RECLAMATION BIBLIOGRAPHY EARLY IN 1979. EACH BIBLIOGRAPHY WILL CONTAIN A LISTING OF REFERENCES TO THE MINE DRAINAGE BIBLIOGRAPHY PUBLISHED IN 1976. THIS PROJECT IS A CONTINUATION OF WORK BEGUN AT BCR IN 1961. CURRENTLY THE HOLDINGS IN THE BCR LIBRARY ON COAL MINE DRAINAGE ARE THE LARGEST IN THE WORLD. FROM 1964 TO 1975 BCR PREPARED, FOR PUBLICATION BY THE COMMONWEALTH OF PENNSYLVANIA, AN ANNUAL BIBLIOGRAPHY OF ABSTRACTS ON MINE DRAINAGE. IN 1976 EPA AND THE COMMONWEALTH SPONSORED THE PREPARATION BY BCR OF A COMPREHENSIVE MINE DRAINAGE BIBLIOGRAPHY. IN 1975 BCR AND THE NATIONAL COAL ASSOCIATION PUBLISHED A BIBLIOGRAPHY ON COAL MINED-LAND RECLAMATION. COLLECTING OF MATERIAL ON REFUSE DISPOSAL BEGAN IN 1974; NO ABSTRACT BIBLIOGRAPHY HAS BEEN PREPARED.

**PROJECT: 00338-POLLUTION CONTROL GUIDELINES FOR COAL REFUSE PILES AND SLURRY PONDS

STARTING/ COMPLETION DATE : 12/75 09/77 FUNDING ESTIMATED FY77 / $ 5000
TASK CODE=B623B-325 **EPA=68-03-2344 ** (CNTR.) PRIOR FY76 / $ 134000

EPA OFFICER.. E BATES EPA/IERL CINC
INVESTIGATOR. JP CONNELL W.A. WAHLER & ASSOCIATES
JV VANTINE W.A. WAHLER & ASSOCIATES
MILESTONES.... 03/75 -FUNDING PACKAGE SUBMITTED
12/75 -AWARD FUNDS FOR PROJECT
06/77 -FUNDING INCREMENT
09/77 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000338 SSIE-GMA 3133 1 EPA -68-03-2344 TASK-B623B-325
AP -623B DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVE: DEVELOP GUIDELINES FOR CONSTRUCTION OF COAL REFUSE PILES AND SLURRY PONDS WITH EMPHASIS ON ENVIRONMENTAL PROTECTION OF BOTH AIR AND WATER WHILE MAINTAINING STRUCTURAL STABILITY OF THE MATERIAL. APPROACH: REVIEW CURRENT LITERATURE AND INTERVIEW KEY GOVERNMENT AND INDUSTRIAL PERSONNEL FOR INFORMATION ON PROPER DESIGN OF REFUSE DISPOSAL FACILITIES. EVALUATE IN THE FIELD, COAL REFUSE DISPOSAL SITES AND SLURRY POND INSTALLATIONS. THE STUDY SITES WILL BE IN THE EASTERN U.S. AND WILL BE IN BOTH FLAT AND MORE RUGGED TERRAIN. ANY WATER EMANATING FROM THE DISPOSAL SITES WILL BE SAMPLED FOUR TIMES, TWICE EACH IN THE WET AND DRY SEASONS. VARIOUS PHYSICAL AND WATER QUALITY DETERMINATIONS WILL BE MADE ON EACH SAMPLE SERIES. A SET OF CONSTRUCTION GUIDELINES WILL BE DEVELOPED WHICH WILL ADDRESS HAULAGE, COMPACTION, LAYERING, SOIL COVERING, PREPARATION PLANT PROCEDURES, RECLAMATION PLANNING, AND STRUCTURAL MATERIAL STABILITY. THE GUIDELINES WILL BE BASED IN PART ON THE FIELD STUDIES AND THE LITERATURE SEARCH, AND WILL CONFORM TO CURRENT MESA REQUIREMENTS. CURRENT PLANS: LITERATURE SEARCH IS UNDERWAY; INITIAL SITES ARE BEING SELECTED FOR INCLUSION ON THE CANDIDATE SITE LIST. PLANS ARE BEING MADE FOR AN AERIAL SURVEY OF THE CANDIDATE SITE LIST BEFORE GROUND VISITS ARE MADE TO A REDUCED LIST. FROM THESE SURVEYS, THE ACTUAL LIST OF STUDY SITES WILL BE SELECTED. FIELD WORK, SAMPLING, AND WATER TESTING WILL COMMENCE IN MARCH, 1976.

**PROJECT: 00339-EVALUATION OF GROUNDWATER POLLUTION FROM EASTERN UNDERGROUND COAL MINES

STARTING/ COMPLETION DATE : 10/76 07/78 : FUNDING ESTIMATED FY77 / $ 74000
TASK CODE=B623B-331 **EPA=68-03-2467 ** (CNTR.) PRIOR FY76 / $ 130000

EPA OFFICER.. E BATES EPA/IERL CINC
INVESTIGATOR.. WH WALKER GERAGHTY & MILLER INC
OC BRAIDS GERAGHTY & MILLER INC
LW SAPERSTEIN GERAGHTY & MILLER INC
MILESTONES...: 02/76 -FUNDING PACKAGE SUBMITTED
09/76 -AWARD FUNDS FOR PROJECT
02/77 -FUNDING INCREMENT
07/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000339 SSIE-GMA 3200 1 EPA -68-03-2467 TASK-B623B-331
AP -623B DU -N105 LABT-EMI
ABSTRACT..... UNDERGROUND COAL MINES WILL DISRUPT THE EXISTING HYDROLOGIC SYSTEM AND HAVE THE POTENTIAL TO POLLUTE THE GROUNDWATER IN THE VICINITY OF THE MINING OPERATION. THE RATE, DIRECTION OF MOVEMENT, AND DILUTION OF THE GROUNDWATER POLLUTED BY UNDERGROUND MINING OPERATIONS NEEDS TO BE STUDIED. THE COLLECTION AND ANALYSIS OF AVAILABLE INFORMATION FROM THE LITERATURE, STATE AND FEDERAL AGENCIES AND INDUSTRY CONCERNING PROBLEMS RELATED TO GROUNDWATER POLLUTION FROM EASTERN UNDERGROUND COAL MINES SHOULD BE ASSIMILATED. SELECTION OF NINE MINE SITES WHERE A DETAILED EVALUATION OF GROUNDWATER POLLUTION PROBLEMS CAN BE MADE. DETERMINE NECESSARY CORRECTIVE ACTION NEEDED OR BEING USED AND THE IMPROVEMENT IN GROUNDWATER QUALITY THAT RESULTS FROM THE CORRECTIVE ACTION.

**PROJECT: 00341-DEMONSTRATION OF CONNECTOR WELLS

```
                    STARTING/ COMPLETION DATE : 06/74   11/79     FUNDING    ESTIMATED   FY77  / $   40000
                    TASK CODE=B623B-342     **EPA=S803191-01  ** (GRANT)      PRIOR       FY76  / $   52000
EPA  OFFICER.. SJ HUBBARD                  EPA/IERL   CINC
INVESTIGATOR.. J  DEMCHALK                 STATE DEPT OF ENV RES
               RR PARIZEK                  PENNSYLVANIA STATE UNIV
               VM BEARD                    STATE DEPT OF ENV RES
MILESTONES...: 05/74 -FUNDING PACKAGE SUBMITTED
               06/74 -AWARD FUNDS FOR PROJECT
               05/77 -AMENDMENT TO GRANT
               11/79 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000341            SSIE-GMA  3740        EPA -S803191-01       TASK-B623B-342
               AP  -623B              DU  -N105             LABT-EMI
ABSTRACT.....: OBJECTIVE: TO STUDY THE FEASIBILITY AND EFFECTIVENESS OF USING GRAVITY CONNECTOR WELLS TO IMPROVE
                STREAM QUALITY BY REDUCING DRAINAGE FROM ABANDONED DEEP COAL MINES. APPROACH: SELECT THE BEST SITE
                FOR DEMONSTRATING THE EFFECTIVENESS OF GRAVITY CONNECTOR WELLS FOR REDUCING DRAINAGE FROM ABANDONED
                DEEP COAL MINES. DETERMINE OPTIMUM NUMBER AND LOCATION OF GRAVITY DRAINAGE WELLS AND ESTIMATE THE
                QUANTITY OF DRAINAGE THAT WILL BE ABATED. CURRENT PLANS: CURRENT PLANS ARE FOR CONDUCTING
                FEASIBILITY STUDY OF AN OPTIMUM DEMONSTRATION SITE AND DEVELOP PLANS AND SPECIFICATIONS FOR A
                FULL-SCALE FIELD DEMONSTRATION OF THE TECHNIQUE. THE SITE WILL BE STUDIED TO DETERMINE ITS
                HYDROGEOLOGIC AND MINING CONDITIONS AFFECTING GRAVITY DRAINAGE OF RELATED AQUIFERS THAT WILL
                SIGNIFICANTLY REDUCE DEEP MINE DRAINAGE. THE STUDY WILL CAPITALIZE ON AVAILABLE DATA, BUT ALSO
                INCLUDE LIMITED DRILLING AND TESTING TO DETERMINE AQUIFER FLOW CHARACTERISTICS. FOLLOWING
                EVALUATION OF THE DEMONSTRATION SITE, CONTINUOUS MONITORING OF QUALITY AND QUANTITY OF DEEP MINE
                DISCHARGE WILL COMMENCE. DETAILED DESIGN PLANS FOR THE GRAVITY DRAINAGE WELLS WILL BE DETERMINED
                BASED ON THE HYDROGEOLOGY AND AQUIFER FLOW CHARACTERISTICS OF THE SITE. THE OPTIMUM LOCATION OF THE
                WELLS WILL BE DETERMINED BY STUDYING FRACTURE TRACE PATTERNS AS RELATED TO AQUIFER FLOW
                CHARACTERISTICS AND HYDROGEOLOGY. BASED ON THE ABOVE, A DETERMINATION WILL BE MADE OF THE NUMBER
                AND LOCATIONS FOR CONSTRUCTING THE REQUIRED GRAVITY DRAINAGE WELLS. AS MANY AS FOUR CONNECTOR WELLS
                WILL BE CONSTRUCTED TO STUDY THE MINE DRAINAGE REDUCTION POSSIBLE FROM THIS TECHNIQUE.
```

**PROJECT: 00344-EFFECTS OF SURFACE CONFIGURATION IN WATER POLLUTION CONTROL ON SEMI-ARID MINED LANDS

```
                    STARTING/ COMPLETION DATE : 09/77   09/78 :   FUNDING    ESTIMATED   FY77  / $  200000
                    TASK CODE=B623B-353     **EPA=R803079-04  ** (GRANT)      PRIOR       FY76  / $ 1047000
EPA  OFFICER.: JF MARTIN                   EPA/IERL   CINC
INVESTIGATOR.. RL HODDER                   MONTANA STATE UNIV
               IB JENSEN                   MONTANA STATE UNIV
               D  DOLLHOPF                 MONTANA STATE UNIV
               D  HALK                     MONTANA STATE UNIV
               J  OLSON                    MONTANA STATE UNIV
               W  VANVOAST                 STATE BUREAU OF MINES & GEOLOGY
MILESTONES.... 00/74 -FUNDING PACKAGE SUBMITTED
               00/74 -AWARD FUNDS
               11/78 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000344            SSIE-GMA  3647 2       EPA -R803079-04       TASK-B623B-353
               AP  -623B              DU  -N105             LABT-EMI
ABSTRACT.....: OBJECTIVES OF THIS STUDY ARE TO DEMONSTRATE THE EFFECTIVENESS OF SEVERAL SURFACE CONFIGURATIONS IN:
                CONTROLLING EROSION, RUNOFF, SEDIMENTATION AND POLLUTION OF ADJACENT DRAINAGES; QUICKLY PRODUCING A
                DESIRABLE STABILIZING VEGETATIVE COVER; CREATING AN EQUILIBRIUM BETWEEN PRECIPITATION ABSORBED AND
                SOIL MOISTURE EVAPORATED AND TRANSPIRED SO THAT GROUND WATER POLLUTION WILL REMAIN MINIMAL;
                PRODUCING AN OVERALL DESIRABLE RECLAMATION DESIGN PROVIDING EFFECTIVE DRAINAGE, ESTHETICS,
                PRODUCTIVENESS AND USE. DEMONSTRATION AREAS APPROXIMATELY 16 HECTARES IN SIZE WERE LOCATED ON
                RESHAPED SPOILS OF STRIP MINED COAL MINES NEAR COLSTRIP, MT; SAVAGE, MT; BEULAH, ND; HANNA, WY; AND
                GLENROCK, WY. FIVE TREATMENTS EVALUATED INCLUDE DEEP CHISELING IN TOPSOIL, DEEP CHISELING NO
                TOPSOIL, GOUGING IN TOPSOIL, GOUGING NO TOPSOIL AND DOZER BASINS IN TOPSOIL. FIVE 0.21 HECTARE
                MICROWATERSHEDS HAVE BEEN CONSTRUCTED AT EACH AREA TO AID IN INTENSIVELY EVALUATING EACH TREATMENT.
                TREATMENT EVALUATION AT EACH AREA INCLUDE: METEOROLOGICAL MONITORING, SURFACE RUNOFF WATER QUALITY,
                SOIL MOISTURE, EVAPOTRANSPIRATION RATE, WATER AQUIFER LEVELS. IMPLEMENTATION OF THE FIVE AREAS HAS
                BEEN COMPLETED AND DATA IS BEING COLLECTED AND PROCESSED. THE FIRST REPORT WILL BE PUBLISHED DURING
                1977. TREATMENT EVALUATIONS ARE SCHEDULED THROUGH SEPTEMBER 12, 1978.
```

**PROJECT: 00345-POTENTIAL IMPACTS TO GROUND-WATER & SURFACE-WATER QUALITY & QUANTITY FROM PROPOSED ENERGY DEVELOPMENT ON THE NORTHERN CHEYENNE RE

STARTING/ COMPLETION DATE : 06/75 09/78 : FUNDING : ESTIMATED FY77 / $ 177000
TASK CODE=B623B-356 **EPA=R803566-03 ** (GRANT) PRIOR FY76 / $ 477000

EPA OFFICER.. JF MARTIN EPA/IERL CINC
INVESTIGATOR.. R MONTEAU NORTHERN CHEYENNE TRIBE
WW WOESSNER NORTHERN CHEYENNE TRIBE
E HEFFERN NORTHERN CHEYENNE TRIBE
MILESTONES.... 05/75 -FUNDING PACKAGE SUBMITTED
06/75 -AWARD FUNDS FOR PROJECT
04/76 -FUNDING INCREMENT
03/77 -FUNDING INCREMENT
09/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000345 SSIE-GMA 2726 1 EPA -R803566-03 TASK-B623B-356
AP -623B DU -N105 LABT-EMI
ABSTRACT.....: THE NORTHERN CHEYENNE TRIBE, VIA THE NORTHERN CHEYENNE RESEARCH PROJECT, DESIRES TO DEVELOP AN IN-DEPTH KNOWLEDGE OF THE CHEMICAL AND PHYSICAL CHARACTER OF THE RESERVATION WATER RESOURCES, AND THE INTERRELATION OF WATER TO OTHER RESOURCES, SO THAT THE TRIBE CAN MAKE FORMAL CHOICES IN PLANNING COAL DEVELOPMENT. A THREE-YEAR STUDY PLAN HAS BEGUN TO: (1) GATHER AND INTERPRET BASELINE DATA CONCERNING THE WATER RESOURCES AND THE INTERRELATIONSHIPS OF THESE DATA TO LAND, BIOCOMMUNITY, SUPPLY NEEDS, AND ENERGY RESOURCES OF THE RESERVATION; (2) ASCERTAIN POTENTIAL ADVERSE CHEMICAL, PHYSICAL, AND ECONOMIC IMPACTS TO RESERVATION WATER RESOURCES FROM COAL DEVELOPMENT; AND (3) DEVELOP A COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN THAT WILL AID PRESENT AND FUTURE PLANNING FOR RESOURCES EXPLOITATION. STANDARD FIELD AND LABORATORY METHODOLOGY ARE BEING EMPLOYED IN ASSESSING THE GEOLOGY, SURFACE WATER, AND GROUND WATER OF RESERVATION LANDS. BASELINE DISCHARGE AND WATER QUALITY DATA COLLECTION HAS BEGUN FOR SIX RESERVATION STREAMS. WELL INVENTORIES, A BASIC GROUND WATER MONITORING PROGRAM, AND COLLECTION OF GROUND WATER QUALITY DATA HAS BEGUN. STRATIGRAPHIC CORRELATION OF THE REGIONAL AND LOCAL GEOLOGY IS COMPLETED AND POTENTIAL DEVELOPMENT PRIORITY AREAS HAVE BEEN SELECTED. DURING THE THIRD BUDGET PERIOD A DESCRIPTION OF POTENTIAL IMPACTS TO THE SURFACE AND GROUND WATER RESOURCES FROM MINING AND A RESERVATION WATER RESOURCES MANAGEMENT PLAN WILL BE PREPARED.

**PROJECT: 00346-EVALUATE SURFACE AND GROUNDWATER AT POTENTIAL STRIP MINE SITES

STARTING/ COMPLETION DATE : 05/75 06/78 : FUNDING ESTIMATED FY77 / $ 482000
TASK CODE=B623B-357 **EPA=R803727-03 ** (GRANT) PRIOR FY76 / $ 2141000

EPA OFFICER.. TG NEWPORT EPA/IERL CINC
INVESTIGATOR.. TT WILLIAMS MONTANA STATE UNIV
DG STUART MONTANA COLL OF MIN SCI & TECH
W VANVOAST MONTANA COLL OF MIN SCI & TECH
R KOOB NORTH DAKOTA STATE UNIV
P RICHARD UNIV OF WYOMING DEPT OF AGRIC ENG
MILESTONES.... 05/75 -FUNDING PACKAGE SUBMITTED
06/75 -AWARD FUNDS FOR PROJECT
07/76 -FUNDING INCREMENT
07/77 -FUNDING INCREMENT
06/78 -FINAL REPORT RECEIVED
PLAN ID.....: (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000346 SSIE-GMA 3708 EPA -R803727-03 TASK-B623B-357
AP -623B DU -N105 LABT-EMI
ABSTRACT..... MAJOR OBJECTIVE OF THIS PROJECT IS TO IDENTIFY POSSIBLE IMPACTS OF COAL MINING AND DEVELOPMENT IN THE NORTHERN GREAT PLAINS ON THE SURFACE AND GROUNDWATER SYSTEMS OF THE SURROUNDING AREA. SPECIFIC OBJECTIVES ARE: 1) OBTAIN AN EQUATION OF BALANCE FOR ALL WATER INFLOW AND OUTFLOW IN EACH OF THREE STUDY SITES, ONE EACH IN MONTANA, NORTH DAKOTA AND WYOMING; 2) CHARACTERIZE THE OVERBURDEN FROM A PHYSICAL AND CHEMICAL POINT OF VIEW AS WELL AS DETERMINE ITS RELATIONSHIP TO THE WATER COMING TO THE SURFACE; 3) DETERMINE HYDROLOGIC CHARACTER OF SPOILS AT ACTIVE MINE SITES IN MONTANA; 4) CHARACTERIZE THE CHEMICAL FEATURES OF THE MINED SITES. THE PROPOSED WORK IS A KEY EFFORT IN THE EPA PROGRAM TO ASSESS THE SURFACE AND GROUNDWATER PROBLEMS ASSOCIATED WITH WESTERN COAL. THREE SITES ARE BEING STUDIED COMPREHENSIVELY. EACH SITE IS JUST COMMENCING TO HAVE IMPACT. BASE LINE DATA WERE OBTAINED BEFORE IMPACTS BEGAN. IN ADDITION TO THE SITE-SPECIFIC WORK, SOME DATA ARE BEING COLLECTED AT THE TWO ACTIVE MINING SITES IN MONTANA TO PROVIDE ADDITIONAL DATA FOR THE ANALYSES.

**PROJECT: 00347-VEGETATIVE STABILIZATION OF SPENT OIL SHALE

```
                    STARTING/ COMPLETION DATE : 08/76   08/79     FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=B623B-358     **EPA=R804719-01  ** (GRANT)      PRIOR       FY76  / $   21000
EPA  OFFICER.. E  HARRIS                  EPA/IERL   CINC
INVESTIGATOR.: WA BERG                    COLORADO STATE UNIV                 SCH OF AGRIC SCI
MILESTONES.... 08/76 -FUNDING PACKAGE SUBMITTED
               09/76 -AWARD FUNDS FOR PROJECT
               09/77 -AMENDMENT
               00/00 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000347          SSIE-GMA  2471 1      EPA -R804719-01       TASK-B623B-358
               AP  -623B            DU  -N105             LABT-EMI
ABSTRACT...... OBJECTIVE: TO INVESTIGATE SURFACE STABILITY AND SALT MOVEMENT IN SPENT OIL SHALES AND SOIL-COVERED
                SPENT SHALES AFTER A COVER OF NATIVE VEGETATION HAS BEEN ESTABLISHED BY INTENSIVE TREATMENTS AND
                THEN LEFT UNDER NATURAL PRECIPITATION CONDITIONS. APPROACH: THE STUDY IS BEING CARRIED OUT ON TWO
                DIFFERENT SPENT OIL SHALES. "SOIL" TREATMENTS ARE PLANT ESTABLISHMENT ON: 1. DIRECTLY ON LEACHED
                AND FERTILIZED SPENT SHALES; 2. SIX INCHES OF SOIL OVER LEACHED SPENT SHALE; 3. ONE FOOT OF SOIL
                OVER UNLEACHED SPENT SHALE; 4. SOIL. PLOTS HAVE BEEN ESTABLISHED ON 25 PERCENT NORTH AND SOUTH
                SLOPES AT ALTITUDES OF 5,700 AND 7,200 FEET IN OR NEAR THE PICEANCE BASIN OF NORTHWESTERN COLORADO.
                EACH PLOT (28 PER SITE) IS BORDERED WITH WOOD TO FORM INDIVIDUAL RUNOFF PLOTS 11 FEET WIDE AND 22
                FEET LONG. SEDIMENT AND RUNOFF CATCHMENTS HAVE YET TO BE INSTALLED. ONE SITE (5,700') HAS BEEN
                INSTRUMENTED FOR SOIL SALINITY AND SOIL MOISTURE MEASUREMENTS. A COVER OF NATIVE PLANT SPECIES HAS
                BEEN ESTABLISHED ON THE LOWER ALTITUDE SITE AND WILL BE ESTABLISHED ON THE HIGHER SITE.
                MEASUREMENTS ON VEGETATION INCLUDE FREQUENCY, DENSITY AND VEGETATIVE GROUND COVER.
```

**PROJECT: 00349-VEGETATIVE STABILIZATION OF PARAHO SPENT OIL SHALE

```
                    STARTING/ COMPLETION DATE : 07/77   07/78 :   FUNDING    ESTIMATED   FY77  / $   69000
                    TASK CODE=B623B-359     **EPA=R803788-03  ** (GRANT)      PRIOR       FY76  / $  128000
EPA  OFFICER.: EF HARRIS                  EPA/IERL   CINC
INVESTIGATOR.: WA BERG                    COLORADO STATE UNIV                 SCH OF AGRIC SCI
MILESTONES.... 03/75 -FUNDING PACKAGE SUBMITTED
               07/75 -AWARD FUNDS FOR PROJECT
               07/76 -ANNUAL REPORT
               09/76 -CONTINUATION AWARDED
               12/76 -AMENDMENT
               08/77 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000349          SSIE-GMA  2472 2      EPA -R803788-03       TASK-B623B-359
               AP  -623B            DU  -N105             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO STUDY SURFACE STABILITY AND WATER MOVEMENT IN AND
                THROUGH THE PARAHO SPENT OIL SHALES. IN ADDITION TO THE VEGETATIVE STABILIZATION STUDIES, THE
                DISTRIBUTIONS OF WATER AND SALTS IN THE PLOTS WILL BE MONITORED WITH THE OBJECTIVE OF QUANTIFYING
                THE POTENTIAL SALT POLLUTION FROM SHALE RESIDUES. IT IS NOT POSSIBLE TO EXPERIMENTALLY MODEL THE
                ACTUAL PROTOTYPE DISPOSAL. FOR THIS REASON, DATA FROM PLOT STUDIES WILL BE USED TO DEVELOP AND
                VERIFY A MATHEMATICAL MODEL OF SALT AND WATER TRANSPORT. THIS MODEL WILL BE USED TO ESTIMATE THE
                LONG TERM WATER QUALITY ASPECTS OF LARGE SCALE DISPOSAL OF SPENT SHALE RESIDUES.
```

**PROJECT: 00351-ENVIRONMENTAL MONITORING & ASSESSMENT OF COAL STRIP MINING & RECLAMATION IN THE FOUR CORNER AREA

```
                    STARTING/ COMPLETION DATE : 09/76   10/79     FUNDING    ESTIMATED   FY77  / $  145000
                    TASK CODE=B623B-418     **EPA=R804679-02  ** (GRANT)      PRIOR       FY76  / $  196000
EPA  OFFICER.. JF MARTIN                  EPA/IERL   CINC
INVESTIGATOR.. MM FOGEL                   UNIV OF ARIZONA                     SCH OF AGRIC
               JL THAMES                  UNIV OF ARIZONA                     SCH OF AGRIC
               TR VERMA                   UNIV OF ARIZONA                     SCH OF AGRIC
               LH HEKMAN                  UNIV OF ARIZONA                     SCH OF AGRIC
               L  DUCKSTEIN               UNIV OF ARIZONA                     SCH OF AGRIC
MILESTONES...: 08/77 -FUNDING PACKAGE SUBMITTED
               09/77 -AWARD FUNDED
               09/78 -AWARD CONTINUATION
               10/79 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000351          SSIE-GMA  3267 1      EPA -R804679-02       TASK-B623B-418
               AP  -623B            DU  -N105             LABT-EMI
ABSTRACT.....: THE OVERALL OBJECTIVE OF THE PROJECT IS TO DEVELOP CRITERIA FOR THE OPTIMAL MANAGEMENT OF LAND THAT
                HAS BEEN DISTRIBUTED BY COAL STRIP MINING ACTIVITIES. THE CRITERIA WILL BE BASED ON MINIMIZING AIR
                AND WATER POLLUTION. SPECIFICALLY, THE SECOND PHASE OF THE PROJECT WILL BE DEVOTED PRINCIPALLY TO
                MONITORING (1) TWO SELECTED GROUNDWATER BASINS, (2) THREE SURFACE WATER SITES AND (3) THREE AIR
                QUALITY SITES TO DETERMINE THE EFFECTS OF STRIP MINING ON THE ENVIRONMENT. SEVERAL HOLES WILL BE
                DRILLED, CASED AND MONITORED FOR EACH OF THE SHALLOW GROUNDWATER BASINS. INFILTRATION STUDIES WILL
                BE USED TO ASCERTAIN THE MOBILITY OF POLLUTANTS FROM THE LAND SURFACE TO GROUNDWATER. THE SURFACE
                WATER SITES WILL INVOLVE BOTH MINED AND UNDISTURBED AREAS AS WELL AS REVEGETATED AREAS WHICH ARE
                EITHER IRRIGATED OR RAINFED. HIGH VOLUME AIR SAMPLERS WILL BE USED TO MONITOR PARTICULATE
                CONCENTRATIONS BEFORE, DURING AND AFTER MINING DEVELOPMENT.
```

**PROJECT: 00353-WATER-QUALITY HYDROLOGY OF SURFACE-MINED WATERSHEDS

STARTING/ COMPLETION DATE : 09/76 09/78 : FUNDING ESTIMATED FY77 / $ 39000
TASK CODE=B623B-419 **EPA=R804673-02 ** (GRANT) PRIOR FY76 / $ 39000
EPA OFFICER.: RC WILMOTH EPA/IERL CINC
INVESTIGATOR.: DB MCWHORTER COLORADO STATE UNIV
GV SKOGERBOE COLORADO STATE UNIV
MILESTONES.... 09/76 -FUNDING PACKAGE SUBMITTED
10/76 -AWARD FUNDS FOR PROJECT
10/77 -CONTINUATION
09/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000353 SSIE-GMA 3466 EPA -R804673-02 TASK-B623B-419
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THE PROJECT IS TO DEVELOP A MANUAL OF PROCEDURES FOR QUANTITATIVELY ASSESSING THE IMPACT OF INDIVIDUAL SURFACE MINING PROJECTS ON THE WATER RESOURES IN THE AFFECTED WATERSHED. ONE APPROACH IS TO GATHER ALL PERTINENT DATA THAT IS AVAILABLE AND DETERMINE THE REQUIRED PARAMETERS BY FITTING THE MODEL TO THE DATA. THE SECOND APPROACH IS TO USE A WATERSHED MODEL TO GENERATE "FIELD" DATA FOR A WIDE VARIETY OF HYPOTHETICAL SITUATIONS AND DETERMINE THE REQUIRED PARAMETERS FOR THE SIMPLER MODEL. A CORRELATION BETWEEN THE PARAMETERS AND CONDITIONS SIMULATED BY THE WATERSHED MODEL WILL BE MADE. THE CORE OF THE MANUAL WILL BE A WATER-QUALITY HYDROLOGY MODEL DEVELOPED IN A PREVIOUS PROJECT. THIS MODEL HAS BEEN TESTED SUCCESSFULLY ON FOUR WATERSHEDS PREVIOUSLY, AND WILL BE FURTHER TESTED USING DATA NOW BEING COLLECTED AT MANY LOCATIONS IN THE ROCKY MOUNTAIN REGION. DETAILED PROCEDURES FOR TRANSLATING BASIC WATERSHED OBSERVATIONS INTO THE APPROPRIATE MODEL PARAMETERS WILL BE GIVEN.

**PROJECT: 00354-COREHOLE SPACING MODELS DEFINING POTENTIAL TOXIC ROCK BODIES IN COAL SURFACE MINING

STARTING/ COMPLETION DATE : 02/77 02/79 FUNDING ESTIMATED FY77 / $ 109000
TASK CODE=B623B-503 **EPA=R805101-01 ** (GRANT) PRIOR FY76 /
EPA OFFICER.. TG NEWPORT EPA/IERL CINC
INVESTIGATOR.. JC HORNE UNIV OF SOUTH CAROLINA SCI & MATH/CHEM DEPT
JC FERM UNIV OF SOUTH CAROLINA SCI & MATH/CHEM DEPT
MILESTONES...: 01/77 -FUNDING PACKAGE SUBMITTED
02/77 -AWARD FUNDS FOR PROJECT
10/78 -FINAL DRAFT REPORT
02/79 -FINAL REPORT
03/79 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000354 SSIE-GMA 3712 EPA -R805101-01 TASK-B623B-503
AP -623B DU -N105 LABT-EMI
ABSTRACT..... WITH THE RECENT INCREASE IN STRIP MINING AND THE IMPENDING PASSAGE OF FEDERAL SURFACE MINING LEGISLATION, IT IS IMPERATIVE THAT A COREHOLE SPACING PROGRAM BE DEVELOPED THAT DEFINES THE POTENTIALLY TOXIC SPOIL MATERIALS IN ADVANCE OF SURFACE MINING. ONE OF THE PRODUCTS OF CURRENT RESEARCH IS A COLOR PHOTOGRAPHIC BOOK ILLUSTRATING 28 OF THE STANDARD ROCK TYPES FOUND IN THE COAL MEASURES OF EASTERN KENTUCKY AND SOUTHERN WEST VIRGINIA. BY ASSOCIATING THESE ROCK TYPES WITH THEIR GEOCHEMICAL AND WEATHERING CHARACTERISTICS, THE TOXICITY POTENTIAL OF EACH LITHOLOGY WAS APPRAISED, AND POTENTIAL PROBLEM ROCK TYPES WERE ISOLATED. USING THESE RESULTS AS A BASE, IT IS PROPOSED TO DETERMINE THE SHAPE, THICKNESS, AND LATERAL EXTENT OF THE POTENTIALLY TOXIC ROCK TYPES WITH THE VIEW THAT, IF DIMENSIONS OF SOME OF THESE ROCK BODIES ARE KNOWN, CORE HOLE SPACING REQUIRED TO DELINEATE THE DIMENSIONS OF OTHER SIMILAR BODIES CAN BE DETERMINED. KNOWLEDGE OF THIS TYPE WILL AID IN THE PLANNING FOR HYDRAULIC MANIPULATIONS AND SEGREGATION AND BURIAL OF POTENTIALLY TOXIC MATERIALS DURING OVERBURDEN HANDLING IN SURFACE MINES. THE DATA BASE FOR THE PROPOSED STUDY INCLUDE DETAILED (20' EQUALS 1" VERTICAL, .1 MILE EQUALS 1" HORIZONTAL) GEOLOGIC CROSS SECTIONS OF MORE THAN 400 MILES OF PRE-SPLIT HIGHWAY EXPOSURES AND OVER 5,000 COREHOLE RECORDS IN EASTERN KENTUCKY AND SOUTHERN WEST VIRGINIA. BY COMPARING THE ROCKS FOUND TO BE POTENTIALLY TOXIC IN THE CORE BOOK EXPERIMENT WITH THOSE FOUND IN THE HIGHWAY CUTS AND ADJOINING BORE HOLES IN THE DIMENSIONS OF THE POTENTIALLY PROBLEM ROCKS CAN BE DELINEATED. THE TOXICITY OF THESE ROCK TYPES WILL BE ANALYZED TO DETERMINE THE TYPE AND AMOUNT OF PYRITE AND THE ACIDITY, ALKALINITY, SULFATE CALCIUM, MAGNESIUM ALUMINUM AND IRON CONTENTS OF EFFLUENTS LEACHED FROM THEM. FROM THESE DATA, MODELS WILL BE DEVELOPED TO EVALUATE THE IDEAL CORE HOLE SPACING IN ADVANCE OF MINING THAT IS NECESSARY TO DELINEATE POTENTIALLY TOXIC LITHOLOGIES.

**PROJECT: 00356-AUDIOVISUAL PROGRAM FOR SURFACE COAL MINING AND THE ENVIRONMENT

STARTING/ COMPLETION DATE : 02/77 12/77 : FUNDING ESTIMATED FY77 / $ 88000
TASK CODE=B623B-504 **EPA=R804972-01 ** (GRANT) PRIOR FY76 /
EPA OFFICER.. JF MARTIN EPA/IERL CINC
INVESTIGATOR.. KC BOWLING INTERSTATE MINING COMPACT COMM
MILESTONES.... 11/76 -FUNDING PACKAGE SUBMITTED
01/77 -AWARD FUNDS FOR PROJECT
10/77 -DRAFT INTERIM
11/77 -AWARD SECOND PHASE
09/78 -FINAL PROGRAM RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000356 SSIE-GMA 3714 EPA -R804972-01 TASK-B623B-504
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE INTERSTATE MINING COMPACT COMMISSION PROPOSES TO DEVELOP A COMPREHENSIVE INFORMATIONAL PROGRAM IN AUDIOVISUAL FORMAT ON THE TOPIC OF "SURFACE COAL MINING AND THE ENVIRONMENT." THE PROGRAM WILL CONSIST OF UP TO FOURTEEN (14) INDIVIDUAL TWENTY TO FORTY (20-40) MINUTE AUDIOVISUAL PRESENTATIONS ON THE VARIOUS ENVIRONMENTAL TOPICS AND A TECHNICAL MANUAL KEYED TO THE PRESENTATION. THE TARGET AUDIENCE FOR THE INFORMATION TO BE DEVELOPED WILL BE MINE INSPECTORS, ENVIRONMENTAL TECHNICIAN, MINE FOREMEN, AND MINE OPERATORS.

PROJECT: 00358-DESIGN AND PERFORMANCE OF HEAD-OF-HOLLOW FILLS--A SURFACE MINING & RECLAMATION METHOD

STARTING/ COMPLETION DATE : 07/77 07/80 : FUNDING ESTIMATED FY77 / $ 67000
TASK CODE=B623B-505 **EPA=R805272-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. RC WILMOTH EPA/IERL CINC
INVESTIGATOR.. GR LAUGHLIN STATE DIV OF SURFACE MINING
MILESTONES.... 06/77 -FUNDING PACKAGE SUBMITTED
07/77 -AWARD FUNDS FOR PROJECT
07/78 -AWARD CONTINUATION
07/79 -AWARD CONTINUATION
07/80 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000358 SSIE-GMA 3733 EPA -R805272-01 TASK-B623B-505
AP -623B DU -N105 LABT EMI
ABSTRACT..... THE OBJECTIVE IS TO DESIGN AND CONSTRUCT HEAD-OF-HOLLOW FILLS USING ECONOMIC ENGINEERING CRITERIA AND TO DETERMINE THE EFFECTS OF THIS MINING/RECLAMATION METHOD ON THE ENVIRONMENT. THE STUDY INVOLVES MONITORING ENVIRONMENTAL PARAMETERS PRIOR TO DISTRIBUTION, DURING DISTURBANCE, AND AFTER COMPLETION OF CONSTRUCTION. THE PROGRAM WILL INVOLVE HILL-TOP REMOVAL AND VALLEY FILLS, EACH OF VARYING DESIGN. COST ANALYSES WILL BE CONDUCTED FOR EACH FILL DESIGN. SOILS ENGINEERING PARAMETERS INCLUDING SETTLEMENT AND STABILITY WILL BE DETERMINED AND ANALYZED DURING AND AFTER CONSTRUCTION.

PROJECT: 00359-USE OF A VEGETATIVE FILTER ZONE TO CONTROL FINE-GRAINED SEDIMENTS FROM SURFACE MINES

STARTING/ COMPLETION DATE : 11/77 05/79 : FUNDING ESTIMATED FY77 / $ 119000
TASK CODE=B623B-506 **EPA=S805632-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. E BATES EPA/IERL CINC
INVESTIGATOR.. RE NICKEL HITTMAN ASSOCIATES INC
B FISH DEPT OF NAT RES & ENV PROT
BJ BARFIELD UNIVERSITY OF KENTUCKY
CT HAAN UNIVERSITY OF KENTUCKY
MILESTONES.... 08/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
01/78 -PLANNING AND FEASIBILITY STUDY
04/79 -CONSTRUCTION & DATA COLLECTION
05/79 -FINAL REPORT
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000359 SSIE-GMA 3729 EPA -S805632-01 TASK-B623B-506
AP -623B DU -N105 LABT-EMI
ABSTRACT.....: PRIMARY OBJECTIVE OF THE PROJECT IS TO DEMONSTRATE THE TECHNICAL, THE ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF USING A VEGETATIVE FILTER ZONE TO ASSIST IN CONTROLLING FINE-GRAINED SEDIMENTS ORIGINATING FROM SURFACE MINING ACTIVITIES. SPECIFIC OBJECTIVES INCLUDE: (1) EXAMINE SEDIMENT TRAPPING EFFICIENCY OF THE FILTER ZONE, (2) EXAMINE SUITABILITY OF VARIOUS TYPES OF VEGETATION FOR USE IN THE FILTER ZONE, (3) EVALUATE THE FILTER'S USEFULNESS IN IMPROVING WATER QUALITY, AND (4) DETERMINE THE COST FEASIBILITY OF USING THE FILTER ON SURFACE MINES IN EASTERN KENTUCKY. BASICALLY, THE PROJECT WILL ENTAIL THE DIVERSION OF SURFACE RUNOFF WATER, WHICH HAS BEEN COLLECTED AT A PARTICULAR POINT ON THE MINING SITE, DOWN A RIPRAP LINED CHANNEL AND THROUGH A VEGETATIVE FILTER ZONE APPROXIMATELY 20 FEET WIDE AND 200 FEET LONG. IN ORDER TO ASSURE THAT RUNOFF IS ACCURATELY MONITORED, A BERM WILL BE CONSTRUCTED AROUND THE PROJECT SITE. A FLOW DISTRIBUTION AREA AND A LEVEL SPREADER WILL BE INSTALLED BELOW THE RIPRAP LINED CHANNEL AND ABOVE THE FILTER ZONE. THE PROJECT WILL INCLUDE FOUR TASKS: (1) PLANNING AND FEASIBILITY STUDY, (2) SEDIMENT AND WATER QUALITY MONITORING, (3) CONSTRUCTION AND DEMONSTRATION, AND (4) PROJECT MANAGEMENT.

PROJECT: 00360-DETERMINE THE EFFECTIVENESS OF REGULATIONS AND PRACTICES FOR HANDLING TOXIC STRIP MINE SPOILS TO PREVENT ACID MINE DRAINAGE

STARTING/ COMPLETION DATE : 09/77 03/79 : FUNDING ESTIMATED FY77 / $ 112500
TASK CODE=B623B-508 **EPA=R805598-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.: JL KENNEDY EPA/IERL CINC
INVESTIGATOR.: DR THOMPSON STATE BUR OF SURFACE MINE REC
MT DOUGHERTY ACKENHEIL & ASSOC GEO SYS
MILESTONES.... 08/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
09/78 -AWARD CONTINUATION
03/79 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000360 SSIE-GMA 3735 EPA -R805598-01 TASK-B623B-508
AP -623B DU -N105 LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THE PROPOSED RESEARCH PROJECT IS TO DETERMINE IF MODERN REGULATIONS AND PRACTICES GOVERNING HANDLING OF TOXIC STRIP MINE SPOIL MATERIALS HAVE BEEN EFFECTIVE IN CONTROLLING ACID MINE DRAINAGE AFTER MINING AND RECLAMATION HAVE BEEN COMPLETED. THE PROJECT WILL INCLUDE THE EVALUATION OF SIXTEEN STRIP MINES IN THE COMMONWEALTH OF PENNSYLVANIA. THESE MINES WILL HAVE BEEN RECLAIMED FOLLOWING LAWS AND REGULATIONS WHICH REQUIRED THAT TOXIC SPOIL MATERIALS BE SEGREGATED DURING MINING AND THAT THE TOXIC MATERIAL BE BACKFILLED IN ACCORDANCE WITH SPECIFICATIONS DESIGNED TO PREVENT RESIDUAL ACID MINE DRAINAGE. SPOIL SAMPLES WILL BE OBTAINED FROM A TEST BORING PROGRAM. THE POTENTIAL TOXICITY OF THE SPOIL SAMPLES WILL BE DETERMINED BY LABORATORY ANALYSIS. STATISTICAL METHODS WILL BE USED TO DETERMINE THE RELATION BETWEEN ACID MINE DRAINAGE PRODUCTION AND THE PRESENCE OF TOXIC STRIP MINE SPOILS, THEIR CONFIGURATION WITHIN THE RECLAIMED STRIP MINE, AND THE LOCATION OF GROUND WATER WITH RESPECT TO THE TOXIC MATERIALS.

**PROJECT: 00362-USER DESIGN MANUAL FOR TREATMENT OF ACID MINE DRAINAGES

STARTING/ COMPLETION DATE : 06/77 04/78 FUNDING ESTIMATED FY77 / $ 55000
TASK CODE=B623B-512 **EPA=68-03-2599 ** (CNTR.) PRIOR FY76 /

EPA OFFICER.. RC WILMOTH EPA/IERL CINC
INVESTIGATOR.. UNKNOWN SYSTEMS TECHNOLOGY CORP
MILESTONES.... 04/77 -FUNDING PACKAGE SUBMITTED
06/77 -AWARD FUNDS FOR PROJECT
01/78 -FINAL REPORT
04/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000362 SSIE-GMA 4633 EPA -68-03-2599 TASK-B623B-512
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE PURPOSE OF THIS PROGRAM IS TO DEVELOP A USER DESIGN MANUAL WHICH WILL PRESENT DETAILED STEP-BY-STEP DESIGN PROCEDURES AND DESIGN FACTORS FOR NEUTRALIZATION PROCESSES TO TREAT AMD. THE APPLICABILITY OF EACH TREATMENT PROCESS WILL BE CONSIDERED IN TERMS OF INFLUENT AND EFFLUENT CONDITIONS, LIMITING PARAMETERS GOVERNING THE SELECTION OF THESE PROCESSES AND ADVANTAGES AND DISADVANTAGES OF EACH. A REVIEW OF ALL APPLICABLE LITERATURE ON THE TREATMENT OF ACID MINE DRAINAGE (AMD) WILL BE MADE. THE TREATMENT FACTORS AND PROCEDURES WILL BE OBTAINED FROM THE LITERATURE. WHERE ADEQUATE INFORMATION ON A SPECIFIC UNIT PROCESS MAY NOT EXIST, AN OBJECTIVE RECOMMENDATION WILL BE MADE FOR SUCH FACTORS BASED UPON THE APPLICATION OF SOUND ENGINEERING PRINCIPLES AND/OR KNOWLEDGE OF THE APPLICABILITY OF THE SUBJECT PARAMETER IN A RELATED WASTE TREATMENT PROCESS. A SECTION OF THE USER MANUAL SHALL DETAIL THE RELATIVE CAPITAL AND OPERATING COSTS OF ALL PROCESSES GIVEN TWO SETS OF INFLUENT WATER QUALITY AND THREE PLANT SIZES (P.5, 1.0, AND 10 MGD).

**PROJECT: 00363-ROTATING DISC BIOLOGICAL TREATMENT OF AMD

STARTING/ COMPLETION DATE : 04/77 04/78 : FUNDING : ESTIMATED FY77 / $ 63000
TASK CODE=B623B-514 **EPA=R805132-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.: RG WILMOTH EPA/IERL CINC
INVESTIGATOR.: RF UNZ PENNSYLVANIA STATE UNIV
H OLEM PENNSYLVANIA STATE UNIV
MILESTONES.... 03/77 -FUNDING PACKAGE SUBMITTED
04/77 -AWARD FUNDS FOR PROJECT
04/78 -FINAL REPORT RECEIVED
PLAN ID.....: (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000363 SSIE-GMA 3710 EPA -R805132-01 TASK-B623B-514
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE PROJECT IS CONCERNED WITH EVALUATING THE FERROUS (FEII) IRON OXIDIZING CAPACITY OF THE ROTATING BIOLOGICAL CONTACTOR IN THE TREATMENT OF ACID MINE DRAINAGE. THE PROCESS IS DEPENDENT UPON THE LITHOTROPHIC CAPACITY OF IRON-OXIDIZING BACTERIA WHICH COLONIZE THE AVAILABLE SURFACE AREA OF ROTATING DISCS IMMERSED IN ACID MINE WATER FLOWING THROUGH THE RBC UNIT. THE OXIDATION OF THE FERROUS IRON TO THE FERRIC STATE REDUCES THE POLLUTION POTENTIAL OF THE DRAINAGE. THE SPECIFIC OBJECTIVES OF THE PROJECT ARE TO DETERMINE THE TREATMENT OF MINE DRAINAGES OF DIFFERING CHEMICAL NATURE AND THE REQUIREMENTS FOR TREATMENT OF CERTAIN SPECIFIC DRAINAGES BY THE UNIT TO ACCOMPLISH DESIRED EFFLUENT QUALITY. A FULL-SIZE RBC TREATMENT UNIT, WITH 2 METER DIAMETER DISCS, WILL BE SPECIALLY MODIFIED FOR DEMONSTRATION PURPOSES AND OPERATED AT THREE FERROUS IRON-CONTAINING ACID MINE DRAINAGE LOCATIONS. THESE LOCATIONS ARE IN PENNSYLVANIA AND WEST VIRGINIA AND INCLUDE ONE ACTIVE AND TWO ABANDONED COAL MINES. PERTINENT WATER QUALITY PARAMETERS WILL BE ANALYZED TO DETERMINE THE EFFECTIVENESS OF THE UNIT. PARTICULAR ATTENTION WILL BE PAID TO THE POPULATION DYNAMICS OF THE IRON OXIDIZING ORGANISMS AT VARIOUS STAGES OF TREATMENT. ANALYTICAL DATA WILL BE UTILIZED TO AID IN THE DESIGN OF OTHER UNITS AND THE ASSESSMENT OF CAPITAL AND OPERATING COSTS. ECONOMICS OF THE UNIT WILL BE COMPARED TO THOSE OF OTHER IRON OXIDIZING PROCESSES IN USE OR PLANNED.

**PROJECT: 00364-THE IMPORTANCE AND FUNCTIONS OF ALLUVIAL VALLEY FLOORS

STARTING/ COMPLETION DATE : 06/77 02/80 : FUNDING ESTIMATED FY77 / $ 110000
TASK CODE=B623B-517 **EPA=R805185-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. JF MARTIN EPA/IERL CINC
INVESTIGATOR.. PA RECHARD UNIVERSITY OF WYOMING
MILESTONES.... 06/77 -FUNDING PACKAGE SUBMITTED
07/77 -AWARD FUNDS FOR PROJECT
08/78 -AWARD CONTINUATION
02/80 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000364 SSIE-GMA 3661 EPA -R805185-01 TASK-B623B-517
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THERE ARE BASICALLY FIVE OBJECTIVES FOR THE STUDY: (1) TO DEFINE THE MECHANISMS INVOLVED IN THE HYDROLOGY OF THE ALLUVIAL SYSTEM, (2) TO INVESTIGATE THE STRATIGRAPHIC RELATIONSHIP OF THE STREAM DEPOSITS, (3) TO IDENTIFY THE SOIL TYPES REPRESENTED, (4) TO DETERMINE REPRODUCTIVITY OF THE NATIVE PLANT COMMUNITY, AND (5) TO PROVIDE INFORMATION RELEVANT FOR STATE AND FEDERAL REGULATORY AGENCIES. IT IS INTENDED THAT THIS STUDY DELINEATE THE PROBLEMS, MINEABILITY, TREATABILITY, ETC. OF POTENTIAL ALLUVIAL VALLEY MINE SITES. THIS EFFORT IS TO DEFINE THE CRITICALLY IMPORTANT PHYSICAL FEATURES OF ALLUVIAL VALLEYS WHICH HAVE MAJOR IMPACTS TO THE HYDROLOGIC CYCLE. AFTER AN EXTENSIVE LITERATURE REVIEW, THREE SITES IN MONTANA AND WYOMING WILL BE SELECTED FOR FIELD STUDY.

PROJECT: 00366-TRACE AND POTENTIALLY TOXIC ELEMENTS ASSOCIATED WITH URANIUM DEPOSITS IN SOUTH TEXAS

STARTING/ COMPLETION DATE : 05/77 05/78 FUNDING ESTIMATED FY77 / $ 60000
TASK CODE=B623B-523 **EPA=R805147-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.: SJ HUBBARD EPA/IERL CINC
INVESTIGATOR.: CD HENRY UNIV OF TEXAS BUR OF ECONOMIC GEOLOGY
CG GROAT UNIV OF TEXAS BUR OF ECONOMIC GEOLOGY
MILESTONES... 04/77 -FUNDING PACKAGE SUBMITTED
05/77 -AWARD FUNDS
07/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000366 SSIE-GMA 4398 EPA -R805147-01 TASK-B623B-523
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS STUDY IS TO EVALUATE POTENTIAL PROBLEMS OF TOXIC ELEMENTS ASSOCIATED WITH URANIUM MINERALIZATION AND MINING IN SOUTH TEXAS. SAMPLING OF SOILS AND VEGETATION IN (1) AREAS THAT ARE WITHIN OR IMMEDIATELY ADJACENT TO MINING AREAS OR HAVE HAD ORE STORED ON THEM; (2) AREAS UNDERLAIN BY IDENTIFIED URANIUM MINERALIZATION BUT WHICH HAVE NOT BEEN MINED; AND (3) AREAS OF SIMILAR SUBSTRATE AND SOILS AWAY FROM ANY KNOWN MINERALIZATION OR PREVIOUS MINING WILL ACCOMPLISH THIS OBJECTIVE. THE THIRD LOCALITY WILL ESTABLISH BACKGROUND LEVELS; THE FIRST TWO WOULD INDICATE THE EXTENT OF MAN-CAUSED OR "NATURAL" CONTAMINATION. SAMPLING WILL BEGIN EARLY IN 1977.

PROJECT: 00367-TRANSPORT WATER CONTAMINATION IN COAL-SLURRY PIPELINES

STARTING/ COMPLETION DATE : 03/77 04/78 : FUNDING ESTIMATED FY77 / $ 80000
TASK CODE=B623B-525 **EPA=R805176-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. JL KENNEDY EPA/IERL CINC
INVESTIGATOR.. HS PEAVY MONTANA STATE UNIV
WA HUNT MONTANA STATE UNIV
PW JENNINGS MONTANA STATE UNIV
MILESTONES... 03/77 -FUNDING PACKAGE SUBMITTED
04/77 -AWARD FUNDS FOR PROJECT
08/77 -COMPLETE FIRST PUMP TESTS
04/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES.. RECN-000367 SSIE-GMA 3711 EPA -R805176-01 TASK-B623B-525
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS RESEARCH PROJECT WILL BE TO QUALIFY AND QUANTIFY ANY CONTAMINATION OF WATER USED AS A TRANSPORT MEDIA IN COAL-SLURRY PIPELINES. A SLURRY OF WATER AND COAL WILL BE PUMPED CONTINUOUSLY FOR SEVERAL DAYS AROUND A 2,400 FOOT, CLOSED LOOP PIPELINE. SAMPLES WILL BE DRAWN OFF PERIODICALLY AND ANALYSIS WILL BE PERFORMED ON THE WATER PHASE FOR VARIOUS DISSOLVED AND SUSPENDED MATERIAL. TEST PARAMETERS WILL BE DETERMINED BY PRIOR ANALYSIS OF THE COAL AND WATER USED TO MAKE UP THE SLURRY. IT IS ANTICIPATED THAT THESE PARAMETERS WILL INCLUDE SEVERAL METALS AS WELL AS SEVERAL ORGANIC CARBON COMPOUNDS. BOTH FRESH WATER AND SALINE WATER WILL BE USED AS A TRANSPORT MEDIA. SOME ORGANIC ANALYSIS OF WATER WHICH HAS CONTRACTED COAL HAS ALREADY BEEN DONE AT M.S.U. THIS WORK INDICATES THAT DISSOLVED ORGANIC CARBON OF UP TO 100 PPM CAN RESULT UNDER SOME CONDITIONS.

PROJECT: 00368-EVALUATION OF 3 PERMEABLE LIMESTONE SEALS VIA CONSTRUCTION OF 3 EARTHEN DAMS

STARTING/ COMPLETION DATE : 11/76 11/80 FUNDING ESTIMATED FY77 / $ 19000
TASK CODE=B623B-574 **EPA= ** (IN-HO) PRIOR FY76 /
IN-HOUSE EFFORT FY 77 / 00.1 YEARS ; TOTAL PROJECT 00.3

EPA OFFICER.. RB SCOTT EPA/IERL CINC
INVESTIGATOR.. RB SCOTT US EPA ORD/IERL
MILESTONES.... 11/76 -FUNDING PACKAGE SUBMITTED
11/76 -AWARD FUNDS
11/80 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000368 SSIE-ZMA 1339 TASK-B623B-574 AP -623B
DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO DEMONSTRATE MINE SEALING BY PNEUMATICALLY INJECTING LIMESTONE (1/2" X 0") INTO ABANDONED DRIFT MINE PORTALS. THE LIMESTONE (CACO3) IN THE SEAL WILL REACT WITH THE ACID WATER TO NEUTRALIZE ACIDITY AND PRECIPITATE FERRIC AND ALUMINUM HYDROXIDES THAT WILL TEND TO PLUG THE VOIDS BETWEEN THE STONE AND PREVENT WATER FLOW FROM THE MINE. THE CURRENT PHASE OF THE PROJECT INVOLVES EVALUATION OF THE MINE SEALS BY EXTERNAL FLOODING. EXTENSIVE MONITORING IS BEING CONDUCTED TO DETERMINE THE EXTENT OF FLOODING INSIDE THE MINE AREA, AND THE VOLUME OF WATER PERCOLATING THROUGH THE LIMESTONE SEALS.

**PROJECT: 00369-PREDICTING ACID POLLUTION POTENTIAL FROM COAL STRIP MINES

```
                    STARTING/ COMPLETION DATE : 04/77   02/79 :   FUNDING    ESTIMATED   FY77  / $   86000
                    TASK CODE=B623B-606     **EPA=R805116-01  ** (GRANT)     PRIOR       FY76  /
EPA  OFFICER.. TG NEWPORT                EPA/IERL   CINC
INVESTIGATOR.. FT CARUCCIO               UNIV OF SOUTH CAROLINA              SCI & MATH/CHEM DEPT
MILESTONES.... 04/77 -FUNDING PACKAGE SUBMITTED
               05/77 -AWARD FUNDS FOR PROJECT
               02/79 -FINAL REPORT
PLAN ID....... (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000369          SSIE-GMA  3706        EPA -R805116-01       TASK-B623B-606
               AP  -623B            DU  -N105             LABT-EMI
ABSTRACT..... IF AN ACIDITY INDEX CAN BE DEVELOPED WITH A REASONABLE DEGREE OF PRECISION, THE INFORMATION WILL BE
               VERY VALUABLE TO MINING OPERATORS AND REGULATORY OFFICIALS IN THAT THEY WILL HAVE A TOTAL WHICH CAN
               BE USED TO ACCURATELY PREDICT THE AMOUNT OF ACID POLLUTION TO BE EXPECTED FROM A SITE PROPOSED FOR
               SURFACE MINING. THIS WILL BE USEFUL IN DETERMINING WHETHER A MINE PERMIT SHOULD BE ISSUED AND IN
               REVIEWING THE PROPOSED MINING OPERATION TO SEE IF PROPER RECLAMATION PRACTICES ARE EMPLOYED. SIX
               PROPOSED STRIP MINES UNDERLAIN BY DIFFERENT GEOLOGIES IN THE BITUMINOUS COAL FIELD OF WESTERN
               PENNSYLVANIA WILL BE CORE DRILLED TO PROVIDE FRESH ROCK SAMPLES, DETAILED GEOLOGY AND GROUND WATER
               SAMPLING POINTS. THE ROCKS WILL BE RELATED TO THEIR ACID-ALKALINITY PRODUCTION POTENTIALS THROUGH
               LABORATORY SIMULATED WEATHERING CONDITIONS AND PETROGRAPHIC ANALYSES. THE LEACHATES WILL BE
               ANALYZED FOR SPECIFIC IONIC SPECIES INDICATIVE OF PARTICULAR CHEMICAL REACTIONS. A REGIONAL AQUEOUS
               GEOCHEMICAL SURVEY WILL BE COMPLETED TO EVALUATE THE NATURAL SYSTEM'S NEUTRALIZING AND BUFFERING
               CAPACITIES. DURING THE BACKFILLING PHASE OF MINING OPERATION, WATER COLLECTORS WILL BE BURIED IN
               THE BACKFILL AND MINE DRAINAGE CHARACTERISTICS MONITORED. THE CHEMICAL CHARACTERISTICS OF THE MINE
               DRAINAGE WILL THEN BE RELATED TO THOSE OF THE LEACHATE TO ASCERTAIN THE CHEMICAL REACTIONS TAKING
               PLACE. FURTHER IDENTIFICATION WITH THE PETROGRAPHIC ANALYSES AND PYRITE TYPES OF THE ROCKS
               OCCUPYING THE MINE SITE AND NOTED TO PRODUCE PARTICULAR ACID-ALKALINE LOADS, PERMITS THE EXTENSIONS
               OF THIS POLLUTION PREDICTIVE TECHNIQUE TO OTHER AREAS.
```

**PROJECT: 00371-ACTIVITIES ASSOCIATED WITH ENERGY RESOURCE EXTRACTION

```
                    STARTING/ COMPLETION DATE : 01/75   06/82 :   FUNDING    ESTIMATED   FY77  / $  973000
                    TASK CODE=B623B-622     **EPA=D6-E764     ** ( IAG )     PRIOR       FY76  / $ 1254000
EPA  OFFICER.. RD HILL                   EPA/IERL   CINC
INVESTIGATOR.. H  BRAUN                  USDA                                FOREST SERV
MILESTONES.... 01/75 -FUNDING PACKAGE SUBMITTED AND FUNDS AWARDED
               12/77 -TECHNICAL HANDBOOK ON EASTERN U.S. REVEGETATION
               06/78 -GUIDELINES ON OVERBURDEN DRILLING
               06/80 -FINAL REPORT ON REVEGETATION GUIDELINES   SEMI-ARID
               06/80 -FINAL REPORT ON REVEGETATION GUIDELINES   ARID
               06/80 -REPORT EFFECTS TRANSPORTATION SYSTEMS
               06/79 -REPORT ASSESS QUALITY WATER IN STRIP MINES
               06/80 -REPORT ASSESS TECHNOLOGIES FOR REDEPOSITING AND STABILIZING
               06/80 -REPORT CRITERIA USE NONMINE WASTE
PLAN ID......: (AP-623B)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES.   RECN-000371          SSIE-GMA  4404        EPA -D6-E764          TASK-B623B-622
               AP  -623B            DU  -N105             LABT-EMI
ABSTRACT...... THIS PROGRAM IS TO DEVELOP ASSESSMENT AND GUIDELINE REPORTS FOR COAL MINING IN BOTH THE HUMID
               EASTERN STATES AND THE ARID AND SEMI-ARID WESTERN STATES. THE WORK IS DIVIDED INTO FOUR TASKS
               UNDERTAKEN BY FOREST SERVICE PERSONNEL IN BEREA, KY., LOGAN, UTAH, AND ALBUQUERQUE, N.M. THE TASKS
               ARE AS FOLLOWS: 1. DEVELOP GUIDELINES AND CRITERIA FOR OVERBURDEN DRILLING, ANALYSIS, AND PLACEMENT
               AS RELATED TO GROWTH SUPPORTING MEDIA. 2. PREPARE TECHNICAL HANDBOOK ON REVEGETATION METHODS FOR
               MINED LANDS IN EASTERN U.S., INCLUDING RECOMMENDATIONS FOR NEW RESEARCH. 3. DEVELOP GUIDELINES AND
               CRITERIA FOR THE USE OF NON-MINE WASTES AS SOIL AMENDMENTS ON COAL AND OIL SHALE SPOILS. 4. DEVELOP
               RECOMMENDATIONS, GUIDELINES, AND CRITERIA, BASED ON NEW RESEARCH, FOR REVEGETATION FOLLOWING COAL
               AND OIL SHALE MINING.
```

**PROJECT: 00372-GEOCHEMISTRY OF CADMIUM AND OTHER SELECTED HEAVY METALS AS RELATED TO COAL STRIP MINING

STARTING/ COMPLETION DATE : 09/77 09/79 : FUNDING ESTIMATED FY77 / $ 27000
TASK CODE=B623B-633 **EPA=R805353-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER. RC WILMOTH EPA/IERL CINC
INVESTIGATOR.. W HOOD SOUTHERN ILLINOIS UNIV SCH OF SCI
P ROBINSON SOUTHERN ILLINOIS UNIV SCH OF SCI
MILESTONES.... 08/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS
12/77 -REVIEW SAMPLING & ANALYSIS PLAN
01/78 -AWARD CONTINUATION
09/79 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-000372 SSIE-GMA 4399 EPA -R805353-01 TASK-B623B-633
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THIS INVESTIGATION IS CONCERNED WITH THE POTENTIAL RELEASE OF CADMIUM AND OTHER TOXIC HEAVY ELEMENTS (ARSENIC, ANTIMONY, NICKEL, COBALT, ZINC, AND CHROMIUM) TO SOUTHERN ILLINOIS STREAMS AS A RESULT OF THE STRIP MINING OF COAL. PRELIMINARY DATA INDICATE THAT SIGNIFICANT AMOUNTS OF TOXIC HEAVY ELEMENTS CAN BE LEACHED BY ACID MINE WATER BUT THE FATE OF THESE ELEMENTS AFTER THEY ENTER THE AQUATIC ENVIRONMENT IS NOT KNOWN. HOWEVER, PRELIMINARY INFORMATION INDICATES THAT DANGEROUS CONCENTRATIONS OF THESE ELEMENTS MAY POSSIBLY BE TRANSPORTED DOWNSTREAM AS PART OF THE BEDLOAD, PERHAPS TO BE AGAIN RELEASED WHEN FAVORABLE CONDITIONS ARISE. OUR STUDY SITE WILL BE A SIX-COUNTY AREA IN SOUTHERN ILLINOIS, ONE OF THE MOST EXTENSIVELY STRIP-MINED AREAS IN THE WORLD. OUR PROPOSED STUDY WILL BE DIVIDED INTO THREE SEPARATE PARTS: (1) REGIONAL AND STRATIGRAPHIC DISTRIBUTION OF THE ELEMENTS IN MINE OVERBURDEN MATERIALS, (2) LEACHING STUDIES ON THE REMOVAL OF THE ELEMENTS FROM OVERBURDEN ROCKS AND (3) DISTRIBUTION OF THE ELEMENTS IN SELECTED STREAMS AND STREAM SEDIMENTS IN THE AREA. OUR RESULTS WILL ESTABLISH THE EXTENT OF CADMIUM AND OTHER HEAVY ELEMENT POLLUTION RESULTING FROM SOUTHERN ILLINOIS COAL STRIP MINING OPERATIONS, ESTABLISH THE CAUSES, AND PROVIDE THE INFORMATION NEEDED FOR ITS PREVENTION.

**PROJECT: 00374-PREDICTING RESPONSE OF A NATURAL SYSTEM TO URANIUM EXTRACTION, OAKVILLE AQUIFER SYSTEM, TEXAS

STARTING/ COMPLETION DATE : 09/77 09/78 : FUNDING ESTIMATED FY77 / $ 105000
TASK CODE=B623B-638 **EPA=R805357-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. J HUBBARD EPA/IERL CINC
INVESTIGATOR.. WE GALLOWAY UNIV OF TEXAS BUR OF ECONOMIC GEOLOGY
CD HENRY UNIV OF TEXAS BUR OF ECONOMIC GEOLOGY
CW KREITLER UNIV OF TEXAS BUR OF ECONOMIC GEOLOGY
MILESTONES.... 07/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
00/00 -FINAL REPORT RECEIVED
PLAN ID.....: (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES..: RECN-000374 SSIE-GMA 3731 EPA -R805357-01 TASK-B623B-638
AP -623B DU -N105 LABT-EMI
ABSTRACT..... THE PRINCIPAL OBJECTIVE OF THIS PROJECT IS TO DETERMINE AND DOCUMENT FOR ONE URANIUM-BEARING AQUIFER SYSTEM THE INTERRELATIONSHIPS BETWEEN AQUIFER GEOMETRY, HYDROLOGY, HYDROCHEMISTRY, MINERALOGY, AND URANIUM MINERALIZATION AND TO DETERMINE HOW THIS NATURAL SYSTEM WILL RESPOND TO LOCAL CHEMICAL OR PHYSICAL STRESSES INDUCED BY URANIUM MINING. THE IMPLICATIONS OF PROJECT RESULTS FOR THE DESIGN OF MONITORING SYSTEMS WILL BE EVALUATED. THE PROGRAM IS EXPECTED TO BE STARTED IN 1977.

**PROJECT: 03998-TECHNOLOGIES FOR CONTROLLING ADVERSE EFFECTS OF MINING ON FOREST, RANGE, AND RELATED FRESHWATER ECOSYSTEMS

STARTING/ COMPLETION DATE : 00/75 00/79 : FUNDING : ESTIMATED FY77 / $ 460000
TASK CODE=V623B-13 **EPA=D5-E764 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. UNKNOWN USDA AGRIC RES SERV
MILESTONES.... 06/78 -OVERBURDEN DRILLING FOR PRE-MINING CHARACTERIZATION REPORT
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-003998 SSIE-GMA 4671 EPA -D5-E764 TASK-V623B-13
AP -623B DU -N105 LABT-EMI
ABSTRACT..... DEVELOP GUIDELINES AND CRITERIA FOR OVERBURDEN DRILLING, ANALYSIS, AND PLACEMENT AS RELATED TO GROWTH SUPPORTING MEDIA. PREPARE TECHNICAL HANDBOOK ON VEGETATION METHODS FOR MINED LANDS IN EASTERN U.S., INCLUDING RECOMMENDATIONS FOR NEW RESEARCH. DEVELOP GUIDELINES AND CRITERIA FOR THE USE OF NON-MINE WASTES AS SOIL AMENDMENTS ON COAL AND OIL SHALE SPOILS. DEVELOP RECOMMENDATIONS, GUIDELINES, AND CRITERIA, BASED ON NEW RESEARCH, FOR REVEGETATION FOLLOWING COAL AND OIL SHALE MIN

**PROJECT: 03999-REVEGETATION AND RECLAMATION OF LAND AREAS DISTURBED BY MAN CONTROLLED TECHNOLOGY

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 200000
TASK CODE=V623B-23 **EPA=D7-E763 ** (IAG) PRIOR FY76 / $ 707000

EPA OFFICER.. CW HALL EPA/HD''TRS- OEMI
INVESTIGATOR.. OL BENNETT USDA AGRIC RES SERV
RF FOLLETT USDA AGRIC RES SERV
PLAN ID..... (AP-623B)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, SOLID FOSSIL FUELS
ORDIS CODES... RECN-003999 SSIE-GMA 4669 EPA -D7-E763 TASK-V623B-23
AP -623B DU -N105 LABT-EMI
ABSTRACT..... OBJECTIVES: A) TO UTILIZE WASTE MATERIALS IN REVEGETATION AND RECLAMATION OF STRIP MINE AREAS, B) TO DEVELOP METHODS FOR CONTROL OF INSTABILITY OF MINED LANDS, AND C) TO RESTORE AND MAINTAIN A FAVORABLE SOIL ORGANIC MATTER COMPONENT IN RECLAIMED STRIP MINE AREAS. APPROACH: GREENHOUSE, GROWTH-CHAMBER, AND FIELD EXPERIMENTS ARE CONDUCTED TO DETERMINE THE EFFECTS OF VARIOUS TREATMENTS AND PRACTICES. HYPOTHESES ARE TESTED USING FIELD PLOT AND OTHER EXPERIMENTAL TECHNIQUES TO DETERMINE THE EFFECTS OF TREATMENTS AND PRACTICES SO THAT PLANNERS, MINE OPERATORS AND OTHERS CAN USE THIS INFORMATION AS NEEDED. CURRENT PLANS AND/OR PROGRESS: FIELD AND GREENHOUSE STUDIES ARE BEING CONDUCTED TO EVALUATE THE EFFECT OF AN ARRAY OF TYPES AND RATE OF WASTE PRODUCTS ON THE CHEMICAL STATUS OF SPOILS AND ON VEGETATIVE GROWTH. REGARDING TECHNIQUES, AMENDMENT INCORPORATION, AND REVEGETATION PRACTICES ARE BEING DETERMINED THAT WILL ALLEVIATE INSTABILITY OF MINED LANDS. STUDIES ARE BEING CONDUCTED TO SELECT AND DETERMINE MANAGEMENT PRACTICES FOR THOSE LEGUMES MOST TOLERANT TO STRIP-MINED AREAS. BIBLIOGRAPHIC REFERENCES: BENNETT, O.L., ARMIGER, W.H., AND J.N. JONES, JR. (1976) REVEGETATION AND USE OF EASTERN SURFACE MINE SPOILS. IN: LAND APPLICATION OF WASTE MATERIALS, SCSA, PP 195-215.

**PROJECT: 00387-OPERATE OHMSETT

STARTING/ COMPLETION DATE : 05/74 10/77 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=B623C-235 **EPA=68-03-0490 ** (CNTR.) PRIOR FY76 / $ 611000

EPA OFFICER. JS FARLOW EPA/IERL CINC
INVESTIGATOR.. R ACKERMAN M & H SILAS MASON CO INC
E MCCRACKEN M & H SILAS MASON CO INC
MILESTONES.... 10/75 -FUNDING PACKAGE SUBMITTED
11/75 -AWARD FUNDS FOR PROJECT
10/77 -COMPLETION DATE
PLAN ID.....: (AP-623C)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000387 SSIE-GMA 3664 EPA -68-03-0490 TASK-B623C-235
AP -623C DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO PROVIDE AN OPERATIONS AND MAINTENANCE STAFF AND A MECHANISM FOR OPERATING THE OHMSETT FACILITY. THE CONTRACTOR PROVIDES A PERMANENT STAFF OF A MANAGER, A SECRETARY, AN ENGINEER, A CHEMIST, AN ACCOUNTANT/EXPEDITER AND FIVE TECHNICIANS. AUTHORITY IS PROVIDED IN THE CONTRACT FOR THE LOCAL HIRING OF TEMPORARY PERSONNEL AND THE EXECUTION OF SMALL SUBCONTRACTS AS NEEDED TO OPERATE AND MAINTAIN THE FACILITY. FUNDING FOR THIS "OPERATE OHMSETT" PROJECT IS PROVIDED BY VARIOUS TESTING PROGRAMS EXECUTED FOR OHMSETT "CUSTOMERS". EACH TESTING PROGRAM IS DESIGNATED JOB ORDER 1, 2 ETC., AND IS PERFORMED ON A TIME-AND-MATERIALS BASIS. FACILITY CUSTOMERS ARE AT PRESENT LIMITED TO FEDERAL, STATE AND LOCAL GOVERNMENT AGENCIES. PRIMARY CUSTOMERS ARE THE U.S. COAST GUARD, THE U.S. NAVY, U.S. EPA OIL SPILL RELATED PROJECTS, AND THE U.S. EPA HAZARDOUS MATERIAL SPILL RELATED PROJECTS. EACH CUSTOMER-RELATED JOB ORDER CONSTITUTES AN EPA PROJECT FUNDED BY EPA OR AN IAG WITH ANOTHER AGENCY. IN EACH CASE, A CUSTOMER-RELATED JOB ORDER REPRESENTS INCREMENTAL FUNDING TO THE "OPERATE OHMSETT" PROJECT. IN SOME CASES, THE JOB ORDERS THEMSELVES ARE INCREMENTALLY FUNDED, SINCE IT IS NOT ALWAYS POSSIBLE TO ACCURATELY ESTIMATE THE ACTUAL COST TO COMPLETE A JOB ORDER PRIOR TO ITS EXECUTION. THE PROJECT PROVIDES OTHER FEDERAL AGENCIES WITH A FACILITY TO ACCOMPLISH THEIR SIMILAR PROJECTS, AT NO EXPENSE TO EPA.

**PROJECT: 00388-OHMSETT SUPPORT NAVAL WEAPONS STATION EARLE

STARTING/ COMPLETION DATE : 06/74 12/82 : FUNDING : ESTIMATED FY77 / $ 38000
TASK CODE=B623C-236 **EPA=D4-F491 ** (IAG) PRIOR FY76 / $ 20000

EPA OFFICER.: JS FARLOW EPA/IERL CINC
INVESTIGATOR.: D BRUNDAGE US DOD NAVY
MILESTONES.... 05/74 -FUNDING PACKAGE SUBMITTED
06/74 -AWARD FUNDS FOR PROJECT
10/76 -FUNDING INCREMENT
10/77 -FUNDING INCREMENT
10/78 -FUNDING INCREMENT
10/79 -FUNDING INCREMENT
10/80 -FUNDING INCREMENT
10/81 -FUNDING INCREMENT
12/82 -FINAL REPORT RECIEVED
PLAN ID..... (AP-623C)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000388 SSIE-GMA 4402 EPA -D4-F491 TASK-B623C-236
AP -623C DU -N105 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS INTERAGENCY AGREEMENT IS TO PROVIDE OHMSETT WITH CERTAIN SPECIFIC SUPPORT SERVICES WHICH ARE REQUIRED FOR OHMSETT OPERATIONS, AND WHICH EITHER CANNOT BE OBTAINED ELSEWHERE, OR CAN BE OBTAINED THROUGH THE NAVY AT THE LEAST COST. THE SUPPORT SERVICES ARE OBTAINED THROUGH AN INTERAGENCY AGREEMENT WITH NAVAL WEAPONS STATION EARLE FROM WHOM EPA HAS LEASED THE PROPERTY ON WHICH OHMSETT IS SITED. THIS AGREEMENT PROVIDES SECURITY SERVICES, FIRE PROTECTION, TANK FILLING AND EMPTYING SERVICES (OPERATION OF NAVY PUMPS TO PROVIDE WATER), RUBBISH REMOVAL, RENTAL OF A FORKLIFT AND CRANES AS NEEDED AND OTHER SIMILAR SERVICES.

**PROJECT: 00390-PERFORMANCE TESTING OFFSHORE EQUIPMENT

```
                    STARTING/ COMPLETION DATE : 04/76   12/80     FUNDING    ESTIMATED   FY77  / $  175000
                    TASK CODE=B623C-246     **EPA=68-03-0490  ** (CNTR.)      PRIOR       FY76  / $   35000
EPA  OFFICER.: JS FARLOW                EPA/IERL   CINC
INVESTIGATOR.: R  ACKERMAN              M & H SILAS MASON CO INC
MILESTONES...: 03/76 -FUNDING PACKAGE SUBMITTED
               04/76 -AWARD FUNDS FOR PROJECT
               12/80 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000390           SSIE-GMA  3665        EPA -68-03-0490       TASK-B623C-246
               AP  -623C             DU  -N105             LABT-EMI
ABSTRACT......
```

EVALUATE PERFORMANCE OF SELECTED SPILL CLEANUP EQUIPMENT. CONDUCT CONTROLLED REPRODUCIBLE TESTS IN EPA'S OHMSETT TEST FACILITY. EQUIPMENT EVALUATED INCLUDES TWO OIL SKIMMERS (MACRO CLASS V AND A PROTOTYPE OIL MOP, INC. ZRV) AND A RESEARCH PROTOTYPE SORBENT SYSTEM (CEL). FINAL REPORTS ARE BEING PREPARED.

**PROJECT: 00391-OIL SPILL AND OIL POLLUTION REPORTS II

```
                    STARTING/ COMPLETION DATE : 02/77   03/79     FUNDING    ESTIMATED   FY77  / $   49000
                    TASK CODE=B623C-266     **EPA=R805052-01  ** (GRANT)      PRIOR       FY76  / $   44000
EPA  OFFICER.: LT MCCARTHY              EPA/IERL   CINC
INVESTIGATOR.. HW OFFEN                 UNIV OF CALIFORNIA                    SANTA BARBARA CAMPUS
MILESTONES.... 12/76 -FUNDING PACKAGE SUBMITTED
               02/77 -AWARD FUNDS FOR PROJECT
               03/79 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000391           SSIE-GMA  3615        EPA -R805052-01       TASK-B623C-266
               AP  -623C             DU  -N105             LABT-EMI
ABSTRACT......
```

THE PURPOSE OF THIS PROJECT IS TO PREPARE A QUARTERLY PUBLICATION SERVING AS A SINGLE INFORMATION SOURCE FOR: CURRENT OIL SPILL EVENTS, SCIENTIFIC AND TECHNICAL PUBLICATIONS RELATING TO OIL POLLUTION RESEARCH, OIL POLLUTION STUDIES SPONSORED BY GOVERNMENT, INDUSTRY AND PRIVATE AND PUBLIC INSTITUTIONS AND OIL POLLUTION RELATED "PATENT" DESCRIPTION

**PROJECT: 00392-REVIEW AND ANALYSIS OF OIL/WATER SEPARATION LITERATURE

```
                    STARTING/ COMPLETION DATE : 06/75 - 03/78     FUNDING    ESTIMATED   FY77  / $   1000[illegible]
                    TASK CODE=B623C-271     **EPA=R803978-01  ** (GRANT)      PRIOR       FY76  / $   1000[illegible]
EPA  OFFICER.. LT MCCARTHY              EPA/IERL   CINC
INVESTIGATOR.  RC AHLERT                RUTGERS STATE UNIV OF NJ              SCH OF EN/CHEM & BIOCHEM ENG
MILESTONES.... 05/75 -FUNDING PACKAGE SUBMITTED
               06/75 -AWARD FUNDS FOR PROJECT
               07/76 -GRANT AMENDMENT
               12/76 -GRANT AMENDMENT
               04/77 -GRANT AMENDMENT
               03/78 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000392           SSIE-GMA  3750        EPA -R803978-01       TASK-B623C-271
               AP  -623C             DU  -N105             LABT-EMI
ABSTRACT......
```

THE PROJECT WILL IDENTIFY, ORGANIZE AND INTERPRET TECHNICAL AND COMMERCIAL LITERATURE RESOURCES ON OIL/WATER SEPARATION. DETAILED INFORMATION ON DESIGN CONSIDERATION AND OPERATING CHARACTERISTICS OF SYSTEMS, DEVICES AND PROCESSES, WILL BE ASSEMBLED.

**PROJECT: 00393-MOP OIL SPILL DISPERSANTS

```
                    STARTING/ COMPLETION DATE   09/77   09/79 :   FUNDING    ESTIMATED   FY77  / $   21000
                    TASK CODE=B623C-272     **EPA=68-03-2621  ** (CNTR.)     PRIOR       FY76  / $   30000
EPA  OFFICER.  LT MCCARTHY                EPA/IERL   CINC
INVESTIGATOR.     UNKNOWN                 WOODWARD & CLYDE CNSLTS
MILESTONES...  03/76 -FUNDING PACKAGE SUBMITTED
               08/77 -FUNDING INCREMENT
               09/77 -AWARD FUNDS FOR PROJECT
               09/79 -FINAL REPORT RECEIVED
PLAN ID......  (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..  RECN-000393          SSIE-GMA  4634        EPA -68-03-2621       TASK-B623C-272
               AP  -623C            DU  -N105             LABT-EMI
ABSTRACT.....  THE OBJECTIVE IS TO DEVELOP A FIRST GENERATION MANUAL OF PRACTICE FOR ENVIRONMENTALLY ACCEPTABLE
                UTILIZATION OF OIL SPILL DISPERSANTS TO "PREVENT OR SUBSTANTIALLY REDUCE EXPLOSION OR FIRE HAZARD
                TO PROPERTY", OR "PREVENT OR REDUCE SUBSTANTIAL HAZARD TO A MAJOR SEGMENT OF THE POPULATIONS OR
                VULNERABLE SPECIES OF WATERFOWL", OR "RESULT IN LEAST OVERALL ENVIRONMENTAL DAMAGE, OR INTERFERENCE
                WITH DESIGNATED WATER USE". THE APPROACH UTILIZED WILL BE THE REDUCTION OF THE SCIENTIFIC AND
                TECHNICAL LITERATURE CURRENTLY EXISTING INTO A PRACTICAL, UTILITARIAN FORMAT WHICH ESTABLISHES
                GUIDELINES AND CRITERIA TO IMPLEMENT BOTH THE "SPIRIT AND LETTER" OF ANNEX X (SCHEDULE OF CHEMICALS
                AND OTHER ADDITIVES TO REMOVE OIL AND HAZARDOUS SUBSTANCES DISCHARGE) OF THE NATIONAL OIL AND
                HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN (CFR, VOL. 40, NO. 28, FEBRUARY 10, 1975).
                ADDITIONALLY, AN INVENTORY OF AVAILABLE EQUIPMENT AND AGENT APPLICATION AND USE EXPERTS WILL BE
                DEVELOPED. NUMEROUS STUDIES HAVE DOCUMENTED THE ADVERSE TOXICOLOGICAL PROPERTIES OF DISPERSANTS AND
                OIL ALONE, AND IN COMBINATION. AS A RESULT DISPERSANTS ARE NOT UTILIZED IN PRACTICE AS AN EFFECTIVE
                OIL SPILL CONTROL AND COUNTERMEASURE OPTION. PRODUCTS, TECHNIQUES AND EQUIPMENT FOR FIELD USE ARE
                AVAILABLE. WHAT IS NEEDED IS GUIDELINES FOR THEIR USE IN AN ENVIRONMENTALLY ACCEPTABLE MANNER. THE
                DECISION MAKING PROCESS TO USE OR NOT TO USE DISPERSANTS IS COMPLEX AND INVOLVES PRACTICAL
                COMPROMISE OR TRADE-OFFS BETWEEN THE SEVERAL AVAILABLE OPTIONS FOR CLEANUP AND CONTROL. HOWEVER
                DISPERSANTS DO HAVE THEIR PLACE IN THE ARSENAL OF SPILL CONTROL OPTIONS. THE PROPER USE OF
                DISPERSANTS AT THE RIGHT TIME AND PLACE COULD SIGNIFICANTLY MITIGATE THE ADVERSE ENVIRONMENTAL
                EFFECTS OF OIL SPILLS. THIS PROJECT WILL IDENTIFY THE PROPER USE OF DISPERSANTS, AS WELL AS FIELD
                METHODS, EQUIPMENT, TECHNIQUES AND APPLICATION EXPERTS FOR THEIR USE IN AN ENVIRONMENTALLY
                ACCEPTABLE MANNER. ADDITIONALLY, DISPERSANT PRODUCT TESTING WILL BE PERFORMED IN ORDER
```

**PROJECT: 00395-METHODS MANUAL FOR OIL SPILL SOURCE IDENTIFICATION

```
                    STARTING/ COMPLETION DATE : 01/76   03/78 :   FUNDING    ESTIMATED   FY77  / $   18000
                    TASK CODE=B623C-275     **EPA=            ** (IN-HO)     PRIOR       FY76  / $   10000
                IN-HOUSE EFFORT   FY 77  /  00.6  YEARS  ; TOTAL PROJECT  01.8
EPA  OFFICER.. M  GRUENFELD               EPA/IERL   CINC
INVESTIGATOR.. M  GRUENFELD               US EPA                              ORD/IERL
MILESTONES.... 01/76 -INITIATE PROJECT
               04/76 -COMPLETE LITERATURE REVIEW
               09/77 -COMPLETE METHODS EVALUATION
               12/77 -DRAFT MANUAL
               03/78 -FINAL MANUAL
PLAN ID....... (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000395          SSIE-ZMA  1335        TASK-B623C-275        AP  -623C
               DU  -N105            LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A COMPREHENSIVE MANUAL OF PROVEN ANALYTICAL METHODS FOR
                THE QUANTITATION, CHARACTERIZATION, AND SOURCE IDENTIFICATION OF PETROLEUM OILS THAT ARE SPILLED
                INTO THE ENVIRONMENT. A MANUAL OF RELIABLE ANALYTICAL METHODS WILL BE PREPARED IN ORDER TO MONITOR
                OIL POLLUTION IN THE VICINITY OF OIL SPILLS, OIL PRODUCTION PLATFORMS, TANKER ROUTES, INDUSTRIAL
                AND MUNICIPAL OUTFALLS, ET AL. ALTHOUGH METHODS FOR ANALYZING OILS IN WATER, SEDIMENTS, AND
                BIOLOGICAL TISSUES ARE CURRENTLY PROLIFERATING, THEY GENERALLY LACK SENSITIVITY, SPECIFICITY AND
                ADEQUATE VALIDATION. THIS PROJECT WILL REVIEW THE AVAILABLE METHODS, AND CONSOLIDATE THE MOST
                APPROPRIATE ONES WITHIN THE CONTEXT OF A STATE-OF-THE-ART EPA OIL SPILL METHODS MANUAL.
```

**PROJECT: 00396-METHOD OF QUANTITATION FOR PETROLEUM OILS IN WATER

```
                    STARTING/ COMPLETION DATE : 06/75   06/79 :   FUNDING    ESTIMATED   FY77  / $   21000
                    TASK CODE=B623C-276     **EPA=            ** (IN-HO)     PRIOR       FY76  / $   15000
                IN-HOUSE EFFORT   FY 77  /  00.7  YEARS  ; TOTAL PROJECT  02.0
EPA  OFFICER.. M  GRUENFELD               EPA/IERL   CINC
INVESTIGATOR.. M  GRUENFELD               US EPA                              ORD/IERL
MILESTONES.... 06/75 -INITIATE PROJECT
               09/75 -REPORT TEST RESULTS OF ADSORPTION PROCEDURES
               12/76 -REPORT ON UTILITY OF IR
               12/77 -REPORT ON UTILITY OF GC
               12/78 -REPORT ON UTILITY OF FLUORESCENCE SPECTROSCOPY
               06/79 -FINAL REPORT
PLAN ID....... (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000396          SSIE-ZMA  1336        TASK-B623C-276        AP  -623C
               DU  -N105            LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A METHOD FOR QUANTITATING PETROLEUM OILS THAT ARE
                DISPERSED IN WATER, OR THAT HAVE SEPARATED FROM WATER DISPERSION FOLLOWING SAMPLE COLLECTION. THE
                METHOD WILL BE SPECIFIC FOR PETROLEUM OILS, I.E., IT SHOULD ACCURATELY QUANTITATE PETROLEUM EVEN IN
                THE PRESENCE OF NON-PETROLEUM ORGANICS. APPLICATION TO THE MINIMUM CONCENTRATION 1 MICROGRAM PER
                LITER (PPB) IS DESIRED. THE METHODOLOGY TO BE USED WILL INCLUDE PROCEDURES SUCH AS SOLVENT
                EXTRACTION, ADSORPTION, GAS AND LIQUID CHROMATOGRAPHY, SPECTROSCOPY, ET AL.
```

**PROJECT: 00399-PROTECTION AND RESTORATION OF SHORELINES FROM OIL SPILLS

```
                    STARTING/ COMPLETION DATE : 12/74   03/77 :   FUNDING    ESTIMATED   FY77  / $   12000
                    TASK CODE=B623C-287     **EPA=68-03-2160  ** (CNTR.)     PRIOR       FY76  / $  158000
EPA  OFFICER.: L  MCCARTHY                 EPA/IERL   CINC
INVESTIGATOR.: R  CASTLE                   U R S RES CO
MILESTONES...: 11/74 -FUNDING PACKAGE SUBMITTED
               12/74 -AWARD FUNDS FOR PROJECT
               03/74 -FINAL REPORT RECEIVED
PLAN ID......: (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000399            SSIE-GMA  3686        EPA -68-03-2160       TASK-B623C-287
               AP  -623C              DU  -N105             LABT-EMI
ABSTRACT.....: THE OBJECTIVES OF THIS PROJECT ARE TO PROVIDE FROM EFFICIENT ACTION TO MINIMIZE DAMAGE TO SHORELINES
                FROM OIL AND HAZARDOUS SUBSTANCE DISCHARGES INCLUDING CONTAINMENT, DISPERSAL AND REMOVAL. EPA
                HEADQUARTERS HAS SPECIFICALLY EXPRESSED THE NEED FOR, AND GIVEN THE HIGHEST PRIORITY TO, MANUALS OF
                PRACTICE (MOP) TO MEET THE OPERATIONAL NEEDS OF FIELD PERSONNEL DURING SPILL RESPONSE ACTIONS TO
                PROTECT AND RESTORE THREATENED AND CONTAMINATED SHORE AREAS. THE PROJECTS ASSOCIATED WITH THE
                MILESTONE WILL SATISFY THE NEED BY SUPPLYING MANNUALS OF PRACTICE WHICH WILL BE UTILIZED BY
                ON-THE-SCENE FIELD PERSONNEL. FOR THE ACCOMPLISHMENT OF THIS MILESTONE, THE APPROACH OR METHODOLOGY
                IS TO EVALUATE AND SELECT FROM THE CURRENTLY PRACTICED STATE-OF-THE-ART, THOSE FIELD RELEVANT
                METHODS AND TECHNIQUES FOR REDUCTION TO CONCISE DESCRIPTIVE HANDBOOK FORMAT FOR ON-THE-SCENE USE BY
                FIELD PERSONNEL. THE MANUALS WILL EMPHASIZE THE DECISION PROCESS THROUGH WHICH THE FIELD PERSONNEL
                MUST PROGRESS IN ORDER TO ARRIVE AT THE PROPER RECOMMENDATION. FOR EXAMPLE, IN PROTECTING A MARSH
                AREA, SOME QUESTIONS THAT SHOULD BE ANSWERED MAY INCLUDE THE TYPE OF MARSH GRASSES, THE INHABITANTS
                OF THE MARSH, THE TIME OF YEAR, EXPECTED WEATHER CONDITIONS AND THE ECOLOGICAL, RECREATIONAL,
                COMMERCIAL AND AESTHETIC VALUE OF THE MARSH. FIELD PROCEDURES WILL BE APPENDED FOR UTILIZING
                EXISTING PRODUCTS, EQUIPMENT AND SUPPLIES. THESE PROCEDURES WILL OUTLINE IN CONCISE DESCRIPTIVE
                FORMAT THE STEP-BY-STEP APPROACH FOR IMPLEMENTATION BY THE ON-THE-SCENE FIELD PERSONNEL.
```

**PROJECT: 00400-PETROLEUM PIPELINE LEAK DETECTION

```
                    STARTING/ COMPLETION DATE : 04/77   04/79 :   FUNDING    ESTIMATED   FY77  / $  110000
                    TASK CODE=B623C-298     **EPA=68-03-2532  ** (CNTR.)     PRIOR       FY76  / $   80000
EPA  OFFICER.. JS DORRLER                  EPA/IERL   CINC
INVESTIGATOR.. GH BURGHART                 SCI APPLICATIONS INC
MILESTONES.... 02/76 -FUNDING PACKAGE SUBMITTED
               04/77 -AWARD FUNDS FOR PROJECT
               04/77 -FUNDING INCREMENT
               02/78 -FUNDING INCREMENT
               04/79 -FINAL REPORT RECEIVED
PLAN ID......  (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000400            SSIE-GMA  3668        EPA -68-03-2532       TASK-B623C-298
               AP  -623C              DU  -N105             LABT-EMI
ABSTRACT......  THIS PROJECT IS INTENDED TO DEFINE THE STATE-OF-THE-ART OF PIPELINE LEAK DETECTION AND TO DEVELOP AN
                IMPROVED TECHNIQUE OR SET OF TECHNIQUES TO ADVANCE THIS AREA OF TECHNOLOGY. AT PRESENT, A LARGE
                PERCENTAGE OF INLAND OIL SPILLS ARE DUE TO PIPELINE FAILURES OF VARIOUS TYPES. ADDITIONALLY, WITH
                NEW PORTIONS OF THE OUTER CONTINENTAL SHELF BEING DEVELOPED FOR OIL AND GAS RESOURCES, PIPELINES
                WILL BE THE PRINCIPAL MEANS OF MOVING THE PRODUCTS TO SHORE, AND THROUGH VARIOUS ONSHORE
                FACILITIES. THE PRESENT STATE-OF-THE-ART OF PIPELINE LEAK DETECTION PERMITS SIZEABLE QUANTITIES OF
                MATERIAL TO FLOW FROM THE PIPE PRIOR TO SHUTDOWN. THEREFORE, IT IS NECESSARY TO ATTEMPT TO ADVANCE
                THE STATE-OF-THE-ART OF LEAK DETECTION TO MINIMIZE ENVIRONMENTAL IMPACTS OF LEAKING PIPELINES.
```

**PROJECT: 00401-ENVIRONMENTAL GUIDELINES FOR ONSHORE IMPACT OF OFFSHORE PETROLEUM DEVELOPMENT

```
                    STARTING/ COMPLETION DATE : 03/76   03/79     FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=B623C-300     **EPA=D6-0008     ** ( IAG )     PRIOR       FY76  / $  100000
EPA  OFFICER.. JS FARLOW                   EPA/IERL   CINC
INVESTIGATOR.. WW DOYEL                    US DOI                            RES & LAND INVEST PROG
               PA MARCUS                   US DOI                            RES & LAND INVEST PROG
MILESTONES.... 02/76 -FUNDING PACKAGE SUBMITTED
               03/76 -AWARD FUNDS FOR PROJECT
               07/76 -FUNDING INCREMENT
               03/77 -FUNDING INCREMENT
               03/79 -FINAL REPORT RECEIVED
PLAN ID....... (AP-623C)(DU-N105)  ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000401            SSIE-GMA  3781        EPA -D6-0008          TASK-B623C-300
               AP  -623C              DU  -N105             LABT-EMI
ABSTRACT.....: OBJECTIVE: TO CARRY OUT A SERIES OF WORKSHOPS FOR STATE AND LOCAL PLANNING OFFICIALS TO PROVIDE THEM
                WITH METHODOLOGIES AND INFORMATION PERTAINING TO THE IDENTIFICATION OF THE ONSHORE IMPACT OF OUTER
                CONTINENTAL SHELF PETROLEUM DEVELOPMENT AND THE SITING OF FACILITIES ASSOCIATED WITH THAT
                DEVELOPMENT. APPROACH: RETAIN THE AMERICAN SOCIETY OF PLANNING OFFICIALS (ASPO) TO SET UP THE
                MEETINGS, ARRANGE FOR CURRICULA AND FACILITY, PREPARE PREPRINTS AND PROCEEDINGS, AND PRESENT A
                FINAL REPORT BOTH ON THE CONTENT AND ON THE SUCCESS OF THIS MEANS OF RAPID DISSEMINATION OF
                INFORMATION. USE THE RESULTS OF USGC-FUNDED NEW ENGLAND RIVER BASINS COMMISSION (NERBC) METHODOLOGY
                AND DEVELOPMENT FOR THE NEW ENGLAND OCS FRONTIER AS A BASIS FOR THE FIRST SERIES OF WORKSHOPS (HELD
                IN 5 LOCATIONS AROUND THE COASTAL U.S.). INVOLVE STATE AND LOCAL PLANNERS FROM THE REGION WHERE
                EACH WORKSHOP IS HELD TO THE MAXIMUM EXTENT POSSIBLE IN PREPARATION AND IN EXECUTION TO ENRICH THE
                TOTAL CONTENT, TO ENSURE USEFUL FEEDBACK TO NERBC, AND TO GUARANTEE A NATIONALLY USEFUL BODY OF
                INFORMATION AND METHODS. PROGRESS: IAG WITH USGS SIGNED; ASPO CONTRACT SIGNED; FEDERAL AND REGIONAL
                ADVISORY COMMITTEES BEING FORMED; FIRST WORKSHOPS TENTATIVELY SCHEDULED FOR JANUARY 1977.
```

**PROJECT: 00421-NEW AMINE CARBAMATE GELATION TECHNIQUES FOR USE IN OIL SPILL RECOVERY OPERATIONS

STARTING/ COMPLETION DATE : 05/77 05/78 FUNDING ESTIMATED FY77 / $ 29000
TASK CODE=B623C-602 **EPA=R804628-01 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. U FRANK EPA/IERL CINC
INVESTIGATOR.. WW BANNISTER UNIV OF LOWELL SCH OF PURE & APPLIED SCI
A DONATELLI UNIV OF LOWELL SCH OF PURE & APPLIED SCI
J WALKINSHAW UNIV OF LOWELL SCH OF PURE & APPLIED SCI
MILESTONES.... 03/77 -FUNDING PACKAGE SUBMITTED
05/77 -AWARD FUNDS FOR PROJECT
03/78 -DRAFT FINAL REPORT
05/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623C)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000421 SSIE-GMA 3739 EPA -R804628-01 TASK-B623C-602
AP -623C DU -N105 LABT-EMI
ABSTRACT..... THE MAIN OBJECTIVE OF THIS RESEARCH IS TO DEVELOP FOR "REAL WORLD" SITUATIONS AND AMINE CARBAMATE GELATION TECHNIQUE TO FACILITATE THE REMOVAL OF PETROLEUM DERIVED OIL SPILLED ON OCEAN OR INLAND WATERS. THE SPECIFIC OBJECTIVES ARE: A. DETERMINATION OF PHYSICAL PROPERTIES OF A SELECTED GELLING AGENT (DEHYDROABIETYL AMINE), INCLUDING SOLUBILITY AND DETERGENCY DETERMINATIONS OF THE AGENT IN WATER/OIL MATRICES. B. DEVELOPMENT OF CARBAMATING AGENTS OTHER THAN CARBON DIOXIDE. C. DETERMINE THE FEASIBILITY OF OIL AND AGENT RECOVERY BY CENTRIFUGATION. D. PILOT STUDIES OF GELATION TECHNIQUE IN LARGE LABORATORY WAVE TANKS. E. FIELD TESTS OF GELATION TECHNIQUE AT EPA TEST FACILITIES. F PRELIMINARY EVALUATION OF AGENT FOR GELLING NON PETROLEUM HAZARDOUS MATERIALS. G. PRELIMINARY EVALUATION OF THE GELATION TECHNIQUE'S UTILITY IN THE PROPHYLACTIC TREATMENT OF BEACH FRONTS.

**PROJECT: 00423-MULTIAGENCY PROJECT FOR OIL SPILL EQUIPMENT EVALUATION, PHASE I

STARTING/ COMPLETION DATE : 06/77 10/77 : FUNDING ESTIMATED FY77 / $ 38000
TASK CODE=B623C-612 **EPA=68-03-0490 ** (CNTR.) PRIOR FY76 /

EPA OFFICER.. JS FARLOW EPA/IERL CINC
INVESTIGATOR.. R ACKERMAN M & H SILAS MASON CO INC
MILESTONES.... 06/77 -FUNDING PACKAGE SUBMITTED
06/77 -AWARD FUNDS FOR PROJECT
10/77 -FINAL REPORT RECEIVED
PLAN ID..... (AP-623C)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES... RECN-000423 SSIE-GMA 3666 EPA -68-03-0490 TASK-B623C-612
AP -623C DU -N105 LABT-EMI
ABSTRACT.....: PERFORMANCE EVALUATION OF COMMERCIALLY AVAILABLE SPILL CLEANUP EQUIPMENT. PERFORMANCE TESTING OF ACTUAL EQUIPMENT AT OHMSETT. FOUR OIL SKIMMERS HAVE BEEN SELECTED AND THEIR THROUGHPUT EFFICIENCY, OIL RECOVERY EFFICIENCY AND OIL RECOVERY RATE WILL BE DETERMINED FOR TWO OIL TYPES UNDER A VARIETY OF CURRENT AND WAVE CONDITIONS. A FINAL REPORT WILL BE PREPARED.

**PROJECT: 00424-OPTIMIZATION OF LAND CULTIVATION PARAMETERS

STARTING/ COMPLETION DATE : 08/77 06/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=B623C-621 **EPA=R805474 ** (GRANT) PRIOR FY76 /

EPA OFFICER.: JS FARLOW EPA/IERL CINC
INVESTIGATOR.: K BROWN TEXAS A & M UNIV SCH OF AGRIC
MILESTONES.... 07/77 -FUNDING PACKAGE SUBMITTED
08/77 -AWARD FUNDS FOR PROJECT
06/78 -FINAL REPORT RECEIVED
PLAN ID.....: (AP-623C)(DU-N105) ENERGY RESOURCE EXTRACTION AND HANDLING, OIL & GAS PROD.
ORDIS CODES..: RECN-000424 SSIE-GMA 3713 EPA -R805474 TASK-B623C-621
AP -623C DU -N105 LABT-EMI
ABSTRACT..... RESEARCH IS TO BE CONDUCTED ON THE LAND DISPOSAL OF TANK BOTTOM AND API SEPARATOR WASTES. THE INVESTIGATION WILL UTILIZE THREE DIVERSE WASTES, AND TESTS WILL BE CONDUCTED ON SEVERAL SOILS REPRESENTING A RANGE OF CHARACTERISTICS. THE INVESTIGATION WILL BEGIN WITH CHARACTERIZATION OF THE WASTES. THIS DATA WILL BE USED TO DECIDE ON THE APPLICATION RATES TO BE USED IN THE STUDIES. MEASUREMENTS WILL BE MADE OF THE DECOMPOSITION RATE OF THE WASTES, THE INFLUENCE OF APPLICATIONS ON PLANT SURVIVAL AND GROWTH, AND THE CONCENTRATIONS OF POTENTIAL POLLUTANTS IN RUNOFF AND LEACHATE WATER. THE FATE AND MOBILITY OF THE WASTES IN THE SOIL WILL BE INVESTIGATED IN THE LABORATORY, IN GREENHOUSE TESTS, AND ULTIMATELY, IN FIELD TESTS. THE RESEARCH SHOULD PROVIDE INSIGHT INTO THE FEASIBILITY OF LAND DISPOSAL OF THIS CLASS OF WASTE, AND THE RESULTS WILL BE USED TO DEVELOP CRITERIA TO BE USED IN THE DESIGN, MANAGEMENT, AND MONITORING OF OILY WASTE DISPOSAL OPERATIONS.

Environmental Impact of Conventional and Advanced Energy Systems

**PROJECT: 00431-UNIVERSITY OF ILLINOIS CORE TEAM PARTICIPATION IN OHIO RIVER BASIN ENERGY STUDY, PHASE II

STARTING/ COMPLETION DATE : 11/77 10/78 : FUNDING ESTIMATED FY77 / $ 125000
TASK CODE=B624 -06 **EPA=R805587-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. L SMITH EPA/IERL CINC
INVESTIGATOR.. JJ STUKEL UNIV OF ILLINOIS SCH OF ENG/CIV ENG DEPT
BR KEENAN UNIVERSITY OF ILLINOIS
GL FOWLER UNIVERSITY OF ILLINOIS
JP HARTNETT UNIVERSITY OF ILLINOIS
M RIEBER UNIV OF ILLINOIS SCH OF ENG/CIV ENG DEPT
MILESTONES.... 09/77 -GRANT AWARDED
11/77 -PROJECT INITIATION
10/78 -PROJECT TERMINATION
PLAN ID..... (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-000431 SSIE-GMA 4857 EPA -R805587-01 TASK-B624 -06
AP -624 DU -L110 LABT-EMI
ABSTRACT..... THE OHIO RIVER BASIN ENERGY STUDY (ORBES), PHASE II: AN IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN, IS A CONTINUATION OF A COMPREHENSIVE, POLICY-ORIENTED TECHNOLOGY ASSESSMENT ADDRESSING THE BROAD-SCALE ENVIRONMENTAL, PUBLIC HEALTH, ECONOMIC, INSTITUTIONAL, AND SOCIAL EFFECTS OF LOCATING VARIOUS COMBINATIONS OF ENERGY CONVERSION AND SUPPORT FACILITIES IN THE OHIO RIVER BASIN. THE APPROACH IS THAT OF INTEGRATED TECHNOLOGY ASSESSMENT, CONDUCTED BY AN INTERDISCIPLINARY, INTERINSTITUTIONAL (EIGHT STATE UNIVERSITIES IN THE SIX STUDY REGION STATES OF ILLINOIS, INDIANA, KENTUCKY, OHIO, PENNSYLVANIA, AND WEST VIRGINIA) TEAM, WITH SUPPORT RESEARCH PERFORMED BY OTHER PERSONNEL ON A SCHEDULE TO BEST FIT THE RESEARCH NEEDS OF THE TECHNOLOGY ASSESSMENT TEAM. PHASE I OF THE STUDY, CONDUCTED IN 1976-77, WAS A PRELIMINARY, "FIRST-CUT" IMPACT ASSESSMENT. MOST IMPACTS IDENTIFIED WERE FIRST-ORDER. IN PHASE II, DATA AND ASSESSMENTS MADE IN THE FIRST YEAR WILL BE DRAWN UPON, AND INADEQUACIES IDENTIFIED WILL BE CORRECTED.

**PROJECT: 02942-ADVANCED WASTE HEAT CONTROL-WASTE UTILIZATION PROGRAM

STARTING/ COMPLETION DATE : 10/75 10/76 FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=J624 -64 **EPA=68-03-2591 ** (CNTR.) PRIOR FY76 / $ 110000

EPA OFFICER.: VW LAMBOU EPA/EMSL LAS VEGAS
INVESTIGATOR.: RW THOMAS NORTHRUP CORP NORTHROP SERVS
RW THOMAS US EPA
VW LAMBOU US EPA
MILESTONES.... 09/77 -DEFINITION OF FOLLOWING CORRECTIVE ACTIONS
12/77 -PUBLICATION OF REPORT: HAZARDOUS CHEMICALS IN COOLING SYSTEM EFFL
12/77-PUBLICATION OF REPORT: DETECTION AND MONITORING OF HAZARDOUS CHE
PLAN ID.....: (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES..: RECN-002942 SSIE-GMA 4069 EPA -68-03-2591 TASK-J624 -64
AP -624 DU -L110 LABT-MTS
ABSTRACT..... OBJECTIVES: THE OBJECTIVES OF THIS STUDY ARE TO INVENTORY HAZARDOUS MATERIALS TO BE FOUND IN ENERGY-RELATED COOLING SYSTEM EFFLUENTS, EVALUATE THE PRESENT STATE-OF-THE-ART OF TECHNOLOGY FOR MONITORING THESE MATERIALS, AND TO INITIATE CORRECTIVE ACTIONS WHERE DEFICIENCIES IN THE TECHNOLOGY ARE IDENTIFIED. APPROACH: THIS WILL BE ACCOMPLISHED THROUGH EXTENSIVE LITERATURE REVIEW, PERSONAL CONTACTS WITH COOLING TOWER OPERATORS, MONITORING EQUIPMENT MANUFACTURERS, AND OTHER PROFESSIONAL PERSONNEL. DATA OBTAINED WILL BE PRESENTED IN TWO REPORTS, ONE IDENTIFYING MATERIALS TO BE FOUND OR EXPECTED IN COOLING SYSTEM EFFLUENTS AND A SECOND EVALUATING THE PRESENT STATE-OF-THE-ART OF APPROPRIATE MONITORING TECHNOLOGY. OUTPUT: BASED ON THE RESULTS OBTAINED FROM THE ABOVE EFFORT, CORRECTIVE ACTIONS WILL BE TAKEN TO OVERCOME DEFICIENCIES IN MONITORING TECHNOLOGY. THESE WILL INVOLVE PUBLICATION OF TECHNIQUES, DEVELOPMENT AND/OR MODIFICATION OF EQUIPMENT, OR OTHER EFFORTS.

**PROJECT: 03583-CONFERENCE INTERGOVERNMENTAL ENERGY AND ENVIRONMENTAL COOPERATION THE OHIO VALLEY

STARTING/ COMPLETION DATE : 11/77 03/78 : FUNDING ESTIMATED FY77 / $ 16230
TASK CODE=M624 -001 **EPA=R805615-01 ** (GRANT) PRIOR FY /

EPA OFFICER.: L SMITH EPA/ERL CORVALLIS
INVESTIGATOR.: SK GOVE UNIV OF ILLINOIS URBANA CHAMPAIGN CAMPUS
B KEENAN UNIV OF ILLINOIS URBANA CHAMPAIGN CAMPUS
MILESTONES...: 11/77 -PROJECT INITIATION
03/78 -PROJECT TERMINATION
PLAN ID.....: (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-003583 SSIE-GMA 4810 EPA -R805615-01 TASK-M624 -001
AP -624 DU -L110 LABT-HEE
ABSTRACT..... A PROPOSAL IS SUBMITTED TO HOLD A CONFERENCE IN CINCINNATI, OHIO, ON THE TOPIC: "INTERGOVERNMENTAL ENERGY AND ENVIRONMENTAL COOPERATION: THE OHIO VALLEY CHALLENGE." ABOUT 75 INDIVIDUALS FROM ALL LEVELS OF GOVERNMENT WILL BE CONVENED TO DISCUSS THE TOPIC AND TO RECOMMEND APPROACHES TO VARIOUS PROBLEMS.

**PROJECT: 04000-OHIO RIVER BASIN ENERGY STUDY

STARTING/ COMPLETION DATE : 11/77 10/78 FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V624 -01 **EPA=R805609-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. L SMITH EPA/HDQTRS- OEMI
INVESTIGATOR.. JC RANDOLPH INDIANA UNIV PUB & ENV AFFAIRS/ZOOLOGY DEPT
MILESTONES.... 10/77 -GRANT AWARDED
11/77 -PROJECT INITIATION
10/78 -PROJECT TERMINATION
PLAN ID.....: (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES..: RECN-004000 SSIE-GMA 4864 EPA -R805609-01 TASK-V624 -01
AP -624 DU -L110 LABT-EMI
ABSTRACT..... THIS SET OF STUDIES REPRESENTS A PORTION OF A MULTI-INSTITUTIONAL POLICY-ORIENTED TECHNOLOGY ASSESSMENT OF THE SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS WHICH MIGHT RESULT FROM A PROPOSED INCREASED CONCENTRATION OF ENERGY CONVERSION FACILITIES WITHIN THE OHIO RIVER BASIN. UTILIZING THE BEST AVAILABLE DATA BASES, THESE STUDIES WILL ATTEMPT TO ADDRESS THE BROAD-SCALE ENVIRONMENTAL, INSTITUTIONAL, ECONOMIC AND SOCIAL EFFECTS OF VARIOUS FUTURE COMBINATIONS OF ENERGY CONVERSION FACILTIES (I.E., COAL-BASED PLANTS PRODUCING SYNTHETIC FUELS, AS WELL AS NUCLEAR AND COAL-FIRED ELECTRIC POWER GENERATING PLANTS) AND THEIR REQUIRED SUPPORT FACILITIES (I.E., COAL MINING, PROCESSING AND TRANSPORTATION; ASH AND SLUDGE DISPOSAL FACILITIES; NUCLEAR FUEL AND REACTOR WASTE TRANSPORTATION FACILITIES; AND ENERGY TRANSPORTATION SYSTEMS, INCLUDING ELECTRICAL POWER TRANSMISSION SYSTEMS) THAT MIGHT BE BUILT AND OPERATED IN THIS REGION IN THE FUTURE. THE PRINCIPAL OBJECTIVES OF THIS ASSESSMENT ARE (1) TO ASSIST IN OUTLINING THE FULL RANGE OF POLICY OPTIONS FOR DEALING WITH SELECTED KINDS OF DEVELOPMENT, ALTERNATIVE LEVELS OF DEVELOPMENT AND THEIR POSSIBLE UNDESIRABLE EFFECTS, AND ALTERNATIVE TECHNOLOGICAL LEVELS OF ENVIRONMENTAL CONTROLS; AND (2) TO ANALYZE THE PROBABLE IMPACTS THAT WOULD RESULT FROM IMPLEMENTING EACH OPTION IN ITS TOTAL FRAMEWORK, WITH SPECIAL EMPHASIS ON THE NATURAL ENVIRONMENT AND ITS INTERRELATIONSHIP WITH PUBLIC HEALTH AND WELFARE. THE FULL RANGE OF PRIMARY, SECONDARY, AND HIGHER-ORDER EFFECTS WILL BE CONSIDERED.

**PROJECT: 04001-OHIO RIVER BASIN ENERGY STUDY

STARTING/ COMPLETION DATE : 11/77 10/78 : FUNDING ESTIMATED FY77 / $ 80000
TASK CODE=V624 -02 **EPA=R805608-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. L SMITH EPA/HDQTRS- OEMI
INVESTIGATOR.. MA SHAPIRO UNIVERSITY OF PITTSBURGH
JB ANDELMAN UNIVERSITY OF PITTSBURGH
AA SOOKY UNIVERSITY OF PITTSBURGH
JL SYKORA UNIVERSITY OF PITTSBURGH
MILESTONES.... 09/77 -GRANT AWARDED
11/77 -PROJECT INITIATION
10/78 -PROJECT TERMINATION
PLAN ID..... (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004001 SSIE-GMA 4856 EPA -R805608-01 TASK-V624 -02
AP -624 DU -L110 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROPOSAL IS TO DEVELOP AN INFORMATION AND DATA BASE FOR THE DETAILED CONSIDERATION OF POTENTIAL IMPACTS OF FUTURE ENERGY REQUIREMENTS AND CONVERSION ACTIVITIES IN THE OHIO RIVER BASIN. PHASE I INCLUDES: DEMOGRAPHY, ENERGY USE BY SOURCE AND BY SECTOR; ELECTRICITY EXPORTED AND IMPORTED; ENERGY RESERVES, ELECTRICAL GENERATION CAPABILITY BY FACILITY AND FUEL TYPE; PLANT OWNERSHIP; AND SOCIAL AND ECONOMIC DATA ON REGION RESIDENTS. IN PHASE II THE BASE LINE DATA WILL BE COMPLETED BY ADDITIONAL INFORMATION ON MIGRATION, LAND USE PROJECTION, INDUCED INDUSTRY, PUBLIC HEALTH, WATER AND AIR QUALITY, COAL MINING, SOCIAL SERVICES, RECREATIONAL FACILITIES AND ECONOMICS. THE APPROACH WILL INCLUDE: 1. COLLECTION OF AVAILABLE BASE LINE DATA; 2. EXTENSIVE LITERATURE SEARCH; 3. DATA AND INFORMATION ANALYSIS; 4. PARTICIPATION IN CORE TEAM AND PUBLIC MEETINGS. THE RESULTS WILL BE COMPILED INTO COMPLETE AND COMPREHENSIVE DOCUMENTS. CURRENT PLANS INCLUDE COLLECTION AND EVALUATION OF BASE LINE DATA IDENTICAL TO THOSE ALREADY OBTAINED FOR ILLINOIS, INDIANA, KENTUCKY AND OHIO AND PARALLEL THOSE TO BE OBTAINED BY ALL STATES INVOLVED. THIS INCLUDES ALSO PARTICIPATION ON DEVELOPMENT OF PHASE II WORK PLAN, ENERGY CONVERSION CONFIGURATIONS, IMPACT ASSESSMENT AND DEFINITION OF POLICY OPTIONS.

**PROJECT: 04002-OHIO RIVER BASIN ENERGY STUDY PROJECT, PHASE II, UNIVERSITY OF KENTUCKY

STARTING/ COMPLETION DATE : 11/77 10/78 : FUNDING ESTIMATED FY77 / $ 55000
TASK CODE=V624 -03 **EPA=R805590-01 ** (GRANT) PRIOR FY /

EPA OFFICER.: L SMITH EPA/HDQTRS- OEMI
INVESTIGATOR.: S JOHNSON UNIVERSITY OF KENTUCKY
DA BLOME UNIVERSITY OF KENTUCKY
E WEIL UNIVERSITY OF KENTUCKY
MILESTONES.... 09/77 -GRANT AWARDED
11/77 -PROJECT INITIATION
10/78 -PROJECT TERMINATION
PLAN ID..... (AP-624)(DU-L110) CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004002 SSIE-GMA 4860 EPA -R805590-01 TASK-V624 -03
AP -624 DU -L110 LABT-EMI

ABSTRACT.....: THE OBJECTIVE OF THE ORBES PROJECT IS TO CONDUCT AN INTEGRATED TECHNOLOGY ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN REGION. THE PAST YEAR HAS SEEN OVER ONE HUNDRED RESEARCHERS AT EIGHT CAMPUSES IN THE REGION COLLECTING AND ANALYZING BASELINE DATA IN RELEVANT AREAS IN ORDER TO CONDUCT A FIRST-CUT OR "MINI"-ASSESSMENT. THE SECOND YEAR OF THE PROJECT (PHASE II) IS TO BE DEVOTED TO IDENTIFYING, REQUESTING, AND SUPERVISING RESEARCH IN AREAS DEEMED INADEQUATELY COVERED IN THE FIRST YEAR. THE PROJECT HAS BEEN RECONSTRUCTED SO THAT THERE IS A CORE TEAM OF THIRTEEN RESEARCHERS FROM TEN INSTITUTIONS (THE ORBES REGION HAS BEEN EXPANDED TO INCLUDE WEST VIRGINIA AND WESTERN PENNSYLVANIA IN ADDITION TO LAST YEAR'S OHIO, INDIANA, ILLINOIS AND KENTUCKY AREAS) WHO WILL PERFORM THE INTEGRATED TECHNOLOGY ASSESSMENT. THE CORE TEAM REPRESENTS A VARIETY OF RELEVANT DISCIPLINES CAPABLE OF TAKING ON THE ASSESSMENT TASK. THE UNIVERSITY OF KENTUCKY'S TWO CORE TEAM MEMBERS REPRESENT THE DISCIPLINES OF SOCIOLOGY AND ECONOMIC GEOGRAPHY. IN ADDITION, THE ANTHROPOLOGIST IS HELPING CONDUCT THE SOCIAL IMPACT ASSESSMENT OF INCREASED POWER PRODUCTION IN THE ORBES AREA. CONTRIBUTIONS TO BE EXPECTED INCLUDE A STUDY OF THE IMPACT OF SERVICE AREAS ON ELECTRICAL POWER GENERATION AND TRANSMISSION AND FURTHER REFINEMENT OF THE SOCIAL IMPACT ASSESSMENT ANALYSIS. THE LATTER STUDY INCLUDES AN OPERATIONALIZATION OF AN ENVIRONMENTAL ORIENTATION PARADIGM, PREPARATION OF DEMOGRAPHIC PROFILES OF COUNTIES LIKELY TO BE IMPACTED BY ENERGY CONVERSION FACILITIES, CLASSIFICATION OF COUNTIES BY ENVIRONMENTAL ORIENTATION AND AN IMPACT ASSESSMENT. THIS WORK WILL BE USED COOPERATIVELY AND INTEGRATIVELY BY THE CORE TEAM TO PERFORM THE TECHNOLOGY ASSESSMENT.

****PROJECT: 04003-PHASE II, OHIO RIVER BASIN ENERGY STUDY**

```
                    STARTING/ COMPLETION DATE : 11/77   10/78 :   FUNDING    ESTIMATED   FY77  / $   30000
                    TASK CODE=V624 -04      **EPA=R805589-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                   EPA/HDQTRS- OEMI
INVESTIGATOR.. SI GORDON                  OHIO STATE UNIV
               O  FISCH                   OHIO STATE UNIV
MILESTONES...: 09/77 -GRANT AWARDED
               11/77 -PROJECT INITIATION
               10/78 -PROJECT TERMINATION
PLAN ID......: (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES..: RECN-004003            SSIE-GMA  4862        EPA -R805589-01       TASK-V624 -04
               AP  -624               DU  -L110             LABT-EMI
ABSTRACT.....: THIS PROJECT IS THE SECOND PHASE OF A TECHNOLOGY ASSESSMENT OF ENERGY DEVELOPMENT IN THE OHIO RIVER
                BASIN. A CORE TEAM COMPOSED OF MEMBERS FROM NINE DIFFERENT UNIVERSITY CAMPUSES IN SIX STATES WILL
                DIRECT AND DELINEATE RESEARCH ACTIVITIES IN THIS PHASE OF THE PROGRAM. FIRST, REPORTS FROM PHASE I
                OF THE PROJECT WILL BE REVIEWED AND KEY ISSUES FOR FURTHER RESEARCH IDENTIFIED. THE BASE LINE DATA
                FOR THE STUDY WILL BE REFINED AND A NEW SET OF ENERGY FACILITY SITING CRITERIA DEVELOPED. THE CORE
                TEAM WILL THEN REVIEW BASIC TECHNOLOGICAL, SOCIOLOGICAL, AND DEMOGRAPHIC ASSUMPTIONS AND CREATE A
                SET OF ENERGY DEVELOPMENT SCENARIOS RELATIVE TO COAL MINING, TRANSPORTATION, AND CONVERSION
                FACILITIES, AND TO OTHER TYPES OF ENERGY FACILITIES IN THE STUDY REGION. GIVEN THESE SCENARIOS, THE
                IMPACTS OF THE ENERGY FACILITIES ON THE PHYSICAL ENVIRONMENT, SOCIOECONOMIC CONDITIONS, ECOLOGICAL
                FACTORS, PUBLIC HEALTH, INSTITUTIONS, LAND USE, AND THE QUALITY OF LIFE WILL BE ASSESSED. THE PHASE
                II IMPACT ANALYSIS WILL EMPHASIZE THE TRACING OF SECOND- AND HIGHER-ORDER IMPACTS AND THE
                INTERRELATIONSHIPS AMONG THEM. BASED UPON THE IMPACT ASSESSMENT, A RANGE OF POSSIBLE OPTIONS UNDER
                EACH SCENARIO WILL BE DETERMINED.
```

****PROJECT: 04004-EXPERIMENTAL MANAGEMENT PLAN FOR OHIO RIVER BASIN ENERGY STUDY IMPACT ASSESSMENT OF EFFECT OF ENERGY CONVERSION FACILITIES (ABBREV**

```
                    STARTING/ COMPLETION DATE : 11/77   10/78 :   FUNDING    ESTIMATED   FY77  / $   80000
                    TASK CODE=V624 -05      **EPA=R805588-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                   EPA/HDQTRS- OEMI
INVESTIGATOR.: JJ STUKEL                  UNIV OF ILLINOIS                    SCH OF ENG/CIV ENG DEPT
               BR KEENAN                  UNIVERSITY OF ILLINOIS
MILESTONES.... 09/77 -GRANT AWARDED
               11/77 -PROJECT INITIATION
               10/78 -PROJECT TERMINATION
PLAN ID......: (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES..: RECN-004004            SSIE-GMA  4858        EPA -R805588-01       TASK-V624 -05
               AP  -624               DU  -L110             LABT-EMI
ABSTRACT..... OBJECTIVES: THE EXPERIMENTAL MANAGEMENT PLAN FOR THE OHIO RIVER BASIN ENERGY STUDY (ORBES), PHASE
                II: AN IMPACT ASSESSMENT OF THE EFFECT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN IS A
                CONTINUATION OF THE MANAGEMENT OF A COMPREHENSIVE, POLICY ORIENTED TECHNOLOGY ASSESSMENT ADDRESSING
                THE BROAD-SCALE ENVIRONMENTAL, PUBLIC HEALTH, ECONOMIC, INSTITUTIONAL, AND SOCIAL EFFECTS OF
                LOCATING VARIOUS COMBINATIONS OF ENERGY CONVERSION AND SUPPORT FACILITIES IN THE OHIO RIVER BASIN.
                APPROACH: THE INTEGRATED TECHNOLOGY ASSESSMENT IS BEING CONDUCTED BY AN INTERDISCIPLINARY,
                INTERINSTITUTIONAL (EIGHT STATE UNIVERSITIES IN THE SIX STUDY-REGION STATES OF ILLINOIS, INDIANA,
                KENTUCKY, OHIO, PENNSYLVANIA, AND WEST VIRGINIA) TEAM, WITH SUPPORT RESEARCH PERFORMED BY OTHER
                PERSONNEL ON A SCHEDULE TO BEST FIT THE RESEARCH NEEDS OF THE TECHNOLOGY ASSESSMENT TEAM. THE
                MANAGEMENT OF THIS RESEARCH WILL INVOLVE A COMPLEX ARRANGEMENT TO BEST COORDINATE EFFORTS AND
                FURTHER THE ACHIEVEMENT OF RESEARCH GOALS. A FOUR-PERSON PROJECT OFFICE WILL PERFORM DAY-TO-DAY
                COORDINATION, WHILE A SEVEN-PERSON MANAGEMENT TEAM CONSISTING OF THE EXPERIMENTAL MANAGEMENT PLAN
                CO-PRINCIPAL INVESTIGATORS AND FIVE U.S. ENVIRONMENTAL PROTECTION AGENCY REPRESENTATIVES WILL
                PROVIDE LONG-TERM AND POLICY GUIDANCE. CURRENT PLANS AND/OR PROGRESS: IN PHASE I OF THE STUDY, THE
                PROJECT OFFICE AND MANAGEMENT TEAM COORDINATED A SIMILAR STUDY, ALTHOUGH THAT PHASE INVOLVED THREE
                PRELIMINARY ASSESSMENT TEAMS DRAWN FROM SEVEN UNIVERSITY CAMPUSES (WHOSE REPORTS WERE THEN
                INTEGRATED BY THE PROJECT OFFICE). THE EXPERIENCE GAINED DURING PHASE I WILL BE UTILIZED IN PHASE
                II. IN PHASE II, DATA AND ASSESSMENTS MADE IN THE FIRST YEAR WILL BE DRAWN UPON, AND INADEQUACIES
                IDENTIFIED WILL BE CORRECTED.
```

**PROJECT: 04005-OHIO RIVER BASIN ENERGY STUDY (ORBES)

```
                    STARTING/ COMPLETION DATE : 11/77   10/78 :   FUNDING    ESTIMATED   FY77  / $   80000
                    TASK CODE=V624 -07      **EPA=R805585-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                  EPA/HDQTRS- OEMI
INVESTIGATOR.. VP CARDI                  WEST VIRGINIA UNIV                   SCH OF LAW
MILESTONES...  09/77 -GRANT AWARDED
               11/77 -PPOJECT INITIATION
               10/78 -PROJECT TERMINATION
PLAN ID....... (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004005          SSIE-GMA  4866        EPA -R805585-01       TASK-V624 -07
               AP  -624             DU  -L110             LABT-EMI
ABSTRACT...... TO COLLECT BASIC INFORMATION ABOUT THE INSTITUTIONAL, SOCIO-ECONOMIC, PHYSICAL, BIOLOGICAL,
                INDUSTRIAL, MINING AND AGRICULTURAL MAKE-UP OF WEST VIRGINIA AND THE OHIO RIVER BASIN TO ENABLE AN
                INTERDISCIPLINARY TECHNOLOGY ASSESSMENT TEAM TO PREDICT THE IMPACT OF FUTURE (1985 AND 2000 A.D.)
                ENERGY DEMANDS AND PRODUCTION ON THE ECONOMY, SOCIAL PATTERNS AND THE ENVIRONMENT OF THE OHIO RIVER
                BASIN, INCLUDING WEST VIRGINIA. INTERDISCIPLINARY ASSESSMENT BY 9 PUBLIC UNIVERSITIES IN THE SIX
                STATE AREA OF PENNSYLVANIA, WEST VIRGINIA, OHIO, KENTUCKY, INDIANA AND ILLINOIS. THE FIRST OF THREE
                YEARS, INVOLVING DATA COLLECTION, AND GROWTH PREDICTION HAS BEEN COMPLETED FOR ALL BUT WEST
                VIRGINIA AND PENNSYLVANIA, BOTH OF WHICH ARE JOINING THE PROJECT IN THE SECOND YEAR.
```

**PROJECT: 04006-IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN PHASE II

```
                    STARTING/ COMPLETION DATE : 11/77   10/78     FUNDING    ESTIMATED   FY77  / $   30000
                    TASK CODE=V624 -08      **EPA=R805569-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                  EPA/HDQTRS- OEMI
INVESTIGATOR.. HT SPENCER                UNIV OF LOUISVILLE FOUND INC
               CA LEUTHART               UNIV OF LOUISVILLE FOUND INC
MILESTONES.... 10/77 -GRANT AWARDED
               11/77 -PROJECT INITIATION
               10/78 -PROJECT TERMINATION
PLAN ID....... (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004006          SSIE-GMA  4861        EPA -R805569-01       TASK-V624 -08
               AP  -624             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: THE OHIO RIVER BASIN ENERGY STUDY (ORBES) WAS INITIATED TO ASSESS CHANGES THAT MAY OCCUR
                IN THE VARIOUS SECTORS OF SOCIETY, INDUSTRY, AND ENVIRONMENT AS A RESULT OF FUTURE INCREASES IN
                NUMBER OF ENERGY CONVERSION FACILITIES. DURING THE SECOND YEAR OF THIS STUDY EACH PARTICIPATING
                RESEARCH GROUP WILL ADDRESS ITSELF TO ONE OF THE AREAS THOUGHT TO BE AFFECTED. THE GROUP FROM THE
                UNIVERSITY OF LOUISVILLE WILL ADDRESS ASPECTS OF WATER QUALITY, WATER QUANTITY, AND SPECIAL AQUATIC
                HABITATS. APPROACH: THE ASSESSMENTS WILL BE MADE BY COMPILATION AND ANALYSIS OF EXISTING DATA
                POSSIBLY SUPPORTED BY SPECIAL STUDIES OF SPECIFIC AREAS WHERE EXISTING DATA IS WEAK OR LACKING.
                CURRENT PLANS AND/OR PROGRESS: PARTICIPANTS FROM SEVEN MIDWESTERN UNIVERSITIES DIVIDED INTO THREE
                ASSESSMENT TEAMS HAVE SUBMITTED INDEPENDENT PRELIMINARY FIRST-CUT ASSESSMENTS OF THE CHANGES WHICH
                MAY OCCUR AS A RESULT OF THESE DEVELOPMENTS. THESE ASSESSMENTS WILL BE CONDENSED INTO ONE MAJOR
                DOCUMENT WHICH IS TO BE SUBMITTED TO CONGRESS IN JULY 1977.
```

**PROJECT: 04007-COST/BENEFIT OF FUEL REPROCESSING

```
                    STARTING/ COMPLETION DATE : 06/77   08/78 :   FUNDING    ESTIMATED   FY77  / $   28259
                    TASK CODE=V624 -09      **EPA=R804948-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                  EPA/HDQTRS- OEMI
INVESTIGATOR.. M  RESNIKOFF              STATE UNIV OF NEW YORK               BUFFALO CAMPUS
               C  SMITH                  STATE UNIV OF NEW YORK               BUFFALO CAMPUS
PLAN ID....... (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004007          SSIE-GMA  4863        EPA -R804948-01       TASK-V624 -09
               AP  -624             DU  -L110             LABT-EMI
ABSTRACT...... A FULL COST/BENEFIT ANALYSIS OF THE NUCLEAR FUEL REPROCESSING INDUSTRY IS PROPOSED. THE ANALYSIS
                WILL COMPARE, OVER TIME, THE COSTS OF REPROCESSING AND ASSOCIATED CHARGES VERSUS THE VALUE OF THE
                RECOVERED MATERIALS, URANIUM AND PLUTONIUM. THE EFFECTS OF YELLOWCAKE AVAILABILITY, PROPERTIES OF
                PLUTONIUM RECYCLE FUELS, SAFEGUARD AND ENVIRONMENTAL COSTS ON THE VALUE OF THE RECOVERED PRODUCTS
                WILL ALSO BE INCLUDED IN THE ANALYSIS. THE STUDY WILL PREDICT THE TIMING FOR ENTRY OF A COMMERCIAL
                NUCLEAR FUEL REPROCESSING INDUSTRY.
```

```
                                   UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
     REPORT: ORDCONV (VERSION V2.0)     * OFFICE OF RESEARCH AND DEVELOPMENT *

     RUN DATE: 04/11/79                 * O R D I S  D A T A  E X T R A C T *
```

**PROJECT: 04008-SOCIOECONOMIC & ENVIRONMENTAL IMPACTS OF A PROPOSED INCREASED CONCENTRATION OF ENERGY CONVERSION FACILITIES

```
                    STARTING/ COMPLETION DATE : 07/76   07/77 :   FUNDING    ESTIMATED   FY77  / $   42100
                    TASK CODE=V624 -10      **EPA=R804848-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. L  SMITH                  EPA/HDQTRS- OEMI
INVESTIGATOR.. JJ STUKEL                 UNIV OF ILLINOIS                     SCH OF ENG/CIV ENG DEPT
MILESTONES...  07/76 -PROJECT INITIATION
               07/77 -PROJECT TERMINATION
PLAN ID....... (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES... RECN-004008          SSIE-GMA  3318 1      EPA -R804848-01       TASK-V624 -10
               AP  -624             DU  -L110             LABT-EMI
```

ABSTRACT..... THIS SET OF STUDIES REPRESENTS A PORTION OF A MULTI-INSTITUTIONAL POLICY-ORIENTED TECHNOLOGY ASSESSMENT OF THE SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS WHICH MIGHT RESULT FROM A PROPOSED INCREASED CONCENTRATION OF ENERGY CONVERSION FACILITIES WITHIN THE OHIO RIVER BASIN. UTILIZING THE BEST AVAILABLE DATA BASES, THESE STUDIES WILL ATTEMPT TO ADDRESS THE BROAD-SCALE ENVIRONMENTAL, INSTITUTIONAL, ECONOMIC AND SOCIAL EFFECTS OF VARIOUS FUTURE COMBINATIONS OF ENERGY FACILITIES (I.E., COAL-BASED PLANTS PRODUCING SYNTHETIC FUEL, AS WELL AS NUCLEAR AND COAL-FIRED ELECTRIC POWER GENERATING PLANTS) AND THEIR REQUIRED SUPPORT FACILITIES (I.E., COAL MINING, PROCESSING AND TRANSPORTATION; ASH AND SLUDGE DISPOSAL FACILITIES; NUCLEAR FUEL AND REACTOR WASTE TRANSPORTATION FACILITIES; AND ENERGY TRANSPORTATION SYSTEMS, INCLUDING ELECTRICAL TRANSMISSION SYSTEMS) THAT MIGHT BE BUILT AND OPERATED IN THIS REGION IN THE FUTURE. THE PRINCIPAL OBJECTIVES OF THIS ASSESSMENT ARE (1) TO ASSIST IN OUTLINING THE FULL RANGE OF POLICY OPTIONS FOR DEALING WITH SELECTED KINDS OF DEVELOPMENT, ALTERNATIVE LEVELS OF DEVELOPMENT AND THEIR POSSIBLE UNDESIRABLE EFFECTS, AND ALTERNATIVE TECHNOLOGICAL LEVELS OF ENVIRONMENTAL CONTROLS; AND (2) TO ANALYZE THE PROBABLE IMPACTS THAT WOULD RESULT FROM IMPLEMENTING EACH OPTION IN ITS TOTAL FRAMEWORK WITH PUBLIC HEALTH AND WELFARE. THE FULL RANGE OF PRIMARY, SECONDARY, AND HIGHER-ORDER EFFECTS WILL BE CONSIDERED.

****PROJECT: 04009-OHIO RIVER BASIN ENERGY STUDY, PHASE II**

```
                    STARTING/ COMPLETION DATE : 11/77   10/78 :   FUNDING    ESTIMATED   FY77  / $   30000
                    TASK CODE=V624 -11      **EPA=R805603-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.: L  SMITH                    EPA/HDQTRS- OEMI
INVESTIGATOR.: RE BAILEY                   PURDUE UNIV                          SCH OF ENG/NUCLEAR ENG
PLAN ID......: (AP-624 )(DU-L110)  CONSERVATION AND UTILIZATION TECHNOLOGY ASSESSMENT
ORDIS CODES..: RECN-004009            SSIE-GMA  4859        EPA -R805603-01       TASK-V624 -11
               AP  -624               DU  -L110             LABT-EMI
ABSTRACT......
```

THIS STUDY IS PART OF A TECHNOLOGY ASSESSMENT OF THE SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSEQUENCES TO BE EXPECTED FROM AN INCREASED CONCENTRATION OF ENERGY FACILITIES WITHIN THE OHIO RIVER BASIN.

****PROJECT: 01473-PREPARATION OF GUIDELINE FOR ADJUSTMENT OF ATMOSPHERIC GAS BURNERS FOR RESIDENTIAL AND COMMERICAL HEATING**

```
                    STARTING/ COMPLETION DATE : 09/77   06/78 :   FUNDING    ESTIMATED   FY77  / $   26731
                    TASK CODE=F624A-002     **EPA=68-02-2653  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. RE HALL                     EPA/IERL   RTP
INVESTIGATOR.. DW LOCKLIN                  BATTELLE MEMORIAL INST
MILESTONES...: 09/77 -CONTRACT START DATE
               01/78 -COMPLETE GUIDELINE DRAFT FOR INDUSTRY REVIEW
               04/78 -COMPLETE HOMEOWNERS BULLETIN DRAFT
               06/78 -COMPLETE GUIDELINE (USERS MANUAL)
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES...,RECN-001473            SSIE-GMA  4157        EPA -68-02-2653       TASK-F624A-002
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT......
```

THE PROGRAM OBJECTIVE IS TO PROVIDE GUIDELINES FOR ADJUSTMENT OF RESIDENTIAL AND COMMERCIAL ATMOSPHERIC GAS BURNERS. THE DOCUMENT WILL BE USED BY SERVICE TECHNICIANS TO ADJUST GAS BURNERS FOR REDUCED AIR POLLUTANT EMISSIONS AND IMPROVED EFFICIENCY. THE GUIDELINE CAN ALSO BE USED FOR TRAINING GAS BURNER SERVICE TECHNICIANS. THE APPROACH WILL INCLUDE SUB-CONTRACTING TO GAS INDUSTRY EXPERTS WHO ARE FAMILIAR WITH GAS BURNER OPERATION. THERE WILL BE AN INDEPENDENT INDUSTRY REVIEW BEFORE FINAL PUBLICATION. A HOMEOWNERS' BULLETIN SHALL ALSO BE PREPARED FOR FINAL EDITING AND PRINTING BY EPA.

****PROJECT: 01480-APPLICATION OF ADVANCED COMBUSTION MODIFICATION TECHNIQUES TO SELECTED INDUSTRIAL PROCESS EQUIPMENT**

```
                    STARTING/ COMPLETION DATE : 08/77   08/79 :   FUNDING    ESTIMATED   FY77  / $  721146
                    TASK CODE=F624A-007     **EPA=68-02-2645  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. RE HALL                     EPA/IERL   RTP
INVESTIGATOR.. DR BARTZ                    K V B ENG INC
               RE THOMPSON                 K V B ENG INC
               SC HUNTER                   K V B ENG INC
MILESTONES.... 08/77 -CONTRACT START DATE
               09/77 -SUBMIT WORK PLAN
               03/78 -COMPLETE TEST SITE SELECTION
               05/78 -SUB-SCALE TESTS COMPLETED
               08/78 -INTERIM REPORT COMPLETED
               05/79 -FULL SCALE TESTS COMPLETED
               07/79 -FINAL REPORT SUBMITTED
               08/79 -GUIDELINE (USERS MANUAL) SUBMITTED
               08/79 -DATA SUPPLEMENT SUBMITTED
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001480            SSIE-GMA  4164        EPA -68-02-2645       TASK-F624A-007
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT......
```

THE OBJECTIVES ARE TO PROVIDE INFORMATION ABOUT THE EFFECT OF DETAILED COMBUSTION MODIFICATION TECHNIQUES ON THE EMISSIONS AND PERFORMANCE OF SELECTED INDUSTRIAL PROCESS COMBUSTION EQUIPMENT. TECHNOLOGY WHICH HAS BEEN SUCCESSFULLY DEVELOPED FOR REDUCING POLLUTANTS FROM BOILERS WILL BE APPLIED TO OTHER TYPES OF STATIONARY COMBUSTION EQUIPMENT. THE APPROACH WILL BE TO PERFORM FEASIBILITY TESTS ON SUB-SCALE EQUIPMENT, WHERE POSSIBLE. THESE TESTS WILL INCLUDE TECHNIQUES SUCH AS MODIFIED FUEL INJECTION, CONTROLLED ENTRAINMENT, STEAM INJECTION, CONTROLLED HEAT REMOVAL, AND FLUE GAS RECIRCULATION. APPROXIMATELY SIX UNITS WILL BE SELECTED FOR FOLLOW-UP FULL SCALE TESTS. PRODUCTS WILL INCLUDE A FINAL REPORT, DATA SUPPLEMENT, AND INSTRUCTIONAL GUIDELINE FOR MANUFACTURERS AND OPERATORS OF EACH EQUIPMENT TYPE TESTED.

**PROJECT: 01481-FIELD TESTING APPLICATION OF COMBUSTION MODIFICATION TECHNOLOGY TO INDUSTRIAL COMBUSTION EQUIPMENT

STARTING/ COMPLETION DATE : 01/76 09/77 : FUNDING ESTIMATED FY77 / $ 55595
TASK CODE=F624A-008 **EPA=68-02-2144 ** (CNTR.) PRIOR FY76 / $ 797713

EPA OFFICER.: RE HALL EPA/IERL RTP
INVESTIGATOR.: DR BARTZ K V B ENG INC
SC HUNTER K V B ENG INC

MILESTONES.... 01/76 -CONTRACT START DATE
03/76 -EQUIPMENT SURVEY
09/76 -TEST UNIT SELECTION
03/77 -FIELD TEST COMPLETED FOR INDUSTRIAL PROCESS EQUIPMENT
05/77 -EXTENSIVELY MODIFIED BOILERS TESTED
10/77 -FINAL REPORT
10/77 -MODIFIED BOILER REPORT
10/77 -DATA SUPPLEMENT
10/77 -DATA CODING

PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001481 SSIE-GMA 2708 1 EPA -68-02-2144 TASK-F624A-008
AP -624A DU -L110 LABT-EMI

ABSTRACT..... THE PROGRAM OBJECTIVE IS TO EVALUATE THE EFFECTIVENESS OF COMBUSTION MODIFICATIONS AS MEANS OF EMISSIONS REDUCTION AND THERMAL EFFICIENCY IMPROVEMENT ON INDUSTRIAL COMBUSTION EQUIPMENT INCLUDING KILNS, OVENS, DRYERS, PROCESS FURNACES AND HEATERS, BOILERS, STATIONARY ENGINES AND GAS TURBINES. THE APPROACH WILL INVOLVE A FIELD TEST PROGRAM TO MEASURE EMISSIONS OF NO, NOX, SO2, SO3, CO, GASEOUS HYDROCARBONS, PARTICULATES, TRACE ELEMENTS, ORGANICS (POM, PCB) SULFATES AND NITRATES. BASELINE TESTS WILL BE CONDUCTED ON ABOUT TWENTY-FIVE REPRESENTATIVE COMBUSTION DEVICES AND COMBUSTION MODIFICATIONS WILL BE IMPLEMENTED TO DETERMINE THE INFLUENCE ON EMISSIONS AND EFFICIENCY. THESE MODIFICATIONS INCLUDE LOWERED EXCESS COMBUSTION AIR, STAGED COMBUSTION, REDUCED AIR PREHEAT, FUEL CHANGES, WATER INJECTION AND FLUE GAS RECIRCULATION. THE PROGRAM IS AN EXTENSION OF WORK CONDUCTED ON EPA CONTRACT 68-02-1074 THAT DEALT WITH INDUSTRIAL BOILERS. COMBUSTION MODIFICATION TECHNOLOGY THAT WAS FOUND EFFECTIVE ON BOILERS WILL BE EXTENDED TO OTHER INDUSTRIAL EQUIPMENT, ALTHOUGH EXTENSIVE TESTS ON TWO INDUSTRIAL BOILERS EQUIPPED WITH STAGED AIR AND/OR FLUE GAS RECIRCULATION ARE INCLUDED.

**PROJECT: 01482-FIELD TESTING APPLICATION OF COMBUSTION MODIFICATION TO CONTROL POLLUTANT EMISSIONS FROM POWER GENERATION COMBUSTION SYSTEMS

STARTING/ COMPLETION DATE : 06/74 12/78 : FUNDING ESTIMATED FY77 / $ 338095
TASK CODE=F624A-009 **EPA=68-02-1415 ** (CNTR.) PRIOR FY76 / $ 1223150

EPA OFFICER.. RE HALL EPA/IERL RTP
INVESTIGATOR.. AR CRAWFORD EXXON RESEARCH & ENGINEERING CO
W BARTOK EXXON RESEARCH & ENGINEERING CO
EH MANNY EXXON RESEARCH & ENGINEERING CO

MILESTONES.... 06/74 -CONTRACT START DATE
04/77 -COMPLETE FINAL REPORT ON INITIAL SEVEN BOILERS
09/77 -COMPLETE HORIZONTALLY-OPPOSED BOILER CORROSION TESTS
11/77 -COMPLETE FINAL REPORT ON ALL EQUIPMENT EMISSION TESTS
12/77 -COMPLETE GUIDELINES (USERS MANUALS)
01/78 -COMPLETE DATA SUPPLEMENT
04/79 -COMPLETE SINGLE-WALL BOILER CORROSION TESTS

PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001482 SSIE-GMA 2707 1 EPA -68-02-1415 TASK-F624A-009
AP -624A DU -L110 LABT-EMI

ABSTRACT..... THE PURPOSE OF THIS STUDY IS TO FIELD TEST POWER GENERATION COMBUSTION EQUIPMENT INCLUDING UTILITY BOILERS, GAS TURBINES, AND STATIONARY I. C. ENGINES. EMPHASIS WILL BE PLACED ON UTILITY BOILERS FIRING COAL, BUT THE STUDY WILL INCLUDE TESTS OF GAS- AND OIL-FIRED BOILERS AND BOILERS CAPABLE OF FIRING TWO OR MORE FUELS SIMULTANEOUSLY. TESTS WITH SIMULTANEOUS FIRING OF WASTE AND FOSSIL FUELS SHALL ALSO BE INCLUDED. EMISSIONS TO BE MEASURED ARE OXIDES OF NITROGEN, OXIDES OF SULFUR, HYDROCARBONS, CARBON MONOXIDE, CARBON DIOXIDE, OXYGEN, OPACITY, SULFATES, NITRATES, PARTICULATE (MASS AND SIZE DISTRIBUTION), POM, AND TRACE ELEMENTS. THE EFFECT OF COMBUSTION MODIFICATION ON AIR POLLUTANT EMISSIONS AND COMBUSTION EFFICIENCY WILL BE DETERMINED. ALSO, THE EFFECT OF MODIFIED OPERATION ON EQUIPMENT PERFORMANCE (E.G. SLAGGING, FOULING, STEAM TEMPERATURE CONTROL) WILL BE INVESTIGATED. ONE PRIMARY GOAL IS TO DETERMINE THE EFFECT OF STAGED COMBUSTION IN COAL-FIRED BOILERS ON TUBE WALL CORROSION RATES. STAGED COMBUSTION COMBINED WITH LOW EXCESS AIR FIRING IS THE MOST ATTRACTIVE COMBUSTION MODIFICATION COMBINATION BECAUSE IT IS AN EFFECTIVE METHOD OF REDUCING NOX AND IS RELATIVELY EASY AND INEXPENSIVE TO IMPLEMENT. HOWEVER, SOME EXPERTS SUSPECT THAT THE REDUCING ATMOSPHERE IN THE BURNER ZONE INCREASES TUBE WALL CORROSION RATES. THE CONTRACTOR WILL USE THREE METHODS FOR MEASURING CORROSION RATES: (1) CORROSION PROBES FOR AN EASY, INEXPENSIVE, BUT PROBABLY INACCURATE METHOD, (2) ULTRASONIC TUBE WALL MEASUREMENT WHICH IS MORE COSTLY BUT SHOULD PROVIDE AN ACCURATE MAPPING OF THE FURNACE TUBE WALL SURFACE, AND (3) TEST PANELS WHICH WILL BE WELDED INTO THE BOILER TUBE WALL IN AREAS WHERE EXTENSIVE CORROSION IS ANTICIPATED. THE TEST PANELS WILL BE REMOVED AFTER A 6 TO 12 MONTH PERIOD FOR PRECISE MEASUREMENTS.

**PROJECT: 01486-ENVIRONMENTAL AND ENERGY ASSESSMENT OF AFTERBURNER COMBUSTION SYSTEMS

```
                    STARTING/ COMPLETION DATE : 03/77   02/80 :   FUNDING :  ESTIMATED   FY77  / $   56107
                    TASK CODE=F624A-013     **EPA=68-02-2629  ** (CNTR.)      PRIOR       FY76  / $   50000
EPA  OFFICER.. JH WASSER                EPA/IERL   RTP
INVESTIGATOR.. RE BARRETT               BATTELLE MEMORIAL INST
               DA BALL                  BATTELLE MEMORIAL INST
               RH BARNES                BATTELLE MEMORIAL INST
               AA PUTNAM                BATTELLE MEMORIAL INST
MILESTONES.... 12/77 -PRELIMINARY ENVIRONMENTAL ASSESSMENT COMPLETED
               11/78 -LABORATORY STUDIES COMPLETED
               01/79 -FIELD TEST COMPLETED
               09/79 -ENVIRONMENTAL ASSESSMENT COMPLETED
               02/80 -STANDARD PRACTICE MANUAL COMPLETED
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001486          SSIE-GMA  4204        EPA -68-02-2629       TASK-F624A-013
               AP  -624A            DU  -L110             LABT-EMI
```

ABSTRACT..... BATTELLE-COLUMBUS IS CONDUCTING A PROGRAM TO ASSESS THE PERFORMANCE OF AFTERBURNER EMISSION CONTROL DEVICES BY EVALUATING (1) THE POTENTIAL OF AFTERBURNERS FOR REDUCING EMISSIONS; (2) THE POTENTIAL OF AFTERBURNERS GENERATING EMISSIONS; AND (3) THE EFFICIENT UTILIZATION OF FUEL IN AFTERBURNERS, AS IT RELATES TO EMISSION CONTROL. AFTERBURNER TYPES INCLUDED IN THE PROGRAM ARE DIRECT FLAME COMBUSTION AFTERBURNERS, THERMAL COMBUSTION AFTERBURNERS, AND CATALYTIC AFTERBURNERS. THE PROGRAM IS DIVIDED INTO TWO PHASES. PHASE I INCLUDES THE COLLECTION AND CORRELATION OF AVAILABLE DATA (FROM THE LITERATURE, FROM EPA SOURCE TESTS, FROM STATE AND LOCAL AGENCIES, ETC.) TO ASSESS THE STATE-OF-THE-ART OF AFTERBURNER APPLICATION TECHNOLOGY. PHASE II INCLUDES TWO TASKS THAT ARE DIRECTED AT GENERATING NEW DATA ON AFTERBURNER PERFORMANCE, AND TWO THAT ARE DIRECTED AT DOCUMENTING THE ENVIRONMENTAL AND ENGINEERING ASPECTS OF AFTERBURNER APPLICATION. THE EXPERIMENTAL TASKS ARE DIRECTED TOWARD OBTAINING NEW AFTERBURNER PERFORMANCE DATA IN THE FIELD AND THE LABORATORY, RESPECTIVELY. THE LAST TWO TASKS CONSIST OF UTILIZING THE DATA GENERATED IN THE EXPERIMENTAL PROGRAM TO COMPLETE AN ENVIRONMENTAL ASSESSMENT OF AFTERBURNERS AND TO DEVELOP A "STANDARD PRACTICE MANUAL" FOR USE BY ENGINEERS INVOLVED IN AFTERBURNER APPLICATION.

**PROJECT: 01494-INVESTIGATION OF AERODYNAMIC PHEONOMENA IN POLLUTION CONTROL

```
                    STARTING/ COMPLETION DATE : 03/75   03/77 :   FUNDING    ESTIMATED   FY77  / $    5481
                    TASK CODE=F624A-019     **EPA=68-02-1873  ** (CNTR.)      PRIOR       FY76  / $  405906
EPA  OFFICER.: WS LANIER                EPA/IERL   RTP
INVESTIGATOR.: LJ SPADACCINI            UNITED TECHNOLOGIES CORP
               CT BOWMAN                UNITED TECHNOLOGIES CORP
               H  MCDONALD              UNITED TECHNOLOGIES CORP
MILESTONES.... 03/75 -INITIATE CONTRACT
               12/75 -COMPLETE GASEOUS FUEL EXPERIMENTS
               02/76 -COMPLETE PHASE I REPORT
               08/76 -COMPLETE LIQUID FUEL EXPERIMENTS
               12/76 -COMPLETE EXPERIMENTAL FINAL REPORT
               03/77 -COMPLETE DEVELOPMENT OF NUMERICAL ANALYSIS PROCEDURE
               08/77 -COMPLETE FINAL REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001494          SSIE-GMA  4152        EPA -68-02-1873       TASK-F624A-019
               AP  -624A            DU  -L110             LABT-EMI
```

ABSTRACT..... THE RESEARCH PROGRAM WILL INVESTIGATE AERODYNAMIC PHENOMENA IN THE CONTROL OF POLLUTANTS FROM GASEOUS AND HETEROGENEOUS COMBUSTION. THE PROGRAM HAS FOUR PRIMARY OBJECTIVES: (1) TO UTILIZE RECENTLY DEVELOPED OPTICAL AND PROBING TECHNIQUES TO OBTAIN DETAILED INFORMATION ON THE CHEMICAL AND PHYSICAL PROCESSES OCCURRING INSIDE A COMBUSTOR OPERATING ON GASEOUS AND LIQUID FUELS. (2) TO COMPARE EXPERIMENTAL OBSERVATIONS WITH RESULTS FROM A COMBUSTOR FLOW ANALYSIS (FREP CODE) TO FURTHER EVALUATE THE THEORETICAL MODEL. (3) TO FURTHER DEVELOP THE COMBUSTOR FLOW ANALYSIS FOR PREDICTING THE PHYSICAL AND CHEMICAL PROCESSES OCCURRING IN COMBUSTORS OPERATING ON GASEOUS AND LIQUID FUELS. (4) TO UTILIZE INFORMATION OBTAINED FROM THE EXPERIMENTAL AND THEORETICAL INVESTIGATION TO EVALUATE POTENTIAL EMISSION CONTROL STRATEGIES FOR GASEOUS AND LIQUID FUEL COMBUSTORS.

**PROJECT: 01497-PILOT SCALE EVALUATION OF ADVANCED COMBUSTION CONTROL TECHNIQUES FOR FOSSIL & WASTE FUELS

```
                    STARTING/ COMPLETION DATE : 06/75   04/79 :   FUNDING    ESTIMATED   FY77  / $  250000
                    TASK CODE=F624A-022     **EPA=68-02-1885  ** (CNTR.)      PRIOR       FY76  / $  591973
EPA  OFFICER.  DG LACHAPELLE            EPA/IERL   RTP
INVESTIGATOR.  RA BROWN                 ACUREX CORP                          AEROTHERM DIV
               C  HARTMAN               ACUREX CORP                          AEROTHERM DIV
               HB MASON                 ACUREX CORP                          AEROTHERM DIV
               JO WENDT                 UNIV OF ARIZONA                      SCH OF AGRIC
               DW PERSHING              UNIV OF ARIZONA                      SCH OF AGRIC
MILESTONES.... 06/75 -INITIATE WORK
               12/75 -COMPLETE SYSTEM SHAKEDOWN
               06/77 -COMPLETE CONTROL TECHNOLOGY TESTS WITH COAL
               07/77 -INITIATE COAL/OIL SLURRY TESTS
               09/77 -COMPLETE COAL/OIL SLURRY TESTS
               10/77 -INITIATE WASTE FUEL STUDIES
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001497          SSIE-GMA  4165        EPA -68-02-1885       TASK-F624A-022
               AP  -624A            DU  -L110             LABT-EMI
```

ABSTRACT..... THE OBJECTIVE OF THIS EXPERIMENTAL RESEARCH PROJECT IS TO DEVELOP ADVANCED LOW EMISSION HIGH EFFICIENCY COMBUSTION TECHNIQUES FOR APPLICATION TO INDUSTRIAL AND UTILITY BOILERS FIRING FOSSIL AND WASTE FUELS. PRIMARY EMPHASIS WILL BE ON CONTROL OF OXIDES OF NITROGEN (NOX) THROUGH MODIFICATION OF COMBUSTION CONDITIONS. THE FACILITY IS A SUBSCALE VERSATILE FURNACE, WITH CAPACITY OF 3 X 10 TO THE 6TH POWER BTU/HR, CAPABLE OF FIRING A VARIETY OF SOLID, LIQUID AND GASEOUS FUELS. THE FURNACE MAY BE OPERATED EITHER IN THE WALL FIRING MODE, USING UP TO 10 INDIVIDUAL BURNERS, OR IN THE TANGENTIAL, CORNER, FIRING MODE USING UP TO 24 INDIVIDUAL FUEL/AIR NOZZLES. THE RESEARCH BURNERS FOR SINGLE WALL OR OPPOSED WALL FIRING ARE OF A VARIABLE SWIRL DOUBLE CONCENTRIC DESIGN WITH CAPACITIES OF EITHER 300,000 BTU/HR OR 1.5 X 10 TO THE 6TH POWER BTU/HR. THE FIRST PHASE EFFORT WILL FOCUS ON NOX CONTROL TECHNIQUES FOR CONVENTIONAL FOSSIL FUELS, PRIMARILY PULVERIZED COAL AND RESIDUAL OIL. INITIALLY, THE COMBUSTION CHARACTERISTICS OF THE FURNACE WILL BE STUDIED TO ESTABLISH THE CORRESPONDENCE TO FULL-SCALE UTILITY AND INDUSTRIAL BOILERS. SUBSEQUENT TESTING WILL OPTIMIZE NOX CONTROL THROUGH TWO-STAGE COMBUSTION, FLUE GAS RECIRCULATION AND LOW EXCESS AIR FIRING FOR THE WALL FIRED AND TANGENTIALLY FIRED CONFIGURATIONS. EMPHASIS WILL BE GIVEN TO IDENTIFICATION OF OPTIMUM STAGING CONDITIONS FOR REDUCTION OF NOX FROM COAL FIRED BOILERS. THE SECOND PHASE PROGRAM WILL EXPLORE NOX CONTROL TECHNIQUES FOR THE FIRING OF MIXED CONVENTIONAL FUELS, NEW ALTERNATE FUELS, WASTE FUELS, AND MIXTURES OF CONVENTIONAL FUELS WITH ALTERNATE OR WASTE FUELS.

****PROJECT: 01499-EVALUATION OF POLLUTION EMISSIONS FROM INDUSTRIAL BURNERS USING LOW-MEDIUM BTU GASES FROM COAL**

STARTING/ COMPLETION DATE : 06/77 08/78 : FUNDING ESTIMATED FY77 / $ 161462
TASK CODE=F624A-023 **EPA=68-02-2643 ** (CNTR.) PRIOR FY /

EPA OFFICER. DG LACHAPELLE EPA/IERL RTP
INVESTIGATOR.. DH LARSON INST. OF GAS TECHNOLOGY
RT WAIBEL INST. OF GAS TECHNOLOGY
E FLEMING INST. OF GAS TECHNOLOGY
MILESTONES.... 06/77 -WORK INITIATED
06/77 -COMPLETE BASELINE TESTS WITH NATURAL GAS
09/77 -COMPLETE PBB TESTS WITH "DIRTY" GASES
01/78 -COMPLETE GMCB TESTS WITH "DIRTY" GASES
02/78 -FINAL REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001499 SSIE-GMA 4159 EPA -68-02-2643 TASK-F624A-023
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVES: THE WORK IS DESIGNED TO EVALUATE THE SEVERITY OF NOX EMISSIONS FROM COMBUSTING "DIRTY" LOW- AND INTERMEDIATE-BTU GASES. IT WAS CONCLUDED FROM AN ENVIRONMENTAL ASSESSMENT OF COMMERCIAL GASIFICATION PROCESSES THAT THERE ARE TWO DIFFERENT GROUPS OF "DIRTY" OFF-GAS IN TERMS OF POTENTIAL SOURCES OF NOX. AMMONIA IS CONTAINED IN BOTH OF THESE GROUPS. GROUP DIFFERENTIATION IS BASED ON THE TYPE AND CONCENTRATION OF TAR-OILS AND PARTICULATES. APPROACH: IN ORDER TO KEEP THE PROPOSED WORK PLAN WITHIN THE PROGRAM'S OBJECTIVE OF PROBLEM DEFINITION, WE WILL INVESTIGATE ONE GAS WITH THE MAXIMUM NUMBER OF POTENTIAL NOX SOURCES (AMMONIA, TAR-OILS AND CHAR) AT BOTH AN INTERMEDIATE- (OXYGEN) AND LOW- (AIR) BTU HEATING VALUE. THE GAS PROPOSED FOR TESTING IS WELLMAN-GALUSHA, BASED ON THE EXISTENCE OF A COMPREHENSIVE DATA BANK GATHERED FOR THE COMBUSTION OF CLEAN WELLMAN-GALUSHA OFF-GAS DURING A RECENTLY COMPLETED PROGRAM FOR EPA (CONTRACT NO. 68-02-1360). TWO BURNERS WERE SELECTED FOR TESTING BASED ON THEIR EXTREMELY DIFFERENT AERODYNAMIC CHARACTERISTICS AND THEIR LARGE LEVEL OF NOX EMISSIONS WITH NATURAL GAS. THE EMISSIONS FROM THE PORTED BAFFLE BURNER (PBB; USED IN MELTING, REHEATING, AND HOLDING FURNANCES) IS ESTIMATED AT 92.4 X 10 TO 6 POWER LB NO2/YR WHILE THE GAS MOMENTUM CONTROL BURNER (GMCB) USED IN CEMENT, LIME, COPPER, AND ALUMINA KILNS AND DRYING FURNANCES EMITS 441.0 X 10 TO 6 POWER LB NO2/YR. THESE BURNERS ARE THE TWO LARGEST POLLUTERS IN THE INDUSTRIAL CATEGORY. THEIR DIFFERENCES IN COMBUSTION AERODYNAMICS ARISE OVER THE METHOD EMPLOYED TO CONTROL THE RATE OF FUEL-AIR MIXING AND FLAME SHAPE. THE PBB USES SWIRL (TANGENTIAL VELOCITY COMPONENT) OF THE COMBUSTION AIR, WHILE THE GMCB USES THE QUANTITY AND VELOCITY OF THE PRIMARY AIR COUPLED WITH THE VELOCITY OF THE FUEL JET.

****PROJECT: 01500-SYSTEMS EVALUATION OF THE USE OF LOW SULFUR WESTERN COAL IN EXISTING SMALL AND INTERMEDIATE SIZE BOILERS**

STARTING/ COMPLETION DATE : 02/75 12/77 : FUNDING ESTIMATED FY77 / $ 68315
TASK CODE=F624A-024 **EPA=68-02-1863 ** (CNTR.) PRIOR FY76 / $ 675400

EPA OFFICER.. DG LACHAPELLE EPA/IERL RTP
INVESTIGATOR.. DR BARTZ K V B ENG INC
KL MALONEY K V B ENG INC
MILESTONES.... 02/75 -WORK INITIATED
04/77 -INITIATE STUDY TO CORRELATE SULFUR RETENTION BY ASH
08/77 -COMPLETE TESTING OF 10 BOILERS
12/77 -FINAL REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001500 SSIE-GMA 2156 2 EPA -68-02-1863 TASK-F624A-024
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVES: DEMONSTRATE THE ENVIRONMENTALLY SOUND USE OF WESTERN COAL IN COMBUSTION SYSTEMS PRESENTLY UTILIZING BITUMINOUS COALS. EVALUATE THE EMISSIONS AND UNIT PERFORMANCE ASPECTS OF CONVERTING COMBUSTION SYSTEMS TO WESTERN COAL. PROVIDE APPLICATION GUIDELINES AND EVALUATE THE COST EFFECTIVENESS OF UTILIZING WESTERN COALS TO THEIR MAXIMUM EXTENT CONSISTENT WITH VIABILITY AND ECONOMICS. DEVELOP A CORRELATION OF SULFUR RETENTION BY ASH FOR THE COAL TESTED. APPROACH: TEN BOILERS SELECTED ON THE BASIS OF DESIGN TYPE AND SIZE WILL BE SYSTEMATICALLY TESTED WITH EACH OF TWO COAL TYPES CORRESPONDING TO THE DESIGN (EASTERN) COAL AND A WESTERN COAL. EMISSION (NOX, CO, HC AND PARTICULATES) WILL BE MEASURED. UNIT EFFICIENCY AND THE DEGREE OF CONVERTIBILITY WILL BE ASSESSED. OUTPUTS: WORK INITIATED ON FEBRUARY 14, 1975. TESTING OF 10 BOILERS COMPLETED 8/77.

**PROJECT: 01501-DESIGN OPTIMIZATION AND FIELD VERIFICATION OF AN INTEGRATED RESIDENTIAL FURNACE

STARTING/ COMPLETION DATE : 09/76 09/78 : FUNDING ESTIMATED FY77 / $ 350000
TASK CODE=F624A-025 **EPA=68-02-2174 ** (CNTR.) PRIOR FY76 / $ 141980

EPA OFFICER.. GB MARTIN EPA/IERL RTP
INVESTIGATOR.. JA NESTLERODE ROCKWELL INTERNATL CORP ADVANCED PROGRAMS
MILESTONES.... 09/76 -INITIATE CONTRACT
06/77 -COMPLETE LABORATORY OPTIMIZATION
09/78 -COMPLETE FIELD EVALUATION DOCUMENTATION
PLAN ID.....: (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001501 SSIE-GMA 3107 1 EPA -68-02-2174 TASK-F624A-025
AP -624A DU -L110 LABT-EMI
ABSTRACT.....: A 24-MONTH PROGRAM HAS BEEN INITIATED FOR DESIGN OPTIMIZATION, CONSTRUCTION, AND FIELD VERIFICATION TESTING OF A PROTOTYPE OF THE LOW-EMISSION, HIGH-PERFORMANCE RESIDENTIAL WARM-AIR-OIL FURNACE WHICH WAS DEVELOPED UNDER EPA CONTRACT 68-02-1819. THE PROGRAM WILL BE CONDUCTED IN TWO PHASES. THE FIRST PHASE WILL CONSIST OF ANALYSIS AND LABORATORY TESTING TO FURTHER OPTIMIZE THE FURNACE DESIGN AND DOCUMENT ITS POLLUTANT EMISSIONS AND THERMAL EFFICIENCY PERFORMANCE. THE OPTIMUM FURNACE'S CAPABILITIES TO OPERATE WITH ALTERNATE FUELS WILL ALSO BE EVALUATED. IN PREPARATION FOR THE NEXT PHASE, THE LOGISTICS OF FIELD TESTING RESIDENTIAL FURNACES WILL BE DELINEATED. THE SECOND PHASE WILL BE CONCERNED WITH CONSTRUCTION OF A NUMBER OF INTEGRATED FURNACE UNITS TO BE FIELD TESTED, THEIR INSTALLATION IN SELECTED RESIDENCES AND OPERATION DURING AN ENTIRE ANNUAL HEATING SEASON. THE EMISSION AND PERFORMANCE CHARACTERISTICS OF EACH TEST UNIT WILL BE DETERMINED INITIALLY AND REMEASURED MONTHLY. OPERATING CONDITIONS WILL NOT BE ADJUSTED UNLESS REQUIRED TO CORRECT AN UNSAFE OR EXCESSIVE EMISSION CONDITION. COMPLETE DESCRIPTIONS OF THE FURNACE DESIGN AND CAPABILITIES WILL BE DOCUMENTED IN A CONCISE FORM USABLE BY FURNACE MANUFACTURERS AS A DESIGN GUIDE BOOK. THE PROTOTYPE UNITS ARE BEING INSTALLED IN SIX FIELD LOCATIONS FOR TESTING OVER A HEATING SEASON.

**PROJECT: 01504-DEVELOPMENT OF CATALYST AND SYSTEM DESIGN CRITERIA FOR CATALYTIC COMBUSTORS WITH APPLICATION TO STATIONARY SOURCES

STARTING/ COMPLETION DATE : 06/76 02/78 : FUNDING ESTIMATED FY77 / $ 382640
TASK CODE=F624A-027 **EPA=68-02-2116 ** (CNTR.) PRIOR FY76 / $ 594933

EPA OFFICER.. GB MARTIN EPA/IERL RTP
INVESTIGATOR.. RM KENDALL ACUREX CORP AEROTHERM DIV
CB MOYER ACUREX CORP AEROTHERM DIV
LW ANDERSON ACUREX CORP AEROTHERM DIV
JP KESSELRING ACUREX CORP AEROTHERM DIV
CD HARTMAN ACUREX CORP AEROTHERM DIV
AJ MURPHY ACUREX CORP AEROTHERM DIV
MILESTONES.... 06/76 -INITIATE CONTRACT
10/77 -IDENTIFY PROMISING CATALYSTS
02/78 -IDENTIFY SYSTEM DESIGN CRITERIA
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001504 SSIE-GMA 4206 EPA -68-02-2116 TASK-F624A-027
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS THE ESTABLISHMENT OF DESIGN CRITERIA FOR APPLICATION OF CATALYTICAL COMBUSTION TO LOW EMISSION, HIGH EFFICIENCY STATIONARY COMBUSTION SYSTEMS. TO ACCOMPLISH THIS, A RESEARCH AND DEVELOPMENT PROGRAM CONSISTING OF EXPERIMENTAL SMALL-SCALE CATALYST AND COMBUSTOR CONCEPT SCREENING, EXPERIMENTAL AND THEORETICAL SCALE-UP WORK FOR PROMISING CONCEPTS, AND DESIGN DEVELOPMENT OF PROTOTYPE SYSTEMS BASED ON SELECTED CONCEPTS HAS BEEN OUTLINED. A NUMBER OF CATALYST SYSTEMS HAVE BEEN EVALUATED BY SMALL-SCALE SCREENING EXPERIMENTS, UNDER A VARIETY OF CONDITIONS AND FOR SEVERAL DIFFERENT FUELS. BASED ON THE RESULTS OF SINGLE-COMPONENT CATALYST SYSTEMS, ONE MULTI-COMPONENT CATALYST SYSTEM HAS BEEN DEVELOPED AND HAS BEEN TESTED EXTENSIVELY. THE MOST PROMISING SYSTEMS WILL THEN BE FURTHER TESTED BY INTEGRATION INTO A PRACTICAL COMBUSTION SYSTEM. THESE SMALL-SCALE TESTS WILL INVESTIGATE THE EFFECTS OF INTERSTAGED COOLING, MIXING OF SECONDARY AIR, AND BED HEAT REMOVAL. DATA FROM THESE TESTS WILL BE USED TO DEFINE OPTIMUM CATALYTIC SYSTEMS AND SPECIFIC EQUIPMENT APPLICATIONS, AND ALSO TO IDENTIFY THE MECHANISMS OF CATALYST PERFORMANCE BY CORRELATING THE RESULTS WITH SYSTEM PROPERTIES AND BY CONDUCTING DETAILED ANALYTICAL STUDIES WITH APPROPRIATE COMPUTING TECHNIQUES, ACCOUNTING FOR FLOW, DIFFUSION, HOMOGENEOUS AND HETEROGENEOUS REACTION EFFECTS, AND HEAT TRANSFER. LARGER-SCALE CATALYST SYSTEM AND SYSTEM CONCEPT DEVELOPMENT EXPERIMENTS WILL BE PERFORMED FOR VERIFICATION AND FURTHER DEVELOPMENT OF OPTIMUM SYSTEM, AND CONCEPTUAL DESIGNS OF PROMISING CONCEPTS WILL BE MADE.

**PROJECT: 01506-EVALUATION OF FUNDAMENTAL COMBUSTION PHENOMENA

```
                    STARTING/ COMPLETION DATE : 00/77   UNK   :   FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=F624A-028     **EPA=            ** (IN-HO)     PRIOR       FY76  / $   60000
                IN-HOUSE EFFORT : FY 77  /  01.1  YEARS  ; TOTAL PROJECT  05.5
EPA  OFFICER..  WS LANIER                EPA/IERL   RTP
INVESTIGATOR..  WS LANIER                US EPA                              ORD/IERL
MILESTONES....  10/77 -COMPLETE ASSESSMENT OF LASER DOPPLER VELOCIMETRY
                02/78 -COMPLETE INITIAL EVALUAION OF NUMERICAL TECHNIQUES FOR SOLUTION
                00/00 -PERFORM VARIOUS STUDIES RELATED TO FUNDAMENTAL COMBUSTION RESEARC
PLAN ID.......  (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES...  RECN-001506          SSIE-ZMA  1133        TASK-F624A-028        AP  -624A
                DU  -L110            LABT-EMI
ABSTRACT......  THE RESEARCH ACTIVITIES BEING PURSUED UNDER THIS EPA IN-HOUSE PROGRAM FALL INTO TWO CATEGORIES: 1)
                 COMBUSTION AERODYNAMICS AND 2) CHEMICAL KINETICS. IN THE COMBUSTION AERODYNAMICS CATEGORY, STUDIES
                 ARE UNDERWAY TO DEFINE THE INFLUENCE OF EXTERNAL COMBUSTOR AND BURNER VARIABLES ON THE FLOW FIELD
                 STRUCTURE. SPECIFICALLY, A LASER DOPPLER VELOCIMETER IS BEING USED TO MAP THE VELOCITY AND
                 TURBULENCE FIELD IN A SIMULATED FURNACE. EXTERNAL VARIABLES BEING INVESTIGATED ARE THE BURNER
                 CONFINEMENT RATIO, AIR SWIRL LEVEL, INLET QUARL ANGLE AND INLET AIR VELOCITY LEVEL. THE DATA SO
                 GENERATED WILL BE COMPARED TO PREDICTED VALUES FROM APPROPRIATE COMPUTER PROGRAMS. IN THE CHEMICAL
                 KINETICS CATEGORY, PRIMARY ACTIVITY CENTERS AROUND THE USE OF COMPUTER CODES TO ANALYZE KINETIC
                 DATA AND TO DEFINE THE MECHANISMS FOR THE FORMATION OF NO.
```

**PROJECT: 01509-DIRECT MEASUREMENT OF COMBUSTION FACTOR EFFECTS ON SECONDARY PARTICULATE FORMATION

```
                    STARTING/ COMPLETION DATE : 03/77   12/77 :   FUNDING    ESTIMATED   FY77  / $   47227
                    TASK CODE=F624A-030     **EPA=            ** (IN-HO)     PRIOR       FY    /
                IN-HOUSE EFFORT : FY 77  /  00.6  YEARS  ; TOTAL PROJECT  02.5
EPA  OFFICER..  WS LANIER                EPA/IERL   RTP
INVESTIGATOR..  WS LANIER                US EPA                              ORD/IERL
                B  DEMITRIADES           US EPA                              ORD/IERL
MILESTONES....  03/77 -ISSUE GRANT FOR SMOG CHAMBER CONSTRUCTION
                06/77 -INITIATE BASELINE CHARACTERIZATION OF BOILER
                08/77 -INITIATE BOILER/CHAMBER STUDIES
                12/77 -COMPLETE INITIAL ASSESSMENT
                02/78 -ISSUE FINAL REPORT
PLAN ID.......  (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES...  RECN-001509          SSIE-ZMA  1132        TASK-F624A-030        AP  -624A
                DU  -L110            LABT-EMI
ABSTRACT......  THE PROPOSED EFFORT HAS AS ITS OBJECTIVE DETERMINATION OF THE EXTENT TO WHICH MODIFICATIONS IN BASIC
                 COMBUSTION PROCESS AND FUEL CONSTITUENTS WILL AFFECT THE PRIMARY EMISSIONS OF SULFATES AND OTHER
                 PARTICULATES AND THE EXTENT TO WHICH SUCH VARIABLES WILL AFFECT ATMOSPHERIC FORMATION OF
                 PARTICULATES. THE BASIC TECHNIQUE BEING DEVELOPED AND EMPLOYED IS THE COUPLING OF AN ATMOSPHERIC
                 REACTION CHAMBER TO A LABORATORY BOILER. DETAILED BOILER EXHAUST MEASUREMENTS WILL BE PERFORMED AND
                 THE PROGRESSION OF THE PHOTOCHEMICAL CONVERSION OF THESE EMISSIONS TO ATMOSPHERIC PARTICULATES
                 (SUCH AS SULFATES AND NITRATES) WILL BE MONITORED IN THE SMOG CHAMBERS. CONDITIONS TO BE VARIED
                 INITIALLY INCLUDE COMBUSTION MODIFICATIONS, FUEL SULFUR LEVEL AND FULL TRACE METAL SPECIATION AND
                 QUANTITY. TO DATE THE BOILER HAS BEEN BASE LINED, AND THE ATMOSPHERIC REACTION CHAMBER CONSTRUCTED.
                 ACTUAL TESTING WILL COMMENCE IN MID TO LATE AUGUST, 1979.
```

**PROJECT: 01510-CHARACTERIZATION OF EMISSION AND COMBUSTION PERFORMANCE OF ALTERNATE FUELS

```
                    STARTING/ COMPLETION DATE : 06/71   UNK   :   FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=F624A-031     **EPA=            ** (IN-HO)     PRIOR       FY76  / $   60000
                IN-HOUSE EFFORT   FY 77  /  01.0  YEARS  ; TOTAL PROJECT  10.0
EPA  OFFICER.   GB MARTIN                EPA/IERL   RTP
INVESTIGATOR..  GB MARTIN                US EPA                              ORD/IERL
                N  BUTTS                 US EPA                              ORD/IERL
MILESTONES....  06/74 -INITIATE STUDY OF ALTERNATE FUELS
                10/75 -COMPLETE STUDY OF ALCOHOL FUELS
                02/79 -COMPLETE STUDY OF LOW BTU GAS COMBUSTORS
PLAN ID.......  (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..   RECN-001510          SSIE-ZMA  1134        TASK-F624A-031        AP  -624A
                DU  -L110            LABT-EMI
ABSTRACT......  THE OBJECTIVE OF THIS PROJECT IS TO EVALUATE EMISSION PERFORMANCE OF ALTERNATE FUELS AND ADVANCED
                 CONCEPT CONTROL TECHNIQUES. THIS EVALUATION PROVIDES AN INITIAL ASSESSMENT OF PROBLEMS AND/OR
                 PROMISE OF DIFFERENT TECHNOLOGY APPROACHES. THE STUDY UTILIZES A 300,000 BTU/HR VERSATILE
                 EXPERIMENTAL FURNACE FOR COMPARISON OF ALTERNATE FUEL PERFORMANCE TO PREVIOUSLY ESTABLISHED BASE
                 LINES FOR CONVENTIONAL FUEL. THE BASIC FURNACE ALLOWS FOR BURNER DESIGN CHANGES AS WELL AS STAGED
                 COMBUSTION AND FLUE GAS RECIRCULATION. TO DATE THE PROJECT HAS EVALUATED: (1) FUEL NITROGEN
                 CONVERSION AND CONTROL TECHNIQUES FOR LIQUID FUELS; AND (2) ALCOHOL FUELS. A FUEL GAS GENERATOR
                 SYSTEM CAPABLE OF PRODUCING SIMULATED LOW BTU GASES WITH VARIABLE CO TO H2 RATIOS, CH4 CONTENT AND
                 NH3 CONTENT AT A RANGE OF TEMPERATURES FROM 250 DEGREES F TO 1,350 DEGREES F IS BEING DELIVERED.
                 THE EFFORT WILL CENTER ON CONCEPTS FOR CONTROL FUEL AND THERMAL NOX.
```

**PROJECT: 01512-CHARACTERIZATION AND DESIGN EVALUATION FOR COMMERCIAL COMBUSTION SYSTEMS

```
                    STARTING/ COMPLETION DATE : 05/74   09/81 :   FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=F624A-032     **EPA=            ** (IN-HO)     PRIOR       FY76  / $  110000
                IN-HOUSE EFFORT   FY 77  /  01.1  YEARS  , TOTAL PROJECT  05.5
EPA  OFFICER.: RE HALL                    EPA/IERL   RTP
INVESTIGATOR.: RE HALL                    US EPA
               GR GILLIS                  US EPA
MILESTONES.... 01/74 -PUBLICATION OF REPORT ON EPA IN-HOUSE RESIDENTIAL HEATER STUDY
               06/74 -PREPARATION OF APCA PAPER ON EPA'S RESIDENTIAL HEATER PROGRAM
               10/74 -EVALUTAION OF COMPAGNIE FRANCAISE DE RAFFINAGE WATER/OIL EMULSIFI
               12/74 -EVALUATION OF COTTELL REACTOR WATER/OIL EMULSIFIER
               06/75 -PREPARATION OF APCA PAPER ON WATER/DISTILLATE OIL EMULSIFIERS
               08/75 -EVALUATION OF BLUE RAY BURNER
               12/75 -PREPARATION OF ASME PAPER ON WATER/RESIDUAL OIL EMULSIONS
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001512            SSIE-ZMA  1131        TASK-F624A-032        AP  -624A
               DU  -L110              LABT-EMI
ABSTRACT...... THIS IN-HOUSE PROJECT IS DESIGNED TO PROVIDE THE CAPABILITY FOR FAST RESPONSE TESTING OF
                COMMERCIALLY AVAILABLE AND PROTOTYPE COMBUSTION EQUIPMENT AND COMBUSTION IMPROVING DEVICES.
                MEASUREMENTS INCLUDE OXIDES OF NITROGEN, OXIDES OF SULFUR, CARBON MONOXIDE, HYDROCARBONS, OXYGEN,
                CARBON DIOXIDE, SMOKE, AND PARTICULATES (MASS AND SIZE DISTRIBUTION). IN SOME TESTS TRACE SPECIES
                AND EFFICIENCY MEASUREMENTS ARE MADE. TEST EQUIPMENT INCLUDES A RESIDENTIAL WARM-AIR FURNACE RATED
                AT 100,000 BTU/HR, A SCOTCH MARINE PACKAGE FIRETUBE BOILER RATED AT 2,400,000 BTU/HR, AND A FIREBOX
                FIRETUBE PACKAGE BOILER RATED AT 1,440,000 BTU/HR. VARIOUS BURNER DESIGNS ARE TESTED IN THESE
                UNITS. FUELS INCLUDE NATURAL GAS, DISTILLATE OIL, AND LOW SULFUR RESIDENTIAL OIL. EXPECTED OUTPUTS
                INCLUDE EVALUATIONS OF WATER-IN-OIL EMULSIONS, PROTOTYPE OR COMMERCIALLY AVAILABLE PACKAGED BOILER
                BURNERS, AND PROTOTYPE OR COMMERCIALLY AVAILABLE RESIDENTIAL BURNERS.
```

**PROJECT: 01518-POTENTIAL BENEFICIAL USE OF INDUSTRIAL WASTE HEAT FOR GREENHOUSE PRODUCTION OF BEDDING PLANTS, CUT FLOWERS AND FOLIAGE PLANTS

```
                    STARTING/ COMPLETION DATE : 08/77   08/78 :   FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=F624A-039     **EPA=R804499     ** (GRANT)     PRIOR       FY76  / $   40000
EPA  OFFICER.: TG BRNA                    EPA/IERL   RTP
INVESTIGATOR.: IJ CRUMBLY                 FORT VALLEY STATE COLL
               DW ROBINSON                FORT VALLEY STATE COLL
               B  ADAMS                   FORT VALLEY STATE COLL
               J  KENNEBREW               FORT VALLEY STATE COLL
MILESTONES.... 08/77 -LABORATORY STUDIES COMPLETED
               09/77 -GREENHOUSES CONSTRUCTED
               08/77 -FINAL REPORT COMPLETED
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001518            SSIE-GMA  4139        EPA -R804499          TASK-F624A-039
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT.....: OBJECTIVES: THE FEASIBILITY OF USING INDUSTRIAL WASTE HEAT TO CONTROL THE ENVIRONMENT OF GREENHOUSES
                WILL BE EVALUATED RELATIVE TO THREE MAJOR OVERALL OBJECTIVES: A. TESTING THE CAPABILITIES OF THE
                ENVIRONMENTAL CONTROL SYSTEM; B. DETERMINING THE EFFECTS OF THE GREENHOUSE ENVIRONMENTS ON THE
                PRODUCTION OF ORNAMENTAL AND VEGETABLE BEDDING PLANTS, CUT-FLOWERS, AND FOLIAGE PLANTS, AND C.
                EVALUATING THE OVERALL ECONOMICS OF THE SYSTEM. APPROACH: TWO PLASTIC GREENHOUSES, 27' X 72'
                QUONSET-TYPE, WILL BE USED; ONE WILL SERVE AS THE CONTROL AND THE OTHER AS THE WASTE HEAT RESEARCH
                GREENHOUSE. CONVENTIONAL ENVIRONMENTAL CONTROL WILL BE USED IN THE CONTROL GREENHOUSE WHILE BOTH
                HEATING AND COOLING OF THE RESEARCH GREENHOUSE WILL EMPLOY AIR DRAWN THROUGH A CEL-DEK PAD. HEATING
                WILL BE EFFECTED BY PASSING AIR THROUGH THE CEL-DEK PAD CONTAINING COOLING WATER HEATED BY A BOILER
                PRIOR TO DISTRIBUTING THE AIR IN THE RESEARCH GREENHOUSE. COOLING WILL BE EFFECTED BY REVERSING THE
                AIR FLOW DIRECTION. ORNAMENTAL AND CUT-FLOWER, FOLIAGE PLANT, AND VEGETABLE SPECIES, WHICH WERE
                SELECTED IN EARLIER STUDIES WILL BE GROWN IN THE YEAR-LONG GREENHOUSE PRODUCTION PHASE OF THE
                STUDY. ECONOMIC STUDIES WILL BE MADE FOR EACH CROP TO ASSESS CUSTOMER ACCEPTANCE AND PRODUCTION
                COSTS. OUTPUTS: THE FINAL REPORT FOR THE PROJECT WILL PROVIDE DATA, METHODS, AND RESULTS RELATIVE
                TO THE HORTICULTURAL, ENGINEERING AND ECONOMIC OBJECTIVES OF THE STUDY.
```

**PROJECT: 01519-WET/DRY COOLING TOWER STUDY

```
                    STARTING/ COMPLETION DATE · 06/75   09/77 :   FUNDING    ESTIMATED   FY77  / $    6000
                    TASK CODE=F624A-040     **EPA=68-03-2202  ** (CNTR.)     PRIOR       FY75  / $  159970
EPA  OFFICER.  TG BRNA                    EPA/IERL   RTP
INVESTIGATOR.. GA ENGLESSON               UNITED ENG & CONST INC              ADVANCED ENG
               MC HU                      UNITED ENG & CONST INC              ADVANCED ENG
MILESTONES.... 12/76 -DRAFT REPORT SUBMITTED TO EPA FOR REVIEW
               10/77 -FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001519            SSIE-GMA  4160        EPA -68-03-2202       TASK-F624A-040
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: THE OBJECTIVE OF THE PROPOSED WORK IS TO EVALUATE THE TECHNICAL AND ECONOMIC FEASIBILITY
                OF WET/DRY COOLING TOWERS AT SPECIFIC SITES FOR THE PURPOSE OF WATER CONSERVATION AND/OR PLUME
                ABATEMENT. APPROACH: AN OPTIMIZATION TECHNIQUE WILL BE USED SUCH THAT THE WET/DRY TOWERS WOULD HAVE
                OPTIMUM DRY AND WET PORPORTIONS WITH RESPECT TO CAPITAL COST AND OPERATIONAL PENALTIES PLUS
                QUANTITY OF MAKE-UP WATER OF FOGGING IMPACT. CURRENT PLANS: THE PROGRAM IS CONCEIVED AS CONSISTING
                OF A SET OF SIX TASKS. THE FIRST IS TO LAY GROUNDWORK AND TO ACCUMULATE DATA FOR THIS STUDY, THE
                NEXT THREE FOR WATER CONSERVATION IN THE COAL-RICH REGION IN THE WESTERN UNITED STATES. FOR THESE
                THREE TASKS, THE WET-DRY TOWERS WILL BE INTERFACED WITH A 1, 00-MWE COAL-FIRED FOSSIL PLANT. THE
                LAST TWO TASKS ARE FOR PLUME ABATEMENT PURPOSE IN URBAN AREAS OF THE CONTERMINOUS UNITED STATES.
                FOR THE LAST TWO TASKS, THE WET/DRY TOWERS TO BE EVALUATED WILL BE INTERFACED WITH BOTH A 100-MWE
                FOSSIL PLANT AND A 1,000-MWE NUCLEAR PLANT. THE STUDY IS SCHEDULED TO BE COMPLETED IN JUNE, 1976.
                OUTPUTS: A COMPREHENSIVE REPORT WILL DOCUMENT THE METHODS AND RESULTS OF THIS STUDY. THE REPORT
                WILL CONTAIN GRAPHS AND TABLES RELATING OPTIMIZED WET/DRY COOLING SYSTEMS AND THE REFERENCE SYSTEM
                IN TERMS OF COSTS AND WET/DRY COOLING SYSTEM FOR PLUME ABATEMENT AT REPRESENTATIVE U. S. SITES.
```

**PROJECT: 01520-DISPOSAL OF BYPRODUCTS FROM NONREGENERABLE FLUE GAS DESULFURIZATION SYSTEMS

```
                    STARTING/ COMPLETION DATE : 03/77   03/78 :   FUNDING    ESTIMATED   FY77  / $    3440
                    TASK CODE=F624A-041     **EPA=68-02-2633  ** (CNTR.)     PRIOR       FY76  / $  220000
EPA  OFFICER.. JW JONES                   EPA/IERL   RTP
INVESTIGATOR.. J  ROSSOFF                 AEROSPACE CORP                      ELECTRONICS RES LAB
MILESTONES.... 06/78 -FINAL REPORT ISSUED
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001520            SSIE-GMA  4168        EPA -68-02-2633       TASK-F624A-041
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: EVALUATE TECHNIQUES FOR THE ENVIRONMENTALLY SOUND DISPOSAL OF WASTES FROM POWER PLANT
                NONREGENERABLE FLUE GAS DESULFURIZATION SYSTEMS. APPROACH: WASTES OBTAINED FROM PROTOTYPE SCRUBBERS
                AT THE TVA SHAWNEE POWER STATION AT PADUCAH, KENTUCKY HAVE BEEN PLACED IN SEVEN PONDS NEARBY. TWO
                PONDS CONTAIN UNTREATED WASTE (ONE WITH LIMESTONE WASTE AND ONE WITH LIME), THREE PONDS CONTAIN
                CHEMICALLY TREATED WASTE (TWO LIMESTONE AND ONE LIME), AND TWO PONDS CONTAIN UNTREATED WASTE WITH
                AN UNDERDRAIN (ONE LIME AND ONE LIMESTONE). AN ADDITIONAL POND IS SCHEDULED TO BE FILLED WITH
                OXIDIZED SULFITE WASTE LATER IN 1977. THROUGH PERIODIC SAMPLING AND ANALYSIS OF WATER, SOIL AND
                SLUDGE MATERIALS, AN ASSESSMENT IS BEING MADE OF CURRENT DISPOSAL TECHNOLOGY. ENGINEERING COST
                ESTIMATES FOR THE ALTERNATIVE APPROACHES ARE ALSO BEING DEVELOPED. PLANS: THE PROJECT WAS INITIATED
                IN SEPTEMBER, 1974 AND IS SCHEDULED TO CONTINUE THROUGH MARCH, 1978.
```

**PROJECT: 01522-AN ASSESSMENT OF THE TECHNOLOGY OF DISPOSAL AND UTILIZATION OF FLUE GAS CLEANING BYPRODUCTS

```
                    STARTING/ COMPLETION DATE : 09/77   09/81     FUNDING    ESTIMATED   FY77  / $   70000
                    TASK CODE=F624A-042     **EPA=68-02-2654  ** (CNTR.)     PRIOR       FY76  / $  720000
EPA  OFFICER.: JW JONES                   EPA/IERL   RTP
INVESTIGATOR.: CJ SANTHANUM               ARTHUR D. LITTLE INC
               SL JOHNSON                 ARTHUR D. LITTLE INC
               RR LUNT                    ARTHUR D. LITTLE INC
               JE OBERHOLTZER             ARTHUR D. LITTLE INC
MILESTONES.... 12/78 -ANNUAL REPORT ISSUED
               12/79 -ANNUAL REPORT ISSUED
               12/80 -ANNUAL REPORT ISSUED
               12/81 -FINAL REPORT ISSUED
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001522            SSIE-GMA  4154        EPA -68-02-2654       TASK-F624A-042
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: COMPILE AND ASSESS DATA AND INFORMATION REGARDING RESEARCH AND DEVELOPMENT RESULTS AND
                COMMERCIAL ACTIVITIES IN THE AREA OF DISPOSAL/UTILIZATION OF FLUE GAS CLEANING BYPRODUCTS, WITH
                EMPHASIS ON ENVIRONMENTAL ACCEPTABILITY AND COSTS; REPORT RESULTS ANNUALLY. APPROACH: CONTRACTOR
                WILL COMPILE AND ASSESS DATA AND INFORMATION FROM RESEARCH AND DEVELOPMENT ACTIVITIES CONDUCTED BY
                EPA, TVA, AND PRIVATE CONCERNS TO DETERMINE THE STATE-OF-THE-ART OF DISPOSAL AND UTILIZATION OF
                FLUE GAS CLEANING BYPRODUCTS. THIS ASSESSMENT WILL INCLUDE AN EVALUATION OF POTENTIAL ENVIRONMENTAL
                EFFECTS OF VARIOUS TECHNOLOGIES AND A CRITICAL REVIEW OF THEIR ECONOMICS. PHYSICAL AND CHEMICAL
                CHARACTERIZATION OF FLUE GAS CLEANING WASTES FROM SEVERAL PLANTS WILL BE CONDUCTED. RESULTS OF THIS
                EFFORT WILL BE REPORTED ANNUALLY, AND WILL INCLUDE RECOMMENDATIONS FOR APPLIED RESEARCH AND
                DEVELOPMENT EFFORTS. CURRENT PLANS: CONTRACT JUST UNDERWAY.
```

**PROJECT: 01523-WET/DRY COOLING TOWER TEST MODULE PROGRAM

```
                    STARTING/ COMPLETION DATE : 08/77   07/78 :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=F624A-043     **EPA=R805220     ** (GRANT)     PRIOR       FY    /
EPA  OFFICER.  TG BRNA                  EPA/IERL   RTP
INVESTIGATOR.. WC MARTIN                SOUTHERN CALIFORNIA EDISON CO
               TP FITZPATRICK           SOUTHERN CALIFORNIA EDISON CO
MILESTONES.... 09/77 -COMPLETION OF CONSTRUCTION OF COOLING TOWER TEST MODULE
               10/77 -START OF COOLING TOWER TEST PROGRAM
               10/78 -COMPLETION OF COOLING TOWER TEST PROGRAM
               04/79 -PUBLICATION OF FINAL REPORT FOR WET/DRY COOLING TEST MODULE PROGR      AM
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001523          SSIE-GMA  4135        EPA -R805220          TASK-F624A-043
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: IN THIS MULTI-SPONSORED PROJECT, THE PROGRAM OBJECTIVES ARE: A. TO DETERMINE THE WATER
                CONSERVATION AND OPERATIONAL CHARACTERISTICS OF THE WET/DRY COOLING TOWER TEST MODULE IN AN
                ELECTRICAL POWER PLANT SITUATION, AND B. TO DEVELOP AND CONFIRM A MATHEMATICAL MODEL FOR ACCURATELY
                DESCRIBING AND PREDICTING THE PERFORMANCE OF THE WET/DRY COOLING SYSTEM. APPROACH: A FULL-SIZE
                WET/DRY COOLING TOWER CELL WILL BE INSTALLED AND TESTED AT A PLANT SITE OVER A ONE-YEAR PERIOD.
                TEST DATA WILL BE USED TO CONFIRM THE MATHEMATICAL MODEL. OUTPUTS: TEST MODULE, COOLING SYSTEM AND
                AMBIENT DATA WILL BE COLLECTED DURING THE TESTING PHASE WHICH IS SCHEDULED FOR COMPLETION IN
                OCTOBER 1978. THESE DATA WILL BE INCLUDED IN THE COMPREHENSIVE REPORT FOR THE TEST PROGRAM, THE
                REPORT TO BE COMPLETED IN APRIL 1979.
```

**PROJECT: 01524-LIME/LIMESTONE SCRUBBING WASTE CONVERSION PILOT STUDY

```
                    STARTING/ COMPLETION DATE : 08/77   09/78 :   FUNDING    ESTIMATED   FY77  / $   81600
                    TASK CODE=F624A-044     **EPA=68-02-2644  ** (CNTR.)     PRIOR       FY76  / $  292400
EPA  OFFICER.: JW JONES                 EPA/IERL   RTP
INVESTIGATOR.: AG SLIGER                M.W. KELLOGG CO
               BG MANDELIK              M.W. KELLOGG CO
MILESTONES.... 01/78 -COMPLETE LIMESTONE SCRUBBING WASTE REDUCTION TO SULFIDE; ISSUE IN
               04/78 -COMPLETE CARBONATION PILOT PLANT CONSTRUCTION
               06/78 -COMPLETE CARBONATION TESTS
               09/78 -ISSUE FINAL REPORT ON PROJECT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001524          SSIE-GMA  4153        EPA -68-02-2644       TASK-F624A-044
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: DEVELOP KEY PROCESS STEPS, ON A PILOT SCALE, IN THE PULLMAN KELLOGG "KEL-S" PROCESS FOR
                CONVERSION OF LIME/LIMESTONE SCRUBBING WASTE TO ELEMENTAL SULFUR AND CALCIUM CARBONATE. APPROACH:
                WASTE FROM A LIMESTONE SCRUBBER WILL BE REDUCED TO CALCIUM SULFIDE IN A REDUCTION KILN. THE REDUCED
                PRODUCT WILL BE SLURRIED THEN CARBONATED IN A STIRRED REACTOR, RELEASING HYDROGEN SULFIDE GAS
                (WHICH CAN BE READILY CONVERTED TO SULFUR). THE SOLID REACTION PRODUCTS WILL CONSIST OF CALCIUM
                CARBONATE AND INERTS (E.G., COAL ASH); THE INERTS WILL BE SEPARATED FROM THE CALCIUM CARBONATE BY
                AIR FLOTATION. DESIGN DATA FROM THESE PILOT TESTS SHOULD BE SUFFICIENT FOR SCALE-UP TO A LARGE
                (PROTOTYPE) TEST UNIT. CURRENT PLANS: THE PROJECT WAS INITIATED 8/22/77. LIMESTONE SCRUBBING WASTE
                WILL BE SHIPPED TO THE REDUCTION KILN SITE IN SEPTEMBER, 1977.
```

**PROJECT: 01529-DEWATERING PRINCIPLES AND EQUIPMENT DESIGN STUDIES

```
                    STARTING/ COMPLETION DATE : 06/76   08/78 :   FUNDING    ESTIMATED   FY77  / $   75000
                    TASK CODE=F624A-047     **EPA=R804531     ** (GRANT)     PRIOR       FY76  / $   75000
EPA  OFFICER.. JW JONES                 EPA/IERL   RTP
INVESTIGATOR.. AR TARRER                AUBURN UNIV
               BH SHAH                  AUBURN UNIV
               JC WARMAN                AUBURN UNIV
MILESTONES.... 08/78 -ISSUE FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001529          SSIE-GMA  2843 1      EPA -R804531          TASK-F624A-047
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: DEVELOP MORE ECONOMICALLY FEASIBLE METHODS THAN THOSE CURRENTLY AVAILABLE FOR CONTINUOUS
                TREATMENT OF FLUE GAS CLEANING (FGC) WASTES. INITIAL EFFORTS ARE TO BE CONCENTRATED ON APPLYING
                GRAVITY SEDIMENTATION TO RAPIDLY, INEXPENSIVELY DEWATER FGC WASTES. APPROACH: DEVELOP METHODS FOR
                CHARACTERIZING THE PHYSICAL PROPERTIES AND BEHAVIOR OF FGC WASTES. DEVELOP PROCEDURES BASED ON THE
                MODELS PRESENTED HEREIN TO ALLOW ACCURATE DESIGN AND ANALYSIS OF GRAVITY SEDIMENTATION UNITS USED
                IN TREATING FGC WASTES. PERFORM BENCH SCALE AND PILOT TESTS TO EVALUATE THE FEASIBILITY OF USING
                GRAVITY SEDIMENTATION UNITS FOR TREATING FGC WASTES. PERFORM DEVELOPMENTAL STUDIES TO DETERMINE THE
                BEST DESIGN FOR CHANNEL PROMOTERS. BENCH SCALE AND CONTINUOUS PILOT TESTS ARE TO BE PERFORMED TO
                EVALUATE THE FEASIBILITY OF SUCH DEVICES FOR IMPROVING DEWATERING EFFICIENCY WHILE TREATING FGC
                WASTES. ASSESS FILTERABILITY OF DIFFERENT TYPES OF FGC SLUDGES DEWATERED TO DIFFERENT DEGREES AND
                PUMPING REQUIREMENTS FOR THE DIFFERENT SLUDGES. PROGRESS: A GRAVITY SEDIMENTATION SYSTEM CAN NOW BE
                PROPOSED WHICH SHOULD ALLOW RAPID DEWATERING OF FGC WASTE TO HIGH CONCENTRATIONS (35 TO 50 PERCENT
                SOLIDS) WITHOUT THE NEED FOR CHEMICAL ADDITIVES (FLOCCULANTS). THIS SYSTEM SEPARATES THE
                CLARIFICATION AND THICKENING FUNCTIONS INTO TWO UNITS WHICH ARE MUCH SMALLER AND LESS EXPENSIVE
                THAN CONVENTIONAL DEWATERING EQUIPMENT. FURTHER DEVELOPMENT OF THIS CONCEPT IS UNDERWAY.
```

**PROJECT: 01530-DISPOSAL OF HIGH ALKALINE FLY ASH SLUDGE IN A DECOALED MINE SEAM

STARTING/ COMPLETION DATE : 09/77 08/79 : FUNDING ESTIMATED FY77 / $ 236000
TASK CODE=F624A-048 **EPA=R805459 ** (GRANT) PRIOR FY /

EPA OFFICER.. JW JONES EPA/IERL RTP
INVESTIGATOR.. OE MANZ UNIVERSITY OF NORTH DAKOTA
GH GROENEWOLD STATE GEOLOGICAL SURVEY
Y HUNG UNIVERSITY OF NORTH DAKOTA
MILESTONES.... 09/78 -ISSUE INTERIM REPORT
09/79 -ISSUE FINAL REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001530 SSIE-GMA 4136 EPA -R805459 TASK-F624A-048
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVES: DETERMINE THE ENVIRONMENTAL EFFECTS OF SLUDGE DISPOSAL FROM A LIGNITE FLY ASH SO2 SCRUBBER (AT THE MILTON R. YOUNG POWER STATION, CENTER, NORTH DAKOTA) IN A DECOALED OPEN PIT MINE. MONITOR THE GROUNDWATER AND LEACHATE IN THE PROXIMITY OF THE BURIED SLUDGE, AS WELL AS AN EXPOSED SURFACE SLUDGE POND. INVESTIGATE THE PROPERTIES OF SLUDGE, ASH AND SOIL. ASSESS THE STABILITY OF MINE SPOIL DEPOSITED OVER THE SLUDGE. APPROACH: (1) STUDY AVAILABLE MINE, SLUDGE, AND SLUDGE DISPOSAL CHARACTERIZATIONS FROM A 3-YEAR MINING PLAN AND LABORATORY ANALYSES OF PILOT PLANT SLUDGE; (2) CONDUCT ADDITIONAL SLUDGE AND MINE CHARACTERIZATION; (3) CONDUCT EXTENSIVE SAMPLING AND TESTING PRIOR TO AND SUBSEQUENT TO: (A) CONSTRUCTION OF AN EXPOSED SURFACE SLUDGE POND, AND (B) INSTALLATION OF SEVERAL GROUNDWATER AND LEACHATE WELLS IN PROXIMITY OF BURIED SLUDGE IN THE DECOALED MINE SEAM AND SLUDGE POND, ANALYSES OF GROUNDWATER, LEACHATE, SUPERNATANT, SLUDGE AND SOIL FOR 15 MONTH PERIOD; (4) OBTAIN AND COMPILE COST INFORMATION FROM THE POWER PLANT FOR INCLUSION IN AN ECONOMY STUDY BY ARTHUR D. LITTLE, INC. OF DISPOSAL OF SLUDGE IN DECOALED MINE SEAM; (5) ASSESS THE DATA AND PREPARE THE FINAL REPORT, TO BE INCORPORATED IN AN ARTHUR D. LITTLE REPORT FOR CONTRACT 68-03-2334. CURRENT PLANS: PROJECT JUST INITIATED.

**PROJECT: 01531-DEVELOPMENT OF ENVIRONMENTAL ASSESSMENT AND CONTROL TECHNOLOGY QUALITY ASSURANCE PROGRAMS

STARTING/ COMPLETION DATE : 05/76 05/79 : FUNDING ESTIMATED FY77 / $ 225000
TASK CODE=F624A-049 **EPA=68-02-2156 ** (CNTR.) PRIOR FY76 / $ 505000

EPA OFFICER.. WB KUYKENDAL EPA/IERL RTP
INVESTIGATOR.. CE DECKER RESEARCH TRIANGLE INST
F SMITH RESEARCH TRIANGLE INST
J BUCHANAN RESEARCH TRIANGLE INST
D WAGONER RESEARCH TRIANGLE INST
MILESTONES.... 03/76 -QA PLAN FOR DEMONSTRATION PROJECTS
09/77 -QA PLAN FOR ENVIRONMENTAL ASSESSMENT PROJECTS
11/77 -QA PLAN FOR FIELD STUDIES
02/78 -QA PLAN FOR PILOT PROGRAMS
05/78 -QA PLAN FOR RESEARCH AND BENCH-SCALE PROJECTS
09/78 -QA PLAN FOR INDUSTRY SYSTEM STUDIES/POLLUTANT SYSTEM STUDIES
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001531 SSIE-GMA 4171 EPA -68-02-2156 TASK-F624A-049
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVE: THE ENVIRONMENTAL PROTECTION AGENCY IN ITS ENERGY AND INDUSTRIAL PROCESSES PROGRAMS IS INVOLVED IN NUMEROUS AND VARIED ENVIRONMENTAL ASSESSMENT AND TECHNOLOGY DEVELOPMENT PROJECTS. THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP, EVALUATE, ADAPT AND PROVIDE GUIDELINES, FOR THE APPLICATION OF QUALITY CONTROL AND ASSURANCE PRACTICES AND PROCEDURES TO VARIOUS MEASUREMENT SYSTEMS, DEVICES, AND PROCEDURES UTILIZED IN THE ABOVE PROJECTS. APPROACH: THE TEAM USED ON THIS CONTRACT HAS FORMAL TRAINING IN CHEMISTRY, CHEMICAL ENGINEERING, ELECTRICAL ENGINEERING, AND STATISTICS WITH EXPERIENCE IN SAMPLING AND ANALYZING MATERIALS IN STATIONARY SOURCE PROCESSES, CONTROL DEVICES, AND EFFLUENT STREAMS. A SYSTEMS APPROACH WILL BE UTILIZED IN DEVELOPING QUALITY ASSURANCE PLANS CONSISTING OF AN OPTIMUM MIX OF TECHNOLOGIES SUCH AS MATERIAL BALANCES, INTERRELATION OF PROCESS ENGINEERING DATA AND CONTROL SYSTEM PARAMETER VALUES WITH EFFLUENT STREAM MEASUREMENTS, MAINTENANCE OF QUALITY CONTROL CHARTS AND OTHER STATISTICAL TECHNIQUES, AND QUANTITATIVE PERFORMANCE AUDITS TO YIELD THE MAXIMUM QUALITY ASSURANCE AT THE MINIMUM COST. THE BASIC PLAN IS TO PREPARE GENERAL QC/QA PLANS FOR A PROJECT TYPE, THEN EVALUATE THE PLAN BY SHORT TERM IMPLEMENTATION AT SELECTED IERL/RTP PROJECT SITES. AFTER FIELD EVALUATION A QC/QA SPECIFIC TO THE PROJECT IS PREPARED. A QA PLAN SPECIFIC TO THE DEMONSTRATION SCALE PROJECTS HAS BEEN PREPARED. OUTPUT: TWO QUALITY ASSURANCE PLANS HAVE BEEN DEVELOPED FOR DEMONSTRATION PROJECTS AND ENVIRONMENTAL ASSESSMENT PROJECTS. IMPLEMENTATION OF THE QUALITY ASSURANCE PLAN IS UNDERWAY FOR THESE TWO CLASSES OF PROJEC

**PROJECT: 01536-STANDARDIZATION OF OPERATING PERFORMANCE OF A DROPLET MEASURING DEVICE

STARTING/ COMPLETION DATE : 05/77 11/79 : FUNDING : ESTIMATED FY77 / $ 50000
TASK CODE=F624A-052 **EPA=68-02-2111 ** (CNTR.) PRIOR FY76 / $ 158650

EPA OFFICER.. DB HARRIS EPA/IERL RTP
INVESTIGATOR.. H MEDICKI K L D ASSOCIATES INC
D MAGNUS K L D ASSOCIATES INC
MILESTONES.... 01/76 -DESIGN, CONSTRUCT AND DELIVER IMPROVED DROPLET SIZING DEVICE
03/77 -DEVELOP MULTIPLE PROBE INTERFACE
11/77 -COMPARISON OF HOT WIRE AND IMPACTOR TECHNIQUES REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001536 SSIE-GMA 4156 EPA -68-02-2111 TASK-F624A-052
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVE: THIS STUDY IS TO COMPARE THE PRESENTLY USED CASCADE IMPACTOR WITH THE NEWLY DEVELOPED HOT WIRE DROPLET SIZER. APPROACH: LABORATORY AND FIELD TESTS WILL BE CONDUCTED SIMULTANEOUSLY. DISCREPANCIES WILL BE INVESTIGATED AND A REPORT OF THE RESULTS PREPARED. OUTPUTS: LABORATORY TESTING USING A CLOSED SYSTEM HAS BEEN SUCCESSFULLY TESTED. A FIELD TEST PROGRAM HAS BEEN DESIGNED.

**PROJECT: 01537-THE DEVELOPMENT OF FUGITIVE EMISSIONS SAMPLING TECHNIQUES

```
                    STARTING/ COMPLETION DATE : 11/75   11/78 :   FUNDING    ESTIMATED   FY77  / $  233075
                    TASK CODE=F624A-053     **EPA=68-02-2133  ** (CNTR.)      PRIOR       FY76  / $  369600
EPA  OFFICER.. DB HARRIS                EPA/IERL   RTP
INVESTIGATOR.. HJ KOLNSBERG             RESEARCH CORP  OF NEW ENGLAND
               JE YOCOM                 RESEARCH CORP  OF NEW ENGLAND
               PW KALIKA                RESEARCH CORP  OF NEW ENGLAND
               RE KENSON                RESEARCH CORP. OF NEW ENGLAND
               PT BARTLETT              RESEARCH CORP. OF NEW ENGLAND
MILESTONES.... 05/76 -CONDUCT SYMPOSIUM
               05/76 -TECHNICAL MANUAL ON FUGITIVE EMISSION MEASUREMENT: UPWIND/DOWNWIN
               05/76 -TECHNICAL MANUAL ON FUGITIVE EMISSION MEASUREMENT: QUASI-STACK
               05/76 -TECHNICAL MANUAL ON FUGITIVE EMISSION MEASUREMENT: ROOF MONITOR
               05/77 -CONDUCT SECOND SYMPOSIUM
               07/77 -TECHNICAL MANUAL ON SAMPLING STORMWATER RUNOFF
               04/78 -DESIGN FUGITIVE ASSESSMENT SAMPLING TRAIN
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001537          SSIE-GMA  2743 1      EPA -68-02-2133       TASK-F624A-053
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: TO PROVIDE FUGITIVE EMISSION MEASUREMENT METHODOLOGIES REQUIRED FOR ENVIRONMENTAL
                ASSESSMENT AND CONTROL TECHNOLOGY DEVELOPMENT PROJECTS RELATED TO STATIONARY SOURCE ENERGY AND
                INDUSTRIAL PROCESS PROGRAMS OF THE ENVIRONMENTAL PROTECTION AGENCY. APPROACH: CONDUCT A CONTINUING
                PROGRAM OF EVALUATION, DEVELOPMENT, TESTING, AND FIELD ADAPTATION OF MEASUREMENT TECHNIQUES FOR
                AIRBORNE AND WATERBORNE FUGITIVE EMISSIONS FROM PROCESS AND EFFLUENT STREAMS, INCLUDING THE
                FOLLOWING: REVIEW CURRENT PROGRAMS TO IDENTIFY MEASUREMENT REQUIREMENTS. FORMULATE SPECIFICATIONS
                FOR BASIS SAMPLING AND ANALYSIS PROCEDURES. CONDUCT LABORATORY AND FIELD STUDIES TO DETERMINE
                EFFECTIVENESS OF ADAPTING PROCEDURES TO SPECIFIC PROCESS STREAMS. REVIEW AND CRITIQUE MEASUREMENT
                PROGRAMS DEVELOPED OR PROPOSED IN OTHER EPA PROGRAMS. CONDUCT SAMPLING AND ANALYSIS PROGRAMS FOR
                SPECIAL PROJECTS. PREPARE DOCUMENTS DEFINING RECOMMENDED PROCEDURES AND THEIR APPLICATION TO
                PROCESS STREAMS.
```

**PROJECT: 01539-SAMPLING AND ANALYSIS OF REDUCED AND OXIDIZED SPECIES IN PROCESS STREAMS

```
                    STARTING/ COMPLETION DATE : 06/76   06/79 :   FUNDING    ESTIMATED   FY77  / $  385000
                    TASK CODE=F624A-054     **EPA=68-02-2165  ** (CNTR.)      PRIOR       FY76  / $  779000
EPA  OFFICER.. F  BRIDEN                EPA/IERL   RTP
INVESTIGATOR.: RF MADDALONE             THOMPSON RAMO WOOLDRIDGE INC
               EA BURNS                 THOMPSON RAMO WOOLDRIDGE INC
               RG BEIMER                THOMPSON RAMO WOOLDRIDGE INC
MILESTONES.... 01/78 -REVISE TECHNICAL MANUAL FOR INORGANIC SAMPLING AND ANALYSIS
               06/77 -TECHNICAL MANUAL FOR REDUCED INORGANIC SAMPLING AND ANALYSIS
               06/77 -TECHNICAL MANUAL FOR INORGANIC COMPOUND IDENTIFICATION
               06/77 -EVALUATION OF TOTAL SULFUR AND TOTAL ASH MONITORS FOR COAL
               06/77 -PROCEDURES MANUALS FOR INORGANIC MEASUREMENT IN SPECIFIED PROCESS      ES
               01/78 -ISSUE PROCEDURES FOR ANALYSIS OF SULFUR FORMS IN COAL
               02/78 -TECHNICAL MANUAL FOR REDUCED INORGANIC SAMPLING AND ANALYSIS
               06/79 -DEVELOP PROCEDURES FOR COMPOUND
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001539          SSIE-GMA  3355 1      EPA -68-02-2165       TASK-F624A-054
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: THE PRIMARY OBJECTIVE OF THIS PROGRAM IS TO PROVIDE THE MEASUREMENT METHODOLOGIES
                REQUIRED FOR ENVIRONMENTAL ASSESSMENT AND CONTROL TECHNOLOGY DEVELOPMENT PROJECTS RELATED TO THE
                STATIONARY SOURCE ENERGY AND INDUSTRIAL PROCESS PROGRAMS OF THE ENVIRONMENTAL PROTECTION AGENCY.
                APPROACH: THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONDUCTING BOTH THE BASIC DEVELOPMENT EFFORT AND
                THE PROGRAMS NECESSARY TO ADAPT, APPLY AND EVALUATE THE APPLICATION OF THESE AND OTHER SAMPLING AND
                ANALYTICAL TECHNIQUES ON SPECIFIC ENGINEERING STUDIES. OUTPUTS: (1) LEVEL 1 MANUAL REVISIONS; (2)
                LIMESTONE FGD DEMO SUPPORT; (3) OCEAN INCINERATION; (4) COAL CONVERSION TEST MANUAL; (5) FLUIDIZED
                BED COMBUSTOR SUPPORT; (6) COAL PROCESSING FLOW METERS; (7) CONTINUOUS FLOW IMPACTOR; (8)
                PARTICULATE MEASUREMENT ERRORS; (9) SO3 PROCEDURE MANUAL; (10) SASS LEVEL I CHECKOUT; (11)
                INORGANIC COMPOUND ANALYSIS; (12) COAL SULFUR MEASUREMENTS; (13) BAGHOUSE EVALUATION.
```

**PROJECT: 01540-EMISSIONS ASSESSMENT OF CONVENTIONAL COMBUSTION SYSTEMS

```
                    STARTING/ COMPLETION DATE : 09/76   05/80 :   FUNDING    ESTIMATED   FY77  / $ 1036530
                    TASK CODE=F624A-055     **EPA=68-02-2197  ** (CNTR.)      PRIOR       FY76  / $ 1201800
EPA  OFFICER.. RA VENEZIA                EPA/IERL   RTP
INVESTIGATOR.: BJ MATTHEWS               THOMPSON RAMO WOOLDRIDGE INC
MILESTONES...: 11/77 -FINAL REPORT FOR RESIDENTIAL SOURCES
               01/78 -FINAL REPORT FOR INTERNAL COMBUSTION, ELECTRICITY GENERATION SOUR
               09/78 -FINAL REPORT EXTERNAL COMBUSTION, ELECTRICITY GENERATION SOURCES
               03/79 -FINAL REPORT COMMERCIAL/INSTITUTIONAL SOURCES
               02/80 -FINAL REPORT INDUSTRIAL SOURCES
               05/80 -FINAL REPORT EXECUTIVE SUMMARY
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001540           SSIE-GMA  3358 1      EPA -68-02-2197       TASK-F624A-055
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT......
```

THIS PROJECT WILL ASSESS THE AIR AND WATER POLLUTANTS FROM FIFTY-ONE COMBUSTION CATEGORIES, INCLUDING RESIDENTIAL, COMMERCIAL/INSTITUTIONAL, INDUSTRIAL AND UTILITY. SAMPLING AND ANALYSIS INCLUDES THE FOLLOWING: LEVEL 1 INORGANIC AND ORGANIC ANALYSIS, PARTICULATE MATTER BY AT LEAST FOUR SIZE FRACTIONS, PARTICULATE SULFATE, POM, PCB, SOX, AND NOX. THE EMISSION RATES OF THE POLLUTANTS WILL BE DETERMINED BY THE MOST APPROPRIATE MEANS, SUCH AS FIELD SAMPLING, MATERIAL BALANCE CALCULATIONS, OR MANIPULATION OF EXISTING DATA.

**PROJECT: 01561-PROJECT DEFINITION PHASE STUDY FOR AN INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGY

```
                    STARTING/ COMPLETION DATE : 01/77   07/77 :   FUNDING :  ESTIMATED   FY77  / $   50000
                    TASK CODE=F624A-074     **EPA=68-02-2622  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. R  HANSEN                 EPA/IERL   RTP
INVESTIGATOR.. RS DAVIDSON               BATTELLE MEMORIAL INST
               RF AYERS                  BATTELLE MEMORIAL INST
               AN CHRISTAKIS             BATTELLE MEMORIAL INST
               RW COBB                   BATTELLE MEMORIAL INST
               EH HALL                   BATTELLE MEMORIAL INST
               WJ SHEPPARD               BATTELLE MEMORIAL INST
MILESTONES.... 01/77 -CONTRACT AWARD   COMPETITIVE
               07/77 -PHASE I (WORK PLAN AND PROPOSAL FOR PHASE II)   COMPLETED
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001561           SSIE-GMA  3496        EPA -68-02-2622       TASK-F624A-074
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT......
```

OBJECTIVES: THIS PROJECT IS PHASE I DEFINITION PHASE, WILL INCLUDE THE FOLLOWING OBJECTIVES. 1. A METHODOLOGY FOR INTEGRATING THE RESULTS OF COMPLETED AND ONGOING EPA/IERL "ENVIRONMENTAL ASSESSMENTS" OF COAL BASED ENERGY AND ENVIRONMENTAL QUALITY CONTROL TECHNOLOGIES. 2. A METHODOLOGY FOR CONDUCTING A COMPARATIVE ASSESSMENT OF THE ENVIRONMENTAL, SOCIAL, ECONOMIC, AND ENERGY IMPACTS OF COAL BASED ENERGY TECHNOLOGIES, SUPPLY SYSTEMS, AND END USES. 3. A METHODOLOGY FOR ASSESSING NATIONAL IMPACTS FOR ALL COMPONENTS OF COAL ENERGY SUPPLY SYSTEMS; EXTRACTION; FUEL STOCK TRANSPORTATION; PROCESSING; CONVERSION; ENERGY PRODUCT TRANSPORTATION; AND END USE. 4. APPROACHES TO IDENTIFYING, ANALYZING, AND COMPARING TECHNOLOGICAL AND INSTITUTIONAL METHODS OF AVOIDING, OR MITIGATING UNDESIRABLE CONSEQUENCES OF COAL ENERGY DEVELOPMENT. 5. PROPOSE WAYS OF IDENTIFYING AND COMPARING THE EFFECTS OF ALTERNATIVE ENERGY RELATED ENVIRONMENTAL POLICIES AND POLICY IMPLEMENTATION STRATEGIES. APPROACH: BATTELLE'S COLUMBUS LABORATORIES WILL PREPARE A WORKPLAN FOR CONDUCTING A FULL SCALE ASSESSMENT OF COAL-BASED TECHNOLOGY AND DEVELOP A COST PROPOSAL. THE SUBJECT AREA OF THE WORKPLAN WILL HAVE AS ITS SCOPE; COAL PRODUCTION, PREPARATION, TRANSPORTATION, CONVERSION, AND UTILIZATION. THE BOUNDARIES FOR THE FULL ASSESSMENT ARE TO BE CHOSEN IN THE PROJECT DEFINITION PHASE. FORECASTING OF THE TOTAL COAL DEMAND AS WELL AS THE DEMAND FOR OTHER FUELS WILL BE INCLUDED IN THE ANALYSIS. FOR ANY LEVEL OF COAL DEMAND IMPACTS WILL BE FORECAST, AND TRADEOFFS BETWEEN DIFFERENT COAL UTILIZATION SYSTEMS WILL BE COVE

**PROJECT: 01562-AN INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGIES PROJECT DEFINITION PHASE

STARTING/ COMPLETION DATE : 01/77 07/77 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=F624A-075 **EPA=68-02-2621 ** (CNTR.) PRIOR FY /

EPA OFFICER.. R HANSEN EPA/IERL RTP
INVESTIGATOR.. JD STUART RADIAN CORP
CP BARTOSH RADIAN CORP
BR EPPRIGHT RADIAN CORP
JC LACY RADIAN CORP
PS DZIERLENGA RADIAN CORP
SH SPURR UNIVERSITY OF TEXAS
M BLISSETT UNIVERSITY OF TEXAS
MILESTONES...: 01/77 -CONTRACT AWARD COMPETITIVE
07/77 -PHASE I (WORK PLAN AND PROPOSAL FOR PHASE II) COMPLETED
PLAN ID.....: (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001562 SSIE-GMA 4407 EPA -68-02-2621 TASK-F624A-075
AP -624A DU -L110 LABT-EMI
ABSTRACT..... DEVELOP METHODOLOGY AND FORMULATE A WORK PLAN FOR A TWO AND ONE-HALF YEAR PROGRAM. (1) TO COLLECT AND INTEGRATE THE RESULTS OF (A) EPA'S ONGOING EFFORTS AT ASSESSING THE ENVIRONMENTAL, ENERGY, AND ECONOMIC IMPACT OF CONVENTIONAL COAL-BASED SYSTEMS, (B) THE RECENTLY INITIATED ENVIRONMENTAL ASSESSMENTS OF EMERGING COAL-BASED ENERGY TECHNOLOGIES SPONSORED BY EPA, AND (C) OTHER STUDIES BY OTHER ORGANIZATIONS (OTHER THAN EPA) ON RELATED TOPICS. (2) TO IDENTIFY, DESCRIBE, AND QUANTIFY THE RANGE AND MAGNITUDE OF BIOPHYSICAL, SOCIOECONOMIC, AND ENERGY IMPACTS ASSOCIATED WITH EACH COAL-BASED TECHNOLOGY. (3) TO IDENTIFY, DESCRIBE, COMPARE, AND QUANTIFY WHERE POSSIBLE THE RANGE AND MAGNITUDE OF BIOPHYSICAL, SOCIOECONOMIC, AND ENERGY IMPACTS OF ALTERNATIVE MIXES, RATES, LEVELS, AND TIMING OF THE DEVELOPMENT AND DEPLOYMENT OF COAL-BASED ENERGY TECHNOLOGIES, SUPPLY SYSTEMS, AND END USES. (4) TO IDENTIFY AND COMPARATIVELY ANALYZE TECHNOLOGICAL AND INSTITUTIONAL METHODS OF AVOIDING OR MITIGATING UNDESIRABLE IMPACTS. PARTICULAR ATTENTION WILL BE GIVEN TO THE RESPONSIBILITIES OF THE ENVIRONMENTAL PROTECTION AGENCY AS SPECIFIED BY RELEVANT LAWS, DIRECTIONS, ORDERS, ETC.

**PROJECT: 01563-INTEGRATED ASSESSMENT OF COAL BASED ENERGY TECHNOLOGY--PROJECT DEFINITION PHASE

STARTING/ COMPLETION DATE : 01/77 07/77 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=F624A-076 **EPA=68-02-2623 ** (CNTR.) PRIOR FY /

EPA OFFICER.. R HANSEN EPA/IERL RTP
INVESTIGATOR.. W HARMAN S R I INTERNATIONAL
P DORSET S R I INTERNATIONAL
MILESTONES...: 01/77 -CONTRACT AWARD COMPETITIVE
07/77 -PHASE I (WORK PLAN AND PROPOSAL FOR PHASE II) COMPLETED
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001563 SSIE-GMA 3505 EPA -68-02-2623 TASK-F624A-076
AP -624A DU -L110 LABT-EMI
ABSTRACT.....: THE PROJECT DEFINITION PHASE OF THIS STUDY CONSISTS OF EFFORTS TO EXPLICITLY SCOPE THE SUBSEQUENT ASSESSMENT WORK; ESTABLISH PROCEDURES TO SELECT THE MOST RELEVANT TECHNOLOGIES; IDENTIFY AND ASSEMBLE RELEVANT LITERATURE AND DATA; DELINEATE METHODOLOGIES TO UNCOVER AND ANALYZE BOTH THE DIRECT AND INDIRECT ENVIRONMENTAL, ECONOMIC, SOCIAL, INSTITUTIONAL, AND LEGAL IMPACTS OF DEPLOYING THESE TECHNOLOGIES; DEFINE METHODOLOGIES FOR COMPARING THE IMPACTS OF THE VARIOUS TECHNOLOGIES; AND DEVELOP POLICY ALTERNATIVES FOR THE DEVELOPMENT OF COAL-BASED TECHNOLOGIES. A PLAN TO PACKAGE THE RESULTS IN A FORM THAT WILL BE USEFUL TO ENVIRONMENTAL AND ENERGY POLICY DECISIONMAKERS WILL ALSO BE DEVELOPED. THE PRODUCT OF THE PROJECT DEFINITION PHASE WILL, IN EFFECT, BE A DETAILED PROPOSAL FOR THE CONDUCT OF THE ACTUAL ASSESSMENT ITSELF WHICH WOULD BE DONE IN THE SUBSEQUENT INTEGRATED ASSESSMENT PHASE.

**PROJECT: 01564-A SURVEY OF THE USE AND EMISSION OF SELECTED CARCINOGENS IN NEW JERSEY

STARTING/ COMPLETION DATE : 10/77 10/80 : FUNDING ESTIMATED FY77 / $ 55000
TASK CODE=F624A-077 **EPA=R805501-01 ** (GRANT) PRIOR FY /

EPA OFFICER.: JA MCSORLEY EPA/IERL RTP
INVESTIGATOR.: PW PREUSS STATE DEPT OF ENV PROT
MILESTONES.... 09/77 -GRANT AWARD
09/80 -GRANT COMPLETION
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001564 SSIE-GMA 4131 EPA -R805501-01 TASK-F624A-077
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVES OF THE PROJECT: 1. TO ESTABLISH A COMPUTERIZED DATA BASE CONCERNING THE MANUFACTURE, USE, STORAGE, PROCESSING, FORMATION, RELEASE, DISPOSAL AND REPACKAGING IN NJ OF A GROUP OF CARCINOGENIC SUBSTANCES SELECTED ON THE BASIS OF THEIR LARGE VOLUME OF PRODUCTION AND/OR THEIR CARCINOGENICITY. 2. TO IDENTIFY THE AREA OF THE STATE AND POPULATION GROUP THAT ARE SUBJECT TO AN INCREASED CANCER RISK DUE TO EXPOSURE TO CANCER CAUSING SUBSTANCES AND OTHER TOXIC AGENTS IN THE ENVIRONMENT. 3. TO ESTABLISH A BASE FOR THE STUDY OF METHODS OF REDUCING OR ELIMINATING THE RELEASE OF CARCINOGENS INTO THE ENVIRONMENT. THE DATA BASE WILL PERMIT DETERMINATIONS OF THE FOLLOWING: A. A COMPREHENSIVE INVENTORY OF THE SELECTED CARCINOGENS IN NEW JERSEY; B. THE INDUSTRIAL LOCATIONS WHERE THE SELECTED CARCINOGENS ARE USED, MANUFACTURED, STORED, RELEASED, FORMED, REPACKAGED, ETC., AND THE QUANTITY OF THE CARCINOGEN HANDLED AT EACH LOCATION; C. THE PRODUCTS WHICH ARE MANUFACTURED FROM THE SELECTED CARCINOGENS; D. THE QUANTITY OF THE SUBSTANCES EMITTED AND/OR RELEASED TO THE ATMOSPHERE, WATER AND SOLID WASTE STREAM; E. THE POTENTIAL OCCUPATIONAL AND COMMUNITY EXPOSURE TO THE SELECTED MATERIALS.

**PROJECT: 01566-QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 03/77   03/78     FUNDING    ESTIMATED   FY77  / $  283600
                    TASK CODE=F624A-079     **EPA=68-02-2611  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. J  MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.. F  MORENO                  ACUREX CORP                          AEROTHERM DIV
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001566            SSIE-GMA  4196        EPA -68-02-2611       TASK-F624A-079
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROGRAM IS TO PROVIDE SUPPORT AND ASSISTANCE TO THE ENVIRONMENTAL PROTECTION
                AGENCY. WORK WILL BE ACCOMPLISHED BY MEANS OF SPECIFIC WORK ASSIGNMENTS MADE BY THE AGENCY. PLANNED
                AREAS OF WORK ARE LISTED BELOW. 1) ECONOMIC AND ENVIRONMENTAL ASSESSMENT OF POLLUTION CONTROL
                EQUIPMENT; 2) PROCESS ANALYSIS; 3) PREPARATION OF COST ESTIMATES FOR POLLUTION CONTROL SYSTEMS
                BEING DEVELOPED FOR EPA; 4) PROCESS RESEARCH; 5) EVALUATION OF ENERGY CONSERVATION POTENTIAL OF NEW
                POLLUTION CONTROL TECHNOLOGIES; 6) ENGINEERING ANALYSIS OF MAJOR EPA PROGRAM ELEMENTS; 7)
                ASSESSMENT OF R AND D PROGRAMS IN COAL CONVERSION, COAL EXTRACTION, AND COAL RECLAMATION; 8)
                SURVEYS OF PROCESS EMISSIONS AND POLLUTION CONTROL TECHNOLOGY; 9) IDENTIFICATION OF NEW
                ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS OFFERING IMPROVED UTILIZATION OF FOSSIL FUELS; 10)
                TECHNICAL SERVICES INCLUDING SITE PLANNING RECOMMENDATIONS, PROCESS EQUIPMENT DESIGN, REPORT
                PREPARATION, DATA COMPILATION, PREPARATION OF TECHNICAL SYMPOSIA, AND RELATED SERVICES; 11)
                ASSISTANCE TO EPA REGIONAL OFFICES IN THE AREAS LIS
```

**PROJECT: 01567-ENGINEERING SERVICES IN SUPPORT OF ENVIRONMENTAL PROTECTION AGENCY SPECIFIC WORK ASSIGNMENTS

```
                    STARTING/ COMPLETION DATE : 03/77   03/79     FUNDING    ESTIMATED   FY77  / $  110000
                    TASK CODE=F624A-080     **EPA=68-02-2616  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: J  MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.: GH DYER                    BECHTEL NATIONAL INC
               RG DUTHIE                  BECHTEL NATIONAL INC
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001567            SSIE-GMA  4202        EPA -68-02-2616       TASK-F624A-080
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... THIS CONTRACT PROVIDES FOR ENGINEERING AND TECHNICAL SERVICES IN SUPPORT OF VARIOUS PROJECTS AS MAY
                BE ASSIGNED BY EPA OR OTHER RELATED GOVERNMENT ENTITIES. SPECIFIC PROJECTS THAT ARE PERFORMED WILL
                FALL WITHIN THE FOLLOWING CATEGORY TITLES: 1. ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF
                THE POLLUTION CONTROL SYSTEMS AS THEY BECOME COMMERCIALLY AVAILABLE TO THE USER INDUSTRIES. 2.
                PROCESS ANALYSIS. 3. PROVIDING DETAILED COST ESTIMATES FOR THE POLLUTION CONTROL SYSTEMS THAT ARE
                BEING DEVELOPED BY EPA. 4. PROCESS RESEARCH. 5. EVALUATING THE ENERGY CONSERVATION POTENTIAL OF NEW
                POLLUTION CONTROL TECHNOLOGIES WITH THE EMPHASIS PLACED ON NEAR-TERM PAYOFF SYSTEMS. 6. ENGINEERING
                ANALYSIS. 7. ASSESSING R AND D PROGRAMS IN COAL LIQUEFACTION, LOW, MEDIUM, AND HIGH BTU
                GASIFICATION; ADVANCED COMBINATION RESEARCH; AND IMPROVED COAL EXTRACTION AND RECLAMATION
                TECHNIQUES. 8. PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEY. 9. IDENTIFYING NEW ENVIRONMENTALLY
                ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF FOSSIL FUELS. 10.
                ASSOCIATED TECHNICAL SERVICES. 11. REGIONAL ASSISTANCE AND STATE IMPLEMENTATION PLANNING.
```

**PROJECT: 01568-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 02/77   02/79 :   FUNDING    ESTIMATED   FY77  / $   15000
                    TASK CODE=F624A-081     **EPA=68-02-2607  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. JH MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.. R  BRADWAY                 G C A CORP                           TECH DIV
               R  HALL                    G C A CORP                           TECH DIV
               P  FENNELLY                G C A CORP                           TECH DIV
               R  PATTERSON               G C A CORP                           TECH DIV
               N  SURPRENANT              G C A CORP                           TECH DIV
               A  WERNER                  G C A CORP                           TECH DIV
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001568            SSIE-GMA  3557        EPA -68-02-2607       TASK-F624A-081
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... THE WORK TO BE PERFORMED UNDER THIS CONTRACT IS IN SUPPORT OF THE TECHNICAL FUNCTIONS CARRIED OUT BY
                THE ENVIRONMENTAL PROTECTION AGENCY. SPECIFIC WORK ASSIGNMENTS WILL BE FOR WORK IN THE FOLLOWING
                AREAS: 1. ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF THE POLLUTION CONTROL SYSTEMS AS THEY
                BECOME COMMERCIALLY AVAILABLE TO THE USER INDUSTRIES. 2. PROCESS ANALYSIS. 3. PROVIDING DETAILED
                COST ESTIMATES FOR POLLUTION CONTROL SYSTEMS THAT ARE BEING DEVELOPED BY THE EPA. 4. PROCESS
                RESEARCH. 5. EVALUATING THE ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES
                WITH THE EMPHASIS PLACED ON NEAR TERM PAYOFF SYSTEMS. 6. ENGINEERING ANALYSIS. 7. ASSESSING R/D
                PROGRAMS IN COAL LIQUEFACTION, LOW, MEDIUM, AND HIGH BTU GASIFICATION; ADVANCED COMBUSTION
                RESEARCH; AND IMPROVED COAL EXTRACTION AND RECLAMATION TECHNIQUES. 8. PROCESS EMISSIONS AND CONTROL
                TECHNOLOGY SURVEY. 9. IDENTIFYING NEW ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE
                CLEANER, MORE EFFICIENT UTILIZATION OF FOSSIL FUELS. 10. ASSOCIATED TECHNICAL SERVICES. 11.
                REGIONAL ASSISTANCE AND STATE IMPLEMENTATION PLANNI
```

**PROJECT: 01569-NONPERSONAL QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 03/77   03/79 :   FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=F624A-082    **EPA=68-02-2606  ** (CNTR.)      PRIOR       FY    /
 EPA  OFFICER.: J  MCSORLEY                EPA/IERL   RTP
 INVESTIGATOR.: V  YAMADA                  PAC ENV SERVS INC
 MILESTONES...: 03/77 -CONTRACT AWARD
                03/79 -ESTIMATED CONTRACT COMPLETION DATE
 PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
 ORDIS CODES..: RECN-001569            SSIE-GMA  4199        EPA -68-02-2606       TASK-F624A-082
                AP  -624A              DU  -L110             LABT-EMI
 ABSTRACT.....: PACIFIC ENVIRONMENTAL SERVICES, INC. (PES) WILL PERFORM ON A WORK ASSIGNMENT BASIS STUDIES IN THE
                 FOLLOWING AREAS: (1) ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF THE POLLUTION CONTROL
                 SYSTEMS AS THEY BECOME COMMERCIALLY AVAILABLE TO THE USER INDUSTRIES; (2) PROCESS ANALYSIS; (3)
                 PROVIDING DETAILED COST ESTIMATES FOR THE POLLUTION CONTROL SYSTEMS THAT ARE BEING DEVELOPED BY
                 EPA; (4) PROCESS RESEARCH; (5) EVALUATING THE ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION
                 CONTROL TECHNOLOGIES WITH THE EMPHASIS PLACED ON NEAR-TERM PAYOFF SYSTEMS; (6) ENGINEERING
                 ANALYSIS; (7) ASSESSING R AND D PROGRAMS IN COAL LIQUEFACTION, LOW, MEDIUM, AND HIGH BTU
                 GASIFICATION; ADVANCED COMBINATION RESEARCH; AND IMPROVED COAL EXTRACTION AND RECLAMATION
                 TECHNIQUES; (8) PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEY; (9) IDENTIFYING NEW
                 ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER MORE EFFICIENT UTILIZATION OF
                 FOSSIL FUELS; (10) ASSOCIATED TECHNICAL SERVICES; (11) REGIONAL ASSISTANCE AND
```

**PROJECT: 01570-NON-PERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 03/77   03/79 :   FUNDING    ESTIMATED   FY77  / $  270800
                    TASK CODE=F624A-083    **EPA=68-02-2603  ** (CNTR.)      PRIOR       FY    /
 EPA  OFFICER.: JA MCSORLEY                EPA/IERL   RTP
 INVESTIGATOR.. RW GERSTLE                 PEDCO ENVIRONMENTAL INC
                TW DEVITT                  PEDCO ENVIRONMENTAL INC
 MILESTONES...: 03/77 -CONTRACT AWARD
                03/79 -ESTIMATED CONTRACT COMPLETION DATE
 PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
 ORDIS CODES..: RECN-001570            SSIE-GMA  4197        EPA -68-02-2603       TASK-F624A-083
                AP  -624A              DU  -L110             LABT-EMI
 ABSTRACT..... THE WORK TO BE PERFORMED UNDER THIS CONTRACT IS IN SUPPORT OF THE TECHNICAL FUNCTIONS CARRIED OUT BY
                THE ENVIRONMENTAL PROTECTION AGENCY. SPECIFIC WORK ASSIGNMENTS WILL BE FOR WORK IN THE FOLLOWING
                AREAS: 1. ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF THE POLLUTION CONTROL SYSTEMS AS THEY
                BECOME COMMERCIALLY AVAILABLE TO THE USER INDUSTRIES. 2. PROCESS ANALYSIS. 3. PROVIDING DETAILED
                COST ESTIMATES FOR POLLUTION CONTROL SYSTEMS THAT ARE BEING DEVELOPED BY THE EPA. 4. EVALUATING THE
                ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES WITH THE EMPHASIS PLACED ON
                NEAR TERM PAYOFF SYSTEMS. 6. ENGINEERING ANALYSIS. 7. ASSESSING R/D PROGRAMS IN COAL LIQUEFACTION,
                LOW, MEDIUM, AND HIGH BTU GASIFICATION; ADVANCED COMBUSTION RESEARCH; AND IMPROVED COAL EXTRACTION
                AND RECLAMATION TECHNIQUES. 8. PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEY. 9. IDENTIFYING NEW
                ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF
                FOSSIL FUELS. 10. ASSOCIATED TECHNICAL SERVICES. 11. REGIONAL ASSISTANCE AND STATE IMPLEMENTATION
                PLANNING.
```

**PROJECT: 01571-NON-PERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 05/77   05/79     FUNDING :  ESTIMATED   FY77  / $   15000
                    TASK CODE=F624A-084    **EPA=68-02-2619  ** (CNTR.)      PRIOR       FY    /
 EPA  OFFICER.. JA MCSORLEY                EPA/IERL   RTP
 INVESTIGATOR.: WM TALBERT                 M.W. KELLOGG CO
 MILESTONES...: 03/77 -CONTRACT AWARD
                03/79 -ESTIMATED CONTRACT COMPLETION DATE
 PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
 ORDIS CODES..: RECN-001571            SSIE-GMA  4201        EPA -68-02-2619       TASK-F624A-084
                AP  -624A              DU  -L110             LABT-EMI
 ABSTRACT.....: AN EPA CONTRACTING OFFICER WILL ISSUE SPECIFIC TASKS OF WORK WHICH WILL FALL INTO ONE OF THE
                 FOLLOWING CATEGORIES: 1. ASSESSMENT OF THE ENVIRONMENTAL AND ECONOMIC IMPACT OF POLLUTION CONTROL
                 SYSTEMS. 2. PROCESS ANALYSIS OF EARLY STAGE RESEARCH RESULTS. 3. COST ESTIMATES FOR THE POLLUTION
                 CONTROL SYSTEMS BEING DEVELOPED BY THE EPA. 4. ENGAGING IN PROCESS RESEARCH. 5. EVALUATION OF THE
                 ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES. 6. DETERMINE THE ENVIRONMENTAL
                 IMPACTS THAT RESULT FROM AIR POLLUTION CONTROL PROCESSES AND SYSTEMS. 7. ASSESSMENT OF R AND D
                 PROGRAMS IN COAL LIQUEFACTION; LOW-, MEDIUM, AND HIGH-BTU GASIFICATION; ADVANCED COMBUSTION
                 RESEARCH; AND IMPROVED COAL EXTRACTION AND RECLAMATION TECHNIQUES. 8. SURVEY PROCESS EMISSIONS AND
                 CONTROL TECHNOLOGY OF DESIGNATED INDUSTRIAL SOURCES TO DEFINE RESEARCH DEVELOPMENT, AND
                 DEMONSTRATION REQUIREMENTS. 9. IDENTIFY NEW ENVIRONMENTALLY ACCEPTABLE FOSSIL FUEL POWER SYSTEMS.
                 10. PROVIDE TECHNICAL SERVICES IN THE AREAS OF SITE PLANNING, CONFIGURATION OF POWER PLANT PROCESS
                 LAYOUTS, PROCESS EQUIPMENT DESIGN, PREPARATION OF ENGINEERING REPORTS SUCH AS COMPUTATION OF
                 EMISSION BY PROCESS AND SOURCE, AND OTHER ENGINEERING STUDIES. 11. ASSIST REGIONAL EPA OFFICES AND
                 STATE POLLUTION CONTROL AGENCIES IN CONTROL IMPLEMENTATION PLANNING. THE MAJORITY OF WORK
                 ASSIGNMENTS WILL BE COMPLETED BY PULLMAN KELLOGG PERSONNEL, BUT A PART OF THE OVERALL EFFORT MAY BE
                 SUBCONTRACTED TO OUTSIDE COMPANIES.
```

**PROJECT: 01572-QUICK RESPONSE NON-PERSONAL TECHNICAL AND ENGINEERING SERVICES

```
                    STARTING/ COMPLETION DATE : 02/77   02/79 :   FUNDING    ESTIMATED   FY77  / $  820160
                    TASK CODE=F624A-085     **EPA=68-02-2608  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. JA MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.. RM WELLS                   RADIAN CORP
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001572            SSIE-GMA  4200        EPA -68-02-2608       TASK-F624A-085
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... RADIAN WILL SUPPORT THE TECHNICAL FUNCTIONS OF EPA IN THE FOLLOWING AREAS: 1. ASSESSMENT OF
                ENVIRONMENTAL AND ECONOMIC IMPACT OF POLLUTION CONTROL SYSTEMS AS THEY BECOME COMMERCIALLY
                AVAILABLE TO THE USER INDUSTRIES. 2. PROCESS ANALYSIS. 3. PROVIDING DETAILED COST ESTIMATES FOR
                POLLUTION CONTROL SYSTEMS BEING DEVELOPED BY EPA. 4. PROCESS RESEARCH. 5. EVALUATING THE ENERGY
                CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES WITH THE EMPHASIS PLACED ON NEAR-TERM
                PAYOFF SYSTEMS. 6. ENGINEERING ANALYSIS. 7. ASSESSING R AND D PROGRAMS IN COAL LIQUEFACTION, COAL
                GASIFICATION, ADVANCED COMBINATION RESEARCH, AND IMPROVED COAL EXTRACTION AND RECLAMATION
                TECHNIQUES. 8. SURVEYING PROCESS EMISSIONS AND CONTROL TECHNOLOGY. 9. IDENTIFYING NEW
                ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF
                FOSSIL FUELS. 10. ASSOCIATED TECHNICAL SERVICES. SPECIFIC WORK ASSIGNMENTS WILL BE MADE BY THE
                ISSUANCE OF INDIVIDUAL WORK ASSIGNMENTS.
```

**PROJECT: 01573-QUICK REACTION ENGINEERING AND TECHNICAL SERVICES

```
                    STARTING/ COMPLETION DATE : 02/77   02/79 :   FUNDING    ESTIMATED   FY77  / $  178830
                    TASK CODE=F624A-086     **EPA=68-02-2610  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: J  MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.: S  OGLESBY                 SOUTHERN RESEARCH INST
               GB NICHOLS                 SOUTHERN RESEARCH INST
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001573            SSIE-GMA  4195        EPA -68-02-2610       TASK-F624A-086
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... SOUTHERN RESEARCH INSTITUTE WILL FURNISH THE NECESSARY PERSONNEL, MATERIALS, SERVICES, EQUIPMENT,
                FACILITIES AND OTHERWISE DO ALL THINGS NECESSARY FOR OR INCIDENT TO THE SUPPORT OF THE EPA IN THE
                FUNCTIONS STATED BELOW: 1. ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF POLLUTION CONTROL
                SYSTEMS AS THEY BECOME AVAILABLE TO INDUSTRY. 2. PROCESS ANALYSIS. 3. PROVIDE DETAILED COST
                ESTIMATES FOR POLLUTION CONTROL SYSTEMS BEING DEVELOPED BY EPA. 4. PROCESS RESEARCH. 5. EVALUATE
                THE ENERGY CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNOLOGIES WITH THE EMPHASIS PLACED ON
                NEAR-TERM PAYOFF SYSTEMS. 6. ENGINEERING ANALYSIS. 7. ASSESS R AND D PROGRAMS IN COAL LIQUEFACTION,
                LOW, MEDIUM, AND HIGH BTU GASIFICATION; ADVANCED COMBINATION RESEARCH AND IMPROVED COAL EXTRACTION
                AND RECLAMATION TECHNIQUES. 8. PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEY. 9. IDENTIFY NEW
                ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF
                FOSSIL FUELS. 10. ASSOCIATED TECHNICAL SERVICES. 11. REGIONAL ASSISTANCE AND STATE IMPLEMENTATION
                PLANNING.
```

**PROJECT: 01574-NONPERSONAL, QUICK REACTION ENGINEER AND TECHNICAL SERVICES (MOSC)

```
                    STARTING/ COMPLETION DATE : 03/77   03/79     FUNDING    ESTIMATED   FY77  / $  270800
                    TASK CODE=F624A-087     **EPA=68-02-2613  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. JA MCSORLEY                EPA/IERL   RTP
INVESTIGATOR.. I  ZUCKERMAN               THOMPSON RAMO WOOLDRIDGE INC
MILESTONES.... 03/77 -CONTRACT AWARD
               03/79 -ESTIMATED CONTRACT COMPLETION DATE
PLAN ID..... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001574             SSIE-GMA  3563        EPA -68-02-2613       TASK-F624A-087
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... THE WORK TO BE PERFORMED UNDER THIS CONTRACT INVOLVES SUPPORT OF THE TECHNICAL FUNCTIONS CARRIED OUT
                BY THE ENVIRONMENTAL PROTECTION AGENCY. SPECIFIC WORK ASSIGNMENTS WILL BE MADE BY ISSUANCE OF
                INDIVIDUAL TASK ORDERS. THE CONTRACTOR SHALL SUPPLY THE NECESSARY LABOR, MATERIALS, AND FACILITIES
                REQUIRED FOR PERFORMANCE OF EACH INDIVIDUAL TASK ORDER FOR WORK IN THE AREAS DELINEATED BELOW: 1.
                ASSESSMENT OF ENVIRONMENTAL AND ECONOMIC IMPACT OF THE POLLUTION CONTROL SYSTEMS. 2. PROCESS
                ANALYSIS OF RESEARCH RESULTS TO DETERMINE TECHNICAL FEASIBILITY, RECOMMEND SUPPLEMENTAL RESEARCH,
                AND TO RECOMMEND DESIGN AND OPERATING CONDITIONS FOR LARGER SCALE SYSTEMS. 3. DEVELOPMENT OF
                DETAILED COST ESTIMATES FOR THE POLLUTION CONTROL SYSTEMS THAT ARE BEING DEVELOPED BY EPA. 4.
                PROCESS RESEARCH INCLUDING PROCESS CHEMISTRY, REACTION KINETICS, OR OTHER PHENOMENA; DEVELOPMENT OF
                ANALYTICAL METHODS; AND CHEMICAL ANALYSES OF PROCESS MATERIALS. 5. EVALUATION OF THE ENERGY
                CONSERVATION POTENTIAL OF NEW POLLUTION CONTROL TECHNIQUES. 6. ASSESSMENT OF R AND D PROGRAMS IN
                COAL LIQUEFACTION; COAL GASIFICATION; ADVANCED COMBUSTION RESEARCH; AND IMPROVED COAL EXTRACTION
                AND RECLAMATION TECHNIQUES. 7. PROCESS EMISSIONS AND CONTROL TECHNOLOGY SURVEYS OF DESIGNATED
                INDUSTRIAL SOURCES. 8. IDENTIFICATION OF NEW ENVIRONMENTALLY ACCEPTABLE POWER SYSTEMS THAT CAN
                PROVIDE CLEANER, MORE EFFICIENT UTILIZATION OF FOSSIL FUELS. 9. ASSOCIATED TECHNICAL SERVICES
                INCLUDING PREPARATION OF SPECIAL ENGINEERING REPORTS, REPORTS OF SPECIFIC ENVIRONMENTAL SCIENCE AND
                TECHNOLOGY DEVELOPMENTS, AND THE FORMULATION AND PREPARATION OF TECHNICAL SYMPOSIA RELATED TO
                POLLUTION CONTROL SYSTEMS. 10. REGIONAL ASSISTANCE AND STATE IMPLEMENTATION PLANNING, SUPPORT ON AN
                AS-NEEDED BASIS TO THE EPA REGIONAL OFFICES AND, IN SOME CASES, TO VARIOUS STATE AND LOCAL
                POLLUTION CONTROL AGENCIES.
```

**PROJECT: 01576-MEASUREMENT AND EVALUATION PROCEDURES FOR ENVIRONMENTAL R AND D

```
                    STARTING/ COMPLETION DATE : 07/77   06/78 :   FUNDING    ESTIMATED   FY77  / $  136451
                    TASK CODE=F624A-089     **EPA=R805356-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. SZ SHARIQ                EPA/IERL   RTP
INVESTIGATOR.. AH RUBENSTEIN            NORTHWESTERN UNIV
               PH FARQUHAR              NORTHWESTERN UNIV
               N  BAKER                 UNIVERSITY OF CINCINNATI
               WE SOUDER                UNIVERSITY OF PITTSBURGH
               AP HURTER                NORTHWESTERN UNIV
               E  GEISLER               NORTHEASTERN ILL. STATE UNIV.
               AK CHAKRABARTI           DREXEL UNIV
MILESTONES.... 06/78 -PHASE I FINAL REPORT: RECOMMENDATIONS ON MEASUREMENT AND EVALUATI
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001576          SSIE-GMA  4129        EPA -R805356-01       TASK-F624A-089
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... AS PART OF ITS EFFORTS IN PROMOTING BOTH IMPROVED ENVIRONMENTAL ASSESSMENTS AND POLLUTION CONTROL
                TECHNOLOGIES FOR INDUSTRIAL PROCESSES AND ENERGY PRODUCTION, IERL-RTP CARRIES OUT FIVE BASIC
                ACTIVITIES: (1) THE ASSESSMENT OF AREAS WHERE CONTROL TECHNOLOGIES ARE LIKELY TO HAVE SIGNIFICANT
                ENVIRONMENTAL IMPACT, (2) THE TRANSLATION OF SUCH ASSESSMENTS INTO SPECIFIC R AND D WORK UNITS AND
                THE ALLOCATION OF FUNDS NEEDED TO CARRY OUT THIS WORK, (3) THE IDENTIFICATION OF PROJECTS AND
                FUNDING OF CONTRACTORS TO ACCOMPLISH THE WORK UNITS PLANNED, (4) THE MONITORING AND EVALUATION OF
                THE PROGRESS AND PERFORMANCE ON VARIOUS R AND PROJECTS, AND (5) THE DISSEMINATION OF RESULTS FROM R
                AND D PROJECTS TO POTENTIAL USERS. THE PRIMARY GOAL OF THE PROPOSED RESEARCH IS TO SUPPORT THESE
                BASIC ACTIVITIES AT IERL-RTP BY PROVIDING EFFECTIVE METHODS TO: (1) IDENTIFY THE TECHNOLOGICAL,
                ENVIRONMENTAL, AND RELATED GOALS NEEDED TO DETERMINE HIGH IMPACT AREAS FOR R AND D PLANNING, (2)
                ESTABLISH PRIORITIES AMONG SUB-OBJECTIVES AND WORK UNITS SO THAT RATIONAL BUDGET ALLOCATION
                DECISIONS CAN BE MADE, (3) HELP IMPROVE THE DECISION/BUDGETING PROCESS AT VARIOUS ORGANIZATIONAL
                LEVELS AT IERL-RTP AND AT DIFFERENT POINTS IN THE PLANNING CYCLE, (4) INVESTIGATE THE END-USES OF R
                AND D WORK AND ESTABLISH A SYSTEM FOR INFORMATION DISSEMINATION OUTSIDE THE LABORATORY CONSISTENT
                WITH THE MISSION AND RESOURCES OF IERL-
```

**PROJECT: 01577-WASTE HEAT UTILIZATION

```
                    STARTING/ COMPLETION DATE : 05/75   09/80 :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=F624A-090     **EPA=D5-E721-BF  ** ( IAG )      PRIOR       FY76  / $  420000
EPA  OFFICER.: JP CHASSE                EPA/IERL   RTP
INVESTIGATOR.: BJ BOND                  US TVA
               CE MADEWELL              US TVA
               JJ MADDOX                US TVA
               DA MAYS                  US TVA
               RS PILE                  US TVA
               L  BEHRENDS              US TVA
MILESTONES.... 06/77 -COMPLETE CONSTRUCTION PILOT-SCALE PHYTOPLANKTON GROWTH SYSTEM
               06/78 -TESTING THE EFFECT OF HEAT IN PILOT-SCALE PHYTOPLANKTON SYSTEM
               12/78 -COMPLETE CONSTRUCTION OF PILOT-SCALE HEATED OUTDOOR SYSTEM
               12/78 -REPORT ON FIRST PHASE OF FISH-PHYTOPLANKTON SYSTEM
               12/79 -REPORT ON YEAR OF OPERATION OF PILOT-SCALE SYSTEM (ECONOMICS, BIO
               12/79 -COMPLETE TESING OF FIRST PHASE OF CLAM-PLANKTON PRODUCTION SYSTEM
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001577          SSIE-GMA  2950 1      EPA -D5-E721-BF       TASK-F624A-090
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT.....: TASK I. SOIL HEATING TO EXTEND CROP GROWING SEASON--SPECIFIC OBJECTIVES ARE (1) HEATING SOIL TO
                EXTEND THE CROP GROWING SEASON, AND (2) IMPROVING PRODUCTION EFFICIENCY OF FIELD AND HORTICULTURAL
                CROPS. FIELD EXPERIMENTS WERE CONTINUED IN 1977 IN PLOTS OF SOIL HEATED BY WATER CIRCULATED THROUGH
                PLASTIC PIPES. WARMER WATER THAN USED PREVIOUSLY (43 TO 49 DEGREES C) RESULTED IN EARLY SPRING
                GROWTH RESPONSE BY SWEET CORN, SNAP BEANS, PEANUTS, AND CANTALOUPES WITH YIELD INCREASES OF PEANUTS
                AND CANTALOUPES. EXPERIMENTS WERE ALSO CONTINUED IN A PLASTIC GREENHOUSE WITH WARM WATER PIPED
                THROUGH THE SOIL AS THE SOLE SOURCE SUPPLEMENTING SOLAR HEAT. AIR TEMPERATURES REMAINED ABOVE
                FREEZING EXCEPT WITH OUTSIDE NIGHT TEMPERATURES BELOW -18 DEGREES C (0 DEGREES F). COLD SEASON
                VEGETABLE CROPS WERE GROWN SUCCESSFULLY IN MIDWINTER, BUT IT WAS NECESSARY TO DELAY PLANTING OF
                WARM SEASON CROPS UNTIL LATE FEBRUARY. TASK II. BIOLOGICAL RECYCLING OF NUTRIENTS FROM LIVESTOCK
                WASTES--SPECIFIC OBJECTIVES ARE: (1) DEVELOP A METHOD THAT USES WASTE HEAT FROM ELECTRIC POWER
                PLANT DISCHARGE WATER TO ENHANCE BIOLOGICAL RECYCLING OF PLANT NUTRIENTS FROM LIVESTOCK WASTE BY
                GROWING AQUATIC AND TERRESTRIAL PLANTS (2) INVESTIGATING THE USE OF FISH, CLAMS, AND/OR OTHER
                ANIMALS TO CONSUME THE PRODUCED PLANTS, AND (3) EVALUATING THE USE OF THESE PRODUCTS AS FEEDSTUFFS
                OR LIVESTOCK FEED SUPPLEMENTS. EXPERIMENTS HAVE BEEN CONDUCTED IN UNHEATED OPEN-AIR 8000-LITER TEST
                POOLS AND IN HEATED TANKS UNDER A PLASTIC COVERING. THE WATER IS HEATED BY RUNNING WARMED WATER
                THROUGH STAINLESS STEEL HEAT EXCHANGERS. SWINE MANURE WAS USED TO FERTILIZE "NATIVE" ALGAE AND
                OTHER PLANTS. ALGAE PRODUCTION HAS BEEN GOOD, BUT SIMULATED WASTE HEAT TEMPERATURES WERE OF LITTLE
                BENEFIT DURING SUMMER. PHYTOPHAGOUS FISH (SILVER CARP, BIGHEAD CARP, AND TILAPIA) HAVE HAD GOOD
                SURVIVAL AND HIGH GROWTH RATES WHEN FED ALGAE GROWN WITH SWINE MANURES. FURTHER TESTING WILL BE
                NECESSARY TO ASSESS THE BENEFIT OF WASTE HEAT DURING THE WINTER MONTHS.
```

**PROJECT: 01582-ADVANCED WASTE HEAT CONTROL

```
                    STARTING/ COMPLETION DATE : 05/75   12/79 :   FUNDING    ESTIMATED   FY77  / $  300000
                    TASK CODE=F624A-098     **EPA=D5-E721-BE  ** ( IAG )      PRIOR       FY76  / $ 1815000
EPA  OFFICER.. JP CHASSE                  EPA/IERL   RTP
INVESTIGATOR.. HB FLORA                   US TVA
               HB FLORA                   US TVA
MILESTONES.... 06/79 -FEASIBILITY OF MEMBRANE TECHNOLOGY FOR POWER PLANT SYSTEMS
               12/79 -REPORT ON TESTING MECHANISMS TO REDUCE INTAKE STRUCTURE IMPACT
               06/79 -DEMONSTRATION OF WET/DRY COOLING TOWER TECHNOLOGY AND ENVIRONMENT      AL
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001582            SSIE-GMA  2942 1      EPA -D5-E721-BE       TASK-F624A-098
               AP  -624A              DU  -L110            LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT TO (') EVALUATE THE USE OF MEMBRANE PROCESSES, E.G. REVERSE OSMOSIS
                AND ULTRAFILTRATION, FOR REFURBISHING POWER PLANT DISCHARGE WATERS, (2) INVESTIGATE, EVALUATE, AND
                DETERMINE WHETHER ONE OR MORE MECHANISMS MAY BE BENEFICIAL IN REDUCING ENTRAPMENT AND/OR
                ENTRAINMENT, AND (3) EVALUATE THE ENGINEERING AND ENVIRONMENTAL ASPECTS OF WET/DRY COOLING TOWERS.
                THE APPROACH INCLUDES: (1) REVIEW OF AVAILABLE INFORMATION ALONG WITH LABORATORY STUDIES AND
                EVALUATION ON COMMERCIALLY AVAILABLE REVERSE OSMOSIS AND ULTRAFILTRATION MEMBRANES TO DETERMINE
                THEIR ABILITY TO RENDER POWER PLANT WASTE STREAMS SUITABLE FOR RECYCLE OR REUSE, (2) REVIEW OF
                AVAILABLE INFORMATION AND BASIC STUDIES ON THE MOST PROMISING MECHANISMS TO REDUCE ENTRAPMENT
                AND/OR ENTRAINMENT, AND (3) STUDIES AND EVALUATIONS ON THE ENGINEERING AND ENVIRONMENTAL PROBLEMS
                ASSOCIATED WITH A PROTOTYPE WET/DRY COOLING TOWER. CURRENT PROGRESS HAS INCLUDED DEMONSTRATING THAT
                ONE TYPE OF MEMBRANE HAS PROMISE FOR REMOVING TRACE INORGANICS TO BELOW 1.0 MG/L ON ONE WASTE
                STREAM. FURTHER DEVELOPMENTS IN THE INTAKE STRUCTURE TASK HAVE LED TO THE DESIGN AND LABORATORY
                TESTING OF A SYSTEM TO REDUCE ENTRAINMENT BY FINE MESH SCREENING AND TO INCREASE THE POSSIBILITY OF
                SURVIVAL FOR IMPINGED FISH. ALSO, THE FULL-SCALE DEMONSTRATION WET/DRY COOLING TOWER HAS BEEN
                PROCURED. CURRENT PLANS INCLUDE PERFORMING ECONOMIC ANALYSES ON A MEMBRANE SYSTEM THAT CAN CONFORM
                TO THE SPECIFICATIONS OBTAINED IN THE LABORATORY PILOT TESTING. TESTING ON THE INTAKE STRUCTURE
                SYSTEM WILL CONTINUE. THE FULL-SCALE WET/DRY DEMONSTRATION WILL BE TESTED FOR APPROXIMATELY NINE
                MONTHS UNDER DIFFERENT OPERATING AND METEOROLOGICAL CONDITIONS.
```

**PROJECT: 01583-CHARACTERIZATION OF EFFLUENTS FROM COAL-FIRED UTILITY BOILERS

```
                    STARTING/ COMPLETION DATE : 05/75   12/79 :   FUNDING :  ESTIMATED   FY77  / $  350000
                    TASK CODE=F624A-100     **EPA=D5-E721-BB  ** ( IAG )      PRIOR       FY76  / $ 1250000
EPA  OFFICER.. JW JONES                   EPA/IERL   RTP
INVESTIGATOR.. HB FLORA                   US TVA
               HB FLORA                   US TVA
MILESTONES.... 12/78 -CHARACTERIZE COAL PILE DRAINAGE AND TREATMENT
               12/78 -ASSESSMENT OF PH ADJUSTMENT OF QUALITY OF ASH POND EFFLUENT
               08/78 -DESIGN OF AN EFFECTIVE ASH POND MONITORING PROGRAM
               12/78 -CHARACTERIZING CHLORINATED DISCHARGES AND OPTIMUM USAGE OF CHLORI      NE
               10/78 -INFLUENCE OF ASH POND WATER ON GROUND WATER QUALITY
               12/79 -CHARACTERIZING EMISSIONS FROM DIFFERENT BOILERS
               12/79 -DEVELOP CONTROL TECHNOLOGY TO REMOVE TOXIC TRACE ORGANICS AND INO      RG
               06/79 -VERIFY WATER CHEMISTRY MODEL FOR SPECIFIC WATER TREATMENT NEEDED
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001583            SSIE-GMA  2944 1      EPA -D5-E721-BB       TASK-F624A-100
               AP  -624A              DU  -L110            LABT-EMI
ABSTRACT...... THE OBJECTIVES OF THIS PROJECT ARE TO (1) CHARACTERIZE AND QUANTIFY THE CHEMICAL AND PHYSICAL
                COMPONENTS OF COAL PILE DRAINAGE, (2) ASSESS AND QUANTIFY THE CHEMICAL AND PHYSICAL NATURE OF ASH
                POND EFFLUENT AFTER THE PH OF THE ASH POND HAS BEEN ADJUSTED TO MEET EXISTING STANDARDS, (3)
                EVALUATE AN ASH POND MONITORING PROGRAM TO DETERMINE THE SAMPLING NECESSARY TO OBTAIN RELIABLE,
                REPRESENTATIVE INFORMATION, (4) ASSESS AND CHARACTERIZE COAL ASH LEACHATE ON GROUND WATER, (5)
                EVALUATE AND QUANTIFY THE CHLORINATED EFFLUENT IN THE DISCHARGE CANAL OF A ONCE-THROUGH COOLING
                SYSTEM, (6) CHARACTERIZE THE GASEOUS AND PARTICULATE EMISSIONS FROM TWO PLANTS WITH DIFFERENT TYPE
                UNITS, E.G. CYCLONE AND TANGENTIAL-FIRED UNITS, (7) DEVELOP TECHNOLOGY TO REMOVE PRIORITY
                POLLUTANTS, AND (8) VERIFY WATER CHEMISTRY MODEL FOR SPECIFIC WATER TREATMENT NEEDED. CURRENT
                PROGRESS INCLUDES (1) COMPLETING FIELD AND LABORATORY STUDIES ON CHARACTERIZING AND TREATING COAL
                PILE DRAINAGE, (2) COMPLETING LABORATORY STUDIES ON EFFECT OF PH ADJUSTMENT ON THE QUALITY OF ASH
                POND DISCHARGE, (3) COMPLETING FIELD ASH POND MONITORING AND ASSESSMENT OF THE ABILITY OF THE
                MONITORING PROGRAM TO OBTAIN RELIABLE, REPRESENTATIVE DATA, (4) ASSESSMENT OF OPTIMUM CHLORINATION
                SCHEDULE TO MAINTAIN GENERATING UNIT THERMAL PERFORMANCE CONTINUES, (5) COMPLETING OF FIELD AND
                LABORATORY STUDIES ON QUALITY OF ASH POND LEACHATE, AND (6) COMPLETING FIELD STUDIES AND LABORATORY
                ANALYSES FOR CHARACTERIZING GASEOUS AND PARTICULATE EMISSIONS FROM DIFFERENT TYPES OF BOILERS.
                FUTURE PLANS ARE: PUBLISH MILESTONE REPORTS ON TASKS 1, 2, 3, 5, AND 6 ABOVE AND BEGIN WORK ON
                TASKS 7 AND 8.
```

**PROJECT: 01584-FLY ASH CHARACTERIZATION AND DISPOSAL AND STUDYING WATER REUSE OR RECYCLING

STARTING/ COMPLETION DATE : 06/75 12/79 : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=F624A-102 **EPA=D6-E721-BC ** (IAG) PRIOR FY76 / $ 410000

EPA OFFICER.. JW JONES EPA/IERL RTP
INVESTIGATOR.. SS RAY US TVA
SS RAY US TVA
MILESTONES.... 12/76 -SUMMARY OF DATA ON COAL AND ASH CHARACTERIZATION
10/79 -PROPERTIES OF COAL, ASH, AND ASH EFFLUENT
12/78 -SUMMARY OF METHODS OF DISPOSAL AND UTILIZATION OF FLY ASH REPORT
06/79 -EVALUATION OF WET AND DRY FLY ASH HANDLING SYSTEMS REPORT
06/79 -REPORT ON PROCESSES FOR REUSING OR RECYCLING WASTEWATER STREAMS
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001584 SSIE-GMA 2946 1 EPA -D6-E721-BC TASK-F624A-102
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE PURPOSES OF THIS PROJECT ARE TO CHEMICALLY AND PHYSICALLY CHARACTERIZE ASHES AND THEIR WASTE EFFLUENTS AND TO EXAMINE FLY ASH HANDLING SYSTEMS, DISPOSAL AND UTILIZATION METHODS, AND TREATMENT METHODS FOR WATER REUSE. MASS BALANCES AROUND SEVERAL FACILITIES HAVING DIFFERENT BOILER SYSTEMS AND COALS MAY BE INCORPORATED TO DETERMINE THE DIFFERENCE IN ASH AND EFFLUENT CHARACTERISTICS WITH VARIATION IN BOILER DESIGN, OPERATION, OR COAL TYPE. THE SCOPE OF THIS PROJECT INCLUDES SUMMARIZING AVAILABLE INFORMATION ON ASHES AND EFFLUENTS, WET AND DRY HANDLING SYSTEMS, DISPOSAL AND UTILIZATION OF FLY ASH, AND METHODS OF TREATMENT FOR WATER REUSE; CHARACTERIZING ASHES AND EFFLUENTS OF SEVERAL PLANTS; STUDIES ON DISPOSAL ALTERNATIVES AND SPECIFIC ASH PROBLEMS; AND STUDIES ON PROCESSES FOR REUSING OR RECYCLING WASTEWATER STREAMS FROM COAL-FIRED POWER PLANTS. A REPORT, "CHARACTERIZATION OF ASH FROM COAL-FIRED POWER PLANTS," WAS COMPLETED AND DISTRIBUTED. SAMPLING PROGRAMS TO DETERMINE MASS BALANCES AROUND THE UNITS HAVE BEEN CONDUCTED AT TWO TVA STEAM PLANTS. IN OCTOBER, 1975, A THREE-DAY PRELIMINARY STUDY WAS CONDUCTED TO TEST PROCEDURES, EQUIPMENT, AND PERSONNEL AT A WALL-FIRED UNIT OF COLBERT STEAM PLANT. IN AUGUST, 1976, AN EIGHT-DAY SAMPLING PROGRAM WAS CONDUCTED ON THE SAME UNIT. SAMPLING POINTS WERE THE COAL SCALES, PULVERIZER, MECHANICAL COLLECTOR AND ELECTROSTATIC PRECIPITATOR ASH HOPPERS, PYRITE HOPPER, INFLOW WATER, AND SLUICE WATERS FOR FLY ASH, BOTTOM ASH, AND PYRITES. FOR THE SECOND STUDY THE GAS STREAM, BOTH BEFORE AND AFTER THE ELECTROSTATIC PRECIPITATOR, WAS SAMPLED IN ADDITION. THESE SAMPLES HAVE NOW BEEN CHEMICALLY AND PHYSICALLY ANALYZED. IN JULY 1977 A SIMILAR STUDY WAS CONDUCTED AT A TANGENTIALLY FIRED UNIT OF KINGSTON STEAM PLANT. PLANS FOR THIS FISCAL YEAR ARE TO CHEMICALLY AND PHYSICALLY ANALYZE THE SAMPLES FROM THE KINGSTON STEAM PLANT STUDY; TO COMPLETE A MILESTONE REPORT ON RESULTS OF THE COLBERT STEAM PLANT STUDY; TO SUMMARIZE METHODS OF TREATMENT FOR WATER REUSE; TO SUMMARIZE METHODS FOR DISPOSAL AND UTILIZATION OF FLY ASH; AND TO STUDY PROCESSES FOR REUSING OR RECYCLING WASTEWATER STREAMS FR

**PROJECT: 01588-AIR POLLUTION EMISSION CONTROL DEVELOPMENT FOR STATIONARY INTERNAL COMBUSTION ENGINES

STARTING/ COMPLETION DATE : 10/77 10/80 FUNDING ESTIMATED FY77 / $ 300000
TASK CODE=F624A-11 **EPA=68-02-2664 ** (CNTR.) PRIOR FY76 / $ 120076

EPA OFFICER. JH WASSER EPA/IERL RTP
INVESTIGATOR.: UNKNOWN ARTHUR D. LITTLE INC
MILESTONES...: 10/77 -PROJECTED START OF CONTRACT
02/77 -COMPLETE DESIGN CONCEPT DEVELOPMENT
10/78 -COMPLETE DESIGN CONCEPT ANALYSIS AND SELECTION
02/80 -COMPLETE EXPERIMENTAL RESEARCH ON SELECTED DESIGN CONCEPTS
10/80 -COMPLETE DEVELOPMENT PROGRAM FOR SUCCESSFUL CONCEPTS
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001588 SSIE-GMA 4687 EPA -68-02-2664 TASK-F624A-11
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THIS PROGRAM WILL DEVELOP A SET OF COMBUSTION CHAMBER DESIGN CONCEPTS FOR RECIPROCATING ENGINES FROM A COMPILATION OF ALL AVAILABLE PRIOR ANALYTICAL AND EXPERIMENTAL INFORMATION AND FROM THE CONTRACTOR'S FURTHER THOROUGH ASSESSMENT OF THE RECIPROCATING COMBUSTION PROCESS. THE SET OF DESIGN CONCEPTS WILL BE STUDIED AND A SELECTION PROCESS ESTABLISHED TO IDENTIFY THE MOST PROMISING CONCEPTS UTILIZING MATHEMATICAL MODELING AND/OR OTHER TECHNIQUES FOR PREDICTION OF EMISSIONS PERFORMANCE. DESIGN CONCEPTS WILL THEN BE IMPLEMENTED AND TESTED IN AN EXPERIMENTAL FACILITY CAPABLE OF DUPLICATING LARGE BORE RECIPROCATING ENGINES. BASED ON THE EVALUATION OF THE TEST RESULTS, THE BEST DESIGN CONCEPTS WILL BE INCORPORATED IN FULL SCALE ENGINES TO DEVELOP THE OPTIMUM CONFIGURATION AND OPERATING CONDITIONS FOR APPLICATION IN BOTH

**PROJECT: 01617-INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGIES, PHASE II

```
                    STARTING/ COMPLETION DATE : 09/77   09/80 :   FUNDING    ESTIMATED   FY77  / $  150000
                    TASK CODE=F624A-78      **EPA=68-02-2672  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. RP HANSEN                  EPA/IERL   RTP
INVESTIGATOR..    UNKNOWN                 BATTELLE MEMORIAL INST
MILESTONES.... 09/77 -CONTRACT AWARD
               00/00 -PERIODIC REPORTS AND PRESENTATIONS OF INTERIM RESULTS
               09/80 -PROJECT COMPLETE
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001617            SSIE-GMA  4686        EPA -68-02-2672       TASK-F624A-78
               AP  -624A              DU  -L110             LABT-EMI
```

ABSTRACT..... OBJECTIVES: TO IDENTIFY, DESCRIBE, COMPARE, AND QUANTIFY WHERE POSSIBLE THE RANGE AND MAGNITUDE OF BIOPHYSICAL, SOCIO-ECONOMIC, AND ENERGY IMPACTS OF ALTERNATIVE MIXES, RATES, LEVELS, AND TIMING OF THE DEVELOPMENT AND DEPLOYMENT OF COAL-BASED ENERGY TECHNOLOGIES, SUPPLY SYSTEMS, AND END USES; TO IDENTIFY AND COMPARATIVELY ANALYZE TECHNOLOGICAL AND INSTITUTIONAL METHODS OF AVOIDING OR MITIGATING UNDESIRABLE IMPACTS; AND TO RECOMMEND ALTERNATIVE POLICIES THAT WILL ACHIEVE THE BEST BALANCE OF ENVIRONMENTAL QUALITY, ENERGY EFFICIENCY, ECONOMIC COSTS, AND SOCIAL BENEFITS, AND TO PROPOSE STRATEGIES FOR POLICY IMPLEMENTATION. APPROACH: INTEGRATE THE RESULTS OF COMPLETED AND ONGOING EPA/IERL "ENVIRONMENTAL ASSESSMENTS" OF COAL-BASED ENERGY AND ENVIRONMENTAL CONTROL TECHNOLOGIES; CONDUCT A COMPARATIVE ASSESSMENT OF THE ENVIRONMENTAL, SOCIAL, ECONOMIC, AND ENERGY IMPACTS OF COAL-BASED ENERGY TECHNOLOGIES, SUPPLY SYSTEMS, AND END USES; ASSESS NATIONAL IMPACTS FOR ALL COMPONENTS FOR COAL-ENERGY SUPPLY SYSTEMS; EXTRACTION; FUEL STOCK TRANSPORTATION; PROCESSING; CONVERSION; ENERGY PRODUCT TRANSPORTATION AND END USE; IDENTIFY, ANALYZE, AND COMPARE TECHNOLOGICAL AND INSTITUTIONAL METHODS OF AVOIDING OR MITIGATING UNDESIRABLE CONSEQUENCES OF COAL-ENERGY DEVELOPMENT; AND IDENTIFY AND EVALUATE ALTERNATIVE POLICIES AND IMPLEMENTATION STRATEGIES. CURRENT PROGRESS: PHASE I, THE PROJECT DEFINITION PHASE, WAS CONTRACTED TO BATTELLE COLUMBUS LABORATORIES, RADIAN CORPORATION, AND STANFORD RESEARCH INSTITUTE WHO STARTED WORK ON 1/5/77 AND SUBMITTED WORK PLANS FOR PHASE II, THE INTEGRATED ASSESSMENT, ON 7/5/77 ONE OF THESE THREE CONTRACTORS WILL BE SELECTED FOR PHASE II TO COMMENCE ON OR ABOUT 9/30/77

**PROJECT: 04012-PROCESSING SLUDGES FROM LIME/LIMESTONE WET SCRUBBING PROCESSES FOR DISPOSAL OR RECYCLE (ABBREV)

```
                    STARTING/ COMPLETION DATE : 07/75   03/80 :   FUNDING    ESTIMATED   FY77  / $  200000
                    TASK CODE=V624A-14      **EPA=D6-E721-BA  ** ( IAG )      PRIOR       FY76  / $  350000
EPA  OFFICER.. WN MCCARTHY                EPA/HDQTRS- OEMI
INVESTIGATOR.. JL CROWE                   US TVA
               JL CROWE                   US TVA
MILESTONES.... 10/76 -MILESTONE REPORT ON SLUDGE-SCRUBBER CORRELATION
               10/77 -FINAL REPORT ON SLUDGE-SCRUBBER CORRELATION
               10/77 -FINAL REPORT ON FBC WASTE CHARACTERIZATION
               10/78 -FINAL REPORT ON SLUDGE-FERTILIZER STUDY
               10/79 -FINAL REPORT ON REVEGETATION STUDY
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-004012            SSIE-GMA  2941 1      EPA -D6-E721-BA       TASK-V624A-14
               AP  -624A              DU  -L110             LABT-EMI
```

ABSTRACT..... THE OBJECTIVES OF THIS PROGRAM ARE AS FOLLOWS: (1) TO DEFINE THE VARIABLES IN PILOT PLANT PRODUCTION OF FERTILIZER FROM SCRUBBER PRODUCT SLUDGE, TO STUDY THE COMPATIBILITY FACTORS INVOLVED IN STORAGE AND MIXING OF THIS FERTILIZER MATERIAL WITH CONVENTIONAL FERTILIZER, TO ANALYZE FOR TRACE ELEMENTS AND POTENTIAL TOXIC SPECIES IN THIS TYPE OF FERTILIZER, AND TO DETERMINE THE MARKETING AND PRODUCTION COST OF THIS TYPE OF MATERIAL; (2) TO DETERMINE THE RANGE OF VARIABILITY OF SOLIDS IN SLUDGES PRODUCED FROM THE SHAWNEE SCRUBBERS AND TO CORRELATE THIS VARIABILITY WITH PLANT AND SCRUBBER OPERATING CONDITIONS; (3) TO PROVIDE A DETAILED CHEMICAL AND PHYSICAL CHARACTERIZATION OF WASTE BED MATERIAL PRODUCED BY FLUIDIZED-BED COMBUSTORS AND AN EVALUATION OF DISPOSAL METHODS FOR THIS MATERIAL; (4) TO IDENTIFY THE LIMITING FACTORS IN COMBINING VARIOUS WASTES WITH SCRUBBER SLUDGES IN ADMIXTURES WHICH WILL SUPPORT VEGETATION AND IN TURN CAN BE UTILIZED TO RECLAIM WASTE DISPOSAL SITES. CURRENTLY, THE CHARACTERIZATION STUDIES OF SLUDGES OBTAINED FROM SHAWNEE ARE ONGOING AND DATA IS BEING STATISTICALLY ANALYZED. CHARACTERIZATION OF WASTE SOLIDS PRODUCED BY THE FLUIDIZED-BED COMBUSTION PROCESS IS ALSO IN PROCESS. OPERATION OF THE PILOT SCALE PRENEUTRALIZER AND THE PILOT PLANT GRANULATION UNIT IS SCHEDULED TO BEGIN DURING THE TRANSITION PERIOD. FOLLOWING ATTAINMENT OF STEADY-STATE OPERATION, PRODUCTION WILL BEGIN TO PRODUCE A FERTILIZER FOR STORAGE, COMPATIBILITY, AND AGRONOMIC TESTING. STUDIES TO DEVELOP TECHNIQUES FOR REVEGETATION OF SO2 WASTE DISPOSAL PONDS ARE ALSO IN PROCESS AND HAVE PRODUCED GO

**PROJECT: 00432-IERL-CI TECHNICAL SUPPORT CONTRACT

```
                    STARTING/ COMPLETION DATE : 09/77   09/79 :   FUNDING :  ESTIMATED   FY77  / $  158000
                    TASK CODE=B624B-P00     **EPA=68-03-2609  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.: C  DIAL                      EPA/IERL   CINC
INVESTIGATOR.: AD ABBOTT                    AEROSPACE CORP
MILESTONES...: 09/77 -AWARD CONTRACT
               09/79 -TERMINATE CONTRACT
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000432          SSIE-GMA  4620        EPA -68-03-2609       TASK-B624B-P00
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT.....: THIS IS A TECHNICAL SUPPORT CONTRACT WHICH WILL PROVIDE FOR GATHERING OF DATA AND THE CONDUCT OF
                ANALYSES WHICH CAN BE USED BY LABORATORY MANAGEMENT WHEN THEY SET OBJECTIVES OR DETERMINE RESOURCE
                REQUIREMENTS AND METHODS FOR IMPLEMENTATION OF PROGRAMS, AND MECHANISMS TO ENSURE A TIMELY FLOW OF
                TECHNICAL PROGRAMMATIC INFORMATION.
```

**PROJECT: 00437-PROCESS EVALUATION MULTI-WASTE GASIFICATION

```
                    STARTING/ COMPLETION DATE : 09/77   12/77 :   FUNDING    ESTIMATED   FY77  / $   25000
                    TASK CODE=B624B-T11     **EPA=68-03-2550  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. WW LIBERICK                  EPA/IERL   CINC
INVESTIGATOR.. WH HEDLEY                    MONSANTO RESEARCH CORP
MILESTONES.... 07/77 -FUNDING PACKAGE SUBMITTED
               09/77 -AWARD FUNDS FOR PROJECT
               11/77 -DRAFT FINAL REPORT
               12/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000437          SSIE-GMA  3678        EPA -68-03-2550       TASK-B624B-T11
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THIS EFFORT IS TO DO A COMPLETE ENVIRONMENTAL, ECONOMIC, AND TECHNICAL FEASIBILITY
                OF A MULTI-WASTE GASIFICATION SYSTEM. IT IS ENVISIONED THAT SUCH A SYSTEM WOULD BE ADJACENT TO AN
                EXISTING GAS, LIQUID, OR SOLID FUEL USER AND WOULD MARKET ITS GAS PRODUCT TO SUCH A USER.
                ACCEPTABLE WASTE TYPES INCLUDE: MUNICIPAL SOLID WASTE, SEWAGE SLUDGES, INDUSTRIAL (HAZARDOUS,
                SLUDGES, ETC.) AND AGRICULTURAL WASTES. THE CONTRACTOR'S APPROACH SHALL BE TO UTILIZE HIS
                EXPERIENCE, THE LITERATURE, AND EXISTING DATA FROM GASIFICATION PROCESS DEVELOPERS TO COMPLETE THIS
                ASSESSMENT (I.E., UNION CARBIDE, ERCO, PRINCETO
```

**PROJECT: 00440-PROCESS EVALUATION MULTI-WASTE CO-FIRING IN UTILITY BOILERS

```
                    STARTING/ COMPLETION DATE : 09/77   05/78 :   FUNDING    ESTIMATED   FY77  / $   50000
                    TASK CODE=B624B-T24     **EPA=68-03-2552  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.  RA OLEXSEY                   EPA/IERL   CINC
INVESTIGATOR.  GR SMITHSON                  BATTELLE MEMORIAL INST
MILESTONES...  09/77 -AWARD
               05/78 -FINAL REPORT
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000440          SSIE-GMA  4390        EPA -68-03-2552       TASK-B624B-T24
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THIS TASK CALLS FOR A PRELIMINARY, "PAPER STUDY" TYPE ASSESSMENT OF THE POTENTIAL FOR THE USE OF A
                VARIETY OF WASTE MATERIALS IN CONJUNCTION WITH MUNICIPAL SOLID WASTE 9MSW) AS COMBUSTION FUELS FOR
                UTILITY BOILERS. WASTE MATERIALS TO BE INVESTIGATED SHALL INCLUDE MUNICIPAL SEWAGE SLUDGES,
                INDUSTRIAL SLUDGES, WASTE OILS AND LUBRICANTS, INDUSTRIAL WASTES, COMMERCIAL WASTES, INSTITUTIONAL
                WASTES, AND WOOD WASTES. THE STUDY WILL FOCUS ON THE TECHNICAL FEASIBILITY OF COFIRING THE VARIOUS
                WASTES WITH COAL, OIL, MSW, AND OTHER LISTED WASTES. THE STUDY WILL ALSO GENERALLY ADDRESS THE
                ECONOMIC FEASIBILITY OF COFIRING THE VARIOUS WASTES AND WILL INCLUDE A DISCUSSION OF THE LOGISTICAL
                PROBLEMS THAT PRESENTLY CAN BE IDENTIFIED.
```

**PROJECT: 00450-REFUSE DERIVED FUEL SOURCES AND UTILIZATION

```
                    STARTING/ COMPLETION DATE : 08/77   11/77 :   FUNDING    ESTIMATED   FY77  / $   25000
                    TASK CODE=B624B-T61     **EPA=68-03-2563  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. WW LIBERICK                  EPA/IERL   CINC
INVESTIGATOR.. AD MCELROY                   MIDWEST RES INST                   TECH ECON SECTION
MILESTONES...  08/77 -FUNDING PACKAGE SUBMITTED
               10/77 -AWARD FUNDS FOR PROJECT
               00/00 -DRAFT FINAL REPORT
               11/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000450          SSIE-GMA  3679        EPA -68-03-2563       TASK-B624B-T61
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS STUDY IS TO IDENTIFY SOURCES OF FEEDSTOCKS (WASTES) COMPATIBLE WITH EXISTING
                WASTE-AS-FUEL PROCESSES AND "PRODUCT" FUEL USERS. THIS EFFORT CALLS FOR A NATIONAL IDENTIFICATION
                OF WASTE SOURCES (MUNICIPAL, INDUSTRIAL, AGRICULTURAL/QUANTITIES AND LOCATIONS BY COUNTIES) AND
                CURRENT FUEL USERS (RESIDENTIAL, UTILITY BOILERS, ETC. AND LOCATIONS BY COUNTIES). IT IS ENVISIONED
                THAT THE RESULTS OF THIS EFFORT WILL BE DISPLAYED IN A TABULAR FORM ACCORDING TO GEOGRAPHIC AREAS
                AS WELL AS DISPLAYED ON ONE OR A SERIES OF MAPS.
```

**PROJECT: 00453-SYSTEM CONCEPT EVALUATION DENSIFIED REFUSE DERIVED FUELS

```
                    STARTING/ COMPLETION DATE : 09/77   04/78 :   FUNDING    ESTIMATED   FY77  / $   21000
                    TASK CODE=B624B-T72    **EPA=68-03-2568  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. RA OLEXSEY                EPA/IERL   CINC
INVESTIGATOR.. M  ZEITOUN                DOW CHEMICAL CO
MILESTONES.... 09/77 -AWARD
               04/78 -FINAL REPORT
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000453          SSIE-GMA  4393        EPA -68-03-2568       TASK-B624B-T72
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THIS TASK CALLS FOR AN ECONOMIC AND TECHNICAL FEASIBILITY STUDY OF THE CONCEPT OF CENTRAL STATION
                PRODUCTION OF DENSIFIED REFUSE DERIVED FUEL (DRDF), MARKETING, AND DELIVERY OF THE FUEL PRODUCT TO
                INDUSTRIAL, INSTITUTIONAL, AND UTILITY BOILERS WITHIN THE LOCAL VICINITY OF THE CENTRAL STATION
                PLANT. COSTS AND THE FEASIBILITY OF THE DRDF SYSTEM CONCEPT WILL BE COMPARED/CONTRASTED WITH THOSE
                OF THE MORE CONVENTIONAL CONCEPT OF THE PRODUCTION OF "FLUFF" REFUSE DERIVED FUEL (RDF) FOR SALE TO
                AN ADJACENT UTILITY. THE CONTRACTOR WILL USE HIS EXPERIENCE, THE LITERATURE, AND EXISTING DATA
                SUPPLIED BY SYSTEM DEVELOPERS AND EPA THROUGH CONTRACTORS AND GRANTEES WORKING ON THE SUBJECT AREA.
```

**PROJECT: 00454-PROCESS EVALUATION CHINA LAKE PYROLYSIS SYSTEM

```
                    STARTING/ COMPLETION DATE : 09/77   02/78     FUNDING    ESTIMATED   FY77  / $   25000
                    TASK CODE=B624B-T73    **EPA=68-03-2568  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. WW LIBERICK               EPA/IERL   CINC
INVESTIGATOR.: M  ZEITOUN                DOW CHEM CO
MILESTONES...: 09/77 -AWARD
               02/78 -FINAL REPORT
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000454          SSIE-GMA  4613        EPA -68-03-2568       TASK-B624B-T73
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT.....: THIS TASK CALLS FOR A COMPLETE ENVIRONMENTAL, ECONOMIC, AND TECHNICAL FEASIBILITY STUDY OF A
                PYROLYSIS, GAS CLEANING, AND THERMAL POLYMERIZATION PROCESS (TAKING WASTE ALL THE WAY TO GASOLINE)
                DEVELOPED AT THE NAVAL WEAPONS RESEARCH CENTER, AT CHINA LAKE, CALIFORNIA.
```

**PROJECT: 00455-ENVIRONMENTAL ASSESSMENT OF ENERGY CONSERVATION TECHNOLOGY

```
                    STARTING/ COMPLETION DATE : 10/77   02/79 :   FUNDING    ESTIMATED   FY77  / $   80000
                    TASK CODE=B624B-373    **EPA=68-03-2198  ** (CNTR.)      PRIOR       FY76  / $  320000
EPA  OFFICER.. RE MOURNIGHAN             EPA/IERL   CINC
INVESTIGATOR..    UNKNOWN                ARTHUR D. LITTLE INC
MILESTONES.... 06/76 -FUNDING PACKAGE SUBMITTED
               10/77 -AWARD FUNDS FOR PROJECT
               03/77 -FUNDING INCREMENT
               02/79 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000455          SSIE-GMA  4689        EPA -68-03-2198       TASK-B624B-373
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... AN ASSESSMENT OF THE IMPACTS ON AIR QUALITY OF THE IMPLEMENTATION OF SOLAR ENERGY AND VARIOUS ENERGY
                CONSERVATION MEASURES AND TECHNOLOGIES IN SELECTED AIR QUALITY CONTROL REGIONS (AQCR'S) WILL BE
                CONDUCTED. THE STUDY WILL CONCENTRATE ON INDUSTRIAL APPLICATIONS, BUT WILL NOT BE LIMITED TO THIS
                AREA. THE CONVENTIONAL UTILITY INDUSTRY WILL BE EXCLUDED, HOWEVER. PROJECTIONS OF POSSIBLE ENERGY
                CONSERVATION AND SOLAR ENERGY APPLICATIONS IN THREE AQCR'S AND THE IMPACT ON AIR QUALITY WILL BE
                DEVELOPED. THE OUTPUT WILL CONSIST OF SCENARIOS DESCRIBING HOW ENERGY CONSERVATION MEASURES AND
                SOLAR ENERGY APPLICATIONS CAN IMPROVE AMBIENT AIR QUALITY IN TYPICAL AQCR'S WHERE AMBIENT AIR
                QUALITY STANDARDS (AAQS) ARE BEING EXCEEDED AND AN ASSESSMENT OF THE FEASIBILITY OF SUCH
                TECHNOLOGIES.
```

**PROJECT: 00456-FULL-SCALE DEMONSTRATION OF HYPERFILTRATION FOR CLOSED-CYCLE OPERATION IN TEXTILE

```
                STARTING/ COMPLETION DATE : 06/77   04/81     FUNDING    ESTIMATED   FY77  / $  190000
                TASK CODE=B624B-374    **EPA=S805182-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. R  MOURNIGHAN              EPA/IERL   CINC
INVESTIGATOR.. CA BRANDON                 RIEGEL TEXTILE CORP
               JE BOSTIC                  RIEGEL TEXTILE CORP
               RK TEED                    RIEGEL TEXTILE CORP
               JJ PORTER                  RIEGEL TEXTILE CORP
MILESTONES.... 05/77 -FUNDING PACKAGE SUBMITTED
               09/77 -AWARD FUNDS FOR PROJECT
               09/79 -COMPLETE CONSTRUCTION AND BEGIN OPERATION
               09/80 -OPERATION COMPLETE
               12/80 -DRAFT REPORT
               04/81 -FINAL REPORT RECEIVED
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000456            SSIE-GMA  4715        EPA -S805182-01       TASK-B624B-374
               AP  -624B              DU  -L110             LABT-EMI
```

ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVES OF THIS PROJECT ARE TO DEMONSTRATE THE ECONOMIC AND TECHNICAL ADVANTAGES TO A FULL SCALE REVERSE OSMOSIS (HYPERFILTRATION) SYSTEM FOR CLOSED CYCLE OPERATION OF A TEXTILE DYING AND FINISHING PLANT. INVOLVED IS THE DESIGN, INSTALLATION, AND TWELVE-MONTH OPERATION OF A REVERSE OSMOSIS TREATMENT SYSTEM FOR THE HOT WASTEWATER FROM EITHER A CONTINUOUS DYE RANGE OR A GROUP OF TEN ATMOSPHERIC DYE BECKS. THE TWO TYPES OF EQUIPMENT ARE TYPICAL OF THE TWO BROAD CATEGORIES OF TEXTILE PROCESSING: CONTINUOUS AND BATCH. A CONCEPTUAL DESIGN WILL BE DEVELOPED FOR EACH PROCESS AND THE ONE APPEARING TO BE THE MOST ECONOMICALLY VIABLE WILL BE DEMONSTRATED. OUTPUTS FROM THIS PROGRAM CONSIST OF: A DETAILED DESIGN FOR TEXTILE WASTEWATER TREATMENT BY REVERSE OSMOSIS, DETAILED OPERATIONS AND CAPITAL COSTS, DOCUMENTATION OF ENERGY SAVINGS OF THE REVERSE OSMOSIS SYSTEM COMPARED TO CONVENTIONAL WASTE TREATMENT METHODS AND EVALUATION OF CHEMICAL (DYES, SALT) RECYCLE IN THE DYING PROCESS.

**PROJECT: 00458-ENVIRONMENTAL ASSESSMENT OF ADVANCED ENERGY CONVERSION TECHNOLOGIES

```
                STARTING/ COMPLETION DATE : 04/76   10/78 :   FUNDING    ESTIMATED   FY77  / $  100000
                TASK CODE=B624B-379    **EPA=68-02-2146  ** (CNTR.)      PRIOR       FY76  / $  442000
EPA  OFFICER.. WC CAIN                    EPA/IERL   CINC
INVESTIGATOR.. H  SHAW                    EXXON RESEARCH & ENGINEERING CO
               GS ARGYROPOULOS            MIT
               CJ KAU                     ULTRASYSTEMS INC
MILESTONES...: 03/75 -FUNDING PACKAGE SUBMITTED
               04/76 -AWARD FUNDS FOR PROJECT
               02/78 -PRELIMINARY ANALYSIS REPORT
               03/79 -FINAL REPORT RECEIVED
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000458            SSIE-GMA  2765 1      EPA -68-02-2146       TASK-B624B-379
               AP  -624B              DU  -L110             LABT-EMI
```

ABSTRACT..... THE POTENTIAL ENVIRONMENTAL IMPACT OF ADVANCED ENERGY CONVERSION TECHNOLOGIES WILL BE ASSESSED IN A 4-PHASE PROGRAM OVER THE NEXT THREE YEARS IN ORDER TO AVOID THE NEED FOR RETROFITTING CONTROL EQUIPMENT WHEN THESE PLANTS ARE A COMMERCIAL REALITY. THE ADVANCED CYCLES TO BE CONSIDERED IN THIS PROGRAM INCLUDE: OPEN- AND CLOSED-CYCLE MAGNETOHYDRODYNAMICS (MHD), OPEN- AND CLOSED-CYCLE HIGH-TEMPERATURE GAS TURBINES, LIQUID METAL TOPPING CYCLES, SUPERCRITICAL CO2 CYCLES (FEHER), THERMIONICS, FUEL CELLS, ADVANCED STEAM CYCLES (FIELD), AND BOTTOMING CYCLES. THE PHASE I EFFORT WILL CONSOLIDATE THE AVAILABLE INFORMATION ON THE POTENTIAL POLLUTANTS AS WELL AS THE CURRENT STATE OF DEVELOPMENT OF ADVANCED CONVERSION TECHNOLOGIES. THE OBJECTIVE OF PHASE II WILL BE TO DEVELOP REALISTIC AND PRACTICAL ANALYTICAL MODELS IN ORDER TO ESTIMATE EFFLUENTS, POLLUTANTS, AND WASTE ENERGY. THESE MODELS WILL BE EMPLOYED TO PROVIDE PARAMETRIC ANALYSES OF EMISSION LEVELS RELATED TO CYCLE CHARACTERISTICS AND EFFICIENCY. THE COST-EFFECTIVENESS OF EXISTING POLLUTION CONTROL TECHNOLOGIES FOR EACH CYCLE WILL THEN BE DETERMINED. THE PHASE III FIELD AND LABORATORY TESTING EFFORT WILL BE CAREFULLY DESIGNED TO PROVIDE A PRELIMINARY ENVIRONMENTAL ASSESSMENT OF EACH CYCLE TESTED. SUFFICIENT DATA WILL BE OBTAINED TO FILL IN THE CRITICAL DATA GAPS AND THUS CALIBRATE AND VALIDATE THE CYCLE MODELS. PHASE IV OF THE PROGRAM WILL USE ALL THE INFORMATION AND DATA GENERATED IN THE PROGRAM TO IDENTIFY THE CRITICAL R&D NEEDED TO MAKE THESE TECHNOLOGIES ENVIRONMENTALLY ACCEPTABLE. THE IMPACT OF POLLUTION CONTROL ON ENERGY CONVERSION EFFICIENCY WILL BE STRESSED IN THE RECOMMENDATION. THIS PLANNING EFFORT WILL INCLUDE ALTERNATE R&D STRATEGIES AND PRIORITIES BASED ON ANTICIPATED RANGES OF AVAILABLE FUNDING.

**PROJECT: 00460-SURVEY OF GEOTHERMAL ENVIRONMENTAL REGULATIONS AND CONTROL TECHNOLOGY

```
                    STARTING/ COMPLETION DATE : 11/75   06/77     FUNDING    ESTIMATED   FY77  / $   16000
                    TASK CODE=B624B-380     **EPA=68-03-2371  ** (CNTR.)      PRIOR       FY76  / $   98000
EPA  OFFICER.. R  HARTLEY                EPA/IERL   CINC
INVESTIGATOR. DB BOIES                   W A P O R A INC
MILESTONES.... 11/75 -FUNDING PACKAGE SUBMITTED
               11/75 -AWARD FUNDS FOR PROJECT
               04/76 -INTERIM DRAFT REPORT ON REGULATIONS
               03/77 -DRAFT FINAL REPORT
               06/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000460          SSIE-GMA  3140 1      EPA -68-03-2371       TASK-B624B-380
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... ONE OF THE PROJECT OBJECTIVES (PHASE I) IS TO SUMMARIZE AND ANALYZE THE ADEQUACY OF FEDERAL, STATE
                AND LOCAL ENVIRONMENTAL LAWS APPLICABLE TO GEO-THERMAL ENERGY DEVELOPMENT. ANOTHER OBJECTIVE (PHASE
                II) IS TO EXAMINE THE CHARACTERISTICS AND POTENTIAL USES OF THE KNOWN GEOTHERMAL RESOURCE AREAS,
                POTENTIAL POLLUTION PROBLEMS, CONTROL TECHNOLOGIES, AND POLLUTION CONTROL RESEARCH NEEDS. THE
                APPROACH HAS BEEN TO EXAMINE AND ANALYZE EXISTING INFORMATION FROM MANY SOURCES. THE OUTPUT IS TO
                REPORTS, PHASE I (REGULATIONS) AND PHASE II (GEOTHERMAL RESOURCE AREA CHARACTERISTICS AND POTENTIAL
                PROBLEMS). THE TWO DOCUMENTS SHOULD BE USEFUL TO THOSE ENGAGED IN PREPARING IMPACT STATEMENTS, TO
                REGULATORS, TO LEGISLATIVE BODIES, AND TO GEOTHERMAL AREA DECISION-MAKERS.
```

**PROJECT: 00461-PRELIMINARY ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY SYSTEMS

```
                    STARTING/ COMPLETION DATE : 12/75   02/77 :   FUNDING    ESTIMATED   FY77  / $    2000
                    TASK CODE=B624B-383     **EPA=68-02-1331  ** (CNTR.)      PRIOR       FY76  / $   15000
EPA  OFFICER.. R  HARTLEY                EPA/IERL   CINC
INVESTIGATOR. DR SEARS                   LOCKHEED MIS. & SPACE CO INC
MILESTONES.... 12/75 -FUNDING PACKAGE SUBMITTED
               01/76 -AWARD FUNDS FOR PROJECT
               04/76 -DRAFT FINAL REPORT
               01/77 -FUNDING INCREMENT FOR FINAL REPORT
               02/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000461          SSIE-GMA  3703       EPA -68-02-1331       TASK-B624B-383
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE WAS TO PROVIDE A PRELIMINARY ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY POWER GENERATION
                SYSTEMS AND FLAT PLATE COLLECTORS FOR HEATING, AND DEFINE AREAS REQUIRING POLLUTION CONTROL
                RESEARCH. THE APPROACH WAS TO EVALUATE EXISTING INFORMATION AND SOLAR DEVELOPMENT PROGRAMS. THE
                OUTPUT IS A REPORT IN LINE WITH THE OBJECTIVES. SOLAR SYSTEMS ARE ENVIRONMENTALLY SUPERIOR TO THEIR
                CONVENTIONAL ALTERNATIVES. LAND AREA REQUIREMENTS FOR CENTRAL STATION PLANTS WILL BE LARGE BUT NOT
                DESTRUCTIVE AS COAL STRIPPING. VISUAL EFFECTS CAN BE EXTENSIVE. INDIRECT EFFECTS OF PRODUCING LARGE
                QUANTITIES OF SOLAR CELL MATERIALS COULD BE ENVIRONMENTALLY HARMFUL. EPA SHOULD ENCOURAGE SOLAR
                TECHNOLOGIES AS ENVIRONMENTALLY PREFERABLE TO CONVENTIONAL TECHNOLOGIES.
```

**PROJECT: 00462-EIS FOR A SOLAR POWER STATION

```
                    STARTING/ COMPLETION DATE : 03/76   02/77 :   FUNDING    ESTIMATED   FY77  / $    6000
                    TASK CODE=B624B-384     **EPA=68-02-1331  ** (CNTR.)      PRIOR       FY76  / $   57000
EPA  OFFICER.. R  HARTLEY                EPA/IERL   CINC
INVESTIGATOR.. DR SEARS                  LOCKHEED MIS. & SPACE CO INC
MILESTONES.... 03/76 -FUNDING PACKAGE SUBMITTED
               04/76 -AWARD FUNDS FOR PROJECT
               08/76 -DRAFT FINAL REPORT
               01/77 -FUNDING INCREMENT FOR FINAL REPORT
               02/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000462          SSIE-GMA  3704       EPA -68-02-1331       TASK-B624B-384
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT WAS TO PRODUCE AN EXAMPLE ENVIRONMENTAL IMPACT STATEMENT FOR A
                HYPOTHETICAL SOLAR ELECTRIC POWER GENERATING PLANT.THE APPROACH WAS TO SELECT A SITE WHERE
                APPROPRIATE DATA WERE AVAILABLE AND TO IMPOSE THE HYPOTHETICAL SITUATION UPON IT. THE OUTPUT IS A
                REPORT SIMULATING THE ENVIRONMENTAL IMPACT OF A HYPOTHETICAL 1000 MNE SOLAR-ELECTRIC PLANT IN THE
                DESERT OF SOUTHEASTERN NEVADA. RESULTS INDICATE THE PRINCIPAL IMPACTS WOULD BE THE DESTRUCTION OF
                SOIL AND VEGETATION ON 52 SQUARE KM OF DESERT TERRAIN AND THE DISPLACEMENT OF THE ANIMAL
                POPULATION. THERE WOULD BE NO EFFECTS ON GROUND WATER, NO THERMAL POLLUTION, NO SURFACE WATER
                POLLUTION, AND NO NOISE POLLUTION. THE VISUAL IMPACT WOULD BE EXTENSIVE.
```

**PROJECT: 00463-ENVIRONMENTAL ASSESSMENT OF GEOPRESSURED WATERS AND THEIR PROJECTED USES

```
                    STARTING/ COMPLETION DATE : 04/76   12/76     FUNDING    ESTIMATED   FY77  / $    7000
                    TASK CODE=B624B-385    **EPA=68-02-1329  ** (CNTR.)      PRIOR       FY76  / $   53000
EPA  OFFICER.: R  HARTLEY                EPA/IERL   CINC
INVESTIGATOR.: R  DANIELS                DOW CHEMICAL CO
MILESTONES...: 11/76 -FUNDING PACKAGE SUBMITTED
               04/76 -AWARD FUNDS FOR PROJECT
               08/76 -DRAFT FINAL REPORT
               12/76 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000463           SSIE-GMA  4396        EPA -68-02-1329       TASK-B624B-385
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT.....: THE PROJECT OBJECTIVE WAS TO DETERMINE THE POTENTIAL ENVIRONMENTAL CONSEQUENCES OF EXPLOITING THE
                GEOPRESSURED GEOTHERMAL RESOURCES OF THE TEXAS-LOUISIANA GULF COAST AND .. RECOMMEND AN EPA COURSE
                IN RESEARCH. THE APPROACH INVOLVED THE EVALUATION OF EXISTING DATA AND SEVERAL THEORETICAL STUDIES
                THAT HAVE BEEN MADE IN THE AREA. THE OUTPUT IS A REPORT WITH THE ABOVE TITLE. THE POTENTIAL
                EMISSIONS ARE BRINE FROM WELL MISHAPS, WASTE BRINE, COOLING TOWER DISCHARGES AND NONCONDENSIBLE
                GASES. NOXIOUS GASES ARE NOT ANTICIPATED. SUBSIDENCE IS A DEFINITE AND SERIOUS POSSIBILITY.
                EARTHQUAKE ACTIVITY IS NOT EXPECTED. IN VIEW OF THE PRESENT UNCERTAINTY OF RESOURCE DEVELOPMENT,
                ONLY MODERATE EMPHASIS SHOULD BE PLACED ON ENVIRONMENTAL RESEARCH AT THIS TIME.
```

**PROJECT: 00464-ENERGY CONSUMPTION FROM PRESENT POLLUTION CONTROL TECHNOLOGY

```
                    STARTING/ COMPLETION DATE : 04/76   12/76 :   FUNDING    ESTIMATED   FY77  / $    5000
                    TASK CODE=B624B-386    **EPA=68-02-1320  ** (CNTR.)      PRIOR       FY76  / $    2000
EPA  OFFICER.. CC LEE                    EPA/IERL   CINC
INVESTIGATOR.. RS HOCKETT                MONSANTO RESEARCH CORP
MILESTONES...: 07/75 -FUNDING PACKAGE SUBMITTED
               04/76 -AWARD FUNDS FOR PROJECT
               01/78 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000464           SSIE-GMA  4381        EPA -68-02-1320       TASK-B624B-386
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: THE OBJECTIVES OF THIS TASK ARE: (1) TO ASSESS THE EXISTENCE OF AND ACCURACY OF
                POLLUTION CONTROL ENERGY COST ESTIMATES, AND (2) TO ASSESS, IN THE LIGHT OF SHORTAGES AND
                INCREASING COST OF ENERGY, THE NEED FOR MODIFICATION OF PRESENT APPROACHES TO POLLUTION CONTROL.
                WITHIN THE TIME CONSTRAINTS OF THE PROJECT, THE OBJECT IS TO OBTAIN AS BROAD A PERSPECTIVE AS
                POSSIBLE ON THE PROBLEM AREA FOR EPA PROGRAM PLANNING PURPOSES. SCOPE OF WORK: THE TWO OBJECTIVES
                FOR THIS PROJECT WILL BE MET BY THE FOLLOWING TWO SUBTASKS: SUBTASK 1   SURVEY THE OPEN LITERATURE
                AND MAKE PERSONAL CONTACTS TO IDENTIFY PREVIOUS EFFORTS AND SUCCESS IN DETERMINING THE ENERGY COSTS
                OF POLLUTION CONTROL. INTEREST IS IN INDUSTRIAL AND UTILITY STATIONARY POINT SOURCES AND IN THE
                RELATED AIR, WATER, AND SOLIDS POLLUTION CONTROL THOUGHOUT THE U.S. ECONOMY. ANALYZE THE
                DEFICIENCIES AND ASSUMPTIONS IN PREVIOUS WORK. SUGGEST ALTERNATIVE APPROACHES TO OBTAINING BETTER
                COST DATA (125 MANHOURS); SUBTASK 2 -IDENTIFY THE RELATIVE ENERGY USES OF VARIOUS POLLUTION CONTROL
                STRATEGIES NOW IN USE TO DETERMINE THE MOST IMPORTANT AREAS FOR REDUCING ENERGY CONSUMPTION. THE
                BASIS SHOULD BE PRESENT INDUSTRY PRODUCTION CAPACITY, BUT WITH ANTICIPATED POLLUTION CONTROL
                ASSUMED TO BE INSTALLED TO SATISFY PRESENT REGULATIONS. IT MAY BE APPROPRIATE TO CONSIDER
                CATEGORIES OF POLLUTANTS, I.E., NOX, SO2, HYDROCARBONS, BOD, COD, TRACE ORGANICS IN WATER, ETC.,
                RATHER THAN INDUSTRY CATEGORIES, IN MAKING COMPARISONS. ALTERNATIVES TO POLLUTION CONTROL THAT ARE
                LESS ENERGY INTENSIVE SHOULD BE IDENTIFIED AND PRIORITIZED. EMPHASIS SHOULD BE PLACED ON
                MODIFICATIONS OF EXISTING PROCESSES RATHER THAN ON TOTALLY NEW APPROACHES (375 MANHOURS).
```

**PROJECT: 00465-ENVIRONMENTAL ASSESSMENT OF WASTE-TO-ENERGY (388)

```
                    STARTING/ COMPLETION DATE : 10/76   09/79 :   FUNDING    ESTIMATED   FY77  / $  330000
                    TASK CODE=B624B-388    **EPA=68-02-2166  ** (CNTR.)      PRIOR       FY76  / $ 1117000
EPA  OFFICER.: HM FREEMAN                EPA/IERL   CINC
INVESTIGATOR.: MP SCHRAG                 MIDWEST RES INST                     TECH ECON SECTION
MILESTONES...: 07/77 -FUNDING PACKAGE SUBMITTED
               08/77 -AWARD FUNDS FOR PROJECT
               01/77 -DEFINE GAPS IN LITERATURE
               02/77 -RECOMMEND PRELIMINARY STANDARD S & A TECHNIQUES
               03/77 -ENVIRONMENTAL CHARACTERIZATION OF ONE MAJOR PROCESS
               03/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000465           SSIE-GMA  3029 1      EPA -68-02-2166       TASK-B624B-388
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO CHARACTERIZE THE LIQUID, GASEOUS, AND SOLID EMISSION FROM
                VARIOUS WASTE TO ENERGY SYSTEMS. THE CHARACTERIZATION WILL BE BASED ON ACTUAL DATA OBTAINED FROM
                ON-SITE SAMPLING OPERATIONS. THE FIRST REPORT FROM THIS PROJECT WAS DISTRIBUTED IN JULY '77; IT
                REPRESENTED A COLLECTION OF PREVIOUSLY OBTAINED DATA AND WAS CALLED A "SOURCE ASSESSMENT DOCUMENT
                FOR WASTE-AS-FUEL PROCESSES." A CO-FIRING OF WOOD WASTE WITH COAL PROCESS HAS BEEN CHARACTERIZED
                FOR ENVIRONMENTAL EMISSIONS, AS HAS A WASTE PRE-PROCESSING (SHREDDER/AIR CLASSIFICATION) PLANT IN
                HOUSTON, TEXAS. CHARACTERIZATION OF SEVERAL WASTE PYROLYSIS PLANTS IS ENVISIONED, IN ADDITION TO
                THAT OF WATERWALL INCINERATION PLANTS.
```

**PROJECT: 00466-EVALUATION OF WASTE-TO-ENERGY PROCESSES

```
                    STARTING/ COMPLETION DATE : 06/75   09/77     FUNDING    ESTIMATED   FY77  / $   54000
                    TASK CODE=B624B-389     **EPA=68-02-2101  ** (CNTR.)      PRIOR       FY76  / $  265000
EPA  OFFICER.. HM FREEMAN                EPA/IERL   CINC
INVESTIGATOR.. EM WILSON                 RALPH M. PARSONS CO                 RALPH M. PARSONS CO
MILESTONES.... 02/75 -FUNDING PACKAGE SUBMITTED
               05/75 -AWARD FUNDS FOR PROJECT
               12/76 -DRAFT FINAL REPORT
               06/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000466          SSIE-GMA  4383        EPA -68-02-2101       TASK-B624B-389
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO PROVIDE AN OBJECTIVE THIRD-PARTY ENGINEERING EVALUATION OF
                EMERGING WASTE-TO-ENERGY PROCESSES. THE EVALUATION INCLUDED COST FIGURES AND POTENTIAL TECHNICAL
                PROBLEMS FOR THE MOST PROMINENT OF THE CURRENT AND DEVELOPING PROCESSES. SEVEN LEADING PROCESSES
                WERE EVALUATED TECHNICALLY AND ECONOMICALLY.
```

**PROJECT: 00467-ST. LOUIS WASTE CO-FIRING WITH COAL PROJECT EQUIPMENT, FACILITIES AND ENVIRONMENTAL EVALUATION OF MERAMAC POWER PLANT

```
                    STARTING/ COMPLETION DATE : 06/68   09/77 :   FUNDING    ESTIMATED   FY77  / $   15000
                    TASK CODE=B624B-390     **EPA=68-02-1871  ** (CNTR.)      PRIOR       FY76  / $    2000
EPA  OFFICER.. C  WILES                  EPA/IERL   CINC
INVESTIGATOR.. PG GORMAN                 MIDWEST RES INST                    TECH ECON SECTION
               LJ SHANNON                MIDWEST RES INST                    TECH ECON SECTION
               MP SCHRAG                 MIDWEST RES INST                    TECH ECON SECTION
               DE FISCUS                 MIDWEST RES INST                    TECH ECON SECTION
MILESTONES.... 00/00 -FUNDING PACKAGE SUBMITTED
               00/00 -AWARD FUNDS FOR PROJECT
               05/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000467          SSIE-GMA  3673        EPA -68-02-1871       TASK-B624B-390
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... AS PART OF AN EPA DEMONSTRATION GRANT, THE CITY OF ST. LOUIS HAS BEEN PROCESSING MUNICIPAL SOLID
                WASTE AND THE UNION ELECTRIC UTILITY HAS BEEN FIRING IT AS AN AUXILIARY FUEL AT THE MEREMAC POWER
                PLANT. THE FEASIBILITY OF THE CONCEPT HAS BEEN DEMONSTRATED BUT MORE DATA OF A SUBSTANTIVE NATURE
                IS BEING SOUGHT FROM THE PROGRAM. THIS PROCUREMENT IS TO PROVIDE SERVICES TO FULLY TEST AND
                EVALUATE THE REFUSE PREPARATION AND FIRING PROCESSES. SPECIFICALLY, THIS PROJECT PROVIDES FOR TESTS
                TO DETERMINE THE EFFECTS OF FIRING REFUSE AND COAL ON GASES AND PARTICLES EMITTED FROM A 120 MW
                TANGENTIALLY FIRED UTILITY BOILER. TESTS WILL BE MADE TO INVESTIGATE THE MECHANISMS WHICH CAUSE A
                LOSS IN ESP PERFORMANCE. WATER POLLUTION TESTS WILL BE CONDUCTED AND THE EMISSION OF POTENTIALLY
                HAZARDOUS POLLUTANTS WILL BE INVESTIGATED. TESTING AND ENGINEERING ANALYSES WILL BE PERFORMED TO
                TECHNICALLY AND ECONOMICALLY EVALUATE THE REFUSE PREPARATION AND FIRING PROCESSES. REQUIREMENTS FOR
                DESIGN OF EMISSION CONTROL DEVICES WILL BE ESTABLISHED AND PROCESS OR EQUIPMENT MODIFICATIONS
                NECESSARY TO REDUCE PROCESS COST AND TO INCREASE ENERGY OR MATERIAL RECOVERY WILL BE DETERMINED.
```

**PROJECT: 00468-EVALUATION OF AMES' WASTE PROCESS AN ENERGY RECOVERY SYSTEM

```
                    STARTING/ COMPLETION DATE : 02/76   02/79 :   FUNDING    ESTIMATED   FY77  / $  250000
                    TASK CODE=B624B-391     **EPA=R803903     ** (GRANT)      PRIOR       FY76  / $  464000
EPA  OFFICER.. C  WILES                  EPA/IERL   CINC
INVESTIGATOR.. AO CHANTLAND              AMES CITY GOVT
               LJ SHANNON                MIDWEST RES INST                    TECH ECON SECTION
               AW JOENSEN                IOWA STATE UNIV OF SCI & TECH
               ER BAUMAN                 IOWA STATE UNIV OF SCI & TECH
MILESTONES.... 04/77 -FUNDING PACKAGE SUBMITTED
               05/77 -AWARD FUNDS FOR PROJECT
               01/77 -FUNDING INCREMENT
               04/77 -GRANT AMENDMENT
               02/78 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000468          SSIE-GMA  2719 1      EPA -R803903          TASK-B624B-391
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT...... THE STUDY WILL ASSESS THE EFFECTS OF USING MUNICIPAL SOLID WASTE (MSW) AS A SUPPLEMENTARY FUEL.
                CO-FIRING OF MSW WITH COAL IN STOKER AND TANGENTIALLY-FIRED BOILERS WILL BE CONDUCTED AND SINCE ONE
                BOILER IS THE SAME AS AT ST. LOUIS, STUDIES WILL PERMIT CONFIRMATION, AND COMPARISON OF SELECTED
                ST. LOUIS RESULTS. ASSESSMENTS WILL BE MADE OF THE TECHNICAL AND ENVIRONMENTAL ASPECTS OF THESE
                CO-FIRING TECHNIQUES. IN ADDITION, TECHNICAL AND ECONOMIC TESTS AND EVALUATIONS WILL BE CONDUCTED
                ON THE SECOND GENERATION MSW PROCESSING FACILITY ASSOCIATED WITH SUPPLYING THE REFUSE DERIVED FUEL.
```

PROJECT: 00470-ENVIRONMENTAL EFFECT OF UTILIZING SOLID WASTE AS A SUPPLEMENTARY POWER-PLANT FUEL

```
                    STARTING/ COMPLETION DATE : 06/74   10/78 :   FUNDING    ESTIMATED   FY77  / $   98000
                    TASK CODE=B624B-392     **EPA=R804008-02  ** (GRANT)      PRIOR       FY76  / $  503000
EPA  OFFICER.. R  OLEXSEY                EPA/IERL   CINC
INVESTIGATOR.. DA VAUGHAN                BATTELLE MEMORIAL INST
               WK BOYD                   BATTELLE MEMORIAL INST
               HH KRAUSE                 BATTELLE MEMORIAL INST
               RB ENGDAHL                BATTELLE MEMORIAL INST
MILESTONES.... 08/77 -FUNDING SUPPLEMENT
               10/78 -FINAL REPORT
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000470            SSIE-GMA  3736        EPA -R804008-02       TASK-B624B-392
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO INVESTIGATE THE BENEFITS TO THE ENVIRONMENT RESULTING FROM THE
                UTILIZATION OF SOLID WASTE AS A SUPPLEMENTARY FUEL IN EXISTING COAL-FIRED POWER PLANTS. THE
                APPROACH IS TO EVALUATE THE GASEOUS AND PARTICULATE EMISSION PLUS THE CORROSIVENESS OF COMBUSTION
                PRODUCTS AS A FUNCTION OF REFUSE-COAL RATIO AND AS A FUNCTION OF SULFUR CONTENT OF THE COAL.
                EXPERIMENTS WILL BE CONDUCTED IN AN OPERATING POWER STATION THROUGH COOPERATION OF THE CITY OF
                COLUMBUS, OHIO, AND AT THE HARRISBURG (PA.) WATERWALL CO. INCINERATION PLANT. FURNACE AND STACK GAS
                AND PARTICULATE SAMPLES WILL BE COLLECTED THROUGHOUT THE PERIODS THAT CORROSION PROBES ARE INSERTED
                AT SEVERAL LOCATIONS IN THE HEAT-RECOVERY PASSES. THESE PROBES WILL BE EXAMINED FOR CORROSION
                ATTACK AND DEPOSIT COMPOSITION FOR VARIOUS GAS AND METAL TEMPERATURES TO PROVIDE GUIDANCE IN FUTURE
                UTILIZATION OF SOLID WASTE AS A SUPPLEMENTARY FUEL.
```

PROJECT: 00471-EFFECTS OF BURNING DENSIFIED FORMS OF MUNICIPAL SOLID WASTE DERIVED FUELS IN INDUSTRIAL UTILITY, AND INSTITUTIONAL STOKER BOILER

```
                    STARTING/ COMPLETION DATE : 06/76   09/77 :   FUNDING    ESTIMATED   FY77  / $  117000
                    TASK CODE=B624B-395     **EPA=68-03-2426  ** (CNTR.)      PRIOR       FY76  / $  300000
EPA  OFFICER.. C  WILES                  EPA/IERL   CINC
INVESTIGATOR.. GH RIGO                   SYSTEMS TECHNOLOGY CORP
               MC EIFERT                 SYSTEMS TECHNOLOGY CORP
               BT RILEY                  SYSTEMS TECHNOLOGY CORP
               LW ANDERSON               SYSTEMS TECHNOLOGY CORP
               JT SWARTZBAUGH            SYSTEMS TECHNOLOGY CORP
MILESTONES.... 10/76 -FUNDING PACKAGE SUBMITTED
               11/76  -AWARD FUNDS FOR PROJECT
               03/77 -PRELIMINARY PERFORMANCE EVALUATION OF SHORT BURNS
               06/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000471            SSIE-GMA  3182 1      EPA -68-03-2426       TASK-B624B-395
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROGRAM IS TO DEMONSTRATE THE USE OF DENSIFIED REFUSE DERIVED FUEL (D-RDF) AS
                A COAL SUPPLEMENT IN STOKER-EQUIPPED BOILERS AND TO ASSESS THE ENVIRONMENTAL IMPACT OF WIDESPREAD
                IMPLEMENTATION OF THE CONCEPT. THE QUESTIONS ARE TO BE ANSWERED BY BURNING PELLETIZED, CUBETTED AND
                BRIQUETTED D-RDF AND COAL IN SPREADER STOKER-EQUIPPED BOILERS. THE COAL: D-RDF RATIO WILL BE VARIED
                TO ESTABLISH THE IMPACT OF SUBSTITUTION RATIO ON BOILER PERFORMANCE AND THE ENVIRONMENT. AFTER
                INITIAL TESTING IS COMPLETE, A DEMONSTRATION BURN WILL OCCUR TO ASSESS THE IMPACT OF SUSTAINED
                FIRING. EACH FUEL-BOILER COMBINATION WILL BE APPROACHED IN A THREE STEP SEQUENCE: (1) A FIELD TRIAL
                WILL ESTABLISH THE PROCESSABILITY OF THE FUEL BY THE BOILER AND THE MAXIMUM SUBSTITUTION RATIOS
                USABLE WITHOUT BOILER PROBLEMS; (2) A FIELD TEST WILL QUANTIFY ENVIRONMENTAL, ENERGY AND BOILER
                IMPACTS OF THE FUEL SYSTEM OVER A RANGE OF BOILER CONDITIONS; (3) A DEMONSTRATION WILL BE
                PERFORMED. THE PROGRAM SCHEDULE CALLS FOR INITIATION OF TESTING IN SEPTEMBER 1976, AND COMPLETION
                IN JULY 1977 WITH THE DRAFT REPORT COMPLETE IN OCTOBER 1977.
```

PROJECT: 00473-PILOT SCALE PYROLYTIC CONVERSION OF MIXED WASTE TO FUEL

```
                    STARTING/ COMPLETION DATE : 07/75   12/77     FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=B624B-399     **EPA=68-03-2340  ** (CNTR.)      PRIOR       FY76  / $  565000
EPA  OFFICER.. WW LIBERICK               EPA/IERL   CINC
INVESTIGATOR.. J  PORTER                 ENERGY RES CO INC
               RH STEPHENS               ENERGY RES CO INC
MILESTONES.... 03/75 -FUNDING PACKAGE SUBMITTED
               06/75 -AWARD FUNDS FOR PROJECT
               12/76 -GRANT MODIFICATION #1
               04/77 -GRANT MODIFICATION #2
               12/77 -FINAL REPORT RECEIVED
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000473            SSIE-GMA  3676        EPA -68-03-2340       TASK-B624B-399
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: TO DEVELOP MODELS RELATING FRACTION OF FUEL PRODUCTS (GAS, LIQUID, SOLID) PRODUCED IN
                PYROLYSIS OF VARIOUS TYPES OF SOLID WASTES AS FUNCTION OF PYROLYZED CONDITIONS. SOLID WASTES
                INCLUDE MIXED MUNICIPAL, AGRICULTURAL, AND INDUSTRIAL WASTES. AN INVESTIGATION OF CHEMICAL
                CONVERSIONS INCLUDING STEAM GASIFICATION, PARTIAL OXIDATION, AND CATALYTIC EFFECTS OF BED
                MATERIALS, AS WELL AS DETAILED ANALYSIS AND CHARACTERIZATION OF PYROLYSIS PRODUCTS INCLUDING CHAR
                AND OIL, WILL BE CONDUCTED. APPROACH: EXPERIMENTAL STUDY USING SMALL BATCH PYROLYZER AND PILOT SIZE
                (200 KG/HR) FLUIDIZED BED PYROLYZER TO PRODUCE DATA FOR MODEL DEVELOPMENT AND VERIFICATION.
                STATISTICAL AND SEMI-EMPIRICAL MODELS WILL BE EXAMINED FOR THE NORMAL FLUIDIZED BED PYROLYTIC
                REACTION AS WELL AS FOR STEAM GASIFICATION AND PARTIAL OXIDATION. SEVERAL CHAR AND OIL SAMPLES WILL
                BE ANALYZED IN DETAIL TO EVALUATE THE ACCEPTABILITY OF FUEL PRODUCTS. STATUS: FABRICATION OF THE
                TEST UNITS IS COMPLETED. TEST RUNS ARE UNDERWAY TO ACCUMULATE DATA FOR MODEL VE
```

**PROJECT: 00475-CHEMICAL RECLAMATION OF SCRAP RUBBER

```
                    STARTING/ COMPLETION DATE : 01/77   03/78 :   FUNDING    ESTIMATED   FY77  / $   88000
                    TASK CODE=B624B-401     **EPA=R804321-01  ** (GRANT)      PRIOR       FY76  /
EPA  OFFICER.. WW LIBERICK                EPA/IERL   CINC
INVESTIGATOR.. JW LARSEN                  UNIVERSITY OF TENNESSEE
MILESTONES.... 10/76 -FUNDING PACKAGE SUBMITTED
               01/77 -AWARD FUNDS FOR PROJECT
               12/77 -DRAFT FINAL REPORT
               03/78 -FINAL REPORT RECEIVED
PLAN ID...... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000475            SSIE-GMA  3718        EPA -R804321-01       TASK-B624B-401
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... THE ENVIRONMENTAL PROBLEMS CAUSED BY 200 MILLION TIRES DISCARDED ANNUALLY IN THE UNITED STATES ARE
                WELL DOCUMENTED. AT PRESENT THERE IS NO GOOD WAY OF DISPOSING OF SCRAP TIRES OR OF RECOVERING THE
                VALUABLE CARBON MATERIALS WHICH THEY CONTAIN. THE CHIEF OBJECTIVE OF THIS PROJECT IS TO COMPLETE
                BENCH SCALE ENGINEERING RESEARCH ON A PROCESS WHICH CONVERTS SCRAP RUBBER TO A MIXTURE OF
                HYDROCARBON GASES, A LOW SULFUR OIL, AND CARBON BLACK. THIS WILL INVOLVE IDENTIFICATION AND
                SOLUTION OF TECHNICAL PROBLEMS, FOR EXAMPLE, SEPARATION OF THE CATALYST AND CARBON BLACK. IT WILL
                INCLUDE A COMPLETE ECONOMIC EVALUATION OF THE PROCESS. QUANTITIES OF THE PRODUCTS WILL BE PRODUCED
                FOR EVALUATION BY POTENTIAL CUSTOMERS. THE DATA NECESSARY FOR THE DESIGN OF A PILOT PLANT W
```

**PROJECT: 00477-CONVERSION OF SOLID WASTE TO POLYMER GASOLINE

```
                    STARTING/ COMPLETION DATE : 06/75   12/77 :   FUNDING    ESTIMATED   FY77  / $  171000
                    TASK CODE=B624B-402     **EPA=D5-0781     ** ( IAG )      PRIOR       FY76  / $  235000
EPA  OFFICER.. W  LIBERICK                EPA/IERL   CINC
INVESTIGATOR.. CB BENHEM                  US DOD                              NAVY
               JP DIEBOLD                 US DOD                              NAVY
MILESTONES.... 04/75 -FUNDING PACKAGE SUBMITTED
               06/75 -AWARD FUNDS FOR PROJECT
               12/77 -PROJECT TESTING COMPLETED
               12/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000477            SSIE-GMA  3915        EPA -D5-0781          TASK-B624B-402
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: TO DETERMINE THE FEASIBILITY, BOTH TECHNICAL AND ECONOMIC, OF PYROLYZING THE ORGANIC
                FRACTION OF MUNICIPAL SOLID WASTE TO SUFFICIENT QUANTITY OF HYDROCARBON GASES (ETHYLENE, ETHANE,
                ETC.) TO PRODUCE CHEMICAL INTERMEDIATES. PHASE I OF SUBSEQUENT STUDIES ARE DIRECTED TOWARDS THE
                POLYMERIZATION OF HYDROCARBON FRACTION TO LIQUID FUEL (POLYMER GASOLINE) SUITABLE FOR INTERNAL
                COMBUSTION ENGINE OPERATION. APPROACH: 1. AN EXISTING PYROLYSIS UNIT WILL BE OPERATED UNDER VARIOUS
                CONDITIONS TO MAXIMIZE THE PRODUCTION OF UNSATURATED HYDROCARBONS. 2. A POLYMERIZATION UNIT WILL BE
                DESIGNED, FABRICATED AND ADDED TO THE PYROLYSIS UNIT. 3. DATA WILL BE OBTAINED OVER A WIDE VARIETY
                OF CONDITIONS USING THE COMBINED PYROLYSIS AND POLYMERIZATION UNITS. COMPOSITIONAL ANALYSIS OF
                PYROLYSIS AND POLYMERIZATION PRODUCTS WILL BE PERFORMED FOR EACH TEST CONDITION. 4. PRELIMINARY
                DESIGN OF A SCALED-UP PILOT PLANT WILL BE DEVELOPED. PROGRESS: STUDIES HAVE BEEN CONDUCTED WITH THE
                PYROLYSIS UNIT TO OPTIMIZE THE UNSATURATED HYDROCARBONS IN THE OFF-GASES. SEPARATE STUDIES HAVE
                BEEN MADE ON A GAS CLEANING SYSTEM AND A THERMAL POLYMERIZATION UNIT. POLYMER GASOLINE HAS BEEN
                PRODUCED FROM THE POLYMERIZATION UNIT USING A COMBINATION OF BOTTLE GASES SIMULATING THE GAS
                MIXTURE FROM THE PYROLYSIS UNIT. FUTURE TESTS INVOLVE USING GASES FROM THE PYROLYSIS UNIT IN THE
                GAS CLEANING SYSTEM AND THE POLYMERIZATION UNIT AND AGAIN OPTIMIZE OPERATING PARAMETERS.
```

**PROJECT: 00480-PROGRAM BRIEFINGS ON ENERGY CONSERVING INDUSTRIAL PROCESS CHANGES

```
                    STARTING/ COMPLETION DATE : 11/76   06/77     FUNDING    ESTIMATED   FY77  / $   74000
                    TASK CODE=B624B-529     **EPA=68-03-2198  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. HS SKOVRONEK               EPA/IERL   CINC
INVESTIGATOR.: H  HALEY                   ARTHUR D. LITTLE INC
MILESTONES...: 10/76 -FUNDING PACKAGE SUBMITTED
               11/76 -AWARD FUNDS FOR PROJECT
               10/77 -DRAFT FINAL REPORT RECEIVED
               02/78 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000480            SSIE-GMA  4395        EPA -68-03-2198       TASK-B624B-529
               AP  -624B              DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE BRIEFINGS IN WASHINGTON, RESEARCH TRIANGLE PARK AND
                CINCINNATI ON THE RESULTS OF THE ENERGY/ENVIRONMENT STUDY CONDUCTED BY ARTHUR D. LITTLE, INC. UNDER
                EPA CONTRACT 68-03-2198. ALSO INCLUDED IN THE PROGRAM IS THE PUBLICATION OF INFORMATION OBTAINED IN
                THIS STUDY AND CATEGORIZED BY POLLUTANT RATHER THAN BY INDUSTRIAL SEGMENT.
```

**PROJECT: 00481-WASTE HEAT RECOVERY POTENTIAL FOR ENVIRONMENTAL BENEFITS IN SELECTED INDUSTRIES

STARTING/ COMPLETION DATE : 04/77 01/78 · FUNDING ESTIMATED FY77 / $ 70000
TASK CODE=B624B-530 **EPA=68-01-4454 ** (CNTR.) PRIOR FY76 / $ 46000

EPA OFFICER.. CC LEE EPA/IERL CINC
INVESTIGATOR.. SR LATOUR D S S ENGINEERS INC
C KIEFER D S S ENGINEERS INC
R NIMO D S S ENGINEERS INC
MILESTONES.... 07/75 -FUNDING PACKAGE SUBMITTED
03/77 -AWARD FUNDS FOR PROJECT
01/78 -INTERIM REPORT RECEIVED
08/79 -FINAL REPORT
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000481 SSIE-GMA 3701 EPA -68-01-4454 TASK-B624B-530
AP -624B DU -L110 LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THIS TASK IS TO IDENTIFY THE POINTS, QUANTITY, AND QUALITY OF HEAT DISCHARGED FROM: 1) ESTABLISHED INDUSTRIAL TECHNOLOGIES NOW DISCHARGING SUBSTANTIAL AMOUNTS OF WASTE HEAT TO THE ENVIRONMENT AND 2) EMERGING TECHNOLOGIES FOR ENERGY DEVELOPMENT, CONVERSION AND UTILIZATION. THE PURPOSE OF THIS STUDY IS TO PRESENT DETAILED DATA ON HEAT AND WATER DISCHARGED FROM INDUSTRIES AND EMERGING TECHNOLOGIES, FOR ENERGY DEVELOPMENT, WHICH ARE DISCHARGING SUBSTANTIAL QUANTITIES OF WASTE HEAT TO THE ENVIRONMENT, IN SUCH A MANNER THAT IT MAY BE EFFECTIVELY USED TO: 1) ASSESS THE RELATIVE ECONOMIC AND ENVIRONMENTAL EFFECTS OF UTILIZING WASTE HEAT, 2) ASSURE THE DEVELOPMENT OF ENVIRONMENTALLY COMPATIBLE CONTROL TECHNOLOGY NECESSARY FOR EFFICIENT WASTE HEAT UTILIZATION. SCOPE OF WORK: IN ORDER TO ACCOMPLISH THIS OBJECTIVE THE FOLLOWING SUB-TASK WILL BE PERFORMED: 1) IDENTIFICATION OF WASTE HEAT DISCHARGING INDUSTRIES AND TECHNOLOGIES. 2) DETERMINATION OF THE MAIN PROCESSES IN USE. 3) ESTABLISHMENT OF INDUSTRIAL OR TECHNOLOGICAL SUB-CATEGORIES. 4) PREPARATION OF HEAT FLOW CHARTS AND DIAGRAMS. 5) DETERMINATION OF ANNUAL WASTE HEAT DISCHARGE OF EACH SUB-CATEGORY. 6) CATEGORIZE TYPES OF WASTE HEAT DISCHARGED ACCORDING TO QUALITY, QUANTITY, AND POTENTIAL OF UTILIZATION. 7) PRESENT TOTAL WASTE HEAT DISCHARGED OF EACH WASTE HEAT CATEGORY. A) AS A PERCENT OF THE TOTAL INDUSTRIAL CONSUMPTION OF ENERGY; B) AS A PERCENTAGE OF EACH SIC GROUP; C) ACCORDING TO GEOGRAPHICAL DISTRIBUTION. 8) IDENTIFY FURTHER R AND D NEEDS.

**PROJECT: 00483-ENVIRONMENTAL, ECONOMIC, AND CONSERVATION ASPECTS OF INTEGRATED ENERGY USE APPLICATIONS

STARTING/ COMPLETION DATE : 07/75 01/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=B624B-531 **EPA=68-03-2394 ** (CNTR.) PRIOR FY76 / $ 70000

EPA OFFICER.: CC LEE EPA/IERL CINC
INVESTIGATOR.: RP ZIMMER GEORGIA INST OF TECH GRADUATE SCH
MILESTONES...: 07/75 -FUNDING PACKAGE SUBMITTED
03/76 -AWARD FUNDS FOR PROJECT
01/78 -FINAL REPORT RECEIVED
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000483 SSIE-GMA 4384 EPA -68-03-2394 TASK-B624B-531
AP -624B DU -L110 LABT-EMI
ABSTRACT..... THE PURPOSE OF THIS PROJECT IS TO PROVIDE UP-TO-DATE ANALYSES OF THE ENVIRONMENTAL, ECONOMIC AND TECHNICAL FEASIBILITY OF ALTERNATIVES FOR SUPPLYING TOTAL ENERGY NEEDS, TO ASSESS VARIOUS INTEGRATED ENERGY SYSTEM CONCEPTS FOR SUPPLYING MULTIPURPOSE ENERGY FOR UTILITY AND INDUSTRIAL NEEDS, TO IDENTIFY THE TECHNICAL FEASIBILITY OF MATCHING INDUSTRIAL PROCESSES TO THERMAL OUTPUTS OF POWER PLANTS, TO ANALYZE EXTENSIVELY SEVERAL FINAL CONCEPTS SELECTED FOR THEIR POTENTIAL FOR FUTURE ENVIRONMENTALLY SOUND DEVELOPMENTS, AND TO MAKE RECOMMENDATIONS ABOUT FUTURE ENVIRONMENTAL RESEARCH AND DEVELOPMENT ACTIVITIES BASED ON THE PROJECT RESULTS. THIS RESEARCH STUDY WILL FOLLOW A PHASE-ORIENTED PROGRAM TO ACHIEVE ITS OBJECTIVES. FIVE PHASES HAVE BEEN IDENTIFIED AND ARE LISTED BELOW: PHASE 1: PROJECT MANAGEMENT, PHASE 2: ENVIRONMENTAL, ECONOMIC AND TECHNOLOGICAL OVERVIEW AND PRELIMINARY CONCEPT IDENTIFICATION, PHASE 3: METHODOLOGY DEVELOPMENT AND FINAL CONCEPT SELECTION, PHASE 4: CONCEPT ANALYSIS AND EVALUATION, PHASE 5: CONCLUSION AND RECOMMENDATIO

**PROJECT: 00484-DEVELOPMENT OF SAMPLING PLAN FOR GEOTHERMAL MANIFESTATIONS

STARTING/ COMPLETION DATE : 04/77 10/77 FUNDING ESTIMATED FY77 / $ 10000
TASK CODE=B624B-532 **EPA=68-03-1291 ** (CNTR.) PRIOR FY76 /

EPA OFFICER.. RP HARTLEY EPA/IERL CINC
INVESTIGATOR.. C LEAVITT THOMPSON RAMO WOOLDRIDGE INC
MILESTONES.... 04/77 -FUNDING PACKAGE SUBMITTED
04/77 -AWARD FUNDS FOR PROJECT
10/77 -FINAL REPORT
PLAN ID.....: (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000484 SSIE-GMA 4394 EPA -68-03-1291 TASK-B624B-532
AP -624B DU -L110 LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THIS PROJECT IS TO DEVISE A PLANT FOR SAMPLING GEOTHERMAL FLUIDS AT VARIOUS SITES, PRIORITIZED ON THE BASIS OF ADEQUACY OF EXISTING DATA, STAGE OF DEVELOPMENT OF THE RESOURCE AREA, SIGNIFICANCE OF POTENTIAL POLLUTION AND SAMPLING COSTS. THE PLAN WILL BE DESIGNED TO ENCOMPASS THE RANGE OF RESOURCE CHARACTERISTICS. THE APPROACH IS TO EXAMINE THE EXISTING DATA BASE AND FIELD DEVELOPMENTS AND EVALUATE NEEDS THEREFROM. THE OUTPUT WILL BE A PLAN TO SUPPORT AND JUSTIFY A GEOTHERMAL FLUID DATA-GATHERING EFFORT, AS A BASE FOR FURTHER REFINING POLLUTION CONTROL TECHNOLOGY NEEDS.

**PROJECT: 00485-MONITORING SOLAR WASTEWATER TREATMENT

STARTING/ COMPLETION DATE : 05/77 06/79 : FUNDING ESTIMATED FY77 / $ 60000
TASK CODE=B624B-534 **EPA=68-03-2587 ** (CNTR.) PRIOR FY76 /
EPA OFFICER.. CC LEE EPA/IERL CINC
INVESTIGATOR.. RC CROCKETT WRIGHT PIERCE BARNES & WYMAN
MILESTONES.... 05/77 -FUNDING PACKAGE SUBMITTED
06/77 -AWARD FUNDS FOR PROJECT
01/80 -FINAL REPORT
06/79 -FINAL REPORT RECEIVED
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000485 SSIE-GMA 4530 EPA -68-03-2587 TASK-B624B-534
AP -624B DU -L110 LABT-EMI
ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. OBJECTIVES: THE PURPOSE OF THIS CONTRACT IS TO DETERMINE THE MOST ENERGY-EFFECTIVE METHOD OF OPERATING A MUNICIPAL WASTEWATER TREATMENT PLANT USING AN INTEGRATED ENERGY SYSTEM OF SOLAR ENERGY, DIGESTER METHANE, AND HEAT PUMPS. APPROACHES: THE APPROACHES FOR PERFORMING THIS PROJECT INCLUDE: 1) MONITOR AND DOCUMENT THE OPERATIONAL PERFORMANCE OF THE SOLAR ENERGY SYSTEM INCLUDING THE COLLECTION, THE STORAGE, THE TRANSMITTAL, AND THE USE OF SOLAR ENERGY. 2) MONITOR AND DOCUMENT THE OPERATION PERFORMANCE OF THE ANAEROBIC DIGESTER. 3) GATHER DATA IN APPROPRIATE CLIMATIC PARAMETERS AND RELATE THEIR IMPACT ON THE SOLAR ENERGY SYSTEM AND DIGESTER SUPPLEMENTAL ENERGY REQUIREMENTS. 4) IDENTIFY EACH ENERGY DEMAND IN THE TREATMENT PLANTS AS A PERCENTAGE CONTRIBUTION OF (A) SOLAR ENERGY, (B) DIGESTER GAS, (C) HEAT PUMP, (D) EFFLUENT EXCHANGE, AND (E) EMERGENCY ELECTRICAL GENERATION. 5) IDENTIFY THE MOST COST-EFFECTIVE TECHNIQUES FOR SUPPLYING PLANT ENERGY DEMAND THROUGH THE COMBINED USE OF SOLAR ENERGY, ELECTRICAL POWER, AND DIGESTER GAS.

**PROJECT: 00487-ASSESSMENT OF LARGE-SCALE PHOTOVOLTAIC MATERIALS PRODUCTION

STARTING/ COMPLETION DATE : 11/76 11/76 : FUNDING ESTIMATED FY77 / $ 5000
TASK CODE=B624B-536 **EPA=68-02-1331 ** (CNTR.) PRIOR FY76 / $ 23000
EPA OFFICER.. R HARTLEY EPA/IERL CINC
INVESTIGATOR.: DR SEARS LOCKHEED MIS. & SPACE CO INC
MILESTONES...: 11/76 -FUNDING PACKAGE SUBMITTED
11/76 -AWARD FUNDS FOR PROJECT
11/76 -DRAFT FINAL REPORT
04/77 -FINAL REPORT RECEIVED
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000487 SSIE-GMA 4389 EPA -68-02-1331 TASK-B624B-536
AP -624B DU -L110 LABT-EMI
ABSTRACT..... THE OBJECTIVES OF THIS STUDY WERE TO ASSESS THE ENVIRONMENTAL IMPACT OF LARGE INCREASES IN THE PRODUCTION OF SOLAR CELL MATERIALS ASSUMING THAT PHOTOVOLTAICS WOULD PROVIDE 1% OF THE NATIONAL ELECTRICAL ENERGY REQUIREMENT. THREE TYPES OF CELL PRODUCTION-SILICON, CADMIUM SULFIDE, AND GALLIUM ARSENIDE WERE EXAMINED. THE APPROACH WAS TO INVESTIGATE THE EXISTING AND DEVELOPING PRODUCTION METHODS AND TO CALCULATE POTENTIAL POLLUTION DISCHARGE AND EMISSION LOADINGS. THE FINAL REPORT IS COMPLETE. FOR SILICON PRODUCTION, THE NECESSARY POWER CONSUMPTION PRODUCES INDIRECT AIR EMISSIONS OVER HALF AS LARGE AS THE COAL-BURNING PLANTS THAT THE SILICON CELLS MIGHT REPLACE. FOR THE OTHERS, ATMOSPHERIC CADMIUM RELEASES, AND POTENTIAL CADMIUM AND ARSENIC SPILLS ARE THE MAJOR POTENTIAL PROBLEM AREAS.

**PROJECT: 00488-PYROLYSIS OF AGRICULTURAL RESIDES AND FEEDLOT WASTES IN A REACTIVE STEAM ATMOSPHERE

STARTING/ COMPLETION DATE : 11/76 01/79 : FUNDING ESTIMATED FY77 / $ 86000
TASK CODE=B624B-538 **EPA=R804836-01 ** (GRANT) PRIOR FY76 /
EPA OFFICER.: WW LIBERICK EPA/IERL CINC
INVESTIGATOR.: MJ ANTAL PRINCETON UNIV ENG & APP SCI/AEROSPACE DEPT
MILESTONES.... 11/76 -FUNDING PACKAGE SUBMITTED
02/77 -AWARD FUNDS FOR PROJECT
12/77 -INTERIM REPORT
01/78 -AWARD CONTINUATION
11/78 -DRAFT FINAL REPORT
01/79 -FINAL REPORT
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000488 SSIE-GMA 3716 EPA -R804836-01 TASK-B624B-538
AP -624B DU -L110 LABT-EMI
ABSTRACT..... A PROGRAM TO INVESTIGATE THE PYROLYSIS OF AGRICULTURAL RESIDUES AND FEEDLOT WASTES IN A STEAM ATMOSPHERE IS TO BE DONE. THE PROGRAM IS MOTIVATED BY THE EVIDENT NEED TO UPGRADE THE ENERGY VALUE OF ORGANIC WASTES FOR THEM TO BECOME A NATIONALLY SIGNIFICANT FUEL RESOURCE. HYDROGEN PRODUCED FROM SOLID WASTES BY STEAM PYROLYSIS COULD BE USED TO MEET A PORTION OF THE NATION'S NATURAL GAS DEMAND. EXPERIMENTAL WORK ON THE KINETICS OF STEAM PYROLYSIS IS NEEDED TO DESIGN A PRACTICAL REACTOR SYSTEM AND TO ESTABLISH THE REGIMES WHERE MINIMUM LEVELS OF ENVIRONMENTAL POLLUTANTS ARE PRODUCED. THE RESEARCH PROGRAM OUTLINED IN THIS EFFORT WILL INVESTIGATE AT THE BENCH THE EFFECTS OF DIVERSE PARAMETERS, E.G., HEATING RATE AND ULTIMATE TEMPERATURE, PARTICLE SIZE, REACTOR RESIDENCE TIME AND PRESSURE ON STEAM PYROLYSIS. IN ADDITION, CATALYSIS OF THE PYROLYSIS REACTIONS AND EFFECTS OF TRACE CONSTITUENTS OF THE WASTE ON CATALYSIS WILL ALSO BE STUDIED. MATHEMATICAL MODELS BASED ON DIFFERENTIAL EQUATIONS DESCRIBING THE RATE PROCESSES WILL BE DEVELOPED WHEN APPROPRIATE. THE RESEARCH PROGRAM IS AIMED AT DETERMINING THE OPTIMAL CONDITIONS FOR THE PRODUCTION OF A SYNTHESIS GAS (COMPOSED PRIMARILY OF H2, CO, AND CO2) FROM ORGANIC WASTES BY STEAM PYROLYSIS. IN ORDER TO ACHIEVE THIS GOAL, YIELDS OF CHAR AND LIQUID PRODUCTS WILL BE MINIMIZED. ULTIMATE PYROLYSIS TEMPERATURES WILL ALSO BE KEPT AS LOW AS POSSIBLE, BUT OTHER CONDITIONS WILL BE TREATED AS TRUE VARIABLES IN THE OPTIMIZATION PROCESS. RESULTS FROM THIS RESEARCH WILL FACILITATE THE DESIGN OF A CONTINUOUS, SMALL-SCALE CHEMICAL REACTOR PRIMARILY FOR WASTE GASIFICATION, THOUGH SOME WASTE LIQUEFACTION INFORMATION WILL ALSO RESULT.

**PROJECT: 00490-ASSESSMENT OF COMBUSTION OF RDF FUELS

```
                    STARTING/ COMPLETION DATE : 04/77   04/79 :   FUNDING    ESTIMATED   FY77  / $  159000
                    TASK CODE=B624B-542    **EPA=68-02-1885  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.: HM FREEMAN                EPA/IERL   CINC
INVESTIGATOR.: C  HARTMAN                ACUREX CORP                          AEROTHERM DIV
MILESTONES.... 04/77 -FUNDING PACKAGE SUBMITTED
               08/77 -AWARD FUNDS FOR PROJECT
               09/78 -FINAL REPORT
               04/79 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000490           SSIE-GMA  3674        EPA -68-02-1885       TASK-B624B-542
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THIS PROJECT IS TO ASSESS POLLUTANT FORMATION DURING THE COMBUSTION OF
                REFUSE-DERIVED FUELS (RDF) AS A FUNCTION OF COMBUSTION PARAMETERS (SUCH AS AIR-TO-FUEL RATIO, SOLID
                PARTICLE RESIDENCE TIME, COMBUSTION TEMPERATURE, ETC). POLLUTANT CONTROL WITHIN THE COMBUSTION
                CHAMBER WILL ALSO BE ASSESSED. THE APPROACH WILL BE TO UTILIZE AN ALREADY EXISTING,
                GOVERNMENT-OWNED, SMALL-SCALE (PILOT) TEST FURNACE FOR THE COMBUSTION EXPERIMENTS. THE RDF FUEL
                SYSTEM WILL BE CAPABLE OF FIRING ABOUT 100 POUNDS OF RDF PER HOUR.
```

**PROJECT: 00494-ENVIRONMENTAL AND TECHNOLOGICAL ANALYSIS OF THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL

```
                    STARTING/ COMPLETION DATE : 07/77   05/78 :   FUNDING    ESTIMATED   FY77  / $   57000
                    TASK CODE=B624B-546    **EPA=R805050-01  ** (GRANT)      PRIOR       FY76  /
EPA  OFFICER.. HM FREEMAN                EPA/IERL   CINC
INVESTIGATOR.. EH HALL                   BATTELLE MEMORIAL INST
               WT LAWHON                 BATTELLE MEMORIAL INST
               CM ALLEN                  BATTELLE MEMORIAL INST
MILESTONES.... 07/77 -FUNDING PACKAGE SUBMITTED
               08/77 -AWARD FUNDS FOR PROJECT
               05/78 -FINAL REPORT
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-000494           SSIE-GMA  3728        EPA -R805050-01       TASK-B624B-546
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT.....: THERE IS A WIDESPREAD INTEREST IN THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL BECAUSE IT DOES NOT
                CONTAIN SULFUR, IT IS A RENEWABLE RESOURCE, AND THE TECHNOLOGY FOR ITS USE IS AVAILABLE. THERE ARE,
                HOWEVER, SOME UNRESOLVED QUESTIONS WHICH MUST BE ADDRESSED AT THIS TIME IN ORDER TO BE SURE THAT NO
                LONG-RANGE DETRIMENTAL EFFECTS WOULD RESULT FROM A GREATLY EXPANDED WOOD-FUEL INDUSTRY. THE
                OBJECTIVES OF THIS PROJECT ARE: 1, TO ANALYZE THE POTENTIAL AVAILABILITY OF SURPLUS WOOD BY REGION
                AND COMPARE THAT AVAILABILITY WITH POTENTIAL REGIONAL DEMAND FOR WOOD FUEL. 2. TO ASSESS THE
                CURRENT STATE OF THE TECHNOLOGY FOR THE PROCUREMENT AND UTILIZATION OF SURPLUS WOOD FUEL, TO
                PROJECT POTENTIAL CONSUMPTION OF WOOD FUEL ON THE BASIS OF EXISTING TECHNOLOGY, AND TO IDENTIFY ANY
                TECHNOLOGY-RELATED RESEARCH AND DEVELOPMENT NEEDS. 3. TO ASSESS THE ENVIRONMENTAL/ECOLOGICAL
                IMPACTS WITH RESPECT TO SO2 EMISSIONS, AND WITH RESPECT TO POTENTIAL LONG-RANGE IMPACTS ON OUR
                FORESTS
```

**PROJECT: 00499-CHEMISTRY OF HIGH TEMPERATURE GEOTHERMAL BRINES

```
                    STARTING/ COMPLETION DATE : 02/77   06/77 :   FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=B624B-585    **EPA=68-03-1239  ** (CNTR.)      PRIOR       FY76  /
EPA  OFFICER.. RP HARTLEY                EPA/IERL   CINC
INVESTIGATOR.:    UNKNOWN                LOCKHEED MIS. & SPACE CO INC
MILESTONES...: 01/77 -FUNDING PACKAGE SUBMITTED
               02/77 -AWARD FUNDS FOR PROJECT
               04/77 -DRAFT REPORT
               06/77 -FINAL REPORT RECEIVED
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000499           SSIE-GMA  4535        EPA -68-03-1239       TASK-B624B-585
               AP  -624B             DU  -L110             LABT-EMI
ABSTRACT...... THE STUDY WILL REVIEW THE INFORMATION AVAILABLE ON THE HIGH TEMPERATURE, HIGH PRESSURE AQUEOUS
                CHEMISTRY OF THE IMPORTANT CONSTITUENTS OF GEOTHERMAL BRINES THAT ARE MOST LIKELY TO RESULT IN
                PRECIPITATION, OUTGASSING, SCALING AND CORROSION DURING CLOSED LOOP BRINE HANDLING. THE STUDY WILL
                BE ORIENTED TOWARD THE POTENTIAL FOR POLLUTANT RELEASE TO THE ENVIRONMENT AND THE PREVENTION
                THEREOF  THE APPROACH WILL BE A LITERATURE SURVEY. THE OUTPUT WILL BE A REPORT SUMMARIZING THE
                CURRENT STATE OF KNOWLEDGE, OUTLINING CURRENT MAJOR RESEARCH ACTIVITIES IN THIS AREA, AND DEFINING
                SIGNIFICANT GAPS IN OUR UNDERSTANDING OF HIGH TEMPERATURE, HIGH PRESSURE BRINE CHEMISTRY. THE
                OUTPUT WILL BE USED TO ASSIST IN DETERMINING THE ENVIRONMENTAL RESEARCH NEEDS RELATED TO
                BRINE-INDUCED SYSTEM FAILURES.
```

**PROJECT: 00500-CONSTRUCTION OF THE MERL/IERL T & E FACILITY

```
                    STARTING/ COMPLETION DATE : 09/77   11/78 :   FUNDING    ESTIMATED   FY77  / $  437000
                    TASK CODE=B624B-596     **EPA=68-03-6008  ** (CNTR.)     PRIOR       FY76  /
EPA  OFFICER.  V  JELEN                 EPA/IERL   CINC
INVESTIGATOR.  RA KOETEERS              MONARCH CONSTRUCTION CO
MILESTONES...  03/77 -FUNDING PACKAGE SUBMITTED
               09/77 -AWARD OF PROJECT
               11/78 -CONSTRUCTION COMPLETE
               05/79 -PROGRAM OPERATIONAL
PLAN ID.......(AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..  RECN-000500          SSIE-GMA  4638        EPA -68-03-6008       TASK-B624B-596
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT......
```

THE OBJECTIVE IS THE CONSTRUCTION OF A MULTIPURPOSE TEST AND EVALUATION FACILITY FOR THE ENVIRONMENTAL PROTECTION AGENCY AT THE SITE OF THE METROPOLITAN SEWER DISTRICT OF CINCINNATI TREATMENT FACILITY, 1600 GEST STREET, CINCINNATI, OHIO IN ACCORDANCE WITH PLANS AND SPECIFICATIONS. THE BUILDING WILL BE TWO STORIES OF STEEL FRAMING WITH A SUPERSTRUCTURE OF ROLLED STRUCTURAL STEEL SECTIONS. EXTERIOR WILL CONSIST OF COLORED METAL WALL PANELS TO MATCH EXISTING STRUCTURE OF THE TREATMENT PLANT. THE BUILDING WILL CONTAIN A LARGE TWO STORY EXPERIMENTAL AREA (APPROX. 24,000 SQ. FT.), LABORATORIES FOR EXPERIMENTAL CONTROL, AND OFFICES TO HOUSE PERSONNEL WORKING ON PROJECTS (APPROX. 6,000 SQ.

**PROJECT: 00502-WORKSHOP ON WASTE-TO-ENERGY TECHNOLOGY

```
                    STARTING/ COMPLETION DATE : 08/77   03/78     FUNDING    ESTIMATED   FY77  / $   25000
                    TASK CODE=B624B-625     **EPA=R805561-01  ** (GRANT)     PRIOR       FY76  /
EPA  OFFICER.. H  FREEMAN               EPA/IERL   CINC
INVESTIGATOR.. GR SMITHSON              BATTELLE MEMORIAL INST
               ST DINOVO                BATTELLE MEMORIAL INST
MILESTONES.... 08/77 -FUNDING PACKAGE SUBMITTED
               08/77 -AWARD FUNDS FOR PROJECT
               11/77 -CONFERENCE
               03/78 -SUMMARY REPORT
               00/00 -FINAL REPORT RECEIVED
PLAN ID.......(AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000502          SSIE-GMA  3916        EPA -R805561-01       TASK-B624B-625
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT......
```

THE OBJECTIVE OF THE PROPOSED PROJECT IS TO DEVELOP AND CONDUCT A WORKSHOP WHICH WILL PROVIDE A FORUM FOR REVIEWING THE STATE OF THE ART OF WASTE-TO-ENERGY TECHNOLOGY, FOR ASSESSING PROBLEM AREAS, AND FOR SUGGESTING APPROACHES FOR THE CONTINUED DEVELOPMENT OF THIS TECHNOLOGY. PARTICIPANTS IN THE WORKSHOP WILL INCLUDE REPRESENTATIVES FROM BOTH THE TECHNOLOGICAL AND USER COMMUNITIES. SPECIES DETAILS REGARDING THE FORMAT, SCHEDULING, AND LOCATION OF THE WORKSHOP AS WELL AS THE PREPARATION OF A LIST OF POTENTIAL PARTICIPANTS WILL BE DEVELOPED BY A WORKSHOP COMMITTEE COMPOSED OF REPRESENTATIVES OF U.S. EPA, BATTELLE, AND OTHERS. THIS COMMITTEE WILL BE SELECTED AND BEGIN ITS WORK IMMEDIATELY UPON THE EXECUTION OF THIS GRANT. A BRIEF REPORT IN WHICH THE FINDINGS AND RECOMMENDATIONS OF THE WORKSHOP PARTICIPANTS WILL BE PREPARED AT THE CONCLUSION OF THE PROJECT.

**PROJECT: 00503-CO-FIRING OF SOLID WASTE WITH COAL IN A CEMENT KILN

```
                    STARTING/ COMPLETION DATE : 07/77   12/78 :   FUNDING    ESTIMATED   FY77  / $  200000
                    TASK CODE=B624B-626     **EPA=R805613-01  ** (GRANT)     PRIOR       FY76  /
EPA  OFFICER.. R  OLEXSEY               EPA/IERL   CINC
INVESTIGATOR.. CR WILLEY                STATE ENV SERV
MILESTONES.... 08/77 -FUNDING PACKAGE SUBMITTED
               09/77 -AWARD FUNDS FOR PROJECT
               12/78 -FINAL REPORT
PLAN ID.......(AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-000503          SSIE-GMA  3719        EPA -R805613-01       TASK-B624B-626
               AP  -624B            DU  -L110             LABT-EMI
ABSTRACT......
```

THE OBJECTIVE OF THIS PROJECT IS TO INVESTIGATE THE TECHNICAL AND ECONOMIC FEASIBILITY OF CO-FIRING SOLID WASTE WITH COAL IN AN EXISTING FULL-SCALE CEMENT KILN. THIS PROJECT WILL ADDRESS BOTH THE RESOURCE RECOVERY ASPECTS OF USING WASTE AS A SUPPLEMENTARY FUEL AND THE INDUSTRIAL CONSERVATION ASPECTS OF PRESERVING CONVENTIONAL (HIGH-PRICED, HIGH-SULFUR) FOSSIL FUELS. APPROXIMATELY 3000 TONS OF REFUSE-DERIVED FUEL WILL BE CO-FIRED IN THE DIRECT-FIRED KILN. DURING THESE CO-COMBUSTION TESTS, ENVIRONMENTAL ANALYSES OF PROCESS EFFLUENTS WILL BE CARRIED OUT.

****PROJECT: 02945-GEOTHERMAL SYSTEMS/ENVIRONMENTAL ASSESSMENT OF EXTRACTION, CONVERSION AND WASTE DISPOSAL**

```
                    STARTING/ COMPLETION DATE : 09/76   09/81 :   FUNDING    ESTIMATED   FY77  / $       0
                    TASK CODE=J624B-60      **EPA=68-03-2468  ** (CNTR.)      PRIOR       FY76  / $  424500
EPA  OFFICER.. DB GILMORE                EPA/EMSL   LAS VEGAS
INVESTIGATOR.. SK SANYAL                 GEONOMICS INC
MILESTONES.... 02/77 -GEOLOGIC, HYDROLOGIC ASSESSMENT REPORT
               06/77 -ENVIRONMENTAL IMPACT RESEARCH REPORT
               06/77 -SITING AND LEASING GUIDE
               09/77 -GEOTHERMAL RESOURCE USES, CONVERSION PROCESSES, WASTES REPORT
               09/77 -MONITORING STRATEGY DESIGN
               09/78 -POLLUTION CONTROL TECHNOLOGY REPORT
               09/81 -FINAL REPORT
PLAN ID....... (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-002945            SSIE-GMA  4094        EPA -68-03-2468       TASK-J624B-60
               AP  -624B              DU  -L110             LABT-MTS
ABSTRACT...... OBJECTIVE: A GUIDELINE DOCUMENT FOR THE MULTI-MEDIA MONITORING STRATEGY AROUND ANY GEOTHERMAL
                RESOURCE DEVELOPMENT. THIS OUTPUT WILL BE USED BY THE FEDERAL, STATE, AND LOCAL GOVERNMENTS TO
                MONITOR THE CHANGES IN SURFACE AND UNDERGOUND WATERS AS A RESULT OF THE DEVELOPMENT OF GEOTHERMAL
                RESOURCES. APPROACH: DETERMINE THE GEOLOGY, HYDROLOGY, AND CLIMATOLOGY OF THE GEYSERS AND IMPERIAL
                VALLEY, CALIFORNIA, GEOTHERMAL AREAS, THE KLAMATH FALLS, OREGON, AREA, THE RIO GRANDE RIFT ZONE
                AREA, AND IDENTIFY THE AQUIFERS IN EACH AREA. DEFINE THE VARIOUS GEOTHERMAL SYSTEMS, QUANTIFY THE
                POLLUTANTS FROM GEOTHERMAL RESOURCES DEVELOPMENT INCLUDING PHASE OF PRODUCE FLUIDS, SUBSIDENCE
                POSSIBILITIES, SEISMIC EFFECTS, FLUID DISPOSAL METHODS, THERMAL LOSSES AND THEIR POSSIBLE EFFECTS
                ON THE BIOTA AND GROUNDWATER OF EACH AREA. SELECT A STUDY AREA AND DESIGN A MONITORING SYSTEM FOR
                THE AREA. IMPLEMENT AND OPERATE THE MONITORING PROGRAM MAKING SUCH RECOMMENDATIONS FOR IMPROVEMENT
                IN THE MONITORING PLAN AS DEEMED ADVISABLE. AS A RESULT OF THE EXPERIENCE IN DESIGNING AND
                OPERATING SUCH A MONITORING SYSTEM, MAKE RECOMMENDATIONS FOR A GENERAL MONITORING METHODOLOGY THAT
                WILL BE MOST APT TO MEET THE REQUIRMENTS OF ANY GEOTHERMAL RESOURCE DEVELOPMENT. OUTPUT· GEOLOGIC,
                HYDOLOGIC ASSESSMENT REPORT (2/77); ENVIRONMENTAL IMPACT RESEARCH REPORT (6/77); SITING AND LEASING
                GUIDE (6/77); GEOTHERMAL RESOURCE USES, CONVERSION PROCESSES, WASTES REPORT (9/77); MONITORING
                STRATEGY DESIGN (9/77); POLLUTION CONTROL TECHNOLOGY REPORT (9/77); FINAL REPORT (9/81).
```

****PROJECT: 02946-GEOTHERMAL ENVIRONMENTAL IMPACT ASSESSMENT FAUNA**

```
                    STARTING/ COMPLETION DATE : 06/76   12/82     FUNDING    ESTIMATED   FY77  / $   20000
                    TASK CODE=J624B-61      **EPA=            ** (IN-HO)      PRIOR       FY76  / $   96000
               IN-HOUSE EFFORT   FY 77  /  01.5  YEARS  ; TOTAL PROJECT  03.0
EPA  OFFICER.. DB GILMORE                EPA/EMSL   LAS VEGAS
INVESTIGATOR.. WW SUTTON                 US EPA
               ZC NELSON                 US EPA
               AA MULLEN                 US EPA
               GD POTTER                 US EPA
MILESTONES.... 09/77 -ANNUAL REPORT COVERING IMPERIAL VALLEY AND ROOSEVELT HOT SPRINGS
               09/78 -ANNUAL REPORT COVERING IMPERIAL VALLEY AND ROOSEVELT HOT SPRINGS
               09/79 -ANNUAL REPORT COVERING IMPERIAL VALLEY AND ROOSEVELT HOT SPRINGS
               09/80 -DEVELOPMENT OF MONITORING STRATEGY
PLAN ID......: (AP-624B)(DU-L110)  ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-002946            SSIE-ZMA  1058        TASK-J624B-61         AP  -624B
               DU  -L110              LABT-MTS
ABSTRACT..... OBJECTIVE: BIOLOGICAL SAMPLES ARE COLLECTED AT GEOTHERMAL SITES AND ANALYZED FOR SELECTED ELEMENTS.
                THE OBJECTIVES WILL BE TO (1) PROVIDE BASELINE INFORMATION PRIOR TO FULL SCALE ENERGY PRODUCTION
                AND (2) TO EXAMINE THE FEASIBILITY OF USING ANIMALS AS BIOLOGICAL MONITORS FOR GEOTHERMAL
                POLLUTANTS. RODENTS, RABBITS, CHICKENS AND BEEF CATTLE REPRESENT VARIOUS ASPECTS OF THE FIELD
                SAMPLING PROGRAM. THE RELATIVE ABUNDANCE/DENSITY OF VARIOUS WILDLIFE SPECIES IS ALSO BEING
                INVESTIGATED. APPROACH: FIELD COLLECTED SAMPLES ARE TRANSPORTED BACK TO LAS VEGAS AND WILL BE
                ANALYZED FOR SUCH ELEMENTS AS LEAD, ARSENIC, ZINC, AND CADMIUM. CONCURRENT LABORATORY STUDIES ARE
                DESIGNED TO CONFIRM TISSUE RETENTION CHARACTERISTICS (OR COMPLICATING HOMEOSTATIC FACTORS) FOR
                GEOTHERMAL ELEMENTS FOLLOWING QUANTITATED ORAL EXPOSURES. THESE LABORATORY EXPERIMENTS SERVE AS AN
                ESSENTIAL PART OF THE QUALITY ASSURANCE EFFORT AND THE LABORATORY GENERATED SAMPLES WILL BE
                ANALYZED BY THOSE TECHNIQUES USED FOR THE FIELD COLLECTED TISSUES. OUTPUTS: SAMPLES HAVE BEEN
                COLLECTED FROM ROOSEVELT HOT SPRINGS, UTAH AND FROM IMPERIAL VALLEY, CALIFORNIA. RELATIVE ABUNDANCE
                WORK ON SMALL MAMMAL POPULATIONS AT ROOSEVELT HOT SPRINGS IS ALSO IN PROGRESS. ANALYTICAL DATA ON
                THE FIELD COLLECTIONS, AND ASSOCIATED LABORATORY STUDIES, ARE NOT AVAILABLE BUT SHOULD BE REPORTED
                NEXT YEAR.
```

**PROJECT: 02947-GEOTHERMAL ENVIRONMENTAL IMPACT ASSESSMENT PLANTS AND SOILS

STARTING/ COMPLETION DATE : 07/75 09/81 : FUNDING ESTIMATED FY77 / $ 95700
TASK CODE=J624B-62 **EPA= ** (IN-HO) PRIOR FY76 / $ 126000
IN-HOUSE EFFORT FY 77 / 03.8 YEARS ; TOTAL PROJECT 17.3
EPA OFFICER.. DB GILMORE EPA/EMSL LAS VEGAS
INVESTIGATOR.. KW BROWN US EPA
GB WIERSMA US EPA
AB CROCKETT US EPA
MILESTONES.... 05/77 -BASELINE SAMPLING FOR SOIL AND VEGETATION AT FOUR KGRA'S IN THE I
09/77 -ANNUAL REPORT BASELINE TRACE ELEMENT LEVELS, IMPERIAL VALLEY
09/77 -ANNUAL REPORT BASELINE STUDIES AT ROOSEVELT HOT SPRINGS
09/78 -POST OPERATIONAL REPORT IMPERIAL VALLEY
09/79 -POST OPERATIONAL REPORT ROOSEVELT HOT SPRINGS
09/81 -FINAL REPORT IMPERIAL VALLEY
09/81 -FINAL REPORT ROOSEVELT HOT SPRINGS
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES..: RECN-002947 SSIE-ZMA 1055 TASK-J624B-62 AP -624B
DU -L110 LABT-MTS
ABSTRACT..... OBJECTIVE: CONDUCT ENVIRONMENTAL ASSESSMENT OF GEOTHERMAL ENERGY EXTRACTION ACTIVITIES BY STUDYING POLLUTANT LEVELS AND POPULATION CHARACTERISTICS IN PREOPERATIONAL AND POST OPERATIONAL MODES. APPROACH: SOIL AND PLANT SAMPLES WILL BE COLLECTED PRIOR TO GEOTHERMAL POWER PLANT OPERATION TO ASSESS BASELINE LEVELS OF POLLUTANTS. SAMPLES WILL ALSO BE COLLECTED AFTER POWER PLANT OPERATION. IN ADDITION, CHARACTERISTICS OF PLANT POPULATIONS WILL BE ASCERTAINED SUCH AS SPECIES MIX AND BIOMASS. TWO DISTINCT ECOTYPES WILL BE STUDIED. ONE IS AN INTENSIVE AGRICULTURAL AREA IN THE IMPERIAL VALLEY OF SOUTHERN CALIFORNIA AND THE OTHER A RANGE LAND AREA NEAR ROOSEVELT HOT SPRINGS, UTAH. OUTPUT: PLANT AND SOIL SAMPLING HAS BEEN CONDUCTED AT FOUR KGRA'S IN THE IMPERIAL VALLEY AND ONE KGRA AT ROOSEVELT HOT SPRINGS. AA ANALYSES OF SAMPLES HAS BEGUN.

**PROJECT: 02948-MONITORING GUIDES FOR H2S AND NON-CONDENSIBLE HAZARDOUS GASEOUS EMISSIONS/GEOTHERMAL SYSTEMS

STARTING/ COMPLETION DATE : 09/75 12/79 : FUNDING ESTIMATED FY77 / $ 134300
TASK CODE=J624B-63 **EPA= ** (IN-HO) PRIOR FY76 / $ 65000
IN-HOUSE EFFORT FY 77 / 01.0 YEARS ; TOTAL PROJECT 02.0
EPA OFFICER.. DB GILMORE EPA/EMSL LAS VEGAS
INVESTIGATOR.. W ADAMS US EPA
MILESTONES.... 09/75 -FIRST GEOTHERMAL WORKSHOP
10/76 -COMPLETION OF INITIAL INVESTIGATION WITH AIR MONITORING LABORATOR
02/77 -SECOND GEOTHERMAL WORKSHOP
04/77 -COMPLETION OF SECOND ROUND OF AIR MONITORING AT 4 SITES IN THE IM
10/77 -INITIATE COLLECTION OF CONTINUOUS METEOROLOGICAL AND AIR QUALITY
04/78 -COMPLETION OF FINAL ROUND OF AIR MONITORING AT 4 SITES IN THE IMP
12/79 -REPORT ON AIR MONITORING STRATEGY AROUND GEOTHERMAL SITES
PLAN ID..... (AP-624B)(DU-L110) ENVIRONMENTAL ASPECTS OF ENERGY CONSERVATION/ADVANCED ENERGY
ORDIS CODES... RECN-002948 SSIE-ZMA 1064 TASK-J624B-63 AP -624B
DU -L110 LABT-MTS
ABSTRACT..... OBJECTIVE: TO DEVELOP A STRATEGY FOR AIR QUALITY MONITORING AS PART OF AN INTEGRATED GEOTHERMAL MONITORING METHODOLOGY FOR EVALUATING THE TOTAL IMPACT OF GEOTHERMAL DEVELOPMENT ON A GIVEN LOCALITY. APPROACH: THE DESIGN OF A MONITORING NETWORK IS ACCOMPLISHED IN TWO PHASES. FIELD MEASUREMENTS OF AMBIENT AIR QUALITY WILL BE MADE AND AIR QUALITY SIMULATIONS WILL BE MADE FOR PREDICTING TEMPORAL AND SPATIAL DISTRIBUTIONS OF POLLUTANTS FOR VARIOUS STAGES OF GEOTHERMAL DEVELOPMENT. BECAUSE METEOROLOGICAL AND AIR QUALITY DATA FOR THIS AREA ARE SPARSE, A TWO YEAR FIELD PROGRAM IS NECESSARY TO DOCUMENT AEROMETRIC DATA. A FIRST YEAR EFFORT WOULD BE A PILOT STUDY FOR COLLECTING METEOROLOGICAL DATA AT SEVERAL SITES. LIMITED AIR QUALITY DATA WILL ALSO BE COLLECTED DURING THE FIRST YEAR. DATA FROM THE FIRST YEAR WILL BE USED AS A GUIDE TO DETERMINE THE LEVEL OF EFFORT FOR AN EXPANDED NETWORK IN THE SECOND YEAR. THESE DATA WILL BE USED AS A BASIS FOR THE AIR QUALITY SIMULATION PHASE OF THE PROJECT. OUTPUTS: COMPLETION OF INITIAL INVESTIGATION WITH AIR MONITORING LABORATORY AT 5 SITES IN THE IMPERIAL VALLEY, CALIFORNIA (10/76); COMPLETION OF SECOND ROUND OF AIR MONITORING AT 4 SITES IN THE IMPERIAL VALLEY, CALIFORNIA (4/77); INITIATE COLLECTION OF CONTINUOUS METEOROLOGICAL AND AIR QUALITY DATA AT FIXED SITES NEAR ROOSEVELT HOT SPRINGS, UTAH (10/77); COMPLETION OF FINAL ROUND OF AIR MONITORING AT 4 SITES IN THE IMPERIAL VALLEY (4/78); REPORT ON AIR MONITORING STRATEGY AROUND GEOTHERMAL SITES (12/79).

**PROJECT: 00520-TECHNOLOGY ASSESSMENT OF ENERGY DEVELOPMENT IN APPALACHIA

```
                    STARTING/ COMPLETION DATE : 06/77   07/80     FUNDING    ESTIMATED   FY77  / $  400000
                    TASK CODE=B624C-594     **EPA=68-03-2531  ** (CNTR.)      PRIOR       FY76  / $  447000
EPA  OFFICER.: VF JELEN                  EPA/IERL   CINC
INVESTIGATOR.: RW COBB                   BATTELLE MEMORIAL INST
               RF AYERS                  BATTELLE MEMORIAL INST
               AN CHRISTAKIS             BATTELLE MEMORIAL INST
               BG MAIDEN                 BATTELLE MEMORIAL INST
               TJ THOMAS                 BATTELLE MEMORIAL INST
               GA WATKINS                BATTELLE MEMORIAL INST
MILESTONES.... 03/77 -FUNDING PACKAGE SUBMITTED
               06/77 -CONTRACT AWARDED
               08/78 -REPORT OF FIRST PHASE I
               11/78 -WORK PLAN FOR PHASE II
               07/80 -FINAL REPORT RECEIVED
PLAN ID......: (AP-624C)(DU-L110)  ENERGY-INTERGRATED ASSESSMENT
ORDIS CODES..: RECN-000520           SSIE-GMA  3697        EPA -68-03-2531       TASK-B624C-594
               AP  -624C             DU  -L110             LABT-EMI
```

ABSTRACT.....: THE PURPOSE OF THIS PROGRAM IS TO PROVIDE EPA AND OTHER DECISION MAKERS WITH INFORMATION NECESSARY (1) TO FORESEE THE EFFECTS OF REGULATORY POLICIES UPON FUTURE ENERGY DEVELOPMENT IN APPALACHIA AND (2) TO DETERMINE AREAS REQUIRING RESEARCH EMPHASIS IN PREPARATION FOR MONITORING AND CONTROLLING THE IMPACTS OF NEW OR EXPANDED ENERGY TECHNOLOGIES. THIS REGIONAL STUDY OF ENERGY DEVELOPMENT IN APPALACHIA WILL FOCUS ON ENVIRONMENTAL, SOCIAL, AND ECONOMIC IMPACTS, BOTH BENEFICIAL AND ADVERSE, ASSOCIATED WITH ALTERNATIVE ENERGY POLICIES AND PRACTICES. ALTHOUGH THE EMPHASIS WILL BE ON THE DEVELOPMENT OF APPALACHIAN COAL RESOURCES, OTHER ENERGY RESOURCES WILL ALSO BE EXAMINED. THE FIRST YEAR TECHNOLOGY ASSESSMENT WILL BEGIN BY REVIEWING EXISTING LITERATURE ON APPALACHIAN ENERGY DEVELOPMENT. ENERGY DEVELOPMENT SCENARIOS WILL BE FORMULATED BASED ON (1) NATIONAL ENERGY POLICY AS IT RELATES TO APPALACHIA AND (2) EXISTING ENERGY PRODUCTION TECHNOLOGY THAT IS EXPECTED TO BE USED TO 1985 (NEAR-TERM DEVELOPMENT) AS WELL AS EXISTING AND NEW TECHNOLOGY WHICH CAN BE EXPECTED TO BE AVAILABLE FOR USE BETWEEN 1985 AND 2000 (MID-TERM DEVELOPMENT). NEXT THE DIRECT AND HIGHER-ORDER IMPACTS FROM THE IMPLEMENTATION OF THIS TECHNOLOGY WILL BE EXAMINED. CONCURRENTLY, POLICY OPTIONS AVAILABLE FOR CONTROLLING THE IMPACTS WILL BE INVESTIGATED ALONG WITH ISSUES THAT IMPACTS RAISE. EMPHASIS WILL BE PLACED ON INVESTIGATING THE IMPACTS FROM CURRENT PLANS FOR ENERGY DEVELOPMENT UNDER EXISTING OR PROPOSED ENVIRONMENTAL PROTECTION POLICIES. THE SECOND PHASE WILL EXPAND UPON AND REFINE THE WORK OF THE FIRST YEAR TECHNOLOGY ASSESSMENT. EMPHASIS WILL BE PLACED UPON IDENTIFYING AND ANALYZING ALTERNATIVE STRATEGIES FOR MANAGING THE RATE AND PATTERN OF ENERGY DEVELOPMENT IN APPALACHIA.

**PROJECT: 04013-TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT

```
                    STARTING/ COMPLETION DATE : 07/75   07/79 :   FUNDING    ESTIMATED   FY77  / $  200000
                    TASK CODE=V624C-01      **EPA=68-01-1916  ** (CNTR.)      PRIOR       FY76  / $  470000
EPA  OFFICER.: S  PLOTKIN                EPA/HDQTRS- OEMI
INVESTIGATOR.: IL WHITE                  UNIV OF OKLAHOMA                     GRADUATE SCH/POL SCI DEPT
MILESTONES...: 03/76 -COMPLETION, PUBLICATION OF WORK PLAN
               08/76 -PUBLICATION OF PHASE I REPORT, ENERGY FROM THE WEST
               03/76 -PUBLICATION OF FINAL IMPACT ASSESSMENT REPORT
               01/79 -PUBLICATION OF SERIES OF POLICY-ORIENTED FINAL REPORTS
PLAN ID....... (AP-624C)(DU-L110)  ENERGY-INTERGRATED ASSESSMENT
ORDIS CODES... RECN-004013           SSIE-GMA  4333        EPA -68-01-1916       TASK-V624C-01
               AP  -624C             DU  -L110             LABT-EMI
```

ABSTRACT..... OBJECTIVES TO IDENTIFY A BROAD RANGE OF DESIRABLE AND UNDESIRABLE CONSEQUENCES LIKELY TO RESULT FROM THE DEVELOPMENT OF WESTERN U. S. ENERGY RESOURCES (COAL, OIL SHALE, URANIUM, GEOTHERMAL, OIL, NATURAL GAS); TO IDENTIFY, EVALUATE, AND COMPARE POLICIES THAT WILL PROMOTE DESIRABLE CONSEQUENCES AND ELIMINATE OR REDUCE UNDESIRABLE ONES; AND TO IDENTIFY CRITICAL RESEARCH PROJECTS WHICH WILL ENHANCE THE ABILITY OF ALL LEVELS OF GOVERNMENT TO MAKE OPTIMAL DECISIONS ABOUT FUTURE ENERGY DEVELOPMENT IN THE WEST. APPROACH THE ANALYSIS INCLUDES A SERIES OF IMPACT ASSESSMENTS WHICH EXAMINE THE PHYSICAL AND SOCIAL/CULTURAL/ECONOMIC IMPACTS OF DEVELOPMENT AT SIX SITES AND THE REGION AS A WHOLE. THESE IMPACT ASSESSMENTS ARE USED, IN COMBINATION WITH EXTENSIVE CONTACTS WITH DECISIONMAKERS AND OTHER INDIVIDUALS AND GROUPS AFFECTED BY AND CONCERNED WITH WESTERN ENERGY DEVELOPMENT, TO IDENTIFY CRITICAL PROBLEMS AND ISSUES WHICH ARE THEN EXAMINED IN MORE DETAIL. A CRITICAL PART OF THIS FOLLOW-UP ANALYSIS IS TO IDENTIFY THE INSTITUTIONAL AND POLITICAL CONTEXT IN WHICH THE IMPACTS ARE EVALUATED AND DEALT WITH, IN ORDER TO PINPOINT SITUATIONS WHERE THE PRESENT REGULATORY, INSTITUTIONAL, OR POLITICAL SYSTEM CANNOT PROPERLY DEAL WITH IMPACTS AND TO IDENTIFY APPROPRIATE SOLUTIONS TO THESE SHORTCOMINGS.CURRENT PLANS AND/OR PROGRESS A PHASE I REPORT (ENERGY FROM THE WEST) DEALING PRINCIPALLY WITH IMPACT ASSESSMENT HAS BEEN PUBLISHED. THE REMAINING WORK WILL FOCUS ON POLICY ANALYSIS OF CRITICAL PROBLEMS AND ISSUES, WITH SOME EFFORT AT EXPANDING THE TECHNOLOGIES EXAMINED AND COMPLETING SOME DETAILS OF THE IMPACT ASSESSMENTS.

**PROJECT: 04031-DEVELOP ECONOMIC PROJECTION MODELING CAPABILITY NECESSARY TO DERIVE MODULAR ENERGY & ENVIRONMENTAL PLANNING MODELS AT A MULTICOU

STARTING/ COMPLETION DATE : 05/75 00/80 : FUNDING ESTIMATED FY77 / $ 74000
TASK CODE=V624C-55 **EPA=D6-E721-DU ** (IAG) PRIOR FY76 / $ 160000

EPA OFFICER.. MW BLOCH EPA/HDQTRS- OEMI
INVESTIGATOR.. H HINOTE US TENNESSEE VALLEY AUTH DIV OF NAV DEV & REG STUDIES
PLAN ID.....: (AP-624C)(DU-L110) ENERGY-INTERGRATED ASSESSMENT
ORDIS CODES..: RECN-004031 SSIE-GMA 2932 1 EPA -D6-E721-DU TASK-V624C-55
AP -624C DU -L110 LABT-EMI

ABSTRACT..... AS A PART OF ITS ONGOING ECONOMIC RESEARCH PROGRA, TVA IS IN THE PROCESS OF DEVELOPING A REGIONAL ECONOMIC MODEL OF THE TVA REGION AND ITS PRINCIPAL SUBREGIONS. LONG-TERM OBJECTIVES IN THE DEVELOPMENT OF THE MODEL INCLUDE (1) PROVISION OF AN ANNUAL AND CONSISTENT SET OF LONG-RUN ECONOMIC AND DEMOGRAPHIC PROJECTIONS WHICH REFLECT THE NATIONAL BUSINESS CYCLE; (2) ASSESSMENT OF REGIONAL SENSITIVITY TO NATIONAL ECONOMIC PARAMETERS SUCH AS GROWTH OR DECLINE IN SPECIFIC INDUSTRIES; (3) ASSESSMENT OF THE IMPACT IN SMALL AREAS (MULTICOUNTY) OF A MAJOR CONSTRUCTION PROJECTS, E.G., A LARGE NUCLEAR ENERGY-GENERATING PLANT; AND (4) PROVISION OF A MACROECONOMIC DATA BASE AT A MULTICOUNTY LEVEL FOR LAND-USE PLANNING AND SITE ASSESSMENT. AT THE PRESENT STAGE OF DEVELOPMENT, AN OPERATIONAL MODEL HAS BEEN DEVELOPED FOR THE TVA POWER SERVICE AREA; AND IT IS BEING USED IN DEVELOPING THE TVA POWER SYSTEM LOAD FORECAST. THE OPERATIONAL MODEL CONSISTS OF TWO PRINCIPAL COMPONENTS: (1) A POPULATION-LABOR FORCE-HOUSEHOLD SUBMODEL AND (2) AN EMPLOYMENT SUBMODEL. OUTPUT OF THE CURRENT MODEL FOR THE POWER SERVICE AREA CONSISTS OF POPULATION BY AGE (SIX CATEGORIES) AND RACE (TWO CATEGORIES), NET MIGRATION, LABOR FORCE, HOUSEHOLDS AND EMPLOYMENT IN 20 MANUFACTURING CATEGORIES AND FIVE NONMANUFACTURING CATEGORIES. A PHASE I REPORT ON THIS WORK WILL BE ISSUED BY 3/78. PLANNED DEVELOPMENT OF THE MODEL CONSISTS OF THE FOLLOWING TASKS: (1) EXPAND THE NUMBER OF EMPLOYMENT CATEGORIES IN THE NONMANUFACTURING SECTOR; (2) DEVELOP A PERSONAL INCOME SUBMODEL; (3) ADAPT THE MODEL TO QUANTIFY IMPACTS AT A MULTICOUNTY LEVEL (BEA AREA) ON POPULATION, LABOR FORCE, EMPLOYMENT, ETC., OF A MAJOR CONSTRUCTION PROJECT; (4) DEVELOP AND ADD TO THE MODEL AN ALGORITHM FOR ALLOCATING MULTICOUNTY PROJECTIONS TO SMALLER AREAS; AND (5) DEVELOP DATA AND METHODOLOGIES FOR IDENTIFYING GROWTH DIFFERENTIALS BETWEEN COUNTIES OR GROUPS OF COUNTIES AS CHANGES IN GROWTH RELATE TO LOCAL CAPACITY FOR ACCOMMODATING SOCIOECONOMIC IMPACTS.

**PROJECT: 04033-ENVIRONMENTAL RESIDUALS OUTPUT MODEL FOR OPERATION AND EXPANSION OF AN ELECTRIC POWER SYSTEM

STARTING/ COMPLETION DATE : 05/75 12/77 : FUNDING ESTIMATED FY77 / $ 0
TASK CODE=V624C-56 **EPA=D5-E721-DV ** (IAG) PRIOR FY76 / $ 126000

EPA OFFICER.. MW BLOCH EPA/HDQTRS- OEMI
INVESTIGATOR.. BD EVANS US TVA
D WALTERS US TVA
PLAN ID..... (AP-624C)(DU-L110) ENERGY-INTERGRATED ASSESSMENT
ORDIS CODES... RECN-004033 SSIE-GMA 4679 EPA -D5-E721-DV TASK-V624C-56
AP -624C DU -L110 LABT-EMI

ABSTRACT..... THE TENNESSEE VALLEY AUTHORITY HAS DEVELOPED AN ENVIRONMENTAL RESIDUALS OUTPUT MODEL TO PREDICT AMOUNTS OF RESIDUALS PRODUCED BY DIFFERENT CONFIGURATIONS OF A POWER SYSTEM. FUTURE LOAD DATA IS OBTAINED ON A PLANT-BY-PLANT BASIS FROM A POWER SYSTEM SIMULATION MODEL. THIS SIMULATION DETAILS COMPLEX FUNCTIONAL RELATIONSHIPS AMONG POWER PLANT INPUT-OUTPUT ENERGIES, POWER LEVELS, AND OTHER GENERATING UNIT CHARACTERISTICS. TRANSFORM EQUATIONS IN THE ENVIRONMENTAL RESIDUALS OUTPUT MODEL PROVIDE ESTIMATES OF FLY ASH AND SULFUR DIOXIDE EMISSIONS. THE MODEL'S PREDICTIVE ABILITY WAS DEMONSTRATED WITH HISTORICAL DATA, AND THE MODEL PROVIDES A FIRST ESTIMATE OF RELATIVE ENVIRONMENTAL IMPACT. WORK HAS BEEN COMPLETED ON THE ENVIRONMENTAL RESIDUAL OUTPUT MODEL AND ITS DOCUMENTATION.

**PROJECT: 04035-DEMONSTRATE THE APPLICATION OF COMPUTER GRAPHICS TO SITE-SPECIFIC AND REGIONAL INTEGRATED ENVIRONMENTAL ASSESSMENT OF ENERGY SYSTE

STARTING/ COMPLETION DATE : 06/75 06/80 FUNDING ESTIMATED FY77 / $ 164000
TASK CODE=V624C-57 **EPA=D5-E721-DW ** (IAG) PRIOR FY76 / $ 314000

EPA OFFICER.. MW BLOCH EPA/HDQTRS- OEMI
INVESTIGATOR.. MC BABB US TENNESSEE VALLEY AUTH DIV OF ENV PLANNING
HR HICKEY US TENNESSEE VALLEY AUTH DIV OF ENV PLANNING
DE HOUCHINS US TENNESSEE VALLEY AUTH DIV OF ENV PLANNING
MILESTONES.... 02/78 -MAJOR REPORT
PLAN ID..... (AP-624C)(DU-L110) ENERGY-INTERGRATED ASSESSMENT
ORDIS CODES... RECN-004035 SSIE-GMA 2948 1 EPA -D5-E721-DW TASK-V624C-57
AP -624C DU -L110 LABT-EMI

ABSTRACT..... OBJECTIVES: DEVELOP AND DEMONSTRATE WAYS IN WHICH COMPUTER GRAPHICS CAN BE USED TO IMPROVE OR FACILITATE ENVIRONMENTAL ANALYSES PROCEDURES. APPROACH: METHODS ARE BEING DEVELOPED WHICH UTILIZE THE ABILITY OF COMPUTER GRAPHICS TO (A) IMPROVE THE INTERACTION BETWEEN THE ENGINEER/SCIENTIST AND THE POWER OF THE COMPUTER AND (B) PROVIDE AN EFFECTIVE MEANS FOR COMMUNICATING COMPLEX ENVIRONMENTAL IMPACT INFORMATION AND POLLUTION CONTROL ALTERNATIVES. CURRENT PLANS/PROGRESS: TWO YEARS OF RESEARCH HAVE BEEN COMPLETED EXPLORING THE USE OF STORAGE-TUBE GRAPHICS TECHNOLOGY. IT HAS BEEN FOUND THAT FOR MANY TYPES OF ANALYSIS A SIGNIFICANT SAVINGS OF TIME AND COST CAN BE ACHIEVED OVER THE USE OF CONVENTIONAL MANUAL METHODS. ANALYSIS APPLICATIONS HAVE BEEN DEVELOPED FOR AIR AND WATER QUALITY STUDIES, INDUSTRIAL AND RADIOLOGICAL HYGIENE, SOCIOECONOMIC IMPACT ANALYSIS AND FACILITIES SITING USING GEOGRAPHICALLY REFERENCED DATA. CURRENTLY, INVESTIGATION IS PROCEEDING INTO THE USE OF STAND-ALONE, INTERACTIVE GRAPHICS SYSTEMS WITH REFRESHED DISPLAY CAPABILITIES FOR ENVIRONMENTAL APPLICATIONS. A MILESTONE REPORT PUBLISHED 02/78.

Flue Gas Sulfur Oxide Control

**PROJECT: 01514-WELLMAN-LORD/ALLIED FGD DEMONSTRATION TEST PROGRAM

STARTING/ COMPLETION DATE : 03/75 02/79 : FUNDING ESTIMATED FY77 / $ 558308
TASK CODE=F624A-034 **EPA=68-02-1877 ** (CNTR.) PRIOR FY76 / $ 774000

EPA OFFICER.. WH PONDER EPA/IERL RTP
INVESTIGATOR.. RC ADAMS THOMPSON RAMO WOOLDRIDGE INC
MILESTONES... 03/75 -CONTRACT AWARD
03/76 -PREPARE TEST PLAN
10/77 -BEGIN TEST PROGRAM
10/78 -COMPLETE TEST PROGRAM
02/79 -COMPLETE FINAL REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001514 SSIE-GMA 4631 EPA -68-02-1877 TASK-F624A-034
AP -624A DU -L110 LABT-EMI
ABSTRACT..... TRW, INC. WILL FURNISH THE NECESSARY PERSONNEL, MATERIALS, SERVICES, EQUIPMENT, AND FACILITIES NECESSARY FOR OR INCIDENT TO THE PERFORMANCE OF THE THREE MAJOR TASKS DESCRIBED BELOW· 1. PREPARATION OF DEMONSTRATION TEST PLAN TRW INC. WILL PREPARE AND SUBMIT FOR APPROVAL A DEMONSTRATION TEST PLAN BASED ON THE PRELIMINARY PLANS CONTAINED IN SECTIONS 4.1, 4.2, 4.5, AND 4.6 OF THE WORK PLAN MANUAL -TEST AND EVALUATION PROGRAM FOR THE NIPSCO/DAVY/ALLIED DEMONSTRATION PLANT, DATED 31 AUGUST 1973. THE DEMONSTRATION TEST PLAN WILL INCLUDE A THOROUGH DISCUSSION OF TEST PARAMETERS, SAMPLING METHODS, INSTRUMENTATION, ANALYTICAL METHODS, SCHEDULE, MANPOWER, COSTS, DATA COLLECTION, REDUCTION, AND PRESENTATION. INSTALLATION AND CHECKOUT OF TEST MEASUREMENTS EQUIPMENT, WHICH WAS INITIATED UNDER TASK 18 OF CONTRACT NO. 68-02-0235, WILL BE CONTINUED DURING PREPARATION OF THE DEMONSTRATION TEST PLAN. 2. PERFORM ACCEPTANCE TEST TRW, INC. WILL OBTAIN ACCEPTANCE TEST MEASUREMENTS DURING THE ONE-YEAR DEMONSTRATION OPERATION OF THE WELLMAN-LORD/ALLIED SYSTEM AT NIPSCO. THE PROCEDURES, METHODS, SCHEDULES, ETC., WILL BE IN ACCORDANCE WITH THE APPROVED ACCEPTANCE TEST PLAN PREPARED DURING TASK 16 TO CONTRACT NO. 68-02-0235. 3. PERFORM ONE-YEAR DEMONSTRATION TEST TRW INC. WILL OBTAIN TEST MEASUREMENTS DURING THE ONE-YEAR DEMONSTRATION OPERATION OF THE WELLMAN-LORD/ALLIED SYSTEM AT NIPSCO. THE PROCEDURES, METHODS, SCHEDULES, ETC. WILL BE IN ACCORDANCE WITH THE APPROVED DEMONSTRATION TEST PLAN PREPARED DURING TASK I OF THIS CONTRACT. TRW, INC. WILL COLLECT, REDUCE AND EVALUATE DEMONSTRATION DATA AND PREPARE A REPORT WHICH WILL SERVE AS A FINAL REPOR

**PROJECT: 01525-PROTOTYPE STUDY OF LIME/LIMESTONE SCRUBBERS FOR SO2 AND DUST REMOVAL
ADVANCED TESTING AND DATA EVALUATION

STARTING/ COMPLETION DATE : 07/74 02/78 : FUNDING ESTIMATED FY77 / $ 486714
TASK CODE=F624A-045 **EPA=68-02-1814 ** (CNTR.) PRIOR FY76 / $ 2108507

EPA OFFICER.: JE WILLIAMS EPA/IERL RTP
INVESTIGATOR.: HN HEAD BECHTEL NATIONAL INC
GH DYER BECHTEL NATIONAL INC
SC WANG BECHTEL NATIONAL INC
RM SHERWIN BECHTEL NATIONAL INC
RT KEEN BECHTEL NATIONAL INC
AH ABDULSATTAR BECHTEL NATIONAL INC
MILESTONES... 09/75 -PUBLISH FIRST PROGRESS REPORT
09/75 -CONDUCT INDUSTRY BRIEFING CONFERENCE
09/76 -PUBLISH SECOND PROGRESS REPORT
10/76 -CONDUCT INDUSTRY BRIEFING CONFERENCE
09/77 -PUBLISH THIRD PROGRESS REPORT
02/78 -COMPLETE TESTING
05/78 -CONDUCT INDUSTRY BRIEFING CONFERENCE
05/78 -PUBLISH FINAL REPORT
06/78 -COMPLETE DESIGN/ECONOMIC STUDY COMPUTER PROGRAM
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001525 SSIE-GMA 4161 EPA -68-02-1814 TASK-F624A-045
AP -624A DU -L110 LABT-EMI
ABSTRACT..... BASED ON THE RESULTS OF THE PHASE III TEST PROGRAM UNDER PREDECESSOR CONTRACT PH 22-68-67, AND OTHER SUPPORTING PROGRAMS OF EPA, BECHTEL IS PERFORMING AN EXTENDED TESTING PROGRAM AT THE EPA ALKALI SCRUBBING TEST FACILITY, TVA SHAWNEE STEAM PLANT, PADUCAH, KENTUCKY, FOR THE REMOVAL OF SO2 AND ASH PARTICULATE FROM COAL-FIRED FURNACE GAS. THE TEST FACILITY CONSISTS OF TWO PARALLEL SCRUBBER SYSTEMS VENTURI FOLLOWED BY A SPRAY TOWER AND A TURBULENT CONTACT ABSORBER. EACH SYSTEM IS CAPABLE OF TREATING APPROXIMATELY 10 MW EQUIVALENT (30,000 ACFM AT 300 DEGREES F) OF FLUE GAS CONTAINING 1,800-4,000 PPM SULFUR DIOXIDE AND 2 TO 5 GRAINS/SCF OF PARTICULATES. THE SCRUBBERS ARE INTEGRATED INTO THE FLUE GAS EXHAUST DUCTWORK OF BOILER NO. 10. THE MAJOR GOALS OF THE OVERALL TEST PROGRAM ARE (1) TO CHARACTERIZE THE EFFECT OF IMPORTANT PROCESS VARIABLES ON SULFUR DIOXIDE AND PARTICULATE REMOVAL, (2) TO DEVELOP MATHEMATICAL MODELS FOR ECONOMIC SCALE-UP TO FULL-SIZE SCRUBBER FACILITIES, (3) TO DEMONSTRATE RELIABILITY, AND (4) TO DEMONSTRATE PROCESS AND EQUIPMENT VARIATIONS TO IMPROVE THE ECONOMICS OF LIME/LIMESTONE SCRUBBING. THE PROCESS IMPROVEMENT OBJECTIVES OF THE CURRENT PROGRAM ARE TO IMPROVE (1) ALKALI UTILIZATION, (2) SO2 REMOVAL, (3) SLUDGE DISPOSAL PROPERTIES, AND (4) SYSTEM RELIABILITY. SPECIFIC TASKS TO BE PERFORMED ARE: LIMESTONE/LIME ADVANCED TESTING, SLUDGE FIXATION STUDIES, AND ECONOMIC STUDIES.

**PROJECT: 01527-SULFUR DIOXIDE OXIDATION IN SCRUBBER SYSTEMS

```
                    STARTING/ COMPLETION DATE : 07/77   06/79 :   FUNDING    ESTIMATED   FY77  / $   79641
                    TASK CODE=F624A-046     **EPA=R805227-01  ** (GRANT)     PRIOR       FY    /
EPA  OFFICER.  RH BORGWARDT              EPA/IERL   RTP
INVESTIGATOR.: JL HUDSON                 UNIV OF VIRGINIA                    ENG & APPL SCI/CHEM ENG DEPT
MILESTONES...: 09/77 -CONSTRUCT REACTOR AND ASSEMBLE APPARATUS
               11/77 -LOW LEVEL CATALYST STUDIES IN FLOW REACTOR
               02/78 -BISULFITE OXIDATION IN BATCH REACTOR
               06/78 -BISULFITE OXIDATION WITH MULTIPLE CATALYSTS
               09/78 -EFFECT OF OXIDATION INHIBITORS
               10/78 -CONCENTRATION EFFECTS
               09/78 -DEVELOP MODEL FOR OXIDATION IN SLURRIES
               06/79 -VERIFY MODEL
               08/79 -FINAL REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001527          SSIE-GMA  4127        EPA -R805227-01       TASK-F624A-046
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT......
```

OBJECTIVES: 1) TO INVESTIGATE THE EFFECT OF CONTROLLABLE SYSTEM PARAMETERS IN LIME/LIMESTONE SCRUBBING SYSTEMS IN ORDER TO SUGGEST METHODS OF LIMITING OXIDATION TO PERMIT UNSATURATED OPERATION. SYSTEM PARAMETERS INCLUDE THE CONCENTRATION AND TYPE OF INHIBITORS AND CATALYSTS AS WELL AS PHYSICAL FACTORS WHICH CONTROL MASS TRANSFER. 2) TO INVESTIGATE THE POSSIBILITY OF MAXIMIZING THE EFFICIENCY OF OXIDATION IN A HOLD TANK WHEN OXIDATION IS FORCED BY AERATION. FACTORS IMPORTANT HERE ARE MASS TRANSFER (PARTICULARLY AS INFLUENCED BY AIR BUBBLE SIZE AND CONTACT TIME) AND THE KINETICS OF THE OXIDATION REACTION. APPROACH: CHEMICAL KINETICS AND MASS TRANSFER WILL BE STUDIED IN BOTH CLEAR SOLUTIONS AND SLURRIES USING STIRRED REACTORS AND FLOW REACTORS IN BENCH SCALE EQUIPMENT. THE RESULTS WILL BE INCORPORATED INTO A MATHEMATICAL MODEL TO PRODUCE METHODS OF MINIMIZING OR MAXIMIZING OXIDATION IN SCRUBBERS. PLANS: CONSTRUCT REACTOR AND ASSEMBLE APPARATUS. STUDY OXIDATION OF BISULFITE AT PH 4-6 IN FLOW REACTOR AND BATCH REACTOR WITH SINGLE AND MULTIPLE CATALYSTS. EVALUATE OXIDATION INHIBITORS. STUDY OXIDATION OF SULFITE WITH HIGH CATALYST CONCENTRATIONS. DEVELOP MODEL FOR OXIDATION IN SLURRIES INCLUDING MASS TRANSFER AND KINETICS.

**PROJECT: 01547-DEMONSTRATION OF HIGH-EFFICIENCY/HIGH-THROUGHPUT BAGHOUSE

```
                    STARTING/ COMPLETION DATE : 03/76   10/78 :   FUNDING    ESTIMATED   FY77  / $  283989
                    TASK CODE=F624A-060     **EPA=68-02-2148  ** (CNTR.)     PRIOR       FY76  / $  700000
EPA  OFFICER.. JH TURNER                 EPA/IERL   RTP
INVESTIGATOR.. J  MCKENNA                ENVIRO SYSS & RES INC
               S  PERRY                  FABRICS AMERICA CORP
MILESTONES.... 03/76 -CONTRACT AWARDED
               12/76 -BAGHOUSES ON LINE
               12/77 -REPORT ON FIRST YEAR'S OPERATION
               12/77 -REPORT ON SECOND YEAR'S OPERATION
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001547          SSIE-GMA  4155        EPA -68-02-2148       TASK-F624A-060
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT......
```

OBJECTIVES: EXAMINE TECHNICAL AND ECONOMIC ASPECTS OF SMALL, FULL-SCALE, REVERSE AIR BAGHOUSE OPERATED AT FILTRATION VELOCITIES UP TO 9 FPM ON A STOKER-FIRED INDUSTRIAL BOILER. APPROACH: A. OPERATE BAGHOUSE FOR A MINIMUM PERIOD OF 10 MONTHS USING NOMEX, GORE-TEX, TEFLON, AND DURALON T FABRICS. B. DETERMINE FABRIC PERFORMANCE AND LIFE. C. DETERMINE SYSTEM PERFORMANCE AND COSTS. D. RECORD ALL PERTINENT BOILER AND FILTER SYSTEM OPERATING PARAMETERS. E. CHARACTERIZE FLUE GAS STREAMS AND FLY ASH. CURRENT PLANS AND/OR PROGRESS: SYSTEM SCHEDULED TO START 12/76. OPTIONS INCLUDE TESTING ADDITIONAL FABRICS AND TESTING SO2 REMOVAL CAPABILITIES.

**PROJECT: 01579-DEVELOP COMPARATIVE ECONOMICS OF SO2 EMISSION CONTROL PROCESSES

```
                    STARTING/ COMPLETION DATE : 05/75   02/80 :   FUNDING :  ESTIMATED   FY77  / $  300000
                    TASK CODE=F624A-092     **EPA=D7-E721-BI  ** ( IAG )      PRIOR       FY76  / $  725000
EPA  OFFICER.: RD STERN                  EPA/IERL   RTP
INVESTIGATOR.: GG MCGLAMERY              US TVA
               SV TOMLINSON              US TVA
               F  KENNEDY                US TVA
               JW BARRIER                US TVA
               JD MAXWELL                US TVA
               TA BURNETT                US TVA
               JG PATTERSON              US TVA
MILESTONES...: 03/80 -TASK I, PHASES I, II, AND III REPORTS
               02/78 -TASK IIA DRAFT FINAL REPORT OF SLUDGE STUDIES
               07/76 -TASK IIB, TRW REPORTS ON ALUMINA EXTRACTION PROCESS
               07/76 -ASSISTANCE TO EPA IN ANALYZING COST ESTIMATES OF STACK GAS EMISSI      ON
               03/80 -TASK IV DRAFT INTERIM REPORTS FOR SELECTED FRONT END PROCESSES
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001579            SSIE-GMA  4695        EPA -D7-E721-BI       TASK-F624A-092
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT.....: THE PRIMARY PURPOSE OF TASK I IS TO REVIEW RECENTLY DEVELOPED PROCESSES FOR DESULFURIZATION OF POWER
                PLANT STACK GASES; THEN, SYSTEMATICALLY SELECT AND EVALUATE THOSE WHICH HAVE THE GREATEST DEGREE OF
                DEVELOPMENT AND WHICH ARE POTENTIALLY ATTRACTIVE BOTH TECHNICALLY AND ECONOMICALLY. THESE
                EVALUATIONS WILL INCLUDE PREPARATION OF FLOWSHEET MATERIAL BALANCES, AND COMMERCIAL LAYOUTS;
                DEFINITION OF PROCESS EQUIPMENT; ESTIMATION OF PROCESS EQUIPMENT COSTS; PREPARATION OF CAPITAL
                INVESTMENTS AND OPERATING COSTS; AN ANALYSIS OF DESIGN AND ECONOMIC VARIABLES FOR COST SENSITIVITY.
                AS PART OF THE OVERALL EPA SLUDGE DISPOSAL PROGRAM, TASK IIA OF THIS PROJECT PROVIDES DESIGN AND
                COST STUDIES OF THE NUMEROUS SLUDGE DISPOSAL ALTERNATIVES. THE ECONOMIC AND TECHNICAL PREMISES FOR
                THESE COMPARISONS WILL BE ESTABLISHED AND SURVEYS OF COST STUDIES AND COST DATA FOR OPERATING AND
                PLANNED COMMERCIAL UNITS WILL BE MADE. TASK IIB WILL PROVIDE A REVIEW AND CRITIQUE OF A TRW
                CONCEPTUAL DESIGN COST STUDY FOR AN ALUMINA EXTRACTION PROCESS UTILIZING LIME-LIMESTONE SCRUBBER
                SLUDGE. TASK III IS A CONTINUING TASK OF PROVIDING INTERMITTENT ASSISTANCE TO EPA IN ANALYZING
                PUBLISHED COST ESTIMATES OF POWER PLANT STACK GAS EMISSION ABATEMENT SYSTEMS AND PREPARING BRIEF
                REPORTS OF CRITIQUE. TASK IV IS SIMILAR IN SCOPE TO TASK I EXCEPT THE STUDIES WILL COVER FRONT-END
                PROCESS ALTERNATIVES, SUCH AS COAL CONVERSION SYSTEMS AND COAL WASHING TECHNIQUES, TO STACK GAS
                TREATMENT FOR EMISSION CONTROL.
```

**PROJECT: 01580-ENERGY REQUIREMENT OPTIMIZATION STUDY OF SELECTED PROCESSES FOR REMOVING SO2 FROM POWER PLANT STACK GASES

```
                    STARTING/ COMPLETION DATE : 01/75   01/79 :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=F624A-094     **EPA=D7-E721-BH  ** ( IAG )      PRIOR       FY76  / $  100000
EPA  OFFICER.. JH BLACK                  EPA/IERL   RTP
INVESTIGATOR.. SV TOMLINSON              US TVA
               RL TORSTRICK              US TVA
               GG MCGLAMERY              US TVA
MILESTONES.... 04/78 -PROJECT DEFINITIONS, INCLUDING PROCESSES TO BE STUDIED
               09/78 -BASE ENERGY REQUIREMENTS FOR SELECTED PROCESSES
               01/79 -DRAFT REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001580            SSIE-GMA  4694        EPA -D7-E721-BH       TASK-F624A-094
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT...... THE PRIMARY OBJECTIVES OF THE STUDY PROJECT ARE TO SUMMARIZE THE ENERGY REQUIREMENTS OF SELECTED
                POWER PLANT STACK GAS SO2 REMOVAL PROCESSES AND THEN PREPARE ECONOMIC AND FEASIBILITY ANALYSES OF
                PROCESS MODIFICATIONS FOR REDUCING AND OPTIMIZING THE ENERGY REQUIREMENTS FOR THE PROCESSES.
                CONCEPTUAL DESIGN AND COST STUDIES WILL BE SURVEYED FOR ENERGY REQUIREMENT DATA. ALSO A SURVEY WILL
                BE MADE OF THE ENERGY REQUIREMENT DATA FOR ANY EXISTING DEMONSTRATION AND COMMERCIAL UNITS. THE
                DATA OBTAINED FROM THESE SURVEYS WILL BE SUMMARIZED AND ANALYZED TO ESTABLISH A CURRENT BASE ENERGY
                REQUIREMENT LEVEL FOR EACH OF THE PROCESSES. FEASIBILITY AND ECONOMIC EVALUATIONS WILL THEN BE MADE
                OF PROCESS MODIFICATIONS AND VARIATIONS FOR REDUCING AND OPTIMIZING THE ENERGY REQUIREMENTS.
                PROCESS MODIFICATIONS AND VARIATIONS TO BE STUDIED WILL INCLUDE SUCH ITEMS AS SCRUBBER TYPE, REHEAT
                LEVEL AND TYPE, HEAT RECOVERY SYSTEMS, ETC. THE WORK ON THIS PROJECT HAS BEEN RESCHEDULED TO BEGIN
                IN THE FIRST QUARTER OF CY 1978. IT IS PLANNED FOR THE MAJOR WORK ON THIS PROJECT TO FOLLOW
                SEQUENTIALLY THE COMPLETION OF THE CURRENT PHASE OF THE SHAWNEE LIMESTONE-LIME SCRUBBING PROCESS
                COMPUTERIZED DESIGN-COS
```

PROJECT: 01585-LIME/LIMESTONE AND ADVANCED CONCEPTS--TVA'S 1-MW PILOT PLANT (COLBERT)

```
                    STARTING/ COMPLETION DATE : 05/75   03/77 :   FUNDING    ESTIMATED   FY77  / $       0
                    TASK CODE=F624A-104     **EPA=D5-E721-AZ  ** ( IAG )     PRIOR       FY75  / $  600000
EPA  OFFICER.. JE WILLIAMS                EPA/IERL   RTP
INVESTIGATOR.. GA HOLLINDEN               US TVA
               RF ROBARDS                 US TVA
MILESTONES.... 03/77 -PROJECT COMPLETED   FINAL REPORT ISSUED
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001585          SSIE-GMA  4705        EPA -D5-E721-AZ       TASK-F624A-104
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT.....: PROJECT COMPLETED. FINAL REPORT ISSUED MARCH 1977 ENTITLED "TVA'S 1MW PILOT PLANT: FINAL REPORT ON
                HIGH VELOCITY SCRUBBING AND VERTICAL DUCT MIST ELIMINATION."
```

PROJECT: 01581-DEVELOPMENT OF FLUE GAS DESULFURIZATION TECHNOLOGY--SHAWNEE LIME & LIMESTONE SCRUBBING PROGRAM

```
                    STARTING/ COMPLETION DATE : 11/72   02/78 :   FUNDING :  ESTIMATED   FY77  / $  890000
                    TASK CODE=F624A-096     **EPA=D7-E721-BL  ** ( IAG )     PRIOR       FY76  / $ 4888000
EPA  OFFICER.. JE WILLIAMS                EPA/IERL   RTP
INVESTIGATOR.. AF LITTLE                  US TVA
               JR BOYD                    US TVA
               SB JACKSON                 US TVA
               TM KELSO                   US TVA
MILESTONES...: 02/76 -COMPLETED LIMESTONE UTILIZATION TESTS
               11/76 -COMPLETED LIME/LIMESTONE SCRUBBING TESTS WITH MGO ADDITION
               02/77 -COMPLETED FLUE GAS CHARACTERIZATION TESTS
               10/77 -COMPLETED LIME/LIMESTONE TWO-STAGE FORCED-OXIDATION TESTS
               12/77 -COMPLETE RELIABILITY DEMONSTRATION RUNS
               02/78 -PROJECT COMPLETION
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001581          SSIE-GMA  2986 1      EPA -D7-E721-BL       TASK-F624A-096
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... CONCEPTUAL DESIGN AND ECONOMIC STUDIES AND PILOT-PLANT TESTS INDICATE THAT LIMESTONE WET SCRUBBING
                OFFERS GOOD PROMISE AS AN EFFECTIVE METHOD OF SO2 EMISSION CONTROL FOR STACK GASES AT LARGE
                COAL-FIRED POWER PLANTS. USING TWO 10-MW-SIZE SCRUBBER TRAINS, A PROTOTYPE-SCALE EVALUATION OF THE
                PROCESSES IS BEING CONDUCTED AT SHAWNEE STEAM PLANT (UNIT 10). THE PROJECT IS A JOINT EFFORT OF
                TVA, EPA, AND BECHTEL CORPORATION. THE PROJECT WILL EVALUATE THE FEASIBILITY, EFFECTIVENESS, AND
                ECONOMICS OF LIMESTONE WET SCRUBBING FOR REMOVAL OF SO2 AND PARTICULATES FROM STACK GAS. TESTS WITH
                LIME ARE ALSO INCLUDED. AS PART OF THIS PROGRAM, ADDITIONAL TASK EFFORTS WILL INCLUDE (1) SLUDGE
                TREATMENT/DISPOSAL STUDIES, (2) ADVANCED LIMESTONE TESTING, (3) FLUE GAS CHARACTERIZATION TESTING,
                (4) DESIGN/COST COMPUTER STUDY, AND (5) A GYPSUM-SLUDGE UTILIZA
```

PROJECT: 01586-ADVANCED CONCEPTS SO2 REMOVAL PROCESS IMPROVEMENTS BENCH-SCALE STUDIES

```
                    STARTING/ COMPLETION DATE : 07/74   09/78     FUNDING :  ESTIMATED   FY77  / $  150000
                    TASK CODE=F624A-106     **EPA=D6-E721-BM  ** ( IAG )     PRIOR       FY76  / $  398000
EPA  OFFICER.: RH BORGWARDT               EPA/IERL   RTP
INVESTIGATOR.: JM POTTS                   US TVA
               JE JORDAN                  US TVA
MILESTONES.... 02/76 -COMPLETE LAB STUDIES OF DECOMPOSITION OF POTASSIUM PYROSULFITE
               04/76 -COMPLETE LAB STUDIES OF REDUCTION OF POTASSIUM SULFATE
               06/76 -COMPLETE LAB STUDIES OF SO2 ABSORPTION STEP
               08/76 -COMPLETE BENCH-SCALE DECOMPOSITION AND REDUCTION STUDIES
               06/76 -COMPLETE LAB STUDIES OF MOST EFFECTIVE GAS-LIQUOR CONTACT
               08/76 -COMPLETE LAB STUDIES TO UTILIZE DEVICE IN OXIDATION OF CASO3 AND
               10/76 -COMPLETE LAB STUDIES OF SELECTIVE SULFATE PRECIPITATION WITH BARI      UM
               03/77 -COMPLETE BENCH-SCALE OXIDATION STUDIES
               09/77 -COMPLETE LAB STUDIES OF FREEZE-CONCENTRATION OF DILUTE PHOSPHATE
               12/77 -COMPLETE LAB STUDIES OF EXTRACTION OF PHOSPHATE ROCK WITH DILUTE       SUL
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001586          SSIE-GMA  2987 1      EPA -D6-E721-BM       TASK-F624A-106
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... THE PURPOSE OF TASK I IS TO DEVELOP AND IMPROVE A POTASSIUM SCRUBBING SYSTEM FOR REMOVING SO2 FROM
                STACK GASES, ABSORPTION OF SO2, DECOMPOSITION OF RESULTANT POTASSIUM PYROSULFITE BY PYROLYSIS, AND
                REDUCTION OF PYROLYSIS PRODUCT TO ENABLE PRODUCTION OF ELEMENTAL SULFUR. LABORATORY AND BENCH-SCALE
                WORK ON THE THREE STEPS HAVE BEEN COMPLETED. THE PURPOSE OF TASK II IS TO DEVELOP BETTER METHODS
                AND EQUIPMENT FOR PROMOTING OXIDATION IN SO2 RECOVERY SYSTEMS WHERE THIS WOULD BE DESIRABLE AND FOR
                COPING WITH INADVERTENT OXIDATION IN SYSTEMS WHERE OXIDATION IS UNDESIRABLE. EXPLORATORY TESTS WERE
                MADE TO STUDY THE SELECTIVE PRECIPITATION OF SULFATE FROM POTASSIUM AND AMMONIUM SULFATE-SULFITE
                SOLUTIONS BY ADDITION OF BARIUM CARBONATE. A GAS-LIQUOUR CONTACT DEVICE WAS DESIGNED AND BUILT
                WHICH HAS PROVEN SUPERIOR TO A JAPANESE-DEVELOPED SPINNING CUP OXIDIZER, WITH RESPECT TO OXYGEN AND
                ENERGY UTILIZATION, FOR OXIDATION OF AMMONIUM, POTASSIUM, CALCIUM, AND ZINC SULFITES. THE PURPOSE
                OF TASK III IS TO STUDY RECOVERY OF SO2 AS DILUTE SULFURIC ACID AND UTILIZATION IN FERTILIZER
                PROCESSES. EXPLORATORY LABORATORY TESTS HAVE BEEN CONDUCTED ON FREEZE CRYSTALLIZATION OF ICE FROM
                DILUTE PHOSPHORIC ACID AND AMMONIUM PHOSPHATE SYSTEMS AS A MEANS OF CONCENTRATING THE PHOSPHATE.
                STUDIES ON EXTRACTION OF PHOSPHATE ROCK WITH DILUTE SULFURIC ACID TO PRODUCE DILUTE PHOSPHORIC ACID
                WERE ALSO MADE AND EXPLORATORY LABORATORY AND BENCH-SCALE TESTS WERE MADE OF REGENERABLE PROCESSES
                USING MELAMINE SLURRY AS THE SCRUBBING MEDIUM OR AS AN INTERMEDIATE IN THE REGENERATION STEP.
```

****PROJECT: 01587-UTILITY BOILER DESIGN/COST COMPARISON FLUIDIZED-BED COMBUSTION VERSUS FLUE GAS DESULFURIZATION**

STARTING/ COMPLETION DATE : 06/75 02/78 FUNDING ESTIMATED FY77 / $ 3000
TASK CODE=F624A-108 **EPA=D7-E721-FU ** (IAG) PRIOR FY /

EPA OFFICER.. D MOBLEY EPA/IERL RTP
INVESTIGATOR.. JT REESE US TVA
JT REESE US TVA
MILESTONES.... 02/78 -PUBLISHED REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001587 SSIE-GMA 4696 EPA -D7-E721-FU TASK-F624A-108
AP -624A DU -L110 LABT-EMI

ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO COMPARE THE COMMERCIALLY PROJECTED COSTS OF BOTH ATMOSPHERIC (AFB) AND PRESSURIZED (PFB) FLUIDIZED-BED POWER PLANTS TO THE COSTS OF A CONVENTIONAL COAL-FIRED STEAM POWER PLANT UTILIZING FLUE GAS DESULFURIZATION. THE APPROACH INCLUDES: (1) ESTABLISHMENT OF DESIGN BASIS FOR COMPARISON OF EACH POWER PLANT; (2) DEVELOPMENT OF CONCEPTUAL DESIGN AND COST ESTIMATES FOR EACH POWER PLANT; (3) COMPARISON OF TOTAL COSTS FOR EACH PLANT CONCEPT. NASA-ECAS RESULTS WILL PROVIDE CONCEPTUAL DESIGN AND COST ESTIMATES FOR THE FLUID-BED CASES. PROGRESS INCLUDES: (1) MODIFICATION OF ECAS AFB AND PFB DESIGN INFORMATION TO ENABLE DIRECT COMPARISON TO THE CONVENTIONAL PLANT DESIGN INFORMATION PROVIDED BY NASA; (2) CONSOLIDATION OF DESIGN REVIEWS PREPARED BY VARIOUS TVA DIVISIONS INTO A SINGLE TVA UTILITY REVIEW; (3) PRESENTATION OF CAPITAL AND OPERATING COSTS ASSOCIATED WITH EACH OF THE THREE POWER PLANT TYPES. CURRENT PLANS INCLUDE: PUBLISHING OF REPORT BY FEBRUARY OF 1978.

Nitrogen Oxide Control

**PROJECT: 01474-REDUCTION OF POLLUTANT FORMATION IN COAL PARTICLE AND LIQUID FUEL SPRAY FLAMES

STARTING/ COMPLETION DATE : 10/77 10/80 : FUNDING ESTIMATED FY77 / $ 200789
TASK CODE=F624A-003 **EPA=R805552-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. GB MARTIN EPA/IERL RTP
INVESTIGATOR.. UNKNOWN MASSACHUSETTS INST OF TECH GRADUATE SCH
MILESTONES.... 10/77 -INITIATE GRANT
10/78 -IDENTIFY COAL AND OIL PYROLYSIS MECHANISMS
10/80 -COMPLETE DOCUMENTATION
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001474 SSIE-GMA 4632 EPA -R805552-01 TASK-F624A-003
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE OVERALL OBJECTIVE IS TO STUDY THE COMBUSTION OF SOLID AND LIQUID FUELS WITH PARTICULAR EMPHASIS ON NOX, PARTICULATE AND HETEROCYCLIC HYDROCARBON EMISSION. THE FACTORS IN PRACTICAL COMBUSTION SYSTEMS THAT INFLUENCE THE FORMATION AND EMISSION OF THESE POLLUTANTS ARE THE TIME-TEMPERATURE-CONCENTRATION HISTORY OF THE FUEL AND THE CHEMICAL COMPOSITION OF THE ENVIRONMENT. THE APPROACH IS TO SELECT CONDITIONS REPRESENTATIVE OF THOSE IN INDUSTRIAL FLAMES AND FOLLOW THE TIME RESOLVED BEHAVIOR OF THE FUEL INCLUDING THE EVOLUTION OF NITROGEN BEARING COMPOUNDS, THEIR PYROLYSIS AND OXIDATION REACTIONS AND THE EMISSIONS OF CARBONACEOUS SOLIDS AND OTHER POLLUTANTS. THE PROPOSED RESEARCH INVOLVES THE FOLLOWING PARALLEL AND SEQUENTIAL INVESTIGATIONS: A) EXPERIMENTS WITH PULVERIZED COAL PARTICLES AND MONOSIZE DROPLET STREAMS IN HIGH-TEMPERATURE LAMINAR FLOW FURNACES TO DETERMINE THE TIME RESOLVED EVOLUTION AND CHEMICAL TRANSFORMATION OF FUEL-N COMPOUNDS. B) MONOSIZE DROPLET STREAM PYROLYSIS AND COMBUSTION STUDIES IN WHICH OPTICAL DIAGNOSTICS WILL BE USED TO DETERMINE THE TEMPERATURE DISTRIBUTION AROUND THE REACTING DROPLETS IN A QUARTZ TUBE REACTOR. C) SPRAY PYROLYSIS STUDIES SIMULATING CONDITIONS IN THE FIRST STAGE OF STAGED COMBUSTION SYSTEMS IN WHICH THE FUEL-N EVOLUTION, THE REACTIONS OF NITROGENOUS COMPOUNDS AND THOSE LEADING TO THE FORMATION OF CARBONACEOUS SOLIDS WILL BE STUDIED IN FUEL RICH ENVIRONMENTS. IT IS EXPECTED THAT RESULTS OF THESE BASIC STUDIES WILL ASSIST IN THE INTERPRETATION OF RESULTS OBTAINED IN PARAMETRIC INVESTIGATIONS AND THUS LEAD TO THE DEVELOPMENT OF CONTROL METHODS CAPABLE OF REDUCING NOX EMISSION FROM COAL AND HEAVY FUEL OIL FLAMES WITHOUT AN INCREASE IN THE EMISSION OF SOOT AND CARBONACEOUS PARTICULATES.

**PROJECT: 01475-FUEL DECOMPOSITION AND FLAME REACTIONS IN CONVERSION OF FUEL NITROGEN TO NOX

STARTING/ COMPLETION DATE : 06/75 02/78 : FUNDING ESTIMATED FY77 / $ 99967
TASK CODE=F624A-004 **EPA=68-02-1886 ** (CNTR.) PRIOR FY76 / $ 230639

EPA OFFICER.. GB MARTIN EPA/IERL RTP
INVESTIGATOR.. AE AXWORTHY ROCKWELL INTERNATL CORP ADVANCED PROGRAMS
WH NURICK ROCKWELL INTERNATL CORP ADVANCED PROGRAMS
MILESTONES.... 06/75 -INITIATE CONTRACT
02/78 -IDENTIFY PRIMARY AND SECONDARY FUEL PYROLYSIS PRODUCTS
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001475 SSIE-GMA 4177 EPA -68-02-1886 TASK-F624A-004
AP -624A DU -L110 LABT-EMI
ABSTRACT.....: A EIGHTEEN-MONTH EXPERIMENTAL AND ANALYTICAL PROGRAM HAS BEEN INITIATED TO PROVIDE INFORMATION ON FUEL DECOMPOSITION, FUEL OXIDATION AND FLAME REACTIONS WHICH IS REQUIRED FOR THE DEVELOPMENT OF A COMPLETE UNDERSTANDING OF THE CHEMICAL PHENOMENA INVOLVED IN THE CONVERSION OF ORGANIC FUEL NITROGEN COMPOUNDS TO NOX DURING COMBUSTION. THE PROGRAM IS DIVIDED INTO THREE TASKS. TASK I CONSISTS OF ADDITIONAL EXPERIMENTAL STUDIES OF THE TYPES OF CHEMICAL REACTIONS THAT FUEL NITROGEN SPECIES CAN UNDERGO AS FUEL REACTS IN THE EARLY (PREFLAME) STAGES OF COMBUSTION. THE PYROLYSIS AND OXIDATION OF MODEL NITROGEN COMPOUNDS, COALS, RESIDUAL OIL AND ALTERNATE FUELS WILL BE INVESTIGATED. TASK II INVOLVES THE STUDY OF COMBUSTION KINETICS INVOLVED IN FUEL NOX FORMATION FROM HCN AND NH3 IN PREMIXED CH4 FLAMES INCLUDING: 1) INTERACTIONS WITH THERMAL NOX FORMATION; 2) MORE DETAILED ANALYSIS OF NITROGEN-CONTAINING SPECIES, AND 3) ORGANIC NITROGEN ADDITIVES OR DIFFUSION FLAME STUDIES. TASK III WILL INVOLVE SUMMARIZING THE DATA ANALYSIS AND SYNTHESIZING THE RESULTS INTO A QUANTITATIVE SCHEME FOR THE CONVERSION OF FU

**PROJECT: 01478-ENVIRONMENTAL ASSESSMENT OF STATIONARY SOURCE NOX CONTROL TECHNOLOGIES

```
                    STARTING/ COMPLETION DATE : 06/76   06/79     FUNDING    ESTIMATED   FY77  / $  600000
                    TASK CODE=F624A-006     **EPA=68-02-2160  ** (CNTR.)      PRIOR       FY76  / $ 1100240
EPA  OFFICER.. JS BOWEN                  EPA/IERL   RTP
INVESTIGATOR.: HB MASON                  ACUREX CORP                          AEROTHERM DIV
               L  WATERLAND              ACUREX CORP                          AEROTHERM DIV
MILESTONES.... 06/76 -INITIATE PROJECT
               02/77 -PRELIMINARY ENVIRONMENT ASSESSMENT REPORT
               07/77 -ALTERNATE CLEAN FUELS SPECIAL REPORT
               01/78 -UTILITY BOILER NOX CONTROL TECHNOLOGY SPECIAL REPORT
               05/78 -INDUSTRIAL BOILER NOX CONTROL TECHNOLOGY SPECIAL REPORT
               05/78 -ADVANCED COMBUSTION CONTROL TECHNOLOGY SPECIAL REPORT
               08/78 -GAS TURBINE NOX CONTROL TECHNOLOGY SPECIAL REPORT
               10/78 -RESIDENTIAL HEATING NOX CONTROL TECHNOLOGY SPECIAL REPORT
               12/78 -IC ENGINE NOX CONTROL TECHNOLOGY SPECIAL REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001478          SSIE-GMA  3357 1      EPA -68-02-2160       TASK-F624A-006
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... THE OBJECTIVES OF THIS 3-YEAR SYSTEMS STUDY ARE TO (1) IDENTIFY THE MULTI-MEDIA ENVIRONMENTAL IMPACT
                OF STATIONARY COMBUSTION SOURCES AND NOX COMBUSTION MODIFICATION CONTROLS AND (2) IDENTIFY THE MOST
                COST EFFECTIVE COMBUSTION MODIFICATION APPROACH(ES) TO ACHIEVING AND MAINTAINING AIR QUALITY FOR
                NO2. THE RESULTS OF THIS STUDY WILL GUIDE THE DEVELOPMENT AND SUBSEQUENT IMPLEMENTATION OF
                ENVIRONMENTALLY SOUND NOX CONTROL TECHNIQUES. DETAILED PROCESS ENGINEERING AND MULTIMEDIA IMPACT
                STUDIES WILL BE MADE OF THE APPLICATION OF COMMERCIAL HEATING SYSTEMS, STATIONARY ENGINES AND
                INDUSTRIAL PROCESS FURNACES AS WELL AS OF ALTERNATE CONCEPTS SUCH AS THE USE OF CATALYTIC
                COMBUSTION OR OF CLEAN FUELS. CONTROL OF NOX EMISSIONS BY COMBUSTION PROCESS MODIFICATION WILL BE
                EMPHASIZED FOR NEAR-TERM APPLICATION. THE COMBINATION OF COMBUSTION MODIFICATION WITH
                POST-COMBUSTION FLUE GAS TREATMENT WILL BE CONSIDERED FOR APPLICATION IN THE POST-1980 PERIOD. THE
                INITIAL EFFORT, IN PROGRESS, IS TO GENERATE A COMPREHENSIVE INVENTORY AND PROJECTION OF GASEOUS,
                LIQUID AND SOLID EFFLUENTS FOR BOTH CONTROLLED AND UNCONTROLLED SOURCES. THE ENVIRONMENTAL STRESSES
                OF THE SOURCES AND CONTROL SYSTEMS WILL BE EVALUATED ACCORDING TO POLLUTANT TRANSPORT AND
                TRANSFORMATION AND ULTIMATE RECEPTOR IMPACT. FIELD EMISSION TESTS WILL BE MADE TO AUGMENT THE
                EXISTING DATA BASE. PROCESS STUDIES WILL YIELD DATA ON CONTROL EFFECTIVENESS, ENERGY EFFICIENCY,
                COST AND DIFFERENTIAL TRACE EMISSIONS FOR CURRENT AND EMERGING CONTROL SYSTEMS. THE STUDY WILL
                CULMINATE WITH A SYSTEM ANALYSIS WHICH WILL INTEGRATE THE PROCESS ENGINEERING AND ENVIRONMENTAL
                IMPACT RESULTS TO DETERMINE THE OPTIMUM COMBINATION OF THE CONTROL SYSTEMS UNDER CONSIDERATION, ON
                A REGIONAL BASIS, TO COMPLY WITH NO2 AIR QUALITY STANDARDS.
```

**PROJECT: 01487-COMBUSTOR DESIGN CONCEPTS FOR NOX CONTROL ADVANCED LBG FIRED SYSTEMS

```
                    STARTING/ COMPLETION DATE : 10/76   02/79 :   FUNDING    ESTIMATED   FY77  / $  280270
                    TASK CODE=F624A-014     **EPA=68-02-2196  ** (CNTR.)      PRIOR       FY76  / $  200000
EPA  OFFICER.. GB MARTIN                 EPA/IERL   RTP
INVESTIGATOR.. TJ TYSON                  ULTRASYSTEMS INC
               MP HEAP                   ULTRASYSTEMS INC
               BA FOLSOM                 ULTRASYSTEMS INC
MILESTONES.... 10/76 -INITIATE CONTRACT
               06/78 -IDENTIFY PROMISING CONCEPTS
               02/79 -COMPLETE PROTOTYPE COMBUSTOR LAB TESTS
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001487          SSIE-GMA  3372 1      EPA -68-02-2196       TASK-F624A-014
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... UTILIZATION OF LOW BTU GAS (LBG) IN AN ENVIRONMENTALLY ACCEPTABLE AND ENERGY EFFICIENT MANNER
                REQUIRES CAREFUL ATTENTION TO OVERALL SYSTEM DESIGN. WHILE MOST SYSTEM ASPECTS ARE BEING
                EXTENSIVELY CONSIDERED, THE COMBUSTOR FOR UTILIZATION OF HIGH TEMPERATURE, NITROGEN COMPOUND
                CONTAINING LBG WITHOUT PRODUCTION OF HIGH LEVELS OF NOX AND OTHER POLLUTANTS HAS NOT BEEN GIVEN
                SUFFICIENT ATTENTION. PRELIMINARY CALCULATIONS PERFORMED ON EPA CONTRACT 68-02-1361 INDIATED
                SIGNIFICANT PROMISE FOR CONTROL OF THERMAL AND FUEL NOX BY PROPER COMBUSTION DESIGN THIS PROGRAM
                WILL SUBSTANTIATE THOSE CONCEPTS THROUGH A COORDINATED STUDY INCLUDING: 1) COMBUSTOR DESIGN
                CALCULATIONS; 2) BENCH SCALE EXPERIMENTS; AND 3) DESIGN AND FABRICATION OF TWO PROTOTYPE COMBUSTORS
                FOR TESTING AT THE IERL-RTP LABORATORY.
```

**PROJECT: 01490-INVESTIGATION OF NOX NITRATE AND SULFATE PRODUCTION IN LABORATORY FLAMES

```
                    STARTING/ COMPLETION DATE : 10/76   10/78 :   FUNDING    ESTIMATED   FY77  / $  150000
                    TASK CODE=F624A-017     **EPA=68-02-2188  ** (CNTR.)     PRIOR       FY76  / $   90000
EPA  OFFICER.. WA LANIER                  EPA/IERL   RTP
INVESTIGATOR.. DJ SEERY                   UNITED TECHNOLOGIES CORP
               MF ZABIELSKI               UNITED TECHNOLOGIES CORP
               LG DODGE                   UNITED TECHNOLOGIES CORP
MILESTONES.... 09/76 -INITIATE CONTRACT
               10/77 -COMPLETE ASSESSMENT OF CLEAN FUEL KINETICS INCLUDING NO2 FORMATIO
               09/78 -COMPLETE STUDY OF PROBE EFFECTS, SULFATE FORMATION, AND NOX/SOX I
               11/78 -COMPLETE FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001490            SSIE-GMA  3322 1      EPA -68-02-2188       TASK-F624A-017
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT..... AN EXPERIMENTAL PROGRAM WILL BE CONDUCTED TO MEASURE THE CONCENTRATIONS OF THE IMPORTANT STABLE AND
               UNSTABLE SPECIES IN METHANE-AIR FLAMES. PARTICULAR EMPHASIS WILL BE PLACED ON A DETERMINATION OF
               THE PRESENCE OF NITRATES AND SULFATES IN THE FLAME ZONE. IN ADDITION TO SEARCHING FOR FLAME FORMED
               NITRATES, THE STUDY WILL DEVOTE A MAJOR EFFORT TO DETERMINING IF THE NITRATE PRESURSOR, NO2, IS
               ACTUALLY PRESENT IN THE EARLY FLAME ZONE AND IF REACTIONS ARE OCCURRING WITHIN THE SAMPLING PROBE
               WHICH PERTURB THE ACTUAL NO/NO2 CONCENTRATION RATIO. VARIOUS SAMPLING TECHNIQUES WILL BE EMPLOYED
               INCLUDING COOLED AND UNCOOLED QUARTZ MICROPROBES, OPTICAL SPECTROSCOPY, AND MOLECULAR BEAM SAMPLING
               FOR MEASUREMENTS OF RADICAL SPECIES AND STABLE SPECIES WITH INTERFERENCES. THE MOLECULAR BEAM
               SAMPLING-MASS SPECTROMETRY TECHNIQUE WILL BE AUGMENTED BY USE OF THE APPEARANCE POTENTIAL
               MEASUREMENTS WHICH GREATLY INCREASES THE NUMBER OF SPECIES WHICH CAN BE MEASURED. MEASUREMENTS WILL
               BE MADE OVER A RANGE OF STOICHIOMETRIES AND WITH THE NOX RESULTING FROM CONVERSION OF BOTH
               ATMOSPHERIC N2 AND FUEL-BOUND NITROGEN. ONE EXPERIMENTAL SERIES CALLS FOR DOPING THE FUEL WITH
               HYDROGEN SULFIDE AND SAMPLING TO IDENTIFY THE PRESENCE OF FLAME FORMED SULFATES. THIS SERIES OF
               TESTS WILL BE PERFORMED USING THE MOLECULAR BEAM SAMPLER SO THAT NOT ONLY SULFATES BUT ALSO THEIR
               PRECURSORS WILL BE IDENTIFIED.
```

**PROJECT: 01492-ADVANCED COMBUSTION SYSTEMS FOR STATIONARY GAS TURBINE ENGINES

```
                    STARTING/ COMPLETION DATE : 12/75   04/78     FUNDING    ESTIMATED   FY77  / $  256700
                    TASK CODE=F624A-018     **EPA=68-02-2136  ** (CNTR.)     PRIOR       FY76  / $  900000
EPA  OFFICER.. WS LANIER                  EPA/IERL   RTP
INVESTIGATOR.. SA MOSIER                  UNITED TECHNOLOGIES CORP            DEPT OF APPLIED RES
               RM PIERCE                  UNITED TECHNOLOGIES CORP            DEPT OF APPLIED RES
MILESTONES.... 12/75 -INITATE CONTRACT
               05/76 -COMPLETE DUTY CYCLE REVIEW AND COMBUSTOR CONCEPT SELECTION
               10/77 -COMPLETE BENCH SCALE EVALUATION OF COMBUSTOR CONCEPTS
               12/77 -BENCH SCALE TESTING FINAL REPORT
               01/78 -COMPLETE CONSTRUCTION OF FULL SCALE COMBUSTORS
               08/78 -COMPLETE EVALUATION OF FULL-SCALE HARDWARE
               10/78 -FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001492            SSIE-GMA  2747 1      EPA -68-02-2136       TASK-F624A-018
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT..... AN EXPLORATORY DEVELOPMENT PROGRAM OF ANALYSIS AND EXPERIMENTATION WILL BE CONDUCTED TO IDENTIFY NEW
               STATIONARY GAS TURBINE COMBUSTION DESIGNS WHICH REDUCE POLLUTANT EMISSIONS. PRIMARY EMPHASIS WILL
               BE PLACED UPON CONTROL OF THE OXIDES OF NITROGEN (NOX) FROM BOTH THE THERMAL AND FUEL-BOUND SOURCES
               VIA DRY TECHNIQUES, WHILE AT LEAST MAINTAINING CURRENT CONTROL OF CARBON MONOXIDE (CO) AND UNBURNED
               HYDROCARBONS (UHC). THE PROGRAM IS DIVIDED INTO FOUR PHASES: (1) A REVIEW OF THE VARIOUS COMBUSTOR
               DESIGN APPROACHES; (2) SCREENING EXPERIMENTS OF THE VARIOUS TECHNIQUES; (3) DESIGN OF FULL-SCALE
               COMBUSTORS FOR A NOMINALLY 25 MW STATIONARY GAS TURBINE ENGINE; AND (4) EVALUATION OF THE
               FULL-SCALE COMBUSTORS IN BOTH TEST RIGS AND IN AN ENGINE. THROUGHOUT THE PERFORMANCE OF ALL FOUR
               PHASES, THE NOX CONCENTRATION GOALS FOR THE COMBUSTOR DESIGNS ARE 50 PPMV WHEN BURNING GAS OR OIL
               CONTAINING NO MORE THAN TRACE QUANTITIES OF BOUND NITROGEN AND 100 PPMV WHEN BURNING OIL CONTAINING
               UP TO 0.5% (BY WEIGHT) OF CHEMICALLY BOUND NITROGEN. THE CO CONCENTRATION GOAL IS 100 PPMV
               REGARDLESS OF THE FUEL TYPE.
```

**PROJECT: 01495-STAGED COMBUSTION FOR NOX CONTROL AND ENHANCED SO3 EMISSIONS

```
                    STARTING/ COMPLETION DATE : 07/77   01/78     FUNDING    ESTIMATED   FY77  / $   34559
                    TASK CODE=F624A-020     **EPA=R805330-01  ** (GRANT)     PRIOR       FY    /
EPA  OFFICER..                            EPA/IERL   RTP
INVESTIGATOR.. A  LEVY                    BATTELLE MEMORIAL INST
MILESTONES... 07/77 -INITIATE GRANT
               01/78 -COMPLETE ASSESSMENT OF ENHANCED SULFATE FORMATION FROM STAGE COMB
               02/78 -COMPLETE FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001495            SSIE-GMA  4208        EPA -R805330-01       TASK-F624A-020
               AP  -624A              DU  -L110             LABT-EMI
ABSTRACT..... PREVIOUS EXPERIMENTAL STUDIES INDICATE THAT STAGED COMBUSTION PROCESSES DESIGNED TO REDUCE NOX
               EMISSIONS MAY ENHANCE SO3 EMISSION. THE OBJECTIVE OF THIS PROPOSED PROGRAM IS TO INVESTIGATE THE
               EXTENT TO WHICH SO3/SO2 RATIOS MAY BE INCREASED WHEN NOX EMISSIONS IS REDUCED UNDER SPECIFIC AND
               WELL DEFINED CONDITIONS OF STAGED COMBUSTION. FOR THESE STUDIES, A SIMPLE TWO-STAGE LABORATORY
               BURNER WILL BE USED. MEASUREMENTS OF NOX, SO2, SO3, AND TEMPERATURE WILL BE AT THE EXIT OF EACH
               STAGE FOR BOTH SINGLE-STAGE AND TWO-STAGE OPERATION OF THE BURNER UNDER DIFFERENT OPERATING
               CONDITIONS. RESULTS FROM THESE STUDIES WILL BE USED TO ASSESS THE EXTENT TO WHICH ENHANCED SO3
               PRODUCTION CAN BE A PROBLEM IN STAGED COMBUSTION SYSTEMS.
```

**PROJECT: 01496-ASSESSMENT AND APPLICATION OF COMBUSTION ADDITIVE PROCESS FOR NOX CONTROL

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING : ESTIMATED FY77 / $ 9852
TASK CODE=F624A-021 **EPA=68-02-2649 ** (CNTR.) PRIOR FY75 / $ 61948

EPA OFFICER.. DG LACHAPELLE EPA/IERL RTP
INVESTIGATOR.. W BARTOK EXXON RESEARCH & ENGINEERING CO
R LYON EXXON RESEARCH & ENGINEERING CO
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001496 SSIE-GMA 4623 EPA -68-02-2649 TASK-F624A-021
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVE: EVALUATE PROPRIETARY NH3 INJECTION TECHNOLOGY DEVELOPED BY EXXON RESEARCH & ENGINEERING CO. THE TECHNOLOGY PROVIDES FOR POST-FLAME, NON-CATALYTIC REDUCTION OF NOX TO N2 BY INJECTION OF GASEOUS NH3. THE PROCESS HAS BEEN PROVEN IN JAPAN WITH OIL-FIRED BOILERS. IT HAS NOT BEEN DEMONSTRATED ON COAL-FIRED BOILERS. APPROACH: THE FEASIBILITY OF THE PROCESS WILL BE REVIEWED THROUGH DISCLOSURE BY EXXON OF PROPRIETARY REPORTS MADE AVAILABLE TO EPA PERSONNEL AND AN INDEPENDENT, IMPARTIAL THIRD PARTY. PILOT SCALE WORK ON A COAL-FIRED PILOT-SCALE BOILER WILL BE PROVIDED BY EXXON. PERFORMANCE DATA AND IMPLEMENTATION COSTS WILL BE DEVELOPED. PROGRESS: A CONTRACT HAS BEEN IN NEGOTIATION FOR ABOUT 2 YEARS. PROBLEMS OVER DATA RIGHTS ARE BEING RESOLVED.

**PROJECT: 01502-EFFECTS OF FUEL PROPERTIES AND ATOMIZATION PARAMETERS ON NOX CONTROL FOR HEAVY LIQUID FUEL-FIRED PACKAGE BOILERS

STARTING/ COMPLETION DATE : 01/77 05/78 : FUNDING ESTIMATED FY77 / $ 204301
TASK CODE=F624A-026 **EPA=68-02-2624 ** (CNTR.) PRIOR FY76 / $ 135317

EPA OFFICER.: GB MARTIN EPA/IERL RTP
INVESTIGATOR.: MP HEAP ULTRASYSTEMS INC
JE CICHANOWICZ ULTRASYSTEMS INC
ML LOBELL ULTRASYSTEMS INC
MILESTONES.... 01/77 -INITIATE CONTRACT
03/78 -DEFINE PRELIMINARY CRITERIA FOR ATOMIZATION
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001502 SSIE-GMA 4203 EPA -68-02-2624 TASK-F624A-026
AP -624A DU -L110 LABT-EMI
ABSTRACT..... COMBUSTION AIR STAGING HAS BEEN DEMONSTRATED TO BE A VIABLE TECHNIQUE FOR THE CONTROL OF NOX EMISSIONS FROM RESIDUAL OIL-FIRED PACKAGE BOILERS. HOWEVER, THE REDUCTION IN OXIDES OF NITROGEN CAN BE ACCOMPANIED BY AN INCREASE IN CARBONACEOUS PARTICULATE MATTER WHICH EVENTUALLY LIMITS THE AMOUNT OF STAGING AND THUS THE CONTROL OF NOX. THE FORMATION OF BOTH POLLUTANTS IS STRONGLY LINKED TO THE FUEL/AIR MIXING PROCESS AND THE PROPERTIES OF THE FUEL. THE OVERALL OBJECTIVE OF THIS PROGRAM IS TO DEFINE THE EFFECT OF FUEL ATOMIZATION TECHNIQUES AND OF FUEL PROPERTIES ON POLLUTANT EMISSIONS. COMMERCIALLY AVAILABLE FUEL ATOMIZERS WILL BE SURVEYED AND THEIR CHARACTERISTIC FEATURES DEFINED. THE INFLUENCE OF VARIOUS CRUDE OIL PROPERTIES AND THE PETROLEUM REFINING PROCESS ON THE CHARACTERISTICS OF RESIDUAL FUEL OILS WILL BE EXPLORED. THE BULK OF THE PROGRAM INVOLVES A SERIES OF EXPERIMENTS WITH A PACKAGE BOILER SIMULATOR TO DEFINE THE INFLUENCE OF VARIOUS ATOMIZERS AND FUEL CHARACTERISTICS ON POLLUTANT FORMATION. TWO ADDITIONAL EXPERIMENTS ARE PLANNED TO AID IN THE INTERPRETATION OF THE EXPERIMENTAL RESULTS GENERATED BY THE PACKAGE BOILER SIMULATOR. THESE INVOLVE TWO SPECIALLY BUILT EXPERIMENTAL SYSTEMS TO DEFINE THE CONVERSION OF FUEL-BOUND NITROGEN TO OXIDES OF NITROGEN AND TO CHARACTERIZE THE DETAILS OF THE FUEL SPRAY UNDER REALISTIC CONDITIONS.

**PROJECT: 01508-EMISSIONS CONTROL TECHNOLOGY FOR HIGH PRESSURE COMBUSTION SYSTEMS

STARTING/ COMPLETION DATE : 07/75 09/81 : FUNDING ESTIMATED FY77 / $ 80000
TASK CODE=F624A-029 **EPA= ** (IN-HO) PRIOR FY76 / $ 90000
IN-HOUSE EFFORT FY 77 / 00.4 YEARS ; TOTAL PROJECT 02.0

EPA OFFICER.. JH WASSER EPA/IERL RTP
INVESTIGATOR.: JH WASSER US EPA ORD/IERL
MILESTONES...: 09/75 -COMPLETED NOX CONTROL EVALUATION OF WATER INJECTION ON GT ENGINE
08/77 -COMPLETED NOX CONTROL EVALUATION OF WATER INJECTION ON DIESEL ENG
06/78 -COMPLETE ASSESSMENT OF CATALYTIC REACTOR ON DIESEL ENGINE
06/79 -COMPLETE PARTICULATE ASSESSMENT ON GT ENGINE AND DIESEL ENGINE
07/80 -COMPLETE HIGH PRESSURE COMBUSTION STUDY ON FLUID BED MODEL
09/81 -COMPLETE HIGH PRESSURE COMBUSTOR STUDY
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001508 SSIE-ZMA 1136 TASK-F624A-029 AP -624A
DU -L110 LABT-EMI
ABSTRACT..... THIS PROJECT WILL INVESTIGATE, IN AN EXPERIMENTAL SYSTEM, THE EMISSIONS FROM COMBUSTION OF LIQUID AND GASEOUS FUELS AT PRESSURES BETWEEEN 1 AND 8.5 ATMOSPHERES. COMPREHENSIVE ANALYSIS FOR POLLUTANTS IN ADDITION TO THE CRITERIA POLLUTANTS WILL BE CARRIED OUT OVER A RANGE OF OPERATING CONDITIONS. CAPABILITY FOR INVESTIGATING SEVERAL COMBUSTION SYSTEM CATEGORIES WILL BE DEVELOPED. OTHER AREAS OF WORK WILL INVOLVE TESTING AND MODIFICATION EVALUATION FOR CONTROL TECHNOLOGY ON ACTUAL GAS TURBINE AND DIESEL ENGINES. WATER/FUEL OIL EMULSIONS AND CATALYTIC EXHAUST DEVICES ARE CURRENTLY UNDER STUDY.

Flue Gas Particulate Control

**PROJECT: 01484-EVALUATION OF EMISSIONS AND CONTROL TECHNOLOGY FOR INDUSTRIAL STOKER BOILERS

STARTING/ COMPLETION DATE : 03/77 10/79 : FUNDING ESTIMATED FY77 / $ 250000
TASK CODE=F624A-010 **EPA=68-02-2627 ** (CNTR.) PRIOR FY76 / $ 75000

EPA OFFICER.. JH WASSER EPA/IERL RTP
INVESTIGATOR.. RD GIAMMAR BATTELLE MEMORIAL INST
RE BARRETT BATTELLE MEMORIAL INST
A LEVY BATTELLE MEMORIAL INST
FM TIMM BATTELLE MEMORIAL INST
MILESTONES.... 12/77 -MODEL SPREADER STOKER COMPLETED
06/78 -RESEARCH PROGRAM ON CLEANED COALS COMPLETED
10/79 -DEVELOPMENT PROGRAM ON FULL SCALE SPREADER STOKER COMPLETED
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001484 SSIE-GMA 4205 EPA -68-02-2627 TASK-F624A-010
AP -624A DU -L110 LABT-EMI

ABSTRACT..... BATTELLE-COLUMBUS IS CONDUCTING A PROGRAM TO (1) CHARACTERIZE THE SPECTRUM OF EMISSIONS FROM INDUSTRIAL COAL-FIRED STOKER BOILERS FIRING SEVERAL TYPES OF COAL UNDER VARIOUS STOKER FIRING CONDITIONS, (2) INVESTIGATE CONTROL METHODS TO REDUCE THESE EMISSIONS, (3) DETERMINE THE EFFECT OF THESE CONTROL METHODS AND VARIATIONS IN STOKER BOILER OPERATION ON THE OVERALL PERFORMANCE OF THE STOKER BOILER, AND (4) ASSESS THE ENVIRONMENTAL IMPACT OF NEW TECHNOLOGY ON THE FUTURE ACCEPTABILITY OF STOKER BOILERS. THE PROGRAM IS DIVIDED INTO TWO PHASES. IN PHASE I, THE COMPREHENSIVE EMISSIONS CHARACTERISTICS WILL BE DETERMINED FROM THE COMBUSTION OF UNTREATED, RECONSTITUTED, AND PROCESSED COALS IN BATTELLE'S 20-HP STOKER BOILER SMALL-SCALE STOKER. APPROPRIATE DATA WILL BE COLLECTED TO DETERMINE IF CRITERIA POLLUTANTS AND LEVEL 1 AND LEVEL 2 POLLUTANT GROUPS ARE RESPONSIVE TO CHANGES IN FUEL, STOKER OPERATION, OR COMBUSTION PARAMETERS. AN ASSESSMENT WILL BE DEVELOPED THAT WILL INCLUDE DEFINING THE POTENTIAL FOR UNTREATED, RECONSTITUTED, AND PROCESSED COALS TO IMPROVE THE ENVIRONMENTAL ACCEPTABILITY OF STOKER BOILERS. PHASE II WILL BE CONDUCTED TO IDENTIFY AND EVALUATE POTENTIAL CONTROL CONCEPTS FOR CONTROL OF EMISSIONS FROM FULL-SCALE INDUSTRIAL STOKER BOILERS. THE BATTELLE STEAM PLANT 600-HP SPREADER-STOKER BOILER WILL BE UTILIZED AND MODIFIED TO EVALUATE POTENTIAL CONTROL CONCEPTS. THIS PHASE WILL PROVIDE A SYSTEMATIC EVALUATION OF CONTROL CONCEPTS WHILE FIRING SEVERAL REPRESENTATIVE STOKER FUELS, INCLUDING THE MOST PROMISING TREATED COAL IDENTIFIED IN PHASE I. BASED ON THE RESULTS OF THE RESEARCH PROGRAM, AN ASSESSMENT WILL BE DEVELOPED TO DEFINE THE POTENTIAL OF EMISSIONS CONTROL ON THE OVERALL ACCEPTABILITY OF INDUSTRIAL STOKER COAL-FIRED BOILERS.

**PROJECT: 01485-COMBUSTION RESEARCH ON COAL NITROGEN AND PARTICULATE ORGANIC MATTER

STARTING/ COMPLETION DATE : 08/74 10/77 : FUNDING ESTIMATED FY77 / $ 20000
TASK CODE=F624A-012 **EPA=R803242 ** (GRANT) PRIOR FY76 / $ 355000

EPA OFFICER.. JH WASSER EPA/IERL RTP
INVESTIGATOR.. AF SAROFIM MIT
JB HOWARD MIT
R HITES MIT
MILESTONES.... 08/75 -COMPLETE EXPERIMENTAL SYSTEMS AND INITIAL TEST
08/76 -COMPLETE STUDY OF SOOT AND PCAH FORMATION IN TURBULANT DIFFUSION
08/76 -COMPLETE EVALUATION OF COMPOUND N BEHAVIOR FOR TWO COMMON COALS
10/77 -FINAL REPORT
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001485 SSIE-GMA 4207 EPA -R803242 TASK-F624A-012
AP -624A DU -L110 LABT-EMI

ABSTRACT..... TASK I. CHARACTERIZATION OF POM FROM DIFFUSION AND PREMIXED FLAMES. THE RESEARCH IS CONCERNED WITH THE QUALITATIVE AND QUANTITATIVE ASSESSMENT OF THE PRODUCTION OF PARTICULATE ORGANIC MATTER IN LABORATORY FLAMES. THE OBJECTIVES ARE TO DETERMINE WITHIN THE FLAME AND IN THE EXHAUST GASES (1) THE SIZE DISTRIBUTION AND CONCENTRATIONS OF SOOT PARTICLES, (2) THE IDENTITIES AND CONCENTRATIONS OF ORGANIC COMPOUNDS, (3) THE RELATIONSHIP BETWEEN SOOT AND ORGANIC COMPOUNDS GENERATED IN THE FLAME. EXPERIMENTAL METHODOLOGY USED INCLUDES PARTICLE CONCENTRATION AND SIZE DISTRIBUTION BY ELECTRON MICROSCOPY, AND ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBON BY GAS CHROMATOGRAPHIC MASS SPECTROMETRY AND HIGH-RESOLUTION MASS SPECTROMETRY. THE MAJOR EMPHASIS INVOLVES THE APPLICATION OF MOLECULAR BEAM SAMPLER AND ON-LINE MASS SPECTROMETER FOR COMPLETE GAS PHASE ANALYSIS. ADDITIONAL INFORMATION IS OBTAINED BY SAMPLING ATMOSPHERIC PRESSURE TURBULENT DIFFUSION FLAMES AND LAMINAR PREMIXED FLAMES BY WATER-INJECTED SAMPLING PROBES. TASK II. KINETICS OF DEVOLATILIZATION OF NITROGEN COMPOUNDS DURING THE HIGH-TEMPERATURE PYROLYSIS OF COAL. THE PROGRAM OBJECTIVES ARE TO OBTAIN A BETTER UNDERSTANDING OF THE PROCESSES CONTRIBUTING TO THE EMISSION OF NOX FROM COAL-FIRED BOILERS TO BETTER DEFINE CONTROL METHODS. FUEL BOUND NITROGEN COMPLICATES DEVELOPMENT OF LOW NOX BURNERS BECAUSE THE NITROGEN IN CHAR MAY PERSIST INTO THE SECOND STAGE OF A STAGED COMBUSTOR. DURING THE PAST TWO YEARS LABORATORY FURNACES HAVE BEEN DEVELOPED FOR THE PYROLYSIS AND OXIDATION OF PULVERIZED COAL UNDER CONDITIONS SIMULATING UTILITY BOILERS. RESULTS ON NITROGEN RETENTION IN CHAR HAVE BEEN DETERMINED FOR TWO COALS AS A FUNCTION OF TEMPERATURE AND TIME. ALSO, THE CONVERSION OF THE FUEL NITROGEN TO NOX HAS BEEN DETERMINED AS A FUNCTION OF FUEL/AIR RATIO FOR ONE FURNACE TEMPERATURE. FIVE ADDITIONAL COALS WILL BE STUDIED OVER A WIDER RANGE OF TEMPERATURES AND DATA WILL BE OBTAINED ON THE GAS PHASE CONSTITUENTS OF PYROLYSIS. THE COALS CHARS WILL BE CHARACTERIZED TO DEVELOP MECHANISTIC MODELS FOR EXTRAPOLATION OF DATA TO OTHER CONDITIONS.

**PROJECT: 01533-SAMPLING AND ANALYSIS METHODS FOR POM AND OTHER ORGANIC POLLUTANTS

```
                    STARTING/ COMPLETION DATE : 03/76   03/79     FUNDING    ESTIMATED   FY77  / $  201000
                    TASK CODE=F624A-050     **EPA=68-02-2150  ** (CNTR.)      PRIOR       FY76  / $  490000
EPA  OFFICER.: LD JOHNSON                EPA/IERL   RTP
INVESTIGATOR.: P  LEVINS                 ARTHUR D. LITTLE INC
MILESTONES.... 09/76 -SORPTION AGENTS FOR OCEAN INCINERATION REPORT
               06/77 -TECH MANUAL FOR ANALYSIS OF ORGANICS IN FUELS
               06/77 -REPORT ON STABILITY, STORAGE AND HANDLING OF SAMPLES
               09/77 -REPORT ON ANALYSIS OF PCB FROM COMBUSTION SOURCES
               12/77 -REPORT ON RETENTION PROPERTIES OF SPECIFIED ORGANICS ON SORBENTS
               01/79 -EVALUATE ORGANIC ANALYSIS FOR LEVEL 2
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001533           SSIE-GMA  4158        EPA -68-02-2150       TASK-F624A-050
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: THE PURPOSE OF THIS CONTRACT IS TO PROVIDE FOR THE EVALUATION, DEVELOPMENT, FIELD TESTING
                AND APPLICATIONS RESEARCH OF THE ORGANIC SUBSTANCES SAMPLING AND ANALYSIS PROCEDURES NECESSARY TO
                CONDUCT ENVIRONMENTAL ASSESSMENTS AND TECHNOLOGY DEVELOPMENT PROJECTS IN IERL-RTP. APPROACH: A
                SERIES OF TECHNICAL DIRECTIVES AIMED AT ACCOMPLISHING THE ABOVE GOALS ARE BEING IMPLEMENTED.
                OUTPUTS: REPORTS, TECHNICAL MANUALS, AND REVIEW DOCUMENTS. SOME WILL BE OF INTEREST TO IERL ONLY;
                MANY WILL BE OF GENERAL INTEREST.
```

**PROJECT: 01534-PARTICULATE SAMPLING AND SUPPORT

```
                    STARTING/ COMPLETION DATE : 11/75   11/78 :   FUNDING    ESTIMATED   FY77  / $  125000
                    TASK CODE=F624A-051     **EPA=68-02-2131  ** (CNTR.)      PRIOR       FY76  / $  504888
EPA  OFFICER.. B  HARRIS                 EPA/IERL   RTP
INVESTIGATOR.. WB SMITH                  SOUTHERN RESEARCH INST
               JD MCCAIN                 SOUTHERN RESEARCH INST
               KM CUSHING                SOUTHERN RESEARCH INST
MILESTONES.... 06/77 -IMPACTOR SUBSTRATE REPORT
               06/77 -CALCULATOR HANDBOOKS FOR FIELD DATA REDUCTION
               06/77 -ESP EVALUATION PROCEDURES MANUAL
               06/77 -DESIGN, BUILD AND EVALUATE SERIES CYCLONE FOR PARTICLE SIZING
               06/77 -NON-IDEAL BEHAVIOR OF IMPACTORS (APCA PAPER)
               09/77 -COMPUTER DATA REDUCTION MANUAL   CASCADE IMPACTORS
               09/77 -PROTOTYPE SAMPLING ESP
               11/77 -BAGHOUSE EVALUATION PROCEDURES MANUAL
               12/77 -TECHNICAL MANUAL ON PARTICULATE SAMPLING
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001534           SSIE-GMA  3010 1      EPA -68-02-2131       TASK-F624A-051
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: CONDUCT A CONTINUING PROGRAM OF EVALUATION, DEVELOPMENT, TESTING AND FIELD ADAPTION OF
                MEASUREMENT TECHNIQUES FOR PARTICULATE MASS AND SIZE IN PROCESS STREAMS. APPROACH: (1) IDENTIFY
                CURRENT AND FUTURE REQUIREMENTS FOR PARTICULATE SAMPLING--THE NATURE OF THE PARTICLES, THE SAMPLING
                CONDITIONS, AND THE GOALS OF THE SAMPLING PROGRAM. (2) DESIGN PROTOTYPE IMPACTORS WHICH INCORPORATE
                ALL THAT HAS BEEN LEARNED ABOUT THEIR FUNDAMENTAL BEHAVIOR AND OPERATIONAL PROBLEMS. (3) EVALUATE
                CYCLONE SYSTEMS FOR PARTICLE SIZING. CONSIDER ALTERNATIVES TO FILTER BACKUPS ON HIGH FLOWRATE
                SYSTEMS. (4) STUDY ALTERNATIVES TO IMPACTORS AND CYCLONES FOR PARTICLE SIZING. (5) STUDY AND
                EVALUATE MASS MONITORS. (6) STUDY METHODS OF QUALITY ASSURANCE IN SAMPLING AND CALIBRATION
                PROGRAMS. (7) GENERATE AND REVIEW DOCUMENTS ON PARTICULATE SAMPLING AND CONTINUALLY UPDATE THE
                BIBLIOGRAPHY AND LITERATURE SURVEY. (8) CONTINUE TO STUDY AND EVALUATE NEW IDEAS, TECHNIQUES, AND
                INSTRUMENTS FOR PARTICULATE SAMPLING. (9) ATTEND AND ORGANIZE MEETINGS AND SYMPOSIA ON PARTICULATE
                SAMPLING. (10) PROVIDE CONSULTING AND SUPPORT TO EPA PROGRAM.
```

**PROJECT: 01542-OPERATION OF PILOT SCALE ESP VERSATILE FABRIC FILTER, AND BAGHOUSES (IN-HOUSE)

```
                    STARTING/ COMPLETION DATE : 00/77   UNK   :   FUNDING    ESTIMATED   FY77  / $   40000
                    TASK CODE=F624A-056     **EPA=            ** (IN-HO)      PRIOR       FY76  / $  150000
                IN-HOUSE EFFORT   FY 77  /  00.8  YEARS  ; TOTAL PROJECT  03.0
EPA  OFFICER.: GH RAMSEY                EPA/IERL   RTP
INVESTIGATOR.: JH TURNER                US EPA                              ORD/IERL
               LE SPARKS                US EPA                              ORD/IERL
               GH RAMSEY                US EPA                              ORD/IERL
MILESTONES.... 06/76 -COMPLETE REPORT OF FILTRATION STUDY OF POLYESTER FILTER BAGS
               12/76 -COMPLETE REPORT OF FILTRATION STUDY OF EXPANDED PTFE BAGS
               04/77 -INSTALL PILOT-SCALE ESP
               08/77 -COMPLETE INSTALLATION OF VERSATILE FABRIC FILTER TEST UNIT
               12/77 -ISSUE REPORT OF INITIAL ESP TESTING
               03/78 -COMPLETE STUDY OF WET-SCRUBBER AT OUTLET OF ESP
               09/78 -COMPLETE STUDY OF RESISTIVITY OF FLY ASH
               06/78 -ISSUE REPORT OF INITIAL TESTING ON VERSATILE FABRIC FILTER UNIT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001542          SSIE-ZMA  1135        TASK-F624A-056        AP  -624A
               DU  -L110            LABT-EMI
ABSTRACT...... OBJECTIVE: THE OBJECTIVE OF THE IN-HOUSE PROJECTS IS TO PERFORM VARIOUS TESTS ON THE ESP, THE
                VERSATILE FABRIC FILTER TEST UNIT, THE SINGLE COMPARTMENT SHAKER BAGHOUSE, AND THE PULSE-JET
                BAGHOUSES TO IMPROVE PARTICULATE COLLECTABILITY IN FULL-SIZE COLLECTION DEVICES. NEW IDEAS AND
                NOVEL COLLECTION DEVICES AND MATERIALS WILL BE TESTED ON THE PILOT-SCALE UNITS IN ORDER TO
                DETERMINE IF THEY DO HAVE A POSSIBILITY FOR IMPROVING THE EFFICIENCY OF THE PRESENT METHODS FOR
                COLLECTING PARTICULATES. APPROACH: VARIOUS MATERIALS WILL BE TESTED IN THE VERSATILE FABRIC FILTER
                TEST UNIT IN ORDER TO DETERMINE THE FEASIBILITY OF USING BAGHOUSES AT TEMPERATURES UP TO 1500
                DEGREES F. FABRIC MATERIALS WILL BE TESTED ON BOTH THE HIGH-TEMPERATURE VERSATILE UNIT AND THE
                AMBIENT-TEMPERATURE UNITS. FABRICS WILL BE TESTED FOR BOTH EFFICIENCY AND ENDURANCE. THE ESP WILL
                BE USED TO TEST VARIOUS DUST RESISTIVITIES AND ALSO TO DETERMINE THE FEASIBILITY OF INSTALLING A
                WET-SCRUBBER AT THE OUTLET OF THE ESP. THE UNITS ARE VERSATILE ENOUGH TO TEST AT MANY CONDITIONS
                WHICH COVER THE RANGE OF MOST COMMERCIAL UNITS. OUTPUTS: CURRENT ACTIVITY IS BEING DEVOTED TO
                SHAKEDOWN TESTING OF THE ESP AND THE VERSATILE FABRIC FILTER TEST UNIT WITH A REPORT TO BE ISSUED
                FOR EACH AREA OF STUDY.
```

**PROJECT: 01543-FABRIC FILTRATION RESEARCH EPA IN-HOUSE

```
                    STARTING/ COMPLETION DATE : 06/73   UNK   :   FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=F624A-057     **EPA=            ** (IN-HO)      PRIOR       FY    /
                IN-HOUSE EFFORT   FY 77  /  02.0  YEARS  , TOTAL PROJECT
EPA  OFFICER.. JH TURNER                EPA/IERL   RTP
INVESTIGATOR.. JH TURNER                US EPA/ORD                          IERL/UTIL INDUS POWR DIV
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001543           SSIE-ZMA  1341        TASK-F624A-057        AP  -624A
              DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: ONGOING RESEARCH IN FABRIC FILTRATION TO INVESTIGATE FINE PARTICLE CAPTURE AND
                PENETRATION MECHANISMS, CLEANING EFFECTS, AND ADVANCED FABRICS. APPROACH: COLLECT DATA BY MEANS OF
                WELL INSTRUMENTED AND CONTROLLED SINGLE COMPARTMENT BAGHOUSES. CURRENT PLANS AND/OR PROGRESS:
                PREVIOUS WORK HAS BEEN PUBLISHED; CURRENT AND FUTURE WORK WILL BE PUBLISHED AS EPA REPORTS.
                HIGH-TEMPERATURE FILTRATION AND FILTRATION IN HARSH ENVIRONMENTS WILL BE STUDIED.
```

**PROJECT: 01544-BAGHOUSE STUDY AS AN EMISSION CONTROL ON A SOLID WASTE INCINERATOR BOILER

```
                    STARTING/ COMPLETION DATE : 05/76   08/78 :   FUNDING    ESTIMATED   FY77  / $   67079
                    TASK CODE=F624A-058     **EPA=R804233     ** (GRANT)      PRIOR       FY76  / $   65000
EPA  OFFICER.. JH TURNER                EPA/IERL   RTP
INVESTIGATOR.. B  MCDERMOTT             NASHVILLE THERMAL TRANSFER CO
MILESTONES... 05/76 -GRANT AWARD
              09/77 -REPORT ON PRELIMINARY PERFORMANCE RESULTS
              09/78 -FINAL REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001544          SSIE-GMA  4134        EPA -R804233          TASK-F624A-058
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... DETERMINE APPLICABILITY AND PERFORMANCE FOR PILOT BAGHOUSE ON WASTE TO ENERGY MUNICIPAL INCINERATOR.
                OPERATE PILOT BAGHOUSES ON INCINERATOR FLUE GAS FOR ONE YEAR TEST PERIOD. OBTAIN PERFORMANCE AND
                DURABILITY DATA ON TWO OR THREE BAG STYLES (TEFLON, GLASS). PRELIMINARY PERFORMANCE TESTING
                ACCOMPLISHED; ENDURANCE TESTING YET TO BE STARTED.
```

**PROJECT: 01548-STUDIES OF DUST CAKE FORMATION AND STRUCTURE IN FABRIC FILTRATION

```
                    STARTING/ COMPLETION DATE : 12/76   12/79 :   FUNDING :  ESTIMATED   FY77  / $   65517
                    TASK CODE=F624A-061    **EPA=R804926     ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.  JH TURNER                EPA/IERL   RTP
INVESTIGATOR.  B  MILLER                TEXTILE RESEARCH INST
               GE LAMB                  TEXTILE RESEARCH INST
               P  COSTANZA              TEXTILE RESEARCH INST
MILESTONES.... 12/76 -GRANT AWARDED
               01/78 -YEARLY REPORT
               01/79 -YEARLY REPORT
               01/80 -FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001548          SSIE-GMA  3584        EPA -R804926          TASK-F624A-061
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... IMPROVEMENTS IN FABRIC FILTER PERFORMANCE OBTAINED BY CONTROL OF ELEMENTAL FIBER GEOMETRY, FABRIC
                CONSTRUCTION, OR APPLIED ELECTRIC FIELDS ARE BELIEVED TO DEPEND ON DIFFERENCES IN THE STRUCTURE OF
                THE DEPOSITED DUST LAYER OR CAKE. THE OBJECT OF THE PROPOSED RESEARCH IS TO IDENTIFY THOSE FEATURES
                OF THE DIFFERENT DUST CAKES WHICH CAN ACCOUNT FOR DIFFERENCES IN FILTER PERFORMANCE. THIS WILL BE
                ACCOMPLISHED BY SCANNING ELECTRON MICROSCOPICAL STUDIES USING KNOWN TECHNIQUES AND POSSIBLY NEW
                TECHNIQUES TO BE DEVELOPED IN THE COURSE OF THE PROJECT. ON THE BASIS OF THE INFORMATION SO
                ACQUIRED, IMPROVED FABRIC CONSTRUCTIONS WILL BE DEVELOPED IN WHICH THE TENDENCY TO DEPOSIT DUST
                CAKES WITH DESIRABLE FEATURES WILL BE MAXIMIZED.
```

**PROJECT: 01549-HIGH-VELOCITY FABRIC FILTRATION

```
                    STARTING/ COMPLETION DATE : 08/76   08/79     FUNDING    ESTIMATED   FY77  / $   41119
                    TASK CODE=F624A-062    **EPA=R804700-02  ** (GRANT)      PRIOR       FY76  / $   63031
EPA  OFFICER.. JH TURNER                EPA/IERL   RTP
INVESTIGATOR.. MW FIRST                 HARVARD UNIV                          SCH OF PUBLIC HLTH
               D  LEITH                 HARVARD UNIV                          SCH OF PUBLIC HLTH
MILESTONES.... 08/76 -GRANT AWARDED
               09/77 -YEARLY REPORT
               09/78 -YEARLY REPORT
               09/79 -FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001549          SSIE-GMA  3305 1      EPA -R804700-02       TASK-F624A-062
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... IF FABRIC FILTERS CAN BE MADE TO OPERATE AT HIGHER THAN CONVENTIONAL VELOCITY, A PROPORTIONAL
                REDUCTION IN FILTER SIZE AND INITIAL COST WILL BE POSSIBLE, MAKING THESE EFFICIENT COLLECTORS
                ATTRACTIVE FOR MANY APPLICATIONS WHERE THEY ARE NOT CURRENTLY USED. FOR EXAMPLE, A HIGH-VELOCITY
                FILTER OPERATING AT A SUPERFICIAL FILTRATION VELOCITY OF 25 CM/S (AIR TO CLOTH RATIO OF 50
                CFM/SQUARE FOOT) NEED BE ONLY 1 TO 25 PER CENT AS LARGE AS A UNIT OPERATING AT CONVENTIONAL
                VELOCITIES. THE OBJECTIVES OF THIS PROJECT ARE· (1) TO STUDY THE PRACTICALITY OF HIGH-VELOCITY
                FABRIC FILTRATION, (2) TO INVESTIGATE PHENOMENA WHICH LIMIT EFFECTIVE HIGH-VELOCITY OPERATION, AND
                (3) TO DEVELOP MATHEMATICAL MODELS TO INTERPRET AND PREDICT FABRIC FILTER PERFORMANCE. THESE
                OBJECTIVES WILL BE MET USING EXPERIMENTAL WORK WITH A THREE-BAG PILOT-SCALE FILTER CLEANED BY THE
                PULSE-JET PRINCIPLE, AND THEORETICAL WORK TO DESCRIBE FILTER PERFORMANCE MATHEMATICALLY.
```

**PROJECT: 01545-DEMONSTRATION OF BAGHOUSE FOR COLLECTION OF FLY ASH FROM LOW SULFUR COAL

```
                    STARTING/ COMPLETION DATE : 10/77   01/80 :   FUNDING    ESTIMATED   FY77  / $  763000
                    TASK CODE=F624A-059    **EPA=68-02-2659  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. JH TURNER                EPA/IERL   RTP
INVESTIGATOR.: K  LADD                  SW PUBLIC SERV CO
MILESTONES...: 10/77 -AWARD CONTRACT
               07/78 -BEGIN ONE YEAR TEST
               02/80 -FINAL REPORT
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001545           SSIE-GMA  4625        EPA -68-02-2659       TASK-F624A-059
               AP  -624A            DU  -L110             LABT-EMI
ABSTRACT...... APPROACH: OPERATE FULL SCALE BAGHOUSE FOR ONE YEAR (WITH OPTION FOR FURTHER TIME) AND COLLECT
                INFORMATION ON OPERATION, PERFORMANCE, COST, MAINTENANCE AND PROBLEMS ASSOCIATED TO THE BAGHOUSE ON
                A 350 MEGAWATT BOILER. PROGRESS: BAGHOUSE UNDER CONSTRUCTION.
```

**PROJECT: 01550-FINE PARTICLE CONTROL WITH UNIVERSITY OF WASHINGTON ELECTROSTATIC SCRUBBER

```
                    STARTING/ COMPLETION DATE : 03/76   03/78 :   FUNDING    ESTIMATED   FY77  / $  115265
                    TASK CODE=F624A-063     **EPA=R804393     ** (GRANT)     PRIOR       FY76  / $   74485
EPA  OFFICER.: DL HARMON                 EPA/IERL   RTP
INVESTIGATOR.: MJ PILOT                  UNIVERSITY OF WASHINGTON
MILESTONES.... 03/76 -GRANT FUNDED
               06/77 -COMPLETE TEST ON ELECTRIC ARC FURNACE
               10/77 -COMPLETE TEST ON COAL-FIRED POWER PLANT
               01/78 -COMPLETE 3RD TEST
               03/78 -FINAL REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001550           SSIE-GMA  4133        EPA -R804393          TASK-F624A-063
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT.....: OBJECTIVE: DEMONSTRATE THE EFFECTIVENESS OF THE UNIVERSITY OF WASHINGTON ELECTROSTATIC SCRUBBER FOR
                CONTROLLING THE EMISSIONS OF FINE PARTICLES FROM POWER PLANTS AND INDUSTRIAL PLANTS. APPROACH:
                CONSTRUCT A MOBILE ELECTROSTATIC SCRUBBER AND TEST THE DEVICE ON 3 OR 4 SOURCES IN THE FIELD.
                CURRENT PLANS/PROGRESS: THE UNIT HAS BEEN COMPLETED AND TESTING ON AN ELECTRIC ARC FURNACE IN A
                STEEL MILL HAS BEEN COMPLETED. TESTING ON A COAL-FIRED POWER PLANT IS SCHEDULED.
```

**PROJECT: 01551-DEMONSTRATION OF SODIUM CONDITIONING

```
                    STARTING/ COMPLETION DATE : 10/77   01/79 :   FUNDING    ESTIMATED   FY77  / $  200178
                    TASK CODE=F624A-064     **EPA=68-02-2656  ** (CNTR.)     PRIOR       FY    /
EPA  OFFICER.. LE SPARKS                 EPA/IERL   RTP
INVESTIGATOR..    UNKNOWN                SOUTHERN RESEARCH INST
MILESTONES.... 09/77 -SIGN CONTRACT
               01/78 -SELECT SITE AND BEGIN DESIGN
               06/78 -START UP DEMONSTRATION SYSTEM
               01/79 -COMPLETE STUDY AND ISSUE REPORT
PLAN ID......: (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001551           SSIE-GMA  4630        EPA -68-02-2656       TASK-F624A-064
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THIS PROJECT IS TO DEMONSTRATE THAT SODIUM CONDITIONING CAN REDUCE FLY ASH
                ELECTRICAL RESISTIVITY AND THUS IMPROVE PARTICULATE COLLECTION BY ELECTROSTATIC PRECIPITATORS. THE
                OBJECTIVE WILL BE MET BY CONDUCTING A FULL-SCALE DEMONSTRATION OF SODIUM CONDITIONING TECHNOLOGY AT
                A SMALL POWER PLANT WHEN LOW SULFUR COAL IS BEING BURNED. END ITEM WILL BE A REPORT DOCUMENTING THE
                DEMONSTRATION AND WILL INCLUDE DESIGN INFORMATION TO ALLOW OTHERS TO USE THE SYSTEM. POTENTIAL
                USERS INCLUDE ALL UTILITIES BURNING OR PLANNING TO BURN LOW SULFUR COAL.
```

**PROJECT: 01554-STUDY OPERATING CHARACTERISTICS OF HOT-SIDE PRECIPITATORS

```
                    STARTING/ COMPLETION DATE : 10/77   10/79 :   FUNDING    ESTIMATED   FY77  / $  148666
                    TASK CODE=F624A-066     **EPA=R805324-01  ** (GRANT)     PRIOR       FY    /
EPA  OFFICER.: LE SPARKS                 EPA/IERL   RTP
INVESTIGATOR.: GA RINARD                 UNIVERSITY OF DENVER
               DE RUGG                   UNIVERSITY OF DENVER
               WA ALFORD                 UNIVERSITY OF DENVER
               TD NEVENS                 UNIVERSITY OF DENVER
               WJ CULBERTSON             UNIVERSITY OF DENVER
               RE PRESSEY                UNIVERSITY OF DENVER
MILESTONES.... 09/77 -AWARD GRANT
               09/79 -ISSUE FINAL REPORT WITH SUGGESTED DESIGN CHANGES
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001554           SSIE-GMA  4626        EPA -R805324-01       TASK-F624A-066
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT...... HOT-SIDE PRECIPITATORS, THOSE INSTALLED BEFORE THE COMBUSTION PREHEATER IN COAL-FIRED GENERATING
                PLANTS, ARE ONE MEANS OF IMPROVING THE EFFICIENCY OF COLLECTION OF HIGH RESISTIVITY FLY ASH. THE
                OBJECTIVE OF THE RESEARCH PROJECT IS TO STUDY THESE HOT-SIDE UNITS AND DETERMINE THE CAUSE FOR AN
                APPARENT DECREASED EFFICIENCY AT HIGH ALTITUDE. A SECOND OBJECTIVE IS TO GAIN A BETTER
                UNDERSTANDING OF HOT-SIDE UNITS IN GENERAL. A SURVEY OF OPERATING HOT-SIDE PRECIPITATORS WILL BE
                CONDUCTED TO DETERMINE IF ALTITUDE IS CLEARLY A FACTOR IN REDUCED EFFICIENCY. THE SURVEY WILL ALSO
                PROVIDE DATA THAT WILL BE CORRELATED TO DETERMINE OTHER CAUSES FOR REDUCED EFFICIENCY. THE
                EXPERIMENTAL WORK TO BE CONDUCTED WILL DEPEND ON THE OUTCOME OF THE SURVEY.
```

**PROJECT: 01555-RESIDENCE TIME DISTRIBUTIONS, DISPERSION AND REENTRAINMENT IN A PILOT-SCALE ELECTROSTATIC PRECIPITATOR

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 42992
TASK CODE=F624A-067 **EPA=R805404-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. L SPARKS EPA/IERL RTP
INVESTIGATOR.. RM FELDER UNIVERSITY OF NORTH CAROLINA
JK FERRELL UNIVERSITY OF NORTH CAROLINA
K VERGHESE UNIVERSITY OF NORTH CAROLINA
MILESTONES.... 09/77 -AWARD GRANT
09/79 -PUBLISH DESIGN MODEL INCORPORATING RESULTS OF RESEARCH
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001555 SSIE-GMA 4622 EPA -R805404-01 TASK-F624A-067
AP -624A DU -L110 LABT-EMI
ABSTRACT..... GAS AND SOLID PHASE RESIDENCE TIME DISTRIBUTIONS IN THE NERC CONTROL SYSTEMS LABORATORY PILOT-SCALE ELECTROSTATIC PRECIPITATOR WILL BE MEASURED BY TRACER RESPONSE ANALYSIS. THE RESULTS WILL BE USED TO CHARACTERIZE THE FLOW AND MIXING PATTERNS IN THE UNIT, AND TO PROVIDE A DATA BASE FOR TESTING AND MODIFYING A MODEL FOR ELECTROSTATIC PRECIPITATION FORMULATED BY THE SOUTHERN RESEARCH INSTITUTE. SPECIFIC SYSTEM PROPERTIES TO BE DETERMINED BY ANALYZING THE TRACER RESPONSES WILL INCLUDE THE FRACTIONAL SNEAKAGE, EXISTENCE AND EXTENT OF STAGNANT ZONES, EFFECTIVE AXIAL DISPERSION IN EACH PHASE, AND RATES OF REENTRAINMENT DUE TO PARTICLE IMPACTION ON THE COLLECTION PLATES, SWEEPAGE IN THE COLLECTION HOPPER, AND RAPPING. THE RESULTS WILL BE USED TO DETERMINE WHICH OF THE SPECIFIED PHENOMENA MIGHT ACCOUNT IN PART FOR DISCREPANCIES BETWEEN MEASURED COLLECTION EFFICIENCIES AND EFFICIENCIES PREDICTED BY THE SRI MODEL, AND THE MODEL WILL BE MODIFIED TO ACCOUNT FOR THE PHENOMENA FOUND TO BE SIGNIFICANT.

**PROJECT: 01556-PILOT-SCALE DEMONSTRATION OF FINE PARTICLE RESISTIVITY/HIGH-RESISTIVITY ELECTROSTATIC PRECIPITATORS

STARTING/ COMPLETION DATE : 10/77 10/79 FUNDING ESTIMATED FY77 / $ 150000
TASK CODE=F624A-069 **EPA=68-02-2193 ** (CNTR.) PRIOR FY /

EPA OFFICER.: LE SPARKS EPA/IERL RTP
INVESTIGATOR.: UNKNOWN SOUTHERN RESEARCH INST
MILESTONES.... 10/77 -AWARD CONTRACT
08/78 -COMPLETE DESIGN OF DEMONSTRATION ELECTROSTATIC PRECIPITATOR
07/79 -COMPLETE DEMONSTRATION
10/79 -ISSUE ALL REPORTS DOCUMENTATING THE DEMONSTRATION
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001556 SSIE-GMA 4629 EPA -68-02-2193 TASK-F624A-069
AP -624A DU -L110 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS EFFECT IS TO DEMONSTRATE AT LARGE PILOT-SCALE AN ELECTROSTATIC PRECIPITATOR FOR HIGH-EFFICIENCY COLLECTION OF HIGH-RESISTIVITY DUSTS. THE OBJECTIVE WILL BE MET BY CONDUCTING A PILOT-SCALE DEMONSTRATION AT A POWER PLANT WHERE LOW SULFUR COAL IS BEING BURNED. END ITEMS WILL BE A FINAL REPORT DOCUMENTATING THE DEMONSTRATION AND DOCUMENTS TO TRANSFER TECHNOLOGY TO INDUSTRY. USERS WILL BE UTILITIES AND OTHER INDUSTRIES WHERE HIGH-RESISTIVITY DUSTS ARE A PROBLEM.

**PROJECT: 01557-FINE PARTICULATE CONTROL BY HIGH GRADIENT MAGNETIC SEPARATION (HGMS)

STARTING/ COMPLETION DATE : 06/75 08/79 FUNDING ESTIMATED FY77 / $ 200000
TASK CODE=F624A-070 **EPA=68-02-1879 ** (CNTR.) PRIOR FY75 / $ 200000

EPA OFFICER.. DC DREHMEL EPA/IERL RTP
INVESTIGATOR.. FO MIXON RESEARCH TRIANGLE INST
CH GOODING RESEARCH TRIANGLE INST
P MORSTON SALA MAGNETICS INC
MILESTONES.... 06/75 -AWARD CONTRACT
07/77 -COMPLETE FEASIBILITY TESTS AT SMALL SCALE
08/79 -COMPLETE FIELD PILOT DEMONSTRATION
PLAN ID..... (AP-624A)(DU-L110) UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001557 SSIE-GMA 2276 1 EPA -68-02-1879 TASK-F624A-070
AP -624A DU -L110 LABT-EMI
ABSTRACT..... OBJECTIVE: TO DEMONSTRATE THE FEASIBILITY OF USING A HIGH GRADIENT MAGNETIC SEPARATION (HGMS) SYSTEM AS AN EFFECTIVE AND ECONOMIC TECHNIQUE FOR CONTROL OF FINE PARTICULATE EMISSIONS. APPROACH: PHASE I OF THE PROJECT WILL INCLUDE A REVIEW OF THE THEORETICAL CONCEPTS OF HGMS AS APPLIED TO FINE PARTICLE COLLECTION WITH EMPHASIS ON COLLECTION EFFICIENCY, COLLECTOR REGENERATION, AND POWER AND RESIDENCE TIME REQUIREMENTS. BENCH SCALE EXPERIMENTS WILL FOLLOW TO VERIFY OR DISPROVE THE THEORETICAL PREDICTIONS. A PRELIMINARY ANALYSIS OF CAPITAL AND OPERATING COSTS WILL BE PERFORMED TO COMPARE THE SYSTEM TO CONVENTIONAL EQUIPMENT, I.E., SCRUBBERS, ELECTROSTATIC PRECIPITATORS OR FABRIC FILTERS. IF THE RESULTS OBTAINED IN PHASE I ARE TECHNICALLY AND ECONOMICALLY ATTRACTIVE, PHASE II WILL CONSIST OF THE DESIGN, CONSTRUCTION AND OPERATION OF AN EXPERIMENTAL MODEL OF AT LEAST 500 CFM CAPACITY TO OBTAIN ADDITINAL INFORMATION ON THE PERFORMANCE OF THE HGMS SYSTEM WITH RESPECT TO POWER INPUT, RESIDENCE TIME, TEMPERATURE, PARTICULATE TYPE, AND PARTICULATE SIZE DISTRIBUTION. PHASE III WILL CONSIST OF A 3000 CFM PILOT DEMONSTRATION AT A PLANT SITE. OUTPUTS: DEMONSTRATED CONTROL TECHNOLOGY FOR POTENTIAL PARTICULATE AIR POLLUTANTS WHICH ARE FERROMAGNETIC OR HIGHLY PARAMAGNETIC, USERS WOULD INCLUDE THE FERROALLOY AND IRON AND STEEL INDUSTRIES.

**PROJECT: 01558-TECHNOLOGY TRANSFER FOR SCRUBBERS

```
                    STARTING/ COMPLETION DATE : 09/76   03/78 :   FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=F624A-071     **EPA=68-02-2190  ** (CNTR.)      PRIOR       FY76  / $   50000
EPA  OFFICER.. DC DREHMEL                EPA/IERL   RTP
INVESTIGATOR.. R  PARKER                 AIR POLLUTION TECH INC
               S  CALVERT                AIR POLLUTION TECH INC
               R  PATTERSON              AIR POLLUTION TECH INC
MILESTONES.... 09/76 -CONTRACT AWARD
               05/77 -CONDUCT SCRUBBER CONFERENCE
               09/77 -REPORT ON SCRUBBER PROGRAMS
               11/77 -REPORT ON APPLICATION AREAS FOR DRY SCRUBBING
               01/78 -EXECUTIVE SUMMARIES OF CURRENT RESEARCH
               03/78 -REPORT ON SCRUBBER PERFORMANCE MODELS
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001558           SSIE-GMA  3110 1      EPA -68-02-2190       TASK-F624A-071
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVE: PROVIDE CURRENT INFORMATION ON ADVANCES IN SCRUBBER TECHNOLOGY TO POTENTIAL USERS.
                APPROACHES: THIS PROJECT IS TO CONDUCT A TECHNOLOGY TRANSFER CONFERENCE DEALING WITH NOVEL DEVICE
                AND SCRUBBER CONTROL TECHNOLOGY. IN ADDITION, THE SYMPOSIUM PROCEEDINGS WILL BE COMPILED AND
                PRINTED, THREE SPECIAL REPORTS WILL BE WRITTEN, AND SIX EXECUTIVE SUMMARIES WILL BE PREPARED AND
                COMPILED INTO A REPORT. OUTPUTS: THE FIRST CONFERENCE WAS HELD IN THE EASTERN U. S. DURING THE
                SPRING OF 1977.
```

**PROJECT: 01559-DESIGN AND CONSTRUCTION OF A VERSATILE FABRIC FILTER TEST UNIT

```
                    STARTING/ COMPLETION DATE : 03/76   11/77 :   FUNDING    ESTIMATED   FY77  / $   68288
                    TASK CODE=F624A-072     **EPA=68-02-2151  ** (CNTR.)      PRIOR       FY76  / $  301000
EPA  OFFICER.. GH RAMSEY                 EPA/IERL   RTP
INVESTIGATOR.. FE MORENO                 ACUREX CORP                          AEROTHERM DIV
               RW FULTON                 ACUREX CORP                          AEROTHERM DIV
               JJ REESE                  ACUREX CORP                          AEROTHERM DIV
               DR BLANN                  ACUREX CORP                          AEROTHERM DIV
MILESTONES...: 03/76 -CONTRACT SIGNED
               06/76 -DESIGN DRAWINGS OF VERSATILE FABRIC FILTER TEST UNIT
               08/76 -PROCUREMENT OF ALL PARTS
               10/76 -ASSEMBLY OF UNIT AT CONTRACTOR'S LOCATION
               02/77 -SHIPMENT
               05/77 -INSTALLATION AT RTP
               11/77 -SHAKEDOWN AND DEMONSTRATION TESTS
PLAN ID....... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001559           SSIE-GMA  4167        EPA -68-02-2151       TASK-F624A-072
               AP  -624A             DU  -L110             LABT-EMI
ABSTRACT...... OBJECTIVES: TO DESIGN, FABRICATE, INSTALL AND TEST IN THE IERL LABORATORY IN RESEARCH TRIANGLE PARK,
                N.C., A VERSATILE, HIGH-TEMPERATURE (TO 1500 DEGREES F) FABRIC FILTER TEST UNIT WHICH CAN CONTROL
                THE GAS COMPOSITION, PARTICULATE LEADING AND HUMIDITY OF THE INLET STREAM. APPROACH: A FABRIC
                FILTER TEST UNIT WILL BE DESIGNED, FABRICATED AND INSTALLED WHICH WILL ALLOW FOR THE TESTING OF
                FOUR TUBULAR (35 1/2" X 5" DIAMETER) FABRIC FILTERS IN INDEPENDENT TEST CHAMBERS. INLET PARTICULATE
                LOADING, TEMPERATURE, GAS COMPOSITION, FILTER FACE VELOCITY AND HUMIDITY WILL BE CONTROLLED BY THE
                UNIT. ADDITIONAL INSTRUMENTATION WILL BE DESIGNED WHICH WILL MEASURE AND LOG OTHER PARAMETERS
                AFFECTING FILTER LIFE. CURRENT PLANS: A DESIGN WILL BE GENERATED DURING THE INITIAL 4 MONTHS OF THE
                CONTRACT. THIS DESIGN WILL BE REVIEWED BEFORE PARTS PROCUREMENT AND FABRICATION BEGIN. PARTIAL
                FABRICATION OF THE TEST UNIT WILL BE ACCOMPLISHED AT AEROTHERM (MOUNTAIN VIEW, CALIFORNIA) PRIOR TO
                THE SHIPMENT OF THE DEVICE TO THE EPA IN DECEMBER 1976. INSTALLATION IN THE IERL LABORATORY IS
                SCHEDULED TO BEGIN IN JANUARY 1977. UNIT DEMONSTRATION TESTS WILL BE CONDUCTED IN SEPTEMBER 1977.
```

**PROJECT: 01560-DESIGN, FABRICATE, AND INSTALL A PILOT-SCALE ELECTROSTATIC PRECIPITATOR

```
                    STARTING/ COMPLETION DATE : 11/75   03/77 :   FUNDING :  ESTIMATED   FY77  / $   86813
                    TASK CODE=F624A-073     **EPA=68-02-2129  ** (CNTR.)      PRIOR       FY76  / $  261679
EPA  OFFICER.. GH RAMSEY                EPA/IERL   RTP
INVESTIGATOR.. GA RINARD                UNIVERSITY OF DENVER
               FP VENDITTI              UNIVERSITY OF DENVER
               WJ CULBERTSON            UNIVERSITY OF DENVER
               TD NEVENS                UNIVERSITY OF DENVER
               WA ALFORD                UNIVERSITY OF DENVER
MILESTONES.... 11/75 -CONTRACT SIGNED
               03/76 -TECHNICAL SURVEY REPORT OF ESP EXPERTS
               05/76 -DESIGN DRAWINGS OF ESP SYSTEM
               11/76 -FABRICATION OF ESP AT CONTRACTOR'S SITE
               02/77 -SHIPPING OF UNIT TO RTP, N.C.
               04/77 -INSTALLATION AND CHECKOUT
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001560          SSIE-GMA  3097 1      EPA -68-02-2129       TASK-F624A-073
               AP  -624A           DU  -L110             LABT-EMI
ABSTRACT..... OBJECTIVE: THE OBJECTIVE OF THE PROJECT IS TO PROVIDE A PILOT-SCALE ELECTROSTATIC PRECIPITATOR (ESP)
               AT THE RESEARCH EPA FACILITY IN RESEARCH TRIANGLE PARK, N. C. THE ESP WILL PROVIDE MAXIMUM
               FLEXIBILITY, AND ACCURACY CONSISTENT WITH THE BASIC REQUIREMENT THAT ITS GENERAL CONFIGURATION BE
               SIMILAR TO THAT OF FULL-SCALE ELECTROSTATIC PRECIPITATORS. A BURNER, HUMIDIFIER, AND A SPECIALLY
               DESIGNED AEROSOL GENERATOR WILL BE INCLUDED IN ORDER TO PROVIDE A WIDE VARIETY OF ATMOSPHERES IN
               THE PRECIPITATOR UNIT. APPROACH: PHASE 1: PRIOR TO DESIGNING THE PRECIPITATOR, A SURVEY OF EXISTING
               PILOT-SCALE INSTALLATIONS WILL BE MADE AND EXPERTS IN THE FIELD OF ESP DESIGN AND APPLICATION WILL
               BE INTERVIEWED. WITH THESE BACKGROUND DATA, THE FEATURES AND PARAMETERS OF THE PILOT SCALE ESP WILL
               BE ESTABLISHED AND THE DESIGN WILL BE UNDERTAKEN. PHASE 2: THE SECOND PART OF THE EFFORT WILL BE TO
               FABRICATE AND ASSEMBLE THE PRECIPITATOR AT THE CHERRY CREEK FIELD SITE FACILITY OF THE UNIVERSITY
               OF DENVER FOR CHECK-OUT. HAVING PROVEN THE UNIT, IT WILL BE PARTIALLY DISMANTLED, SHIPPED TO
               RESEARCH TRIANGLE PARK, N.C. AND RE-ASSEMBLED. CURRENT PLANS/PROGRESS: THE ESP SYSTEM HAS BEEN
               INSTALLED AT RESEARCH TRIANGLE PARK, NC.
```

**PROJECT: 01575-OPERATION OF IERL-RTP TEST FACILITIES

```
                    STARTING/ COMPLETION DATE : 07/77   UNK       FUNDING    ESTIMATED   FY77  / $  390000
                    TASK CODE=F624A-088     **EPA=68-02-2646  ** (CNTR.)     PRIOR       FY    /
EPA  OFFICER. CV BRISCOE                EPA/IERL   RTP
INVESTIGATOR.. DR BLANN                 ACUREX CORP                          AEROTHERM DIV
               S  SCHLIESSER            ACUREX CORP                          AEROTHERM DIV
               C  DENE                  ACUREX CORP                          AEROTHERM DIV
               R  CLAYTON               ACUREX CORP                          AEROTHERM DIV
MILESTONES... 00/00 -N/A   TECHNICAL DIRECTIVE TYPE CONTROL
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES.. RECN-001575          SSIE-GMA  4198       EPA -68-02-2646       TASK-F624A-088
               AP  -624A           DU  -L110            LABT-EMI
ABSTRACT..... TO OPERATE AND MAINTAIN INDUSTRIAL AND ENVIRONMENTAL RESEARCH LABORATORY TEST FACILITIES LOCATED AT
               WING G OF THE ERC, RTP. THESE FACILITIES INCLUDE TWO PILOT MODEL SO2 SCRUBBERS, ONE OPERATING IN
               THE LIME/LIMESTONE MODE AND THE OTHER UTILIZING THE DOUBLE-ALKALI PROCESS, A MOBILE FABRIC FILTER,
               MOBILE WET SCRUBBER, MOBILE ELECTROSTATIC PRECIPITATOR, AND AERODYNAMIC TEST CHAMBER, A MOBILE
               ANALYTICAL LABORATORY TRAILER, A MOBILE ANALYTICAL LABORATORY VAN, FLUIDIZED-BED COMBUSTOR TEST
               RIG, AND THE EPA VAN FOR CLEAN ENERGY.
```

**PROJECT: 01615-DEMONSTRATION OF NOVEL FINE PARTICULATE COLLECTION SYSTEM

```
                    STARTING/ COMPLETION DATE : 09/77   03/79 :   FUNDING :  ESTIMATED   FY77  / $  357209
                    TASK CODE=F624A-65      **EPA=68-02-2666  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: DL HARMON                EPA/IERL   RTP
INVESTIGATOR.:    UNKNOWN               AIR POLLUTION SYSS INC
MILESTONES... 09/77 -FUND CONTRACT
               08/78 -COMPLETE DEVICE INSTALLATION
               12/78 -COMPLETE TESTING
               03/79 -FINAL REPORT
PLAN ID...... (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES... RECN-001615         SSIE-GMA  4684       EPA -68-02-2666       TASK-F624A-65
               AP  -624A           DU  -L110            LABT-EMI
ABSTRACT..... OBJECTIVE: DEMONSTRATE AT PILOT SCALE THE TECHNICAL AND ECONOMIC FEASIBILITY OF A NOVEL PARTICULATE
               COLLECTION SYSTEM FOR CONTROL OF FINE PARTICULATE EMISSIONS FROM INDUSTRIAL SOURCES. APPROACH:
               SELECT A NOVEL PARTICULATE COLLECTION SYSTEM WHICH HAS PROMISE FOR EFFICIENT FINE PARTICLE
               COLLECTION. DESIGN, FABRICATE, INSTALL AND TEST THIS SYSTEM ON A FINE PARTICULATE SOURCE. CURRENT
               PLANS/PROGRESS: CONTRACTOR SELECTION IS UNDERWAY.
```

****PROJECT: 01616-EVALUATION AND ASSESSMENT OF METHODS FOR COLLECTING FLY ASH FROM COMBUSTION OF LOW-SULFUR COALS**

```
                STARTING/ COMPLETION DATE : 10/77   09/78     FUNDING    ESTIMATED   FY77  / $  102686
                TASK CODE=F624A-68      **EPA=68-02-2652  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: LE SPARKS                EPA/IERL   RTP
INVESTIGATOR.:    UNKNOWN               TEKTRONIX INC
MILESTONES...: 09/77 -AWARD CONTRACT
               09/78 -ISSUE FINAL REPORT
PLAN ID......  (AP-624A)(DU-L110)  UTILITY AND INDUSTRIAL POWER PRODUCTION
ORDIS CODES..: RECN-001616          SSIE-GMA  4692        EPA -68-02-2652       TASK-F624A-68
               AP  -624A            DU  -L110             LABT-EMI
```

ABSTRACT.....: THE OBJECTIVE IS TO EVALUATE AND ASSESS THE ECONOMICS, PERFORMANCE AND GENERAL SUITABILITY OF ELECTROSTATIC PRECIPITATOR FABRIC FILTER AND WET SCRUBBER TECHNOLOGY FOR CONTROL OF PARTICULATE EMISSIONS FROM COMBUSTION OF LOW SULFUR COAL. THE OBJECTIVE WILL BE ACCOMPLISHED BY SURVEYING UTILITIES AND BY DESIGNING AND COSTING "TYPICAL" POWER PLANTS TO DETERMINE IMPACT OF PARTICULATE CONTROL DEVICE CHOICE ON COST. A REPORT DETAILING THE RESULTS OF THE STUDY WILL BE PUBLISHED. INFORMATION TO BE USED BY EPA, STATE AGENCIES, AND INDUSTRY TO DEVELOP OPTIMUM STRATEGIES FOR CONTROLLING EMISSIONS FROM COMBUSTION OF COAL.

Health and Environmental Effects

Health and Environmental Effects Program

This research and development program within the Interagency Energy/Environment Program is designed to determine which energy-related pollutants are harmful to man, as well as their origin, transformation, and overall impact on the environment.

The following sections describe briefly the health and environmental effects research and development ongoing within each interagency research category, highlighting typical research in that area.

Ecological Effects

This program has the overall goal of assessing the environmental effects of present and proposed energy development activities on ocean, coastal, estuarine and atmospheric/terrestrial ecosystems.

Research conducted by EPA, the Department of Energy (DOE), the Fish and Wildlife Service (USFWS), the National Institute of Environmental Health Sciences (NIEHS), Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA) supports the goals of this program by determining the nature and effects of pollutants resulting from the extraction of coal, oil, oil shale, and natural gas from land and water. Contamination levels, resulting from oil and gas drilling operations, and the thermal impacts of energy development are being determined in both marine and aquatic ecosystems.

Projects typifying these research goals are toxicity testing in the Gulf of Mexico to assess the ecological effects of oil and gas exploration and extraction, studies on the aquatic effects of coal extraction in the mid-west; experiments with varied techniques of land reclamation for strip mined areas, expansion of the existing USDA acid rain monitoring network to cover the midwestern farm belt, and studies in the New England area to determine the effects of offshore drilling fluids on the marine community.

Transport and Fate

The goals of this program are to characterize, assess, and develop predictive models of the movement of energy-related pollutants in the air, water, and soil, their transformation into secondary pollutants, and their ultimate fate and impact on man and his environment.

In accomplishing these goals, the sources and nature of these pollutants are being determined. Included in this research are emissions from conventional power plants (coal, oil, gas) and from advanced energy technologies such as coal gasification and liquefaction, oil shale extraction, and geothermal energy developments. Finally, primary pollutant transformation to secondary pollutants through interaction with various meteorological factors such as wind, precipitation, and solar activity is being investigated.

Measurement Systems and Instrumentation

The Measurement Systems and Instrumentation efforts are primarily aimed at identifying the source and amount of pollution associated with expanding western energy resource development, increased

offshore oil developments and towards developing appropriate instrumentation and measurement capabilities.

The major objective of these efforts is to establish a useful data base to anticipate the multimedia environmental impacts of accelerated energy resource development in these areas, and also to validate sampling and analytical techniques to ensure accurate measurement capability.

EPA, the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA) are working together to monitor air and water quality land use patterns in the western energy development areas through such projects as continued aerial surveys, initiation of a joint EPA/NASA program using satellite imagery to study sulfate transport and transformation in air masses, continued operation of the Water and Air Quality Assurance Program for the Western Energy/Environment Monitoring Study. In addition these agencies are also striving for the development of instrumentation systems to measure atmospheric particulates, marine pollutants, stream velocity, and the chemical nature of energy-related effluents.

Health Effects

This research program is dedicated to improving the ability to estimate the long-term adverse health impacts that can ensue as a consequence of implementing a particular energy policy.

Under the auspices of the Interagency Program, EPA, DOE, NIEHS and National Institute of Occupational Safety and Health (NIOSH) are working together to study the health effects caused by coal extraction and combustion, and emerging energy technologies. With the current emphasis on coal, much of the program's energies focus on research on carcinogenic (cancer causing) substances released through combustion of coal.

To this end EPA, DOE, NIEHS, and NIOSH developed and implemented the concept of interagency workshops to evaluate the state-of-the-art relative to the health and ecological effects of advanced energy system development, as well as making contributions to the development of a blue-ribbon panel report (RALL Committee) on the health impacts of increased coal usage, both in response to the President's requests in his energy message.

Ecological Effects

**PROJECT: 03584-ALASKAN OIL SEEPS THEIR CHEMICAL AND BIOLOGICAL EFFECTS ON THE ENVIRONMENT

STARTING/ COMPLETION DATE : 06/75 05/78 : FUNDING ESTIMATED FY77 / $ 123991
TASK CODE=M625A-003 **EPA=R803922-03 ** (GRANT) PRIOR FY76 / $ 253523

EPA OFFICER.. FB LOTSPEICH EPA/ERL CORVALLIS
INVESTIGATOR.. DG SHAW UNIV OF ALASKA FAIRBANKS CAMPUS
MILESTONES.... 05/78 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003584 SSIE-GMA 4260 EPA -R803922-03 TASK-M625A-003
AP -625A DU -N140 LABT-HEE
ABSTRACT..... OBJECTIVE IS TO RELATE A DEFINED CHRONIC INPUT OF PETROLEUM IN AN INTERTIDAL ENVIRONMENTAL TO BIOLOGICAL CHANGES AT THE ORGANISM AND COMMUNITY LEVELS. THE PROJECT WILL INVESTIGATE OIL SEEPS ALONG THE GULF OF ALASKA THAT PROVIDE LONG-TERM, LOW-LEVEL INPUT OF PETROLEUM INTO THE MARINE INTERTIDAL ENVIRONMENT.

**PROJECT: 03585-ASSESSMENT OF THE EFFECTS OF BOTTOM DISTURBANCE ON THE ENVIRONMENT OF A CLEAR SUBARCTIC STREAM

STARTING/ COMPLETION DATE : 07/75 07/78 : FUNDING : ESTIMATED FY77 / $ 33238
TASK CODE=M625A-004 **EPA=R803945-03 ** (GRANT) PRIOR FY76 / $ 97347

EPA OFFICER.. EW SCHALLOCK EPA/ERL CORVALLIS
INVESTIGATOR.. JE MORROW UNIV OF ALASKA SCH OF BIOL SCI & RENEWABLE RES
MILESTONES.... 07/78 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003585 SSIE-GMA 2447 2 EPA -R803945-03 TASK-M625A-004
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: THE EFFECTS OF A BURIED PIPELINE CROSSING IN THE CHATANIKA RIVER ARE BEING MONITORED. PARAMETERS CONSIDERED ARE 10 TYPE AND RATE OF FLOW; 2) OXYGEN AND CARBON DIOXIDE CONTENT OF WATER; 3) WATER TEMPERATURE; 4) SIZE TYPE AND DISTRIBUTION OF STREAM BOTTOM PARTICLES; 5) INTRA-GRAVEL WATER FLOW AND CHEMISTRY; 6) QUANTITY AND DIVERSITY OF ANIMAL AND PLANT ORGANISMS; 7) ORGANIC DRIFT; 8) PRIMARY PRODUCTIVITY. ITEMS 1) THROUGH 5) ARE HANDLED BY PERSONNEL OF THE ARCTIC ENVIRONMENTAL RESEARCH LABORATORY, EPA. RESULTS THUS FAR INDICATE SOME SILTATION DOWNSTREAM FROM THE CROSSING; LOSS OF SMALL SPAWNING GROUND FOR LONGNOSE SUCKER DOWNSTREAM FROM THE CROSSING; SOME INCREASE IN ORGANIC DRIFT; TEMPORARY INCREASE IN PRIMARY PRODUCTIVITY BELOW AS COMPARED WITH ABOVE THE CROSSING. IT IS PLANNED TO MONITOR THESE FACTORS FOR ANOTHER YEAR TO DETERMINE WHETHER THE OBSERVED EFFECTS ARE PERMANENT OR TEMPORARY.

**PROJECT: 03587-EFFECTS OF NON-GASEOUS AIRBORNE POLLUTANTS FROM COAL-FIRED POWER PLANTS ON PLANT GROWTH AND METABOLISM

STARTING/ COMPLETION DATE : 07/75 10/77 : FUNDING : ESTIMATED FY77 / $ 92440
TASK CODE=M625A-005 **EPA=R803948-02 ** (GRANT) PRIOR FY76 / $ 70990

EPA OFFICER.. E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.. ER LANDA OREGON STATE UNIV SCH OF AGRIC/ENTOMOLOGY DEPT
MILESTONES.... 10/77 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003587 SSIE-GMA 2778 1 EPA -R803948-02 TASK-M625A-005
AP -625A DU -N140 LABT-HEE
ABSTRACT..... INVESTIGATE RELECTED EFFECTS OF STACK EMISSIONS ASSOCIATED WITH COAL-BURNING ON PLANT GROWTH AND METABOLISM.

**PROJECT: 03588-EFFECTS OF CHRONIC SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCERS AND INVERTEBRATE CONSUMERS IN A MIXED PRAIRIE ECOSYSTEM

STARTING/ COMPLETION DATE : 06/77 06/80 : FUNDING ESTIMATED FY77 / $ 163070
TASK CODE=M625A-019 **EPA=R805320-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.. JL DODD COLORADO STATE UNIV NAT RESOURCE ECOLOGY LAB
WK LAUENROTH COLORADO STATE UNIV NAT RESOURCE ECOLOGY LAB
MILESTONES...: 06/80 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003588 SSIE-GMA 4239 EPA -R805320-01 TASK-M625A-019
AP -625A DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO ASSESS THE EFFECTS OF CHRONIC SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCERS AND INVERTEBRATE CONSUMERS IN A MIXED PRAIRIE ECOSYSTEM. FIELD EXPERIMENTS ARE DESIGNED TO: (1) CHARACTERIZE PHYSIOLOGICAL RESPONSES OF WESTERN WHEATGRASS TO FOUR SO2 EXPOSURE LEVELS, (2) RELATE PHYSIOLOGICAL RESPONSES TO WHOLE PLANT GROWTH AND POPULATION DYNAMICS OF WESTERN WHEATGRASS ON EACH TREATMENT AREA; (3) INVESTIGATE THE RELATIONSHIPS BETWEEN PHYSIOLOGICAL STATUS OF WESTERN WHEATGRASS AND INFRARED REFLECTIONS. LABORATORY EXPERIMENTS SUPPORT AND AMPLIFY THE FIELD EXPERIMENTS. THESE EXPERIMENTS ARE DESIGNED TO: (1) CHARACTERIZE THE PHYSIOLOGICAL RESPONSE OF WESTERN WHEATGRASS TO SO2 FUMIGATION WITHIN A MINOR RANGE OF ENVIRONMENTAL CONDITIONS, AND (2) DETERMINE THE RELATIONSHIP BETWEEN INTERNAL SULFUR STATUS OF WESTERN WHEATGRASS AND PHYSIOLOGICAL RESPONSES. VARIABLES TO BE MEASURED INCLUDE GROSS PHOTOSYNTHESIS, NET PHOTOSYNTHESIS, PHOTOSPIRATION, DARK RESPIRATION, PLANT AND LEAF WATER POTENTIAL, STAMATA DIFFUSION RESISTANCE AND LEAF TEMPERATURES.

**PROJECT: 03590-USE OF LICHENS AS PREDICTORS AND INDICATORS OF AIR POLLUTION FROM A COAL-FIRED POWER PLANT

STARTING/ COMPLETION DATE : 09/77 08/80 : FUNDING ESTIMATED FY77 / $ 13604
TASK CODE=M625A-020 **EPA=R805367-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR. S EVERSMAN MONTANA STATE UNIV SCH OF LETTERS & SCI
MILESTONES... 07/80 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-003590 SSIE-GMA 4241 EPA -R805367-01 TASK-M625A-020
AP -625A DU -N140 LABT-HEE

ABSTRACT..... TWO LICHEN SPECIES NATIVE TO SOUTHEAST MONTANA SHOWED REDUCED RESPIRATION RATES AND ALGAL CELL PLASMOLYSIS AND BLEACHING WHEN EXPOSED TO .02, .04, AND .07 PPM SO2 (GEOMETRIC MEANS) ON A FIELD FUMIGATION SITE. THE MAJOR OBJECTIVE OF THE CURRENT PROJECT IS TO COLLECT THESE SAME TWO LICHEN SPECIES TO BE OBSERVED AS BIOLOGICAL MONITORS OF SO2 EMISSIONS FROM TWO COAL-FIRED POWER PLANTS IN COLSTRIP, MONTANA. LICHEN COMMUNITY INFORMATION IS ALSO BEING COLLECTED IN ORDER TO DETECT ANY CHANGES IN EPIPHYTIC AND SOIL LICHEN COMMUNITIES AS COAL BURNING PROCEEDS IN THIS AREA. ALL THE LICHEN INFORMATION WILL BE INTEGRATED WITH PLANT COMMUNITY DATA GATHERED BY OTHER RESEARCHERS IN THE AREA IN ORDER TO DETERMINE EFFECTS OF SO2 EMISSIONS (AND OTHER COAL-BURNING POLLUTANTS) ON PONDEROSA PINE-GRASSLAND ECOSYSTEMS.

**PROJECT: 03592-INVESTIGATION OF THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON TISSUE STRUCTURE OF SELECTED BIRD SPECIES BIRDS AS INDICAT

STARTING/ COMPLETION DATE : 07/77 07/80 : FUNDING : ESTIMATED FY77 / $ 27154
TASK CODE=M625A-021 **EPA=R805370-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.. MD KERN COLLEGE OF WOOSTER GRADUATE SCH
MILESTONES.... 07/80 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003592 SSIE-GMA 4235 EPA -R805370-01 TASK-M625A-021
AP -625A DU -N140 LABT-HEE

ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO IDENTIFY SPECIES OF GRASSLAND BIRDS AND/OR THEIR ORGAN-SYSTEMS WHICH ARE PARTICULARLY SENSITIVE TO THE EMISSIONS OF COAL-FIRED POWER PLANTS AND CAN BE USED TO MONITOR AND INDICATE AIR QUALITY, AND SO PREDICT THE IMPACT OF CHRONIC, LOW-LEVEL, NON-LETHAL STACK EMISSIONS ON THE SURROUNDING ECOSYSTEM. THE STUDY SITE IS A GRASSLAND ECOSYSTEM IN COLSTRIP, MONTANA, IN WHICH TWO COAL-FIRED POWER PLANTS OPERATE. REPRESENTATIVE GRASSLAND BIRDS SELECTED FOR STUDY AT THE SITE ARE THE WESTERN MEADOWLARK (STURNELLA NEGLECTA), MOURNING DOVE (ZENAIDURA MACROURA), LARK BUNTING (CALAMOSOIZA MELANOCORYS), VESPER SPARROW (POOECETES GRAMINEUS, AND LARK SPARROW (CHONDESTES GRAMMACUS). IN EACH CASE, THE HISTOLOGY OF THE FOLLOWING TISSUES IS EXAMINED BEFORE (1975-1979) THE POWER PLANTS HAVE GONE ON-LINE: (1) TISSUES WHICH ARE STRESS INDICATORS: THE ADRENAL AND THYROID GLANDS; (2) TISSUES WHICH BELONG TO THE IMMUNE SYSTEM: THE BURSA OF FABRICIUS, THYMUS, AND SPLEEN; (3) DETOXIFYING TISSUES: THE LIVER, KIDNEY, AND LUNG; AND (4) REPRODUCTIVE TISSUES: THE TESTIS, OVARY, AND OVIDUCT. THIS HISTOLOGICAL INFORMATION WILL BE INTEGRATED WITH (1) MEASURES OF CARCASS AND TISSUE COMPOSITION AND OTHER GROSS MEASUREMENTS MADE ON THE SAME BIRDS, AND (2) INFORMATION ON THE AIR QUALITY, WEATHER, AND OTHER ORGANISMS IN THE SAME IMPACTED ECOSYSTEM, IN ORDER TO IDENTIFY RELATIONSHIPS WHICH ARE USEFUL FOR (1) PREDICTING THE BIOLOGICAL EFFECTS OF GIVEN RATES OF POLLUTION CHALLENGE, AND (2) SITING COAL-FIRED POWER PLANTS IN THE GREAT PLAINS REGION.

**PROJECT: 03594-MONITORING PLANT COMMUNITY CHANGES DUE TO FOSSIL FUEL POWER PLANTS IN SOUTHEASTERN MONTANA

STARTING/ COMPLETION DATE : 07/77 07/80 FUNDING ESTIMATED FY77 / $ 52766
TASK CODE=M625A-023 **EPA=R805391-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.: JE TAYLOR MONTANA STATE UNIV SCH OF AGRIC
MILESTONES...: 07/80 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-003594 SSIE-GMA 4242 EPA -R805391-01 TASK-M625A-023
AP -625A DU -N140 LABT-HEE

ABSTRACT..... OBJECTIVES: A. TO CONTINUE TO MONITOR AIR POLLUTION EFFECTS UPON NATIVE GRASSLAND VEGETATION IN AREAS AFFECTED BY FOSSIL FUEL POWER PLANTS AND ON AREAS ARTIFICIALLY STRESSED WITH AIR POLLUTANTS; B. TO SUPPLY BASE LINE INVENTORY INFORMATION, INCLUDING AERIAL PHOTOGRAPHY AND ITS INTERPRETATION, TO A VARIETY OF SCIENTISTS, LAND USERS AND MANAGERS IN EASTERN MONTANA; C. TO PROVIDE RIGOROUS DATA FOR SIMULATION MODELS WHICH CAN BE USED TO PREDICT BIOENVIRONMENTAL CHANGES DUE TO FOSSIL FUEL POWER GENERATION IN OTHER AREAS. APPROACHES: AERIAL AND GROUND PHOTOGRAPHY, SPECIES DIVERSITY (NUMBER AND COVER), AND PHENOLOGY WILL BE RELATED TO POLLUTION STRESSES AND "NORMAL" VARIATION IN COMMUNITY STRUCTURE. PLANS: TWO YEARS' ADDITIONAL FIELD OBSERVATIONS WILL BE INCORPORATED INTO THE COAL-FIRED POWER PLANT PROTOCOL AND A VEGETATIONAL MONITORING SYSTEM.

**PROJECT: 03596-RESPONSE OF BIRDS TO ENVIRONMENTAL STRESS

STARTING/ COMPLETION DATE : 09/77 09/79 : FUNDING ESTIMATED FY77 / $ 29031
TASK CODE=M625A-024 **EPA=R805409-01 ** (GRANT) PRIOR FY /
EPA OFFICER.: E PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.. DS FARNER UNIVERSITY OF WASHINGTON
JC WINGFIELD UNIVERSITY OF WASHINGTON
RS DONHAM UNIVERSITY OF WASHINGTON
MILESTONES...: 08/78 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003596 SSIE-GMA 4237 EPA -R805409-01 TASK-M625A-024
AP -625A DU -N140 LABT-HEE
ABSTRACT..... MICRO-RADIO COMPETITIVE-PROTEIN-BINDING AND MICRO-RADIOIMMUNOASSAYS FOR CORTISONE IN AVIAN PLASMA HAVE ALREADY BEEN DEVELOPED AND ADAPTED FOR FIELD INVESTIGATIONS IN THIS LABORATORY. SINCE THESE METHOD REQUIRE LESS THAN 100 MICROLITERS OF PLASMA, INDIVIDUAL BIRDS CAN BE SAMPLED, MARKED AND RELEASED FOR SUBSEQUENT CAPTURE AND SAMPLING. THE METHOD HAS BEEN "FIELD-TESTED" EXTENSIVELY ON WHITE-CROWNED SPARROWS, ZONOTRICHIA LEUCOPHRYS GAMBELII AND Z.I. PUGETENSIS. IT IS PROPOSED TO DEVELOP THIS SYSTEM FURTHER AS A MEANS OF "EARLY DETECTION" OF ENVIRONMENTAL STRESS IN POPULATIONS OF BIRDS. USING THESE METHODS, FIRST ON WHITE-CROWNED SPARROWS, THE FOLLOWING ARE PROPOSED: (1) PROCUREMENT OF BASE LINE DATA ON DAILY CYCLES IN PLASMA CORTICOSTERONE; (2) PROCUREMENT OF ADDITIONAL DATA ON EFFECTS OF HANDLING AND HOLDING IN CAGES; (3) EXAMINATION OF EFFECTS OF INDUCED STRESS IN FIELD (DISTURBANCE OF FLOCKS, HARASSMENT OF TERRITORIAL BIRDS, ARTIFICIAL DISTURBANCE OF HABITAT, ETC.); (4) DETERMINATION OF METABOLIC CLEARANCE AND HALF-LIFE OF CORTICOSTERONE IN BIRDS; AND (5) OBSERVATION OF EFFECTS OF "ARTIFICIAL STRESS" (IMPLANTATION OF CORTICOSTERONE IN SILASTIC TUBES IN TERRITORIAL BIRDS). COMPARABLE MICROASSAYS HAVE BEEN DEVELOPED FOR TESTOSTERONE AND ESTRADIOL. THE AVIAN RADIOIMMUNOASSAY OF FOLLETT, SCANES, AND CUNNINGHAM FOR LUTEINIZING HORMONE (LH) HAS BEEN MODIFIED FOR PASSERINE BIRDS. ACCURATE ESTIMATES OF LH, SEX HORMONE AND CORTICOSTERONE CAN BE MADE FROM 200 MICROLITERS OF PLASMA FROM BIRDS THAT CAN BE BANDED AND RELEASED FOR SUBSEQUENT CAPTURE AND SAMPLING. LAPAROTOMY CAN BE PERFORMED ON THESE BIRDS FOR ASSESSMENT OF GONADAL STATE. FOR LH AND SEX HORMONES DATA COMPARABLE TO CORTICOSTERONE (1-3 AND 5) WILL BE OBTAINED, INSOFAR AS POSSIBLE, BY REPEATED SAMPLING OF INDIVIDUAL BIRDS. SAMPLES WILL BE ANALYZED FROM A CARNIVORE, THE WESTERN MEADOWLARK, STURNELLA NEGLECTA, AT THE EPA MONTANA COAL-FIRED POWER PLANT PROJECT, COLSTRIP, TO EVALUATE THE SIGNIFICANCE OF HISTOLOGICAL

**PROJECT: 03598-OIL SPILLS EFFECT ON ARCTIC LAKE SYSTEMS

STARTING/ COMPLETION DATE : 07/75 07/78 FUNDING ESTIMATED FY77 / $ 156180
TASK CODE=M625A-031 **EPA=R804152-03 ** (GRANT) PRIOR FY76 / $ 294333
EPA OFFICER.: RC GORDON EPA/ERL CORVALLIS
INVESTIGATOR.: R BARSDATE UNIV OF ALASKA FAIRBANKS CAMPUS
MILESTONES...: 07/78 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003598 SSIE-GMA 2449 2 EPA -R804152-03 TASK-M625A-031
AP -625A DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO ASSESS THE EFFECTS OF CRUDE OIL ON HIGH LATITUDE AQUATIC ENVIRONMENTS WITH EMPHASIS ON THE EFFECTS OF OIL ON HIGH LATITUDE ARCTIC LAKES. THE PRINCIPAL ACTIVITY WILL BE THE APPLICATION OF A MODERATE SCALE EXPERIMENTAL CRUDE OIL SPILL TO AN ARCTIC LAKE IN ORDER TO OBSERVE THE IMPACT AND RECOVERY OF VARIOUS TROPHIC LEVELS FROM BACTERIA THROUGH FISH.

**PROJECT: 03599-SEASONAL CYCLES IN BODY COMPOSITION, ORGAN SYSTEM FUNCTION, AND ENERGETICS OF GRASSLAND BIRDS NEAR COLSTRIP, MONTANA

STARTING/ COMPLETION DATE : 10/77 09/78 : FUNDING ESTIMATED FY77 / $ 47217
TASK CODE=M625A-036 **EPA=R805581-01 ** (GRANT) PRIOR FY /
EPA OFFICER.. EM PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.. ML MORTON OCCIDENTAL COLLEGE DEPT OF BIOL
MILESTONES...: 09/78 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003599 SSIE-GMA 4262 EPA -R805581-01 TASK-M625A-036
AP -625A DU -N140 LABT-HEE
ABSTRACT..... IN 1974 THE ENVIRONMENTAL PROTECTION AGENCY (EPA) BEGAN A LONG-TERM STUDY OF AIR POLLUTION EFFECTS ON THE GRASSLAND ECOSYSTEM NEAR COAL-FIRED POWER PLANTS AT COLSTRIP, ARIZONA. THIS STUDY IS BROAD IN SCOPE BUT ONE PARTICULAR ASPECT, OF CONCERN HERE, HAS BEEN ON THE POTENTIAL OF BIRDS AS BIOINDICATORS OF POLLUTION. IN THE THREE YEAR PERIOD, 1974-76, MANY AVIAN SPECIMENS WERE COLLECTED IN THE COLSTRIP AREA BY EPA PERSONNEL AND GREAT QUANTITIES OF DATA WERE GATHERED ON SEASONAL CYCLES IN BODY COMPOSITION, ORGAN SYSTEM FUNCTION, AND BIOENERGETICS. SINCE THE POWER PLANTS DID NOT BECOME FUNCTIONAL UNTIL 1975 AND 1976, THESE DATA HAVE THE POTENTIAL OF PROVIDING A SOLID BASE OF INFORMATION THAT CAN BE USED TO QUANTIFY POLLUTION EFFECTS WHICH MAY ACCRUE IN THE FUTURE. AT THIS TIME, HOWEVER, MANY OF THE COLLECTED BIRD SPECIMENS HAVE NOT UNDERGONE LABORATORY PROCESSING NOR HAS EXISTING DATA BEEN PULLED TOGETHER IN USEFUL FORM. IT IS THE PURPOSE OF THE STUDY PROPOSED HEREIN TO COMPLETE THE NECESSARY LABORATORY PROCEDURES ON STORED SPECIMENS, MAKE ADDITIONAL COLLECTIONS, IF NECESSARY, TO FILL INFORMATIONAL GAPS, COMPILE AND EVALUATE ALL PERTINENT DATA, AND CONSTRUCT A FINAL REPORT OF SUFFICIENT SCOPE AND DETAIL THAT WILL CONSTITUTE AN EFFECTIVE DOCUMENTATION OF BIOLOGICAL RELATION IN GRASSLAND BIRDS OF THE COLS

**PROJECT: 03601-POSSIBLE SUBLETHAL EFFECT OF PETROLEUM HYDROCARBONS ON THE PHYSIOLOGY OF TEMPERATURE ACCLIMATION IN MARINE FISHES (ABBREV)

STARTING/ COMPLETION DATE : 10/77 09/79 : FUNDING ESTIMATED FY77 / $ 74000
TASK CODE=M625A-038 **EPA=R805625-01 ** (GRANT) PRIOR FY /

EPA OFFICER.. RM BRICE EPA/ERL CORVALLIS
INVESTIGATOR . RS CALDWELL OREGON STATE UNIV SCH OF AGRIC/ENTOMOLOGY DEPT
EM CALDERONE OREGON STATE UNIV SCH OF AGRIC/ENTOMOLOGY DEPT
MILESTONES.... 08/79 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003601 SSIE-GMA 4224 EPA -R805625-01 TASK-M625A-038
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: THE PROPOSED RESEARCH WILL TEST THE HYPOTHESIS THAT PETROLEUM HYDROCARBON COMPOUNDS CAPABLE OF INDUCING MICROSOMAL MIXED FUNCTION OXIDASES IN FISH TISSUES INTERFERE WITH NORMAL PATTERNS OF FATTY ACID METABOLISM, SPECIFICALLY MICROSOMAL FATTY ACID DESATURATION, AND THAT SUCH EFFECTS RESULT IN MODIFIED FATTY ACID PATTERNS IN MEMBRANE PHOSPHOLIPIDS OF FISH AND SUBOPTIMAL PHYSIOLOGICAL RESPONSES TO TEMPERATURE. TWO APPROACHES WILL BE TAKEN. IN ONE, FISH WILL BE EXPOSED TO PETROLEUM HYDROCARBONS FOR ONE TO TWO WEEKS AT AN INTERMEDIATE TEMPERATURE. FOLLOWING THIS, TREATED AND CONTROL FISH WILL BE COMPARED WITH RESPECT TO MICROSOMAL CYTOCHROME P450 AND B5 LEVELS, MIXED FUNCTION OXIDASE AND FATTY ACID DESATURASE ACTIVITIES, FATTY ACID COMPOSITION OF MEMBRANE PHOSPHOLIPIDS, AND SEVERAL BIOPHYSICAL CHARACTERISTICS OF MEMBRANES. IN A SECOND APPROACH, FISH WILL BE ACCLIMATED TO EXTREME TEMPERATURES, BOTH IN THE PRESENCE AND ABSENCE OF PETROLEUM HYDROCARBONS, AND COMPARED WITH RESPECT TO ABILITY TO CARRY OUT KNOWN BIOCHEMICAL AND PHYSIOLOGICAL ADAPTIONS TO TEMPERATURE (E.G. TEMPERATURE MEDIATED ADJUSTMENT OF MEMBRANE FATTY ACID COMPOSITION AND THE BIOCHEMICAL AND PHYSIOLOGICAL ADAPTIONS RESULTING FROM SUCH FATTY ACID CHANGES).

**PROJECT: 03602-SUPPORT SERVICES AT FORT HOWES RANGER STATION

STARTING/ COMPLETION DATE : 10/74 08/79 : FUNDING ESTIMATED FY77 / $ 5500
TASK CODE=M625A-053 **EPA=D7-F633 ** (IAG) PRIOR FY76 / $ 24200

EPA OFFICER.: EM PRESTON EPA/ERL CORVALLIS
INVESTIGATOR.: RM RICHMOND USDA FOREST SERV
MILESTONES.... 00/00 -NO REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003602 SSIE-GMA 4214 EPA -D7-F633 TASK-M625A-053
AP -625A DU -N140 LABT-HEE
ABSTRACT..... THE AGREEMENT CALLS FOR MAINTENANCE OF LIVING AND LABORATORY TRAILERS LOCATED AT FT. HOWES, MAINTENANCE OF WATER AND SEWAGE SYSTEMS, TEMPORARY STORAGE OF EQUIPMENT AND SERVICES OF A SAFETY OFFICER TO ENSURE COMPLIANCE WITH ALL APPLICABLE STANDARDS.

**PROJECT: 03603-AEROSOL CHARACTERIZATION RESEARCH -- COLSTRIP, MONTANA

STARTING/ COMPLETION DATE : 05/75 09/78 FUNDING ESTIMATED FY77 / $ 57000
TASK CODE=M625A-054 **EPA=D7-0740 ** (IAG) PRIOR FY76 / $ 220000

EPA OFFICER.: NR GLASS EPA/ERL CORVALLIS
INVESTIGATOR.: VE DERR US DOC/NOAA ENV RES LABS/WAVE PROP LAB
MILESTONES.... 09/79 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-003603 SSIE-GMA 4210 EPA -D7-0740 TASK-M625A-054
AP -625A DU -N140 LABT-HEE
ABSTRACT..... PROJECT INVOLVES THE MEASUREMENT OF THE CONCENTRATION OF PARTICULATES CATEGORIZED BY SIZE, SHAPE AND CHEMICAL CONSTITUTION. TWO RADIATION MEASUREMENTS WILL BE MADE: (1) RATE AT WHICH SOLAR ENERGY REACHES THE EARTH AS A FUNCTION OF WAVELENGTH, AND (2) THE NET HEAT LOSS OF THE EARTH WILL BE MEASURED BY INFRARED RADIOMETRY BY MEASURING UPWARD AND DOWNWARD RADIATION AND BY EMPLOYING AIRCRAFT AND GROUND-BASED INSTR

**PROJECT: 03605-OIL MOVEMENT ON SOIL ACTIVE LAYER

STARTING/ COMPLETION DATE : 06/75 05/78 : FUNDING ESTIMATED FY77 / $ 75000
TASK CODE=M625A-055 **EPA=D7-0794 ** (IAG) PRIOR FY76 / $ 199575

EPA OFFICER.: R MCFADDEN EPA/ERL CORVALLIS
INVESTIGATOR.: TT MCFADDEN US DOD/ARMY ENG CORPS COLD REGIONS RES & ENG LAB
MILESTONES...: 05/78 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003605 SSIE-GMA 4211 EPA -D7-0794 TASK-M625A-055
AP -625A DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE IS TO EVALUATE THE RATE AND EXTENT OF OIL MOVEMENT IN AND OVER THE SOIL ACTIVE LAYER, AND TO DETERMINE TRANSPORT PATHWAYS, FATE OF POLLUTANTS, AND DEGRADATION BY-PRODUCTS, FOLLOWING A SIMULATED OIL SPILL OF HOT CRUDE OIL ON A PERMAFROST UNDERLAIN SLOPE.

**PROJECT: 03606-CHARACTERIZING THE AIR QUALITY IN THE COLSTRIP, MONTANA AREA

```
                    STARTING/ COMPLETION DATE : 06/75   11/78 :   FUNDING    ESTIMATED   FY77  / $  119000
                    TASK CODE=M625A-057     **EPA=D7-0840     ** ( IAG )     PRIOR       FY76  / $  100000
EPA  OFFICER.. NR GLASS                 EPA/ERL   CORVALLIS
INVESTIGATOR.. TW AMBROSE               US DOE                                RICHLAND OPERATIONS OFF
               TW AMBROSE               BATTELLE MEMORIAL INST
MILESTONES.... 11/78 -FINAL REPORT
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003606          SSIE-GMA  4220        EPA -D7-0840          TASK-M625A-057
               AP  -625A            DU  -N140             LABT-HEE
ABSTRACT...... ERDA WILL OPERATE AND MAINTAIN A RESEARCH SURVEY STATION FOR THE ENVIRONMENTAL PROTECTION AGENCY AT
                COLSTRIP, MONTANA, PROVIDING APPROXIMATELY 1 MAN-YEAR OF EFFORT. ERDA WILL MAINTAIN A SCIENTIST AT
                COLSTRIP WHO WILL OPERATE RESEARCH EQUIPMENT, AS REQUIRED BY EPA, FOR THE MEASUREMENT OF A WIDE
                SPECTRUM OF AIRBORNE POLLUTANTS. IT IS UNDERSTOOD THAT THESE POLLUTANTS INCLUDE THE MEASUREMENTS OF
                MOST OF THE CONVENTIONAL AIR POLLUTANTS WHICH ARE MONITORED BY THE EPA AND WILL REQUIRE DAILY
                CALIBRATIONS OF MUCH OF THE SCIENTIFIC EQUIPMENT USED FOR THESE MEASUREMENTS. IT WILL ALSO REQUIRE
                THE TRANSFER OF DATA FROM THE VARIOUS ANALYZERS TO AN ON-BOARD COMPUTER FOR SUBSEQUENT ANALYSIS AND
                TRANSMITTAL.
```

**PROJECT: 03608-MONTANA COAL-FIRED POWER PLANT BIOENVIRONMENTAL STUDY

```
                    STARTING/ COMPLETION DATE : 07/74   06/80 :   FUNDING    ESTIMATED   FY77  / $  369094
                    TASK CODE=M625A-088     **EPA=            ** (IN-HO)     PRIOR       FY76  / $  406500
               IN-HOUSE EFFORT   FY 77  /  01.0  YEARS  ; TOTAL PROJECT  05.0
EPA  OFFICER.. NR GLASS                 EPA/ERL   CORVALLIS
INVESTIGATOR.. NR GLASS                 US EPA/ORD                            ERL/TERR ECOL BR
MILESTONES.... 00/00 -ANNUAL REPORTS
               06/80 -FINAL REPORT
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003608          SSIE-ZMA  1154        TASK-M625A-088        AP  -625A
               DU  -N140            LABT-HEE
ABSTRACT...... THE TWO OBJECTIVES OF THIS PROGRAM ARE: (1) TO DEVELOP PROCEDURES WHICH CAN BE USED TO FORECAST AND
                ASSESS THE IMPACTS OF STRESSANTS FROM ENERGY-PRODUCING ACTIVITIES ON AFFECTED ECOSYSTEMS; AND (2)
                TO IDENTIFY AND DESCRIBE THE IMPACTS FOR A GIVEN SET OF ECOSYSTEMS. THE APPROACH IS TO COMBINE
                FIELD MEASUREMENTS WITH ON-SITE FIELD EXPERIMENTATION AND LABORATORY PROCESS STUDIES. REMOTE
                SENSING, MODELING ACTIVITIES, AND OTHER ASSOCIATED SUPPORTIVE EFFORTS WILL BE UTILIZED TO MAXIMIZE
                THE ACTIVITY. THE CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY HAS MOUNTED A FIELD EFFORT IN
                MONTANA. BESIDES THE NORMAL FIELD FACILITIES (MOBILE AIR QUALITY LABORATORIES, BIOLOGICAL ANALYSIS
                SYSTEMS, ETC.) AN EFFORT HAS BEEN MADE TO COORDINATE THE PROJECT WITH OTHER SCIENTIFIC CENTERS
                (GRASSLAND IBP, ERDA, EPA AND NOAA) TO INCLUDE THE NECESSARY SCIENTIFIC AND ENGINEERING EXPERTISE
                TO GUARANTEE A UNIFIED PROGRAM. IT IS INTENDED THAT THE RESEARCH INFORMATION GATHERED FROM THIS
                PROJECT BE UTILIZED IN SUCH A FASHION THAT A SET OF BIOLOGICAL PARAMETERS ARE FOUND THAT WILL ALLOW
                PLANNING MANAGERS TO PROJECT COST/BENEFIT RELATIONSHIPS PRIOR TO LOCATING AN ENERGY-PRODUCING
                FACILITY.
```

**PROJECT: 03610-LABORATORY SUPPORT SERVICES FOR C.E.R.L.

```
                    STARTING/ COMPLETION DATE : 12/76   12/77 :   FUNDING    ESTIMATED   FY77  / $   13732
                    TASK CODE=M625A-090     **EPA=68-03-2505  ** (CNTR.)     PRIOR       FY    /
EPA  OFFICER.. G  PHILLIPS              EPA/ERL   CORVALLIS
INVESTIGATOR.. NM PETTIT                NORTHROP CORP                         NORTHROP SERVS INC
MILESTONES...: 12/77 -FINAL REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003610          SSIE-GMA  4513        EPA -68-03-2505       TASK-M625A-090
               AP  -625A            DU  -N140             LABT-HEE
ABSTRACT...... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE CORVALLIS
                ENVIRONMENTAL RESEARCH LABORATORY PLANS AND CONDUCTS RESEARCH PROGRAMS TO DETERMINE THE EFFECTS OF
                ENVIRONMENTAL POLLUTANTS ON TERRESTRIAL AND AQUATIC ECOSYSTEMS. THESE RESEARCH PROJECTS INVOLVED
                EXPERIMENTS TO EVALUATE THE RESPONSE OF PLANTS AND ANIMALS WHEN EXPOSED TO POLLUTANTS. THESE DATA
                ARE PROCESSED AND ANALYZED TO PROVIDE INFORMATION REQUIRED FOR THE SOLUTION OF EPA PROBLEMS.
```

**PROJECT: 03611-MULTIDISCIPLINARY RESEARCH ON SUBSYSTEMS OF COMPLEX FOREST ECOSYSTEMS

```
                    STARTING/ COMPLETION DATE : 05/75   12/77 :   FUNDING    ESTIMATED   FY77  / $   10000
                    TASK CODE=M625A-092     **EPA=D7-F469     ** ( IAG )     PRIOR       FY    /
EPA  OFFICER.. RG WILHOUR               EPA/ERL   CORVALLIS
INVESTIGATOR.. JL STEWART               USDA/FOREST SERV                      PAC NW FOREST & RANGE EXP STA
MILESTONES.... 12/77 -FINAL REPORT
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003611          SSIE-GMA  4465        EPA -D7-F469          TASK-M625A-092
               AP  -625A            DU  -N140             LABT-HEE
ABSTRACT...... A STATISTICAL ANALYSIS OF THE ECOLOGICAL EFFECTS OF AIR POLLUTION SHALL EMPHASIZE THE DEVELOPMENT OF
                COMMUNITY LEVEL INDICES OF POLLUTION IMPACTS. MULTIVARIATE STATISTICAL METHODS SHALL BE USED TO
                DETERMINE CHANGES IN COMMUNITY STRUCTURE RELATED TO POLLUTION GRADIENTS AND OTHER ENVIRONMENTAL
                VARIABLES. A REPORT ON THE STATISTICAL ANALYSIS OF COMMUNITY STRUCTURE ON NORTHERN GREAT PLAINS
                ECOSYSTEM WILL BE PREPARED.
```

**PROJECT: 03612-MODIFICATION OF THE OPTIMIZED EPRF MULTILAYER HYDRODYNAMICAL-NUMERICAL MODEL

STARTING/ COMPLETION DATE : 06/75 06/77 : FUNDING ESTIMATED FY77 / $ 10000
TASK CODE=M625A-094 **EPA=68-03-2225 ** (CNTR.) PRIOR FY75 / $ 47000

EPA OFFICER.. RJ CALLAWAY EPA/ERL CORVALLIS
INVESTIGATOR.. RA BAUER COMPASS SYSS INC
MILESTONES...: 06/77 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003612 SSIE-GMA 4457 EPA -68-03-2225 TASK-M625A-094
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: THE EFFORT HAS FOUR GOALS: 1) THE ADDITION OF CONVECTIVE TERMS TO THE EPRF VERSION OF THE HN MODEL OF THE HANSEN TYPE AND THE TESTING OF THE MODIFIED MODEL ON A SMALL GEOGRAPHIC AREA; 2) THE ADDITION OF THE CAPABILITY TO HANDLE VARIABLE LAND BOUNDARIES (TIDAL FLATS); 3) THE ADDITION OF THE THERMAL DISCHARGE ADVECTION EFFECTS; AND 4) THE DEVELOPMENT OF A MONTE CARLO PROCEDURE FOR USE IN CONJUNCTION WITH THE VELOCITIES CALCULATED BY THE HN MODEL TO COMPUTE DISPERSION OF A CONSERVATIVE MAT

**PROJECT: 03757-CONTINUOUS FLOW BIOASSAYS USING NATURAL PERIPHYTON COMMUNITIES WITH EMPHASIS ON THE EFFECTS OF COAL LEACHATE

STARTING/ COMPLETION DATE : 07/75 07/78 : FUNDING ESTIMATED FY77 / $ 55369
TASK CODE=N625A-079 **EPA=R803932-03 ** (GRANT) PRIOR FY76 / $ 55000

EPA OFFICER.. W MILLER EPA/ERL DULUTH
INVESTIGATOR.. DZ GERHART UNIV OF MINNESOTA GRADUATE SCH
LL HOLMETRAND UNIV OF MINNESOTA GRADUATE SCH
TJ WOOD UNIV OF MINNESOTA GRADUATE SCH
JR RICHTER UNIV OF MINNESOTA GRADUATE SCH
MILESTONES...: 01/76 -QUANTIFIED EFFECTS OF COAL LEACHATE ON PERIPHYTON COMMUNITIES
06/76 -IDENTIFIED STIMULARY AND INHIBITORY LEACHATE COMPONENTS
05/78 -IDENTIFY SYNERGISTIC OR AGNOSTIC LEACHATE INTERACTIONS
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003757 SSIE-GMA 2783 1 EPA -R803932-03 TASK-N625A-079
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: OBJECTIVE OF THIS PROJECT ARE: 1) TO QUANTIFY THE EFFECTS OF COAL LEACHATE ON SPECIES COMPOSITION AND STRUCTURES OF PERIPHYTON COMMUNITIES; 2) TO IDENTIFY LEACHATE COMPONENTS WITH INHIBITORY OR STIMULATOR EFFECTS; 3) TO ELUCIDATE POSSIBLE SYNERGISTIC OR ANTAGONISTIC INTERACTIONS AMONG LEACHATE COMPONENTS. APPROACH: PERIPHYTON COMMUNITIES ARE GROWN IN LABORATORY STREAMS ON ARTIFICIAL SUBSTRATES. THE BIOASSAY FACILITY UTILIZES WATER FROM LAKE SUPERIOR AND IS LOCATED AT THE EPA'S NATIONAL ENVIRONMENTAL RESEARCH LABORATORY IN DULUTH, MINNESOTA. IN EXPERIMENTS WHICH LAST FROM 3 TO 8 WEEKS, PERIPHYTON COMMUNITIES ARE DOSED WITH VARIOUS CONCENTRATIONS OF COAL LEACHARE, COAL DISTILLATE, OR FRACTIONS THEREOF, AND GROWTH RESPONSE IS MEASURED AS CHANGES IN BIOMASS (CHLOROPHYLL AND ASH-FREE DRY WEIGHT). ALGAL COMMUNITIES ARE ALSO EXAMINED MICROSCOPICALLY TO DETECT CHANGES IN SPECIES COMPOSITION AND DIVERSITY. CURRENT PLANS AND PROGRESS: COAL LEACHATE APPEARS TO STIMULATE THE GROWTH OF ALGAE. CURRENT EFFORTS ARE FOCUSING ON IDENTIFYING THE SPECIFIC CHEMICAL FACTORS RESPONSIBLE FOR THIS EFFECT.

**PROJECT: 03758-ORGANIC LEACHING AND PARTICULATE DISPERSION FROM COAL

STARTING/ COMPLETION DATE : 07/75 06/78 FUNDING ESTIMATED FY77 / $ 180000
TASK CODE=N625A-081 **EPA=R803952-03 ** (GRANT) PRIOR FY76 / $ 145839

EPA OFFICER.. DW KUEHL EPA/ERL DULUTH
INVESTIGATOR.. M SYDOR UNIVERSITY OF MINNESOTA
R CAPLE UNIVERSITY OF MINNESOTA
RM CARLSON UNIVERSITY OF MINNESOTA
MILESTONES.... 05/77 -CHLORINATION OF DISSOLVED POLYNUCLEAR AROMATICS
06/77 -QUANTITATION OF POLYNUCLEAR AROMATIC HYDROCARBONS IN H2O BY HPLC- GC
07/77 -A SELECTIVE SYNTHESIS OF POLYMETHYLATED NAPHTHALENES
07/77 -END ON 2ND YEAR PROGRESS REPORT
07/77 -TRANSPORT IN THE DULUTH HARBOR
06/77 -HEPATIC MIXED-FUNCTION OXIDASE ACTIVITY IN RAINBOW TROUT EXPOSED TO
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003758 SSIE-GMA 2758 2 EPA -R803952-03 TASK-N625A-081
AP -625A DU -N140 LABT-HEE
ABSTRACT..... A MAJOR THRUST OF THIS PROJECT WILL REMAIN THE MONITORING OF POLYNUCLEAR AROMATIC HYDROCARBONS (PAH'S) AT THE MICROPOLLUTANT LEVEL (PPM OR LESS). THE HIGH PRESSURE LIQUID CHROMATOGRAPHY-GAS CHROMATOGRAPHY (HPLC-GC) IDENTIFICATION METHODOLOGY DEVELOPED IN THESE LABORATORIES FOR THE ANALYSIS OF TRACE PAH'S IN COAL LEACHATES, AND IN GENERAL WATER SAMPLES, WILL BE EXTENDED AND APPLIED TO SUCH PROBLEMS AS THE BIOCONCENTRATION OF PAH'S IN FISH TISSUE, AIDING IN THE ANALYSIS OF "SECOND-ORDER" PAH'S (I.E., METABOLITIES, PHOTOCHEMICAL OXIDATION PRODUCTS, AQUEOUS DISINFECTION PRODUCTS), AND IN THE PAH ANALYSIS OF COAL STEAM DISTILLATES. THE ULTIMATE GOAL OF THE PROPOSED INVESTIGATION IS TO DETERMINE THE LONG RANGE INFLUENCE OF A COAL LOADING FACILITY ON A GREAT LAKE HARBOR IN TERMS OF TRANSPORT OF COAL PARTICULATE MATTER, USING PHYSICAL AND CHEMICAL MEASUREMENTS AND APPLICATION OF NUMERICAL MODELING FOR WATER QUALITY TO THE DULUTH-SUPERIOR HARBOR.

**PROJECT: 03761-THE IMPACT OF COAL-FIRED POWER PLANTS ON THE ENVIRONMENT

```
                    STARTING/ COMPLETION DATE : 07/75   07/78 :   FUNDING :  ESTIMATED   FY77  / $  339991
                    TASK CODE=N625A-082     **EPA=R803971-04  ** (GRANT)      PRIOR       FY76  / $  708405
EPA  OFFICER.  G  GLASS                  EPA/ERL   DULUTH
INVESTIGATOR.. OL LOUCKS                 UNIV OF WISCONSIN                     LETTERS & SCI/CHEM DEPT
MILESTONES.... 00/74 -COMPLETE BASE LINE DATA GATHERING-AIR, WATER, PLANTS AND ANIMALS
               03/76 -COMPLETE CONSTRUCTION IMPACTS OF POWER PLANT AND COOLING LAKE
               12/77 -COMPLETE DATA GATHERING ON SHORT-TERM IMPACTS OF OPERATION
               07/78 -COMPLETE DRAFT SITING CRITERIA DOCUMENT
               07/78 -COMPLETE MAJOR REPORTS ON ALL IMPACTS ON UNIT 1
               07/79 -COMPLETE DATA GATHERING ON SHORT-TERM IMPACTS OF UNIT 2
               07/80 -COMPLETE MAJOR REPORTS ON ALL IMPACTS OF UNITS 1 AND 2
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003761            SSIE-GMA  2772 1      EPA -R803971-04       TASK-N625A-082
               AP  -625A              DU  -N140            LABT-HEE
ABSTRACT...... THIS PROPOSAL REQUESTS SUPPORT TO CONTINUE INVESTIGATION OF ENVIRONMENTAL CHANGES DUE TO
                CONSTRUCTION AND OPERATION OF A COAL-FIRED POWER GENERATING STATION, TWO UNITS 527 MEGAWATTS EACH.
                ORIGINALLY RESEARCH WAS COMMENCED IN 1971 UNDER A GRANT FROM THREE WISCONSIN POWER COMPANIES. THE
                THIRD YEAR OF THE CURRENT PHASE OF THE PROJECT WILL BE COMPLETED IN JULY 1978. THE SITE IS ON THE
                FLOODPLAIN OF THE WISCONSIN RIVER NEAR PORTAGE, WISCONSIN. PRIMARY ATTENTION IS GIVEN TO THE IMPACT
                ON THE AQUATIC ENVIRONMENT. THE APPROACH IS INTER-DISCIPLINARY, WITH DISCRETE SECTIONS FOCUSED ON:
                AQUATIC INVERTEBRATES, FISH, HYDROGEOLOGY, WATER USE ANALYSIS, WETLANDS ECOLOGY, REMOTE SENSING,
                AQUATIC CHEMISTRY, HAZARDOUS CHEMICALS IN FISH, ASSESSMENT OF A COOLING SYSTEM, METEOROLOGY, AIR
                POLLUTION MODELLING, PLANT DAMAGE, TRACE ELEMENTS, ORGANIC CONTAMINANTS, PLUME CHEMISTRY, VISUAL
                CHANGES, MASS FLOW AND BALANCE OF WATER, AIR, AND CHEMICALS. DATA AVAILABLE THROUGH THE COLUMBIA
                DATA BANK, IES, MADISON. A PORTION OF THE STUDY IS DEVELOPING, IN CONCERT WITH THE WISCONSIN PUBLIC
                SERVICE COMMISSION, THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES, AND THREE WISCONSIN PUBLIC
                UTILITIES, CRITERIA FOR THE SITING OF GENERATING FACILITIES.
```

**PROJECT: 03839-EFFECTS OF THERMAL ADDITIONS ON THE DYNAMICS OF FOULING COMMUNITIES AT BEAUFORT, NC

```
                    STARTING/ COMPLETION DATE : 12/75   12/78     FUNDING    ESTIMATED   FY77  / $   70000
                    TASK CODE=P625A-01      **EPA=R803856-02  ** (GRANT)      PRIOR       FY75  / $   54702
EPA  OFFICER.. D  MILLER                 EPA/ERL   NARR
INVESTIGATOR.. JP SUTHERLAND             DUKE UNIV
               WW KIRBYSMITH             DUKE UNIV
MILESTONES.... 12/78 -FINAL REPORT ENTITLED "EFFECTS OF THERMAL ADDITIONS ON THE DYNAMI
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003839            SSIE-GMA  4249       EPA -R803856-02       TASK-P625A-01
               AP  -625A              DU  -N140            LABT-HEE
ABSTRACT...... CONSTRUCTION OF A LABORATORY SYSTEM WHICH WILL PROVIDE RUNNING SEAWATER AT AMBIENT TEMPERATURE AND
                AT 2 DEGREES C, 4 DEGREES C, AND 8 DEGREES C ABOVE AMBIENT. FOULING DEVELOPMENT AND CHANGES IN
                FOULING COMMUNITY STRUCTURE WILL BE FOLLOWED AT EACH TEMPERATURE FOR SEVERAL YEARS ON CLAY TILE
                PLATES (232 CM2) SUBMERGED IN OCTOBER 1975 AND APRIL 1976. LARVAL RECRUITMENT AT EACH TEMPERATURE
                WILL ALSO BE MONITORED. PARALLEL EXPERIMENTS WILL BE CONDUCTED SIMULTANEOUSLY ON PLATES SUBMERGED
                UNDER THE DUKE MARINE LAB DOCK. DATA WILL BE USED TO DETERMINE THE EFFECT OF HEATED EFFLUENTS ON
                COMMUNITY STRUCTURE AND FUNCTION.
```

**PROJECT: 03841-A FACILITY FOR THE EXPERIMENTAL ANALYSIS OF COASTAL MARINE ECOSYSTEMS

```
                    STARTING/ COMPLETION DATE : 07/77   06/78 :   FUNDING    ESTIMATED   FY77  / $  980000
                    TASK CODE=P625A-07      **EPA=R803902-03  ** (GRANT)      PRIOR       FY76  / $ 1960955
EPA  OFFICER.  ED SCHNEIDER              EPA/ERL   NARR
INVESTIGATOR.  JA KNAUSS                 UNIV OF RHODE ISLAND                 SCH OF OCEANOGRAPHY
               S  NIXON                  UNIV OF RHODE ISLAND                 SCH OF OCEANOGRAPHY
               M  PILSON                 UNIV OF RHODE ISLAND                 SCH OF OCEANOGRAPHY
               T  SMAYDA                 UNIV OF RHODE ISLAND                 SCH OF OCEANOGRAPHY
MILESTONES.... 06/78 -FINAL REPORT ENTITLED "A FACILITY FOR THE EXPERIMENTAL ANALYSIS O
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003841            SSIE-GMA  2735 1      EPA -R803902-03       TASK-P625A-07
               AP  -625A              DU  -N140            LABT-HEE
ABSTRACT...... OBJECTIVES: A) TO DEVELOP A FACILITY AND METHODOLOGY FOR THE EXPERIMENTAL ANALYSIS OF COASTAL MARINE
                ECOSYSTEMS AND THEIR RESPONSE TO ENERGY-RELATED ENVIRONMENTAL STRESSES B) TO RELATE THE
                EXPERIMENTAL RESULTS TO ECOSYSTEM THEORY AND ITS IMPLICATIONS FOR THE MANAGEMENT OF COASTAL MARINE
                ENVIRONMENTS. APPROACH: REPLICATE MESO-SCALE EXPERIMENTAL ECOSYSTEMS SIMULATING A VARIETY OF COMMON
                COASTAL MARINE ENVIRONMENTS WILL BE DEVELOPED AND MAINTAINED AT A SPECIAL SHORE-BASED LABORATORY. A
                NUMBER OF STRESSES OR ENVIRONMENTAL PERTURBATIONS ASSOCIATED WITH ENERGY DEVELOPMENT WILL THEN BE
                APPLIED OVER A RANGE OF INTENSITIES TO THESE SYSTEMS BEFORE, DURING, AND AFTER THE APPLICATION OF
                STRESS. SIMILAR FIELD EXPERIMENTS MAY ALSO BE CARRIED OUT ON A SMALL SCALE IN SOME ENVIRONMENTS.
                CURRENT PLANS: THE FIRST PROJECT WILL INVOLVE 9 SHORE-BASED EXPERIMENTAL WATER COLUMNS (5M DEEP X
                2M DIA.) WITH ASSOCIATED BOTTOM SEDIMENTS AND BENTHOS. THE MICROCOSMS WILL FIRST BE STUDIED FOR
                REPLICABILITY AND FOR DIFFERENCES BETWEEN TANKS THAT ARE RUN AS OPEN OR CLOSED SYSTEMS WITH RESPECT
                TO SEA-WATER FLOW. AFTER THIS PRELIMINARY WORK IS COMPLETED, A SERIES OF EXPERIMENTS INVOLVING THE
                ADDITION OF WATER SOLUBLE PETROLEUM HYDROCARBONS AT CONCENTRATIONS OF 100 AND 1000 UG/1 WILL BEGIN.
```

**PROJECT: 03863-ISOLATION AND STUDY OF CHLORO-ORGANICS RESULTING FROM CHLORINATION OF SEAWATER

```
                STARTING/ COMPLETION DATE : 07/75   05/79 :   FUNDING    ESTIMATED   FY77  / $  230000
                TASK CODE=Q625A-1-01   **EPA=R803893-03  ** (GRANT)      PRIOR       FY76  / $  350000
EPA  OFFICER.. WP DAVIS                EPA/ERL -GULF BREEZE
INVESTIGATOR.. JH CARPENTER            UNIV OF MIAMI                     MAR & ATMOS SCI/CHEM OCEANOGRAPHY
               CA SMITH                UNIV OF MIAMI                     MAR & ATMOS SCI/CHEM OCEANOGRAPHY
MILESTONES...: 05/79 -FINAL REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003863          SSIE-GMA  2478 2      EPA -R803893-03       TASK-Q625A-1-01
               AP  -625A            DU  -N140             LABT-HEE
```

ABSTRACT..... THE PROPOSED RESEARCH SEEKS TO IDENTIFY THE CHLORINE-CONTAINING AND BROMINE-CONTAINING ORGANIC COMPOUNDS THAT ARE FORMED WHEN CHLORINE IS ADDED TO SEAWATER. INITIAL EMPHASIS WOULD BE PLACED ON STUDY OF REACTION CONDITIONS THAT OCCUR DURING POWER PLANT OPERATION; I.E., UP TO 2 HOURS AT TEMPERATURES UP TO 38 DEGREES C WITH AND WITHOUT SUNLIGHT. TOTAL ORGANIC HALOGENATED COMPOUNDS YIELD WOULD BE MEASURED. THE REACTION PRODUCTS WOULD BE FRACTIONATED, USING SELECTIVE SOLUBILITY AND THIN LAYER CHROMATOGRAPHY. CHARACTERIZATION WOULD BE CARRIED OUT USING GAS CHROMATOGRAPHIC-MASS SPECTRAL TECHNIQUES AND ADDITIONAL CHARACTERIZATION WOULD BE BASED ON UV AND IR SPECTRA WITH NMR FOR SPECIAL CASES.

**PROJECT: 03864-ADP TECHNICAL SUPPORT SERVICES

```
                STARTING/ COMPLETION DATE : 10/76   09/77 :   FUNDING    ESTIMATED   FY77  / $   80000
                TASK CODE=Q625A-1-02   **EPA=D7-01000    ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. TT DAVIES               EPA/ERL -GULF BREEZE
INVESTIGATOR.: R  MCCUTCHEN            US GENERAL SERVS ADMIN
MILESTONES...: 05/77 -BEGIN DATA BASE MANAGEMENT SYSTEM
               12/77 -ATTACH STATISTICAL SERVICE NEEDS TO DATA BASE SERVICE
               06/78 -OPERATE WATER QUALITY MODELS FOR ESTUARIES
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003864          SSIE-ZMA  1112        EPA -D7-01000         TASK-Q625A-1-02
               AP  -625A            DU  -N140             LABT-HEE
```

ABSTRACT..... THE PURPOSE OF THIS IAG IS TO PROVIDE ADP TECHNICAL SERVICES IN SUPPORT OF THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, RESEARCH PROGRAM. THIS INCLUDES WORK IN SUPPORT OF THE BEARS BLUFF FIELD STATION OF THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE. THIS WILL INCLUDE SUPPORT OF THE MODELLING PROGRAM ON THE FATE, PERSISTENCE AND EFFECTS OF TOXIC MATERIALS ON COASTAL WATERS, STATISTICAL SERVICES IN THE LABORATORY AND DATA BASE MANAGEMENT OF THE TOXICOLOGY PROGRAM.

**PROJECT: 03866-SUBLETHAL EFFECTS OF CHLORINE ON VASCULAR PLANTS AND DECAPOD CRUSTACEANS

```
                STARTING/ COMPLETION DATE : 07/75   09/77 :   FUNDING    ESTIMATED   FY77  / $  112000
                TASK CODE=Q625A-1-03   **EPA=R803872-02  ** (GRANT)      PRIOR       FY76  / $   71000
EPA  OFFICER.. WP DAVIS                EPA/ERL -GULF BREEZE
INVESTIGATOR.. MH ROBERTS              VIRGINIA INST OF MARINE SCI
MILESTONES...: 09/77 -FINAL REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003866          SSIE-GMA  2635 2      EPA -R803872-02       TASK-Q625A-1-03
               AP  -625A            DU  -N140             LABT-HEE
```

ABSTRACT..... THE OBJECTIVES OF THE RESEARCH ARE TO DEFINE EFFECTS OF CONTINUOUS EXPOSURE TO CHLORINE ON LARVAL DEVELOPMENT, JUVENILE GROWTH, AND REPRODUCTIVE PARAMETERS, FOR TWO SELECTED MARINE DECAPOD CRUSTACEANS, PANEOPEUS HERBSTII AND PAGURUS LONGICARPUS. ADDITIONALLY THE EFFECTS OF CHLORINE ON DEVELOPMENT OF THE COOT CLAM, MULINIA LATERALIS, AND BLOOD SERUM CONSTITUENTS OF THE BLUE CRAB CALLINECTES SAPIDUS WILL BE STUDIED. PRELIMINARY DATA SUGGEST THAT RESPONSES OCCUR ONLY AT CHLORINE DOSES CLOSE TO THE LETHAL CONCENTRATION. RELIABLE TEST SYSTEMS DEVELOPED TO DATE WILL BE USED TO DEFINE CHLORINE EFFECTS.

**PROJECT: 03867-DETERMINE THE DYNAMICS OF DISPERSION AND DISSIPATION IN MARINE AND ESTUARINE WATERS AND THE EFFECTS ON MARINE AND ESTUARINE ORG

```
                STARTING/ COMPLETION DATE : 12/76   12/79 :   FUNDING    ESTIMATED   FY77  / $   48633
                TASK CODE=Q625A-1-04   **EPA=            ** (IN-HO)      PRIOR       FY76  / $  150000
               IN-HOUSE EFFORT   FY 77  /  00.0  YEARS  ; TOTAL PROJECT  00.0
EPA  OFFICER.:                         EPA/ERL -GULF BREEZE
INVESTIGATOR.: WP DAVIS                US EPA
               D  MIDDAUGH             US EPA
               A  BADGER               US EPA
MILESTONES.... 07/76 -PUBLISH CONFERENCE "ENVIRONMENTAL IMPACT OF WATER SHLORINATION
               12/77 -CONTRIBUTE TO AND HOLD CONFERENCE ON HALOGENATION
               10/78 -PRELIMINARY ASSESSMENT OF HALOGENATION
               12/79 -FINAL ASSESSMENT OF IMPACT OF TREATMENT
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003867          SSIE-ZMA  1108        TASK-Q625A-1-04       AP  -625A
               DU  -N140            LABT-HEE
```

ABSTRACT..... IDENTIFICATION AND QUANTIFICATION OF HALOGENATED COMPOUNDS FORMED WHEN CHLORINE IS ADDED TO SEAWATER. INITIAL EMPHASIS WILL DESCRIBE THE INORGANIC AND ORGANIC REACTIONS WHICH LEAD TO LONG-LASTING BYPRODUCTS. FOLLOWUP STUDIES WILL INVESTIGATE THE COMPLEX AND PHYSICAL CHEMICAL FATE OF IDENTIFIED COMPOUNDS IN SIMULATED AND NATURAL MARINE ECOSYSTEMS, INCLUDING COMPLEXING WITH SEDIMENTS, OR UPTAKE AND BIOACCUMULATION BY ORGANISMS. ANALYTICAL CAPABILITY WILL BE APPLIED BOTH TO ON-SITE EXPERIMENT INVESTIGATIONS AND COMMUNITY STUDIES BY THE BEARS BLUFF FIELD STATION OF THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE,

**PROJECT: 03869-EFFECTS OF COMPOUNDS PRODUCED FROM PETROLEUM UTILIZATION ON MARINE INVERTEBRATES WITH EMPHASIS ON NEOPLASIA AND CARCINOGENESIS

STARTING/ COMPLETION DATE : 07/76 05/78 FUNDING ESTIMATED FY77 / $ 20000
TASK CODE=Q625A-1-06 **EPA=R804427-02 ** (GRANT) PRIOR FY76 / $ 60440

EPA OFFICER.. JA COUCH EPA/ERL -GULF BREEZE
INVESTIGATOR.. MC MIX OREGON STATE UNIV SCH OF SCI/ATMOS SCI DEPT
MILESTONES.... 05/78 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003869 SSIE-GMA 2792 1 EPA -R804427-02 TASK-Q625A-1-06
AP -625A DU -N140 LABT-HEE
ABSTRACT..... OBJECTIVES: 1) TO DETERMINE THE CONCENTRATION (BODY BURDENS) OF SELECTED ENVIRONMENTAL CHEMICAL CARCINOGENS IN ECONOMICALLY-IMPORTANT MOLLUSKS AND CRUSTACEANS FROM OREGON BAYS, ESTUARIES AND INSHORE AREAS. 2) TO DETERMINE IF THERE IS A POTENTIAL PUBLIC HEALTH HAZARD TO MAN FROM CONSUMING SHELLFISH, HARVESTED FROM OREGON BAYS, ESTUARIES AND INSHORE AREAS, WHICH CONTAIN PETROLEUM BY-PRODUCTS THAT ARE CARCINOGENIC. 3) TO SURVEY POPULATIONS OF BIVALVE MOLLUSKS, DETERMINE THE INCIDENCE OF NEOPLASTIC DISEASES IN THESE POPULATIONS AND ASCERTAIN IF THERE IS ANY CORRELATION BETWEEN CARCINOGENIC BODY BURDENS AND THE INCIDENCES OF SUCH DISEASES. 4) TO IDENTIFY POINT SOURCES OF CHEMICAL CARCINOGENS THAT ARE PRESENT IN OREGON BAYS AND ESTUARIES UTILIZED IN THIS STUDY. 5) TO DETERMINE RATES OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBON UPTAKE AND ELIMINATION IN BIVALVE MOLLUSKS. EXTENSIVE PRELIMINARY INVESTIGATIONS HAVE BEEN CONDUCTED TO: DETERMINE WHICH OREGON BAYS WILL BE UTILIZED IN THE STUDY; ASCERTAIN WHICH SHELLFISH SPECIES WILL BE USED; LOCATE SITES AT WHICH SHELLFISH CAN BE CONTINUOUSLY SAMPLED. BIVALVE MOLLUSKS FROM DIFFERENT HABITATS IN THE VARIOUS BAYS ARE ANALYZED FOR THE PRESENCE AND AMOUNT OF BENZO(A)PYRENE (BAP) MONTHLY OR BI-MONTHLY. HISTOLOGICAL SECTIONS ARE PREPARED SO THAT DIAGNOSES CAN BE MADE AND NEOPLASTIC DISEASES, IF PRESENT, CAN BE IDENTIFIED

**PROJECT: 03870-FOOD WEBS, POPULATIONS, AND PRODUCTIVITY IN A SOUTHEAST COASTAL MARINE MARSH

STARTING/ COMPLETION DATE : 09/76 08/78 FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=Q625A-1-07 **EPA=R804688-02 ** (GRANT) PRIOR FY76 / $ 70000

EPA OFFICER.. WP DAVIS EPA/ERL -GULF BREEZE
INVESTIGATOR.. NA CHAMBERLAIN COLLEGE OF CHARLESTON
CK BIERNBAUM COLLEGE OF CHARLESTON
MILESTONES...: 08/78 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003870 SSIE-GMA 4147 EPA -R804688-02 TASK-Q625A-1-07
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: THE OBJECTIVE OF THIS STUDY IS TO ESTABLISH LIFE HISTORY AND ECOLOGICAL INFORMATION ABOUT SALT MARSH COMMUNITIES IN THE NORTH EDISTO ESTUARY, LEADENWAH MARSH. THIS SITE WAS CHOSEN BECAUSE OF ITS ISOLATION FROM EXCESSIVE INFLUENCE OF HUMAN ACTIVITIES. ADDITIONALLY THE SITE IS ADJACENT TO THE E.P.A. BEARS BLUFF FIELD STATION. THERE, STUDIES ON EFFECTS OF LOW LEVELS OF HALOGENATED POLLUTANTS UPON MIXED COMMUNITIES OF MARSH ORGANISMS ARE BEING DONE. STUDIES OF THE LIFE HISTORIES OF ORGANISMS ON THE OYSTER BEDS, MUD, AND MARSH GRASS HABITATS WILL SUPPLY VALUABLE BASELINE DATA ABOUT BREEDING CYCLES, ONTOGENY AND TROPHIC RELATIONSHIPS, THEREBY PROVIDING INSIGHT FOR THE ECOSYSTEM MODELS RUN AT AT BEARS BLUFF. THE BASIC STUDY PLAN COMBINES EXPERTISE IN MYCOLOGY, PLANT PHYSIOLOGY, PARASITOLOGY, GENETICS, INVERTEBRATE AND VERTEBRATE ZOOLOGY, AND ECOLOGY.THE SECOND YEAR OF THE STUDY WILL FOCUS MORE CLOSELY ON STUDIES ON PRODUCTIVITY AND TROPHIC RELATIONSHIPS AMONG THE MARSH ORGANISMS. UNDER CONSIDERATION (AMONG OTHER STUDIES) ARE HABITAT SELECTION AND TROPHIC RELATIONSHIPS OF: AMPHIPODS, FISHES, AND FISH LARVAE IN THE UPPER MARSH; INTERTIDAL AND SUBTIDAL BENTHIC CRUSTA

**PROJECT: 03871-AN INVESTIGATION OF THE ECOLOGICAL EFFECTS OF RESIDUAL OZONE TO SELECTED ESTUARINE SPECIES

STARTING/ COMPLETION DATE : 08/76 08/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=Q625A-1-08 **EPA=R804683-02 ** (GRANT) PRIOR FY76 / $ 80000

EPA OFFICER.. WP DAVIS EPA/ERL -GULF BREEZE
INVESTIGATOR.. DT BURTON PHIL ACADEMY OF NAT SCI
MILESTONES.... 08/78 -FINAL REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003871 SSIE-GMA 3301 1 EPA -R804683-02 TASK-Q625A-1-08
AP -625A DU -N140 LABT-HEE
ABSTRACT.....: A COOPERATIVE EFFORT IS PROPOSED BETWEEN THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA AND THE UNIVERSITY OF MARYLAND TO STUDY THE ECOLOGICAL EFFECT OF RESIDUAL OZONE TO SELECTED ESTUARINE SPECIES. WE PROPOSE TO DETERMINE THE TOXICITY OF RESIDUAL OZONE, BOTH LETHAL AND SUBLETHAL EFFECTS, TO SELECTED COMMERCIALLY AND/OR RECREATIONALLY IMPORTANT ESTUARINE FINFISH AND SHELLFISH SPECIES AND THEIR LIFE STAGES UNDER VARIOUS ENVIRONMENTAL CONDITIONS. WE WILL ALSO COMPARE THE TOXICOLOGICAL EFFECTS OF RESIDUAL OZONE TO THOSE OF RESIDUAL CHLORINE WHICH ARE BEING DETERMINED ON THE SAME SPECIES AND LIFE STAGES UNDER THE SAME EXPERIMENTAL REGIMES SET FORTH ABOVE. FINALLY, WE PROPOSE TO EVALUATE THE ENVIRONMENTAL ACCEPTABILITY OF OZONE AS AN ALTERNATIVE TO CHLORINE.

**PROJECT: 03872-DESIGN OF EXPERIMENTS, STATISTICAL ANALYSES, AND EVALUATION OF AQUATIC RESEARCH DATA

```
                STARTING/ COMPLETION DATE : 10/76   10/78 :   FUNDING    ESTIMATED   FY77  / $   45675
                TASK CODE=Q625A-1-09   **EPA=R805007-01  ** (GRANT)      PRIOR       FY76  / $   33000
EPA  OFFICER.. WP DAVIS                  EPA/ERL -GULF BREEZE
INVESTIGATOR.. RG DOMEY                  UNIV OF TEXAS                    SOUTH TEXAS MED SCH/BIOENGIN DEPT
               BA MAASKANT               UNIV OF TEXAS                    SOUTH TEXAS MED SCH/BIOENGIN DEPT
MILESTONES.... 10/78   FINAL REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003872          SSIE-GMA  3459        EPA -R805007-01       TASK-Q625A-1-09
               AP  -625A            DU  -N140             LABT-HEE
ABSTRACT...... OBJECTIVES: CONSULTATION ON DESIGNS OF RESEARCH ANALYSIS OF AQUATIC RESEARCH DATA, INCLUDING
                EVALUATION AND INTERPRETATION OF RESEARCH RESULTS WHEN REQUIRED. APPROACH: THE APPROACH IS
                MATHEMATICAL/STATISTICAL ACCOMPANIED BY APPROPRIATE GRAPHIC REPRESENTATION. PROGRESS: CERTAIN
                PRELIMINARY PILOT STATISTICAL PROGRAMS HAVE BEEN TESTED AND THE RESULTS ARE ON FILE AT THE GULF
                BREEZE ENVIRONMENTAL RESEARCH LABORATORY, BEARS BLUFF FIELD STATION, P. O. BOX 368, JOHNS ISLAND,
                SOUTH CAROLINA. CURRENT PLANS: PROCEED, AS REQUIRED; DESIGNS OF EXPERIMENTS, FURTHER DEVELOPMENT OF
                STATISTICAL METHODS, DATA ANALYSIS, EVALUATION AND INTERPRETATION OF RESULTS, AS NEEDED.
```

**PROJECT: 03878-ENVIRONMENTAL EFFECTS OF OFFSHORE DRILLING AND OIL ON THE MARINE ENVIRONMENT

```
                STARTING/ COMPLETION DATE : 04/77   12/78 :   FUNDING :  ESTIMATED   FY77  / $  439988
                TASK CODE=Q625A-2-1    **EPA=D7-01134    ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. NL RICHARDS               EPA/ERL -GULF BREEZE
INVESTIGATOR.. N  SCHUH                  US DOD                           NAVY
MILESTONES...  12/77 -COMPLETE FIELD TESTS, PHASE I
               05/78 -REPORT ON FIELD TESTS, PHASE I
               05/78 -START FIELD TESTS PHASE II
               12/78 -COMPLETE FIELD TESTS PHASE II
               12/79 -REPORT ON FIELD TESTS PHASE II
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-003878          SSIE-ZMA  1114        EPA -D7-01134         TASK-Q625A-2-1
               AP  -625A            DU  -N140             LABT-HEE
ABSTRACT...... THE WORK TO BE FUNDED UNDER THIS IAG INCLUDES THE CONDUCT OF RESEARCH TO (1) DETERMINE THE
                ENVIRONMENTAL EFFECTS OF OFFSHORE OIL EXTRACTION, AND (2) ASSESS THE EFFECTS ON THE MARINE
                ENVIRONMENT OF BUNKER C FUEL DERIVED FROM SHALE OIL. IN ORDER TO SIMULATE THE CONDITIONS OF THE
                MARINE ENVIRONMENT, THE USE OF THE STAGE I OFFSHORE PLATFORM OWNED AND MAINTAINED BY THE NCSL,
                PANAMA CITY, FLORIDA, WILL BE R
```

**PROJECT: 03879-TOXICITY TO MARINE ORGANISMS OF PETROCHEMICALS & ENERGY RELATED ORGANIC SOLVENTS DERIVED FROM OFF-SHORE ACTIVITIES & OCEAN DUMPING (

```
                STARTING/ COMPLETION DATE : 10/76   10/78 :   FUNDING :  ESTIMATED   FY77  / $   20000
                TASK CODE=Q625A-2-2    **EPA=            ** (IN-HO)      PRIOR       FY76  / $  100000
               IN-HOUSE EFFORT   FY 77  /  00.0  YEARS  ; TOTAL PROJECT  00.0
EPA  OFFICER..                           EPA/ERL -GULF BREEZE
INVESTIGATOR.. NL RICHARDS               US EPA
               S  SCHIMMEL               US EPA
               S  TAGATZ                 US EPA
MILESTONES.... 09/77 -PROGRESS REPORT
               10/78 -FINAL REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-003879          SSIE-ZMA  1113        TASK-Q625A-2-2        AP  -625A
               DU  -N140            LABT-HEE
ABSTRACT...... OFFSHORE PETROLEUM EXTRACTION MAY AFFECT MARINE ORGANISMS AND ECOSYSTEMS IN THE GULF OF MEXICO AND
                OTHER AREAS UNDERGOING INTENSIFIED PETROLEUM EXPLOITATION, EXTRACTION, AND TRANSPORTATION
                ACTIVITIES. THE RESEARCH OBJECTIVE IS TO ASSESS THE EFFECTS OF THESE EMISSIONS ON MARINE ORGANISMS
                AND COMMUNITIES. BIOASSAYS ON SINGLE SPECIES AND COMMUNITIES WILL BE CONTINUED ON SELECTED
                COMPONENTS OF DRILLING MUDS. WORK WILL BE INITIATED ON WHOLE DRILLING MUDS AND OTHER POLLUTANTS
                EMITTED FROM EXTRACTION ACTIVITIES SUCH AS CUTTING AND MAN-MOBILIZED PETROL
```

**PROJECT: 04038-ASSESSMENT OF IMPACTS OF MINING AND AIRBORNE POLLUTANTS ON FOREST, RANGE, AND RELATED FRESHWATER ECOSYSTEMS

```
                STARTING/ COMPLETION DATE : 00/75   00/79 :   FUNDING    ESTIMATED   FY77  / $  513000
                TASK CODE=V625A-11     **EPA=D5-E764     ** ( IAG )      PRIOR       FY76  / $ 1395000
EPA  OFFICER.. CW HALL                   EPA/HDQTRS- OEMI
INVESTIGATOR..    UNKNOWN                USDA                             FOREST SERV
MILESTONES...: 01/78 -SEAM ALERT DATABASE ANNOUNCEMENTS
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004038          SSIE-GMA  4682        EPA -D5-E764          TASK-V625A-11
               AP  -625A            DU  -N140             LABT-EMI
ABSTRACT...... ASSESS QUALITY OF WATER IN WATER BODIES IN STRIP-MINED AREAS AS IT RELATES TO HABITAT FOR AQUATIC
                ORGANISMS AND WILDLIFE SPECIES ASSOCIATED WITH THESE WATER BODIES. ASSESS TECHNOLOGIES FOR
                REDEPOSITING AND STABILIZING MINE SPOILS TO INCLUDE IDENTIFICATION OF TECHNOLOGIES THAT WILL KEEP
                WATER QUALITY WITHIN ACCEPTABLE LIMITS FOR AQUATIC ORGANISMS AND ASSOCIATED WILDLIFE SPECIES.
                ASSESS EFFECTS OF MINING-RELATED TRANSPORTATION SYSTEMS ON WATER, AIR, SOIL, PLANT, ANIMAL, AND
                ESTHETIC RESOURCES. DEVELOP OPERATIONAL TECHNICAL INFORMATION SYSTEM FOR RECLAMATION OF LANDS
                AFFECTED BY MINING.
```

**PROJECT: 04039-REVEGETATION AND RECLAMATION OF LAND AREAS DISTURBED BY MAN (ENVIRONMENTAL AND HEALTH)

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING : ESTIMATED FY77 / $ 330000
TASK CODE=V625A-24 **EPA=D7-E763 ** (IAG) PRIOR FY76 / $ 789000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. OL BENNETT USDA AGRIC RES SERV
RF FOLLETT USDA AGRIC RES SERV
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004039 SSIE-GMA 4670 EPA -D7-E763 TASK-V625A-24
AP -625A DU -N140 LABT-EMI

ABSTRACT.....: OBJECTIVES: A) TO DEVELOP RECLAMATION PLANNING INFORMATION, B) TO DETERMINE EFFECTS OF STRIP MINING AND RECLAMATION PROCESSES ON THE QUANTITY AND QUALITY OF WATER, C) TO UTILIZE RECLAIMED LAND FOR PRODUCTION OF SPECIALTY AND OTHER CROPS. APPROACH: GREENHOUSE, GROWTH-CHAMBER, AND FIELD EXPERIMENTS ARE CONDUCTED TO DETERMINE THE EFFECTS OF VARIOUS TREATMENTS AND PRACTICES. HYPOTHESES ARE TESTED USING FIELD PLOTS AND OTHER EXPERIMENTAL TECHNIQUES TO DETERMINE THE EFFECTS OF TREATMENTS AND PRACTICES SO THAT PLANNERS, MINE OPERATORS AND OTHERS CAN USE THIS INFORMATION AS NEEDED. CURRENT YEAR PLANS AND/OR PROGRESS: STUDIES ARE BEING CONDUCTED ON WEATHERING, LEACHING, AND OTHER CHANGES IN MINE SPOILS WITH TIME. GUIDANCE IS BEING DEVELOPED FOR ANALYZING AND ASSESSING SPOIL MATERIAL. MATHEMATICAL MODELS ARE BEING DEVELOPED TO HELP PREDICT THE EFFECTS OF STRIP MINING AND RECLAMATION PRACTICES ON THE QUALITY AND QUANTITY OF WATER LEAVING MINED AREAS. USE OF FERTILIZERS, AMENDMENTS, AND MANAGEMENT PRACTICES ARE BEING USED TO ESTABLISH AND GROW SPECIALTY AND OTHER CROPS; THE NUTRITIONAL QUALITY IS BEING DETERMINED.

**PROJECT: 04040-ESTABLISHMENT OF SEVERAL CROP ROTATIONS ON RESTORED SOILS AT A COAL SURFACE MINE

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V625A-26 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: S HENNING IOWA STATE UNIV OF SCI & TECH AGRIC EXP STA/AGRIC ENG
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004040 SSIE-GMA 4665 EPA -D7-E762 TASK-V625A-26
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: INITIATE SYSTEMS OF CROP ROTATIONS TO DETERMINE THEIR ADAPTATION TO RESTORED SOILS AT A COAL SURFACE MINE; DETERMINE THE YIELD AND ECONOMIC RETURN FROM EACH CROP AND CROP ROTATION SYSTEM. APPROACH: SIX CROP ROTATIONS WILL BE INITIATED: (1) CONTINUOUS CORN, (2) CORN-SOYBEAN, (3) CORN-OATS-MEADOW, (4) PERMANENT MEADOW (GRASS), (5) PERMANENT MEADOW (LEGUME), AND (6) WINTER WHEAT WITH A SOYBEAN DOUBLE CROP WHEN POSSIBLE. EACH CROP YEAR OF INDIVIDUAL ROTATIONS WILL APPEAR YEARLY. A SUBSOIL TILLAGE TREATMENT WILL BE CONDUCTED ON ONE-HALF OF ALL PILOTS. A COMPLETE BLOCK EXPERIMENTAL DESIGN WILL BE EMPLOYED AND ALL TREATMENTS WILL BE REPLICATED THREE TIMES. PLANT EMERGENCE, PLANT DENSITY AND YIELDS WILL BE MEASURED. ECONOMIC RETURNS WILL BE CALCULATED BY SUBTRACTING PRODUCTION COSTS FROM THE MARKET VALUE OF THE CROP. PLANT SAMPLES AND SOIL SAMPLES WILL BE OBTAINED YEARLY AND FERTILIZER RATES WILL BE ADJUSTED TO OBTAIN MAXIMUM OR NEAR-MAXIMUM YIELDS. CURRENT PLANS: PLOT LAYOUTS HAVE BEEN DRAWN AND WILL BE IMPLEMENTED IN THE SPRING OF 1978. PLOTS WILL BE PLACED FOLLOWING THE INSTALLATION OF AN INTERCEPT TILE DRAIN AND FINAL LAND LEVELING OPERATIONS.

**PROJECT: 04041-IDENTIFYING AND PREVENTING SULFUR-RELATED PROBLEMS IN SOILS CREATED IN COAL MINING OPERATIONS

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=V625A-27 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: DS FANNING UNIV OF MARYLAND AGRIC EXP STA
MILESTONES...: 03/78 -METHODS RESEARCH COMPLETE
06/78 -PRESENT CLASSIFICATION PAPER AT ISSC
09/79 -EVALUATION OF WEATHERING
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004041 SSIE-GMA 4666 EPA -D7-E762 TASK-V625A-27
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: 1. A) TECHNIQUES FOR MEASURING SULFUR IN COAL-RELATED ROCKS AND SOILS AND B) TO STUDY THE DISTRIBUTION AND KINDS OF SULFUR IN GEOLOGIC COLUMNS, SPOILS AND SOILS. 2. PLANNING FOR BURIAL OF SULFIDIC MATERIALS TO PREVENT ELEVATED ACIDITY PROBLEMS TO GROWING PLANTS AND IN DRAINAGE WATERS. STUDY ACIDITY FROM SULFUR OXIDATION. DEVELOP CORRECTIVE MINING SPECIFICATIONS. 3. IMPROVED CLASSIFICATION SCHEMES FOR SOILS IN COAL MINING OPERATIONS TO INCLUDE SPECIAL CLASSES FOR THOSE SOILS WITH SULFURIC HORIZONS AND OR SULFIDIC MATERIALS. APPROACH: 1. FUSION OF SOIL OR ROCK SAMPLE WITH LIBO2, LI2B4O7, OR NA2 CO3 PRIOR TO X-RAY ANALYSIS. EMPLOY X-RAY FLUORESCENCE TO DISTINGUISH SULPHATE S FROM SULFIDE S. DETERMINE X-RAY INTENSITY PER UNIT OF S IN AN UNFUSED SAMPLE AND MEASURE EFFECT OF ADDITIONS OF VARIOUS FORMS. DEVELOP ORGANOLEPTIC S TEST. APPLY TO MARYLAND SPOILS. 2. EXPERIMENTAL BURIAL OF SULFIDIC MATERIALS FOR 1 YEAR, THEN EVALUATE WEATHERING. STUDY WEATHERING IN SULFIDE-BEARING UNDISTURBED ROCKS AND SPOILS. 3. DESCRIBE AND DOCUMENT THE SOIL CHARACTERISTICS OF SULFIDIC AND SULFURIC HORIZONS CREATED BY MINING. DEVELOP CLASSIFICATION SCHEME FOR SUCH ACIDIC MINESOILS UNDER USDA TAXONOMY OF SOILS. ATTEMPT AREAL MAP DELINEATION OF DESCRIBED MINE SOILS. CURRENT PLANS: METHODS RESEARCH WILL BE DONE IN FALL AND WINTER 1977-8. BURIAL EXPERIMENTS WILL BE SET OUT IN AUTUMN 1978. EVALUATIONS OF WEATHERING IN 1979. CLASSIFICATION OF MAN-MADE MINE SOILS WILL BE ON-GOING. A CLASSIFICATION PAPER WILL BE PREPARED FOR PRESENTATION AT THE INTERNATIONAL SOIL SCIENCE CONGRESS IN EDMONTON IN JUNE, 1978.

**PROJECT: 04042-SOIL PROFILE CHARACTERISTICS OF RESTORED SOILS AT A COAL SURFACE MINE
706-15-13

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=V625A-28 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. W SCHOLTES IOWA STATE UNIV OF SCI & TECH AGRIC EXP STA/AGRIC ENG
MILESTONES.... 01/78 -COLLECT CORE SAMPLES
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004042 SSIE-GMA 4654 EPA -D7-E762 TASK-V625A-28
AP -625A DU -N140 LABT-EMI
ABSTRACT..... DETERMINE SOIL PROFILE CHARACTERISTICS OF SOIL RESTORED AT A COAL SURFACE MINE AND DETERMINE CHANGES IN THE RESTORED SOIL PROFILE RESULTING FROM INITIAL TILLAGE AND CROPPING OPERATIONS. COLLECT SAMPLES (CORES) FOR DESCRIPTION OF RESTORED SOIL PROFILES AND DETERMINATION OF SELECTED PHYSICAL AND CHEMICAL PROPERTIES. THE PROJECT IS JUST UNDERWAY AND ONE TRANSECT OF 9 CORES HAS BEEN OBTAINED FOR INITIAL ANALYSES.

**PROJECT: 04043-DEEP TILLAGE STUDIES ON RECLAIMED LOESS AND GLACIAL TILL 706-15-11

STARTING/ COMPLETION DATE : 10/77 - 10/79 : FUNDING ESTIMATED FY77 / $ 27000
TASK CODE=V625A-29 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. CE ANDERSON IOWA STATE UNIV OF SCI & TECH AGRIC EXP STA/AGRIC ENG
MILESTONES.... 04/78 -BEGIN DEEP TILLAGE OPERATIONS
06/78 -FIRST RAINFALL SIMULATOR RUNS
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-004043 SSIE-GMA 4653 EPA -D7-E762 TASK-V625A-29
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: TO EVALUATE THE EFFECTIVENESS OF DEEP TILLAGE IN COMBATING THE PROBLEMS OF COMPACTION ON LOESS & GLACIAL TILL FOUND IN OVERBURDEN FROM SURFACE COAL MINING IN THE MIDWEST; TO COMPARE WATER INTAKE, EROSION RATES & CROP YIELD RESPONSE TO NORMAL CHISEL PLOWING AND 3 DIFFERENT DEEP TILLAGE PRACTICES APPLIED DURING THE FIRST YEAR AFTER RECLAMATION; TO EVALUATE EFFECT OF TIME ON RESPONSE TO DEEP TILLAGE; TO EVALUATE EFFECT OF FIELD SLOPE ON THE RESPONSE TO DEEP TILLAGE; TO EVALUATE THE EFFECT OF 2 DIFFERENT CROPS ON RESPONSE TO DEEP TILLAGE. APPROACH: PLOTS WILL BE ESTABLISHED ON RECLAIMED SPOIL AT THE IOWA COAL PROJECT DEMONSTRATION MINE. TILLAGE TREATMENTS WILL INCLUDE CONVENTIONAL CHISEL PLOWING, SUBSOILING TO 18" ONE-WAY, SUBSOILING TO 18" IN 2 PERPENDICULAR DIRECTIONS, AND SUBSOILING TO 30" ONE-WAY. TWO CROPS, CORN & GRASS-LEGUME MEADOW, WILL BE STUDIED & PLOT SLOPES OF 3-5% AND 10%. EACH TREATMENT COMBINATION WILL BE REPLICATED TWICE. A ROTATING BOOM RAINFALL SIMULATOR WILL BE USED TO APPLY CONTROLLED SIMULATED STORMS ON 3 DIFFERENT OCCASIONS EACH YEAR. MEASUREMENTS WILL BE MADE ON DEPTH, INTENSITY & DURATION OF SIMULATED RAINFALL & SURFACE RUNOFF, SEDIMENT DISCHARGE & CHANGES IN SOIL MOISTURE. SOIL PHYSICAL PROPERTIES & CROP YIELDS WILL BE MEASURED FOR EACH PLOT. CURRENT PLANS: BECAUSE OF THE UNUSUALLY WET FALL AT THE SITE, DEEP TILLAGE OPERATIONS WERE DELAYED UNTIL SPRING. RAINFALL SIMULATOR PLOT EQUIPMENT IS BEING ASSEMBLED AND IN THE SPRING 64 PLOTS WITH GRASS-LEGUME AND CORN WILL BE PLANTED. THE FIRST SIMULATOR RUNS ARE PLANNED FOR EARLY JUNE.

**PROJECT: 04045-ENVIRONMENTAL ASSESSMENT OF NORTHERN PUGET SOUND & THE STRAIT OF JUAN DE FUCA

STARTING/ COMPLETION DATE : 09/75 09/80 : FUNDING ESTIMATED FY77 / $ 963000
TASK CODE=V625A-34 **EPA=D6-E693-EN ** (IAG) PRIOR FY76 / $ 2069000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. HS HARRIS US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
HS HARRIS SW WASH RES UNIT
ER LONG US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
R KOPENSKI US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
MILESTONES...: 06/80 -FINAL REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004045 SSIE-GMA 4683 EPA -D6-E693-EN TASK-V625A-34
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THIS PROJECT IS DESIGNED TO PROVIDE THE ECOLOGICAL AND ENVIRONMENTAL DATA NECESSARY FOR MAKING MANAGEMENT DECISIONS CONCERNING REGIONAL PETROLEUM DEVELOPMENT, AND FOR ASSESSING THE POTENTIAL IMPACT OF PETROLEUM HYDROCARBONS UPON THE ECOSYSTEM. THE RESULTS OF THIS RESEARCH WILL BE IMMEDIATELY APPLICABLE TO DECISIONS ON THE LOCATION OF DEEPWATER PORTS, EXPANSION OF REFINERY CAPACITY AT EXISTING REFINERY SITES VERSUS THE CONSTRUCTION AT NEW SITES, AND THE REGULATION OF TANKER TRAFFIC IN THE STRAIT OF JUAN DE FUCA AND NORTHERN PUGET SOUND. INVESTIGATIONS ARE BASED UPON EXISTING ECOLOGICAL AND ENVIRONMENTAL DATA AND INCLUDE BOTH FIELD AND LABORATORY RESEARCH. PRIORITY IS GIVEN TO EVALUATION OF THE ECOLOGICAL FACTORS AT RISK FROM LARGE OIL SPILLS. SECONDARY PRIORITY IS GIVEN TO DETERMINATION OF THE EFFECTS OF CHRONIC OIL DISCHARGES ASSOCIATED WITH TRANSPORT, TRANSFER, AND PROCESSING OF OIL AND OIL PRODUCTS. OUTPUT PRODUCTS WILL INCLUDE: (1) A DETAILED CHARACTERIZATION OF THE MAJOR MARINE BIOLOGICAL POPULATIONS AT RISK, (2) A DESCRIPTION OF THE PHYSICAL AND CHEMICAL PROCESSES WHICH TRANSPORT PETROLEUM HYDROCARBONS THROUGH THE ECOSYSTEM, (3) A BASELINE OF THE PRESENT OCCURRENCE AND VARIABILITY OF PETROLEUM HYDROCARBONS IN THE MARINE ECOSYSTEM, AND (4) A STATE-OF-THE-ART OIL SPILL TRAJECTORY MODEL FOR NORTHERN PUGET SOUND AND THE STRAIT OF JUAN DE FUCA.

**PROJECT: 04047-ENVIRONMENTAL ASSESSMENT OF AN ACTIVE OIL FIELD IN THE NORTHWESTERN GULF OF MEXICO

STARTING/ COMPLETION DATE : 09/75 09/80 FUNDING ESTIMATED FY77 / $ 665000
TASK CODE=V625A-35 **EPA=D6-E693-EO ** (IAG) PRIOR FY76 / $ 1611000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. CW CAILLOUET US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
CW CAILLOUET US DOC
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004047 SSIE-GMA 4680 EPA -D6-E693-EO TASK-V625A-35
AP -625A DU -N140 LABT-EMI

ABSTRACT..... A DETAILED MULTI-YEAR ENVIRONMENTAL ASSESSMENT OF THE BUCCANEER OIL AND GAS FIELD WAS INITIATED IN APRIL 1976. THE BUCCANEER FIELD IS APPROXIMATELY 32 MILES SOUTH-SOUTHEAST OF GALVESTON, TEXAS, IS RELATIVELY ISOLATED FROM OTHER OIL AND GAS FIELDS AND HAS BEEN IN PRODUCTION FOR 17 YEARS. THE OBJECTIVES OF THE STUDY ARE: (1) TO IDENTIFY ANL DOCUMENT THE EXTENT AND TYPES OF BIOLOGICAL, CHEMICAL AND PHYSICAL ALTERATIONS IN A MARINE ECOSYSTEM THAT ARE ASSOCIATED WITH THE DEVELOPMENT OF AND PRODUCTION OF DISCHARGES FROM AN OIL FIELD; (2) TO DETERMINE THE SPECIFIC POLLUTANTS, THEIR QUANTITY, AND EFFECTS ON THE VARIOUS COMPONENTS OF THE MARINE ECOSYSTEM; AND (3) TO DEVELOP CAPABILITIES TO DESCRIBE AND PREDICT FATE AND EFFECTS OF OIL FIELD DISCHARGE CONSTITUENTS IN MAJOR COMPONENTS OF THE MARINE ECOSYSTEM. THE PROJECT WILL USE HISTORICAL AND NEW DATA TO DESCRIBE AND QUANTIFY THE BIOLOGICAL, CHEMICAL, AND PHYSICAL CHARACTERISTICS AND THE TEMPORAL VARIATIONS OF THESE CHARACTERISTICS IN THE ENVIRONMENTS OF AN ACTIVE FIELD. IN THIS SECOND YEAR OF RESEARCH, AN INTENSIVE INVESTIGATION OF ENVIRONMENTAL AND ECOSYSTEM VARIABLES WITHIN THE OIL AND GAS FIELD IS BEING CONDUCTED, WITH A VIEW TOWARD COMPARISON BETWEEN PRODUCTON PLATFORMS FROM WHICH PRODUCTION BRINES AND OTHER EFFLUENTS ARE RELEASED AND SATELLITE PLATFORMS (WELL JACKETS) WITH NO EFFLUENTS. ACADEMIC INSTITUTIONS PARTICIPATING IN THE RESEARCH INCLUDE RICE UNIVERSITY AND UNIVERSITY OF HOUSTON WITH ONE PRIVATE FIRM, LGL, INC. OF BRYAN, TEXAS, ALSO HAVING A MAJOR RESEARCH ROLE.

**PROJECT: 04048-FIELD AND FILT/UNFILT FIELD EXPOSURE CHAMBER STUDIES OF THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON CROP AND FOREST SPECIES

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 150000
TASK CODE=V625A-40 **EPA=D6-E721-DO ** (IAG) PRIOR FY76 / $ 363000

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: JC NOGGLE US TVA
HC JONES US TVA
NT LEE US TVA
C MCDUFFIE US TVA
MILESTONES.... 07/78 -MAJOR REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004048 SSIE-GMA 4674 EPA -D6-E721-DO TASK-V625A-40
AP -625A DU -N140 LABT-EMI

ABSTRACT..... THESE STUDIES ARE AIMED AT CHARACTERIZING UNDER FIELD CONDITIONS THE RELATIONSHIPS OF POLLUTION DOSE AND EFFECTS ON FOLIAR APPEARANCE, GROWTH, AND YIELD OF SELECTED CROP AND FOREST SPECIES (INCLUDING SOYBEANS, WHEAT, COTTON, AND VIRGINIA PINE). A FIELD STUDY HAS BEEN CONDUCTED DURING TWO GROWING SEASONS IN THE VICINITY OF A COAL-FIRED POWER PLANT. CONTROL CROPS WERE GROWN UTILIZING AN AIR-EXCLUSION SYSTEM THAT OPERATED WHEN AMBIENT SO2 CONCENTRATIONS EXCEEDED 0.1 PPM. FOLIAR APPEARANCE, GROWTH, AND YIELD OF CROPS EXPOSED TO AMBIENT AIR SO2 CONCENTRATIONS WERE COMPARED TO THE CONTROL CROPS. A MILESTONE REPORT TO EPA DISCUSSING THE SELECTION AND CHARACTERIZATION OF EXPERIMENTAL PLOTS AND TESTING OF THE AIR-EXCLUSION SYSTEM WILL BE AVAILABLE IN EARLY FY 1978.

**PROJECT: 04050-EFFECTS OF EMISSIONS FROM COAL-FIRED POWER PLANTS ON SOYBEANS AND OTHER CROPS OF ECONOMIC IMPORTANCE TO SOUTHEAST US (ABBREV)

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 45000
TASK CODE=V625A-42 **EPA=D6-E721-DO ** (IAG) PRIOR FY76 / $ 121000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. JC NOGGLE US TVA
HC JONES US TVA
NT LEE US TVA
C MCDUFFIE US TVA
FP WEATHERFORD US TVA
MILESTONES.... 06/78 -REPORT ON EXPOSURE CHAMBER DESIGN
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004050 SSIE-GMA 2953 1 EPA -D6-E721-DO TASK-V625A-42
AP -625A DU -N140 LABT-EMI

ABSTRACT.....: THE STUDIES INVOLVE ACUTE AND CHRONIC CONTROLLED EXPOSURE STUDIES OF THE EFFECTS OF SO2, NO2, O3, AND COMBINATIONS OF THESE POLLUTANTS ON THE GROWTH AND/OR YIELD OF SOYBEANS, COTTON, WHEAT, AND VIRGINIA PINE GROWN AND EXPOSED UNDER SEVERAL ENVIRONMENTAL REGIMES. RESPONSES MEASURED INCLUDE VISIBLE INJURY, GROWTH, YIELD, RESPIRATION, AND PHOTOSYNTHESIS. A MILESTONE REPORT TO EPA DESCRIBING THE DESIGN, CONSTRUCTION, AND TESTING OF AN EXPOSURE CHAMBER WILL BE AVAILABLE JUNE 197

**PROJECT: 04052-TRANSFER, FATE, AND EFFECTS OF SOX, NOX, AND ACID PRECIPITATION ON A TERRESTRIAL ECOSYSTEM REPRESENTATIVE OF THE TENNESSEE VALLEY

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 184000
TASK CODE=V625A-43 **EPA=D6-E721-DO ** (IAG) PRIOR FY76 / $ 430000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. JM KELLY US TVA
HC JONES US TVA
JC NOGGLE US TVA
MILESTONES.... 01/79 -REPORTS ON STUDY OBJECTIVES AND AREA ECOLOGY
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004052 SSIE-GMA 2952 1 EPA -D6-E721-DO TASK-V625A-43
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THESE STUDIES IS THE CHARACTERIZATION AND QUANTIFICATION OF THE TRANSFER, FATE, AND EFFECTS OF SOX, NOX, AND ACID PRECIPITATION OF FORESTED ECOSYSTEMS TYPICAL OF THE TENNESSEE VALLEY. FIELD STUDIES INCLUDE THE DEVELOPMENT OF SULFUR AND NITROGEN BUDGETS FOR FORESTED WATERSHEDS INCLUDING MEASUREMENTS OF WET AND DRY ATMOSPHERIC INPUT. INSTALLATION OF INSTRUMENTATION HAS BEEN COMPLETED AT ONE SITE AND IS PROGRESSING ON THE OTHER SITE. AN INTERNAL REPORT SUMMARIZING ACTIVITIES AND PROGRESS IN FY 1976 WAS PRODUCED DURING FY 1977. AN ACID RAIN SIMULATOR SYSTEM HAS BEEN DEVELOPED AND IS BEING UTILIZED TO EVALUATE PLANT AND SOIL RESPONSE TO VARIOUS PRECIPITATION PH LEVELS. A MILESTONE REPORT COVERING THE OBJECTIVES, FACILITIES, AND ECOLOGICAL CHARACTERISTICS OF THE STUDY AREAS WILL BE WRITTEN DURING THE CURRENT FISCAL YEAR AND SHOULD BE AVAILABLE DURING EARLY FY 1979.

**PROJECT: 04054-BENEFICIAL EFFECTS OF SO2 EMISSIONS FROM COAL-FIRED POWER PLANTS ON CROP AND FOREST SPECIES

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 44000
TASK CODE=V625A-44 **EPA=D5-E721-DO ** (IAG) PRIOR FY76 / $ 105000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. JC NOGGLE US TVA
HC JONES US TVA
MILESTONES...: 04/78 -REPORTS ON TWO YEAR'S DATA
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004054 SSIE-GMA 2951 1 EPA -D5-E721-DO TASK-V625A-44
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THIS STUDY INVOLVES THE EVALUATION OF ECONOMIC BENEFITS OF SULFUR DEPOSITION FROM THE ATMOSPHERE ON CROP AND FOREST SPECIES. A TECHNIQUE FOR MEASURING THE ACCUMULATION OF SULFUR BY PLANTS FROM THE ATMOSPHERE HAS BEEN DEVELOPED. THE METHOD IS DESCRIBED IN TVA INTERNAL REPORT I-AQ-77-9, APRIL, 1977. SULFUR STATUS, IN SOILS LOCATED AT DIFFERENT DISTANCES FROM A COAL-FIRED POWER PLANT, WAS DETERMINED TO ASSESS THE DEPOSITION OF SULFUR OVER A TWENTY-FIVE YEAR OPERATIONAL PERIOD OF THE POWER PLANT. A MILESTONE REPORT DISCUSSING TWO YEAR'S DATA WILL BE AVAILABLE APRIL 1978.

**PROJECT: 04056-FATE & EFFECTS OF ATMOSPHERIC EMISSIONS FROM COOLING SYSTEMS ON TERRESTRIAL HABITATS

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 67000
TASK CODE=V625A-46 **EPA=D6-E721-DP ** (IAG) PRIOR FY76 / $ 159000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. JM KELLY US TVA
HC JONES US TVA
D BAIRD US TVA
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004056 SSIE-GMA 2934 1 EPA -D6-E721-DP TASK-V625A-46
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THIS INVESTIGATION IS AIMED AT IDENTIFYING AND CHARACTERIZING THE EFFECTS OF ATMOSPHERIC RELEASES FROM MECHANICAL AND NATURAL DRAFT COOLING TOWERS. FOUR VEGETATION STUDY PLOTS WERE ESTABLISHED 1 TO 9 KM IN THE PREVALING DOWNWIND DIRECTION FROM THE MECHANICAL DRAFT COOLING TOWERS AT BROWNS FERRY NUCLEAR PLANT. MEASUREMENTS INCLUDE (1) WET AND DRY DEPOSITION OF TOXIC CHEMICALS, THEIR ACCUMULATION IN AND EFFECTS ON SOIL AND VEGETATION, (2) IMPACTS OF MOISTURE ON GROWTH AND/OR YIELD OF SELECTED CROP AND TIMBER SPECIES AND INCIDENCE OF DISEASE.

**PROJECT: 04058-ECOLOGICAL RECOVERY AFTER RECLAMATION OF TOXIC SPOILS LEFT BY COAL SURFACE MINING

STARTING/ COMPLETION DATE : 07/75 05/80 : FUNDING ESTIMATED FY77 / $ 70000
TASK CODE=V625A-47 **EPA=D7-E721-BDQ ** (IAG) PRIOR FY76 / $ 167000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. TG ZARGER US TVA
JB MADDOX US TVA
WM SEAWELL US TVA
MILESTONES.... 04/78 -COMPLETE SHRUB/TREE PLANTINGS
06/78 -ENVIRONMENTAL BASELINE REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004058 SSIE-GMA 2905 1 EPA -D7-E721-BDQ TASK-V625A-47
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: TO DETERMINE THE RATE OF RECOVERY OF A DAMAGED ECOSYSTEM IN RESPONSE TO INTENSIVE REMEDIAL TREATMENT OF A PROBLEM SURFACE MINE. THE PROJECT INVOLVES A PROBLEM WATERSHED IN WHICH 162 HA (400 ACRES) OF FORESTED LAND WERE DISTURBED BY COAL SURFACE MINING IN THE EARLY 1970'S. UNSUCCESSFUL RECLAMATION EFFORTS RESULTED IN ADVERSE ENVIRONMENTAL IMPACTS WITHIN A 28 SQ KM (10.8 SQ MI) WATERSHED THAT INCLUDES A CITY WATER SUPPLY RESERVOIR. APPROACH AND PLANS: PROJECT OBJECTIVES ARE BEING ACCOMPLISHED BY APPLYING INTENSIVE REMEDIAL LAND TREATMENTS AND EVALUATING THEIR EFFECTIVENESS BY MEASURING THE DEGREE OF RECOVERY OF THE AFFECTED TERRESTRIAL AND AQUATIC ECOSYSTEMS. ENVIRONMENTAL DATA COLLECTED DURING THE PERIOD OF MINING AND EARLY RECLAMATION EFFORT PROVIDE INITIAL BASELINE. MONITORING (SOIL, VEGETATION, AND RECEIVING STREAM ECOLOGY) IS BEING CONDUCTED THROUGH TREATMENT AND WILL BE CONTINUED THEREAFTER ON A MORE LIMITED BASIS AS LONG AS SIGNIFICANT RECOVERY IS NOTED. TREATMENTS ARE NOW COMPLETE EXCEPT FOR LIMING OF A FEW REMAINING PHYTOTOXIC SPOIL AREAS AND THE PLANTING OF 44 HA (108 ACRES) TO WILDLIFE SHRUB AND FOREST TREE SEEDLINGS IN THE 1977-78 SEASON. AN ENVIRONMENTAL BASELINE REPORT WILL BE PUBLISHED IN JUNE 1978.

**PROJECT: 04060-INFORMATION SYSTEMS DEVELOPMENT

STARTING/ COMPLETION DATE : 05/75 05/80 FUNDING ESTIMATED FY77 / $ 57000
TASK CODE=V625A-48 **EPA=D8-E721-DR ** (IAG) PRIOR FY76 / $ 136000

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: BG ISOM US TVA
MILESTONES.... 04/78 -REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004060 SSIE-GMA 4698 EPA -D8-E721-DR TASK-V625A-48
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS TASK IS TO DEVELOP THE CAPABILITY TO MEASURE AND EVALUATE EXISTING AND ANTICIPATED ENVIRONMENTAL IMPACTS OF ENERGY-RELATED TECHNOLOGIES ON IMPORTANT BIOTIC ASSEMBLAGES IN THE AQUATIC ENVIRONMENT. REPRESENTATIVE DATA SETS HAVE BEEN TESTED USING VARIOUS ANALYTICAL TECHNIQUES. THE TECHNIQUES USED INCLUDE CORRELATION, DISTANCE AND ASSOCIATION COEFFICIENT MATRICES, DIVERSITY INDICES, AND VARIOUS CLUSTER AND ORDINATION ANALYSES. TWO OTHER SHORT-TERM PROJECTS WERE UNDERTAKEN AS PART OF THIS TASK--A HIERARCHICAL DIVERSITY STUDY AND A SIMILARITY COEFFICIENT STUDY TO DETERMINE WHAT COEFFICIENT(S) SHOULD BE USED WHEN CLUSTERING BIOLOGICAL DATA FROM STREAM SURVEYS. SPECIES ASSOCIATIONS HAVE BEEN IDENTIFIED FOR ADDITIONAL LABORATORY AND FIELD STUDIES TO DETERMINE THEIR FUNCTIONAL ROLE IN THE ENVIRONMENT. THIS INFORMATION WILL SUBSEQUENTLY BE USED TO ADAPT OR CREATE STATISTICAL AND/OR ECOSYSTEM SIMULATION MODELS IN ORDER TO ACCOMPLISH THE STATED OBJECTIVE. A MILESTONE REPORT WILL BE ISSUED EARLY IN 1978.

**PROJECT: 04061-ACUTE THERMAL EFFECTS AQUATIC INSECTS

STARTING/ COMPLETION DATE : 05/75 05/80 FUNDING ESTIMATED FY77 / $ 79000
TASK CODE=V625A-49 **EPA=D8-E721-DR ** (IAG) PRIOR FY76 / $ 189000

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: KJ TENNESSEN US TVA
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004061 SSIE-GMA 2939 1 EPA -D8-E721-DR TASK-V625A-49
AP -625A DU -N140 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS TASK IS TO PROVIDE DATA ON THE ACUTE EFFECTS OF THERMAL PLUME ENTRAINMENT ON AQUATIC INSECTS IN RESPONSE TO THE CONCERN THAT IF DRIFTING INSECTS CANNOT SUCCESSFULLY NEGOTIATE PASSAGE THROUGH THERMAL PLUMES, THEIR POPULATIONS UPSTREAM AND DOWNSTREAM OF STEAM-ELECTRIC STATIONS WILL BE DEPLETED. SPECIES SELECTED FOR INITIAL EVALUATION ARE THE BURROWING MAYFLY, HEXAGENIA BILINEATA, AND THE CHIRONOMID MIDGES, CHIRONOMUS SP. AND COELOTANYPUS SP. FIELD STUDIES HAVE BEEN CONDUCTED AT TWO TVA STEAM PLANTS AND HAVE BEEN SUPPLEMENTED BY LABORATORY STUDIES. THERMAL TOLERANCE OF IMMATURE H. BILINEATA AND COELOTANYPUS SP. IS HIGH: SHOCKS AS HIGH AS DELTA T 20 DEGREES CENTIGRADE FOR 6 H (ACCLIMATION TEMPERATURE 15 DEGREES CENTIGRADE) RESULTED IN LOW PERCENTAGE OF MORTALITY. THE UPPER TEMPERATURE LIMIT FOR DEVELOPMENT OF H. BILINEATA EGGS IS NEAR 37 DEGREES CENTIGRADE (OPTIMUM RANGE IS FROM 31 TO 34 DEGREES CENTIGRADE). THE EGGS CAN WITHSTAND A DELTA T OF 10 DEGREES CENTIGRADE (IF AMBIENT IS 30 DEGREES CENTIGRADE FOR AT LEAST 15 MIN AND YIELD A HIGH PERCENTAGE OF HATCHING. H. BILINEATA NYMPHS IN THE THERMAL PLUME AREA NEAR A STEAM PLANT WERE LARGER THAN THOSE AT THE AMBIENT STATION THROUGHOUT THE SPRING OF 1977. HOWEVER, GROWTH AT THE AMBIENT STATION ACCELERATED DURING LATE SPRING AND ADULT EMERGENCE OCCURRED ALMOST SIMULTANEOUSLY AT THE TWO STATIONS.

**PROJECT: 04063-BIOCHEMICAL METHODOLOGY, AQUATIC THERMAL IMPACTS

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $   53000
                    TASK CODE=V625A-50      **EPA=D8-E721-DR  ** ( IAG )      PRIOR       FY76  / $  126000
EPA  OFFICER.. CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.. SA MURRAY                  US TVA
               CG BURTON                  US TVA
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004063           SSIE-GMA  2935 1      EPA -D8-E721-DR       TASK-V625A-50
               AP  -625A             DU  -N140             LABT-EMI
ABSTRACT...... THE OBJECTIVES OF THIS RESEARCH ARE TO DEVELOP AND IMPLEMENT HEMATOLOGICAL METHODOLOGIES FOR FISH,
                DEFINE BASELINE HEMATOLOGICAL PARAMETERS UNDER FIELD AND LABORATORY CONDITIONS, AND QUANTIFY AND
                ISOLATE THERMAL STRESS EFFECTS ON HEMATOLOGY OF FISH UNDER FIELD AND LABORATORY CONDITIONS. THE
                METHODOLOGIES HAVE BEEN DOCUMENTED IN A TVA INTERNAL REPORT (I-WQ-77-3). THE EFFECTS OF DENSITY
                STRESS HAVE BEEN ISOLATED FOR BLOOD CELL MORPHOLOGY IN CATFISH AND GOLDFISH AS WELL AS FOR SOME
                BIOCHEMICAL PARAMETERS IN GOLDFISH BLOOD. THE GOLDFISH REPORTS ARE IN MANUSCRIPT FORM, WHEREAS THE
                CATFISH REPORT WILL BE COMPLETED IN THE EARLY PART OF 1978. DATA ARE CURRENTLY BEING PROCESSED FOR
                HEMATOLOGICAL PARAMETERS OF BLUEGILL TO ISOLATE PREDATOR-DENSITY STRESS EFFECTS AND FIELD
                BASELINES. EXPERIMENTS ARE PLANNED TO ISOLATE THERMAL STRESS EFFECTS ON FISH HEMATOLOGY UNDER
                LABORATORY CONDITIONS. FIELD DATA HAVE BEEN GATHERED AT A STEAM PLANT TO DEMONSTRATE THE EFFECTS OF
                A POWER PLANT ON HEMATOLOGY OF BLUEGILL. THESE DATA WILL BE ANALYZED IN 1978.
```

**PROJECT: 04065-BIOMONITORING, MOLLUSKS, AND OTHERS

```
                    STARTING/ COMPLETION DATE : 05/75   05/80     FUNDING    ESTIMATED   FY77  / $   63000
                    TASK CODE=V625A-51      **EPA=D8-E721-DR  ** ( IAG )      PRIOR       FY76  / $  151000
EPA  OFFICER.. CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.. BG ISOM                    US TVA
               C  GOOCH                   US TVA
               LT NEILL                   US TVA
MILESTONES.... 12/78 -MAJOR REPORT
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004065           SSIE-GMA  2933 1      EPA -D8-E721-DR       TASK-V625A-51
               AP  -625A             DU  -N140             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS TASK IS TO QUANTIFY THE ROLE OF BIOACCUMULATION IN CYCLING OF TRACE ELEMENTS
                (SELECTED METALS AND RADIONUCLIDES) RELEASED TO AQUATIC ECOSYSTEMS BY ENERGY TECHNOLOGIES (COAL
                COMBUSTION AND NUCLEAR STEAM-ELECTRIC STATIONS). LABORATORY PROCEDURES HAVE BEEN INVESTIGATED AND
                ARE NOW ALMOST COMPLETE. STUDIES INCLUDED DRY WEIGHT-ASH WEIGHT DETERMINATIONS, WET DIGESTION, A
                TENTATIVE PROCEDURE FOR TREATING EXTRAPALLIAL FLUID SAMPLES, AND VARIOUS INSTRUMENTS INCLUDING
                ANODIC STRIPPING AND ATOMIC ABSORPTION. A MILESTONE REPORT IS BEING INITIATED FOR ISSUANCE IN 1978.
```

**PROJECT: 04067-EVALUATE WATER INTAKE, ZOOPLANKTON ENTRAINMENT

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $   67000
                    TASK CODE=V625A-52      **EPA=D8-E721-DR  ** ( IAG )      PRIOR       FY76  / $  161000
EPA  OFFICER.. CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.. RD URBAN                   US TVA
               DL DYCUS                   US TVA
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004067           SSIE-GMA  2940 1      EPA -D8-E721-DR       TASK-V625A-52
               AP  -625A             DU  -N140             LABT-EMI
ABSTRACT.....: THE OBJECTIVE OF THE RESEARCH PROJECT IS TO DETERMINE THE BEST TYPE OF INTAKE DESIGN TO MITIGATE
                DELETERIOUS EFFECTS TO THE ZOOPLANKTON COMMUNITY OF A WATER BODY. TO ACCOMPLISH THIS GOAL, SEVERAL
                DIFFERENT TYPES OF INTAKE DESIGNS AND SITINGS OF THESE INTAKES WILL BE EVALUATED AS TO THE RATE OF
                ENTRAINMENT, THE PERCENTAGE OF THE COMMUNITY ENTRAINED, AND THE POSSIBLE EFFECTS OF THE ENTRAINMENT
                UPON THE COMMUNITY. THE RESULTS OF THIS RESEARCH WILL PERMIT A DESCRIPTION OF ZOOPLANKTON
                DISTRIBUTION IN RESPONSE TO NATURALLY OCCURRING PHENOMENA (E.G., CURRENTS, THERMAL STRATIFICATION,
                PRESSURE CHANGES INDUCED BY OBJECTS IN THE WATER COLUMN, ETC.) TO BE MADE. BY KNOWING THESE
                RESPONSES, CRITERIA CAN BE DEVELOPED FOR USE IN DESIGNING AND LOCATING INTAKES WHICH WILL MINIMIZE
                THE ENTRAINMENT OF ZOOPLANKTON. SPECIFIC STUDIES GENERALLY CONFORM TO THE FOLLOWING FORMAT. THE
                HORIZONTAL AND VERTICAL DISTRIBUTION OF THE ORGANISMS IN A WATER MASS UPSTREAM OF THE INTAKE, AT
                THE INTAKE, THE DOWNSTREAM OF THE INTAKE ZONE ARE DETERMINED (I.E., THE SAME WATER MASS). IN
                ADDITION, TEMPERATURE, CURRENT DIRECTION, AND CURRENT VELOCITY DATA FOR VARIOUS DEPTHS WILL BE
                COLLECTED. HYDROLOGICAL MODELS OF THE AREA AROUND THE INTAKE WILL BE USED TO INCREASE THE
                RESOLUTION OF THE BIOLOGICAL DATA. RESULTS OF THESE PRELIMINARY STUDIES ARE BEING DEVELOPED INTO A
                MILESTONE REPORT DUE FOR COMPLETION IN OCTOBER 1978. ENTRAINMENT EFFECTS (316B) STUDIES WERE
                INITIATED IN 1974 AT 11 TVA FOSSIL-FUELED STEAM-ELECTRIC STATIONS. DATA FROM THESE STUDIES HAVE
                BEEN USED AS GUIDES FOR SELECTING APPROPRIATE STUDY SITES, AND THESE DATA ARE SUMMARIZED IN A TVA
                REPORT. INTAKE EVALUATION WILL BE CONDUCTED AT VARIOUS TVA STEAM-ELECTRIC STATIONS.
```

**PROJECT: 04069-STRIP MINE DRAINAGE WATER QUALITY WITH EMPHASIS ON TOXIC SUBSTANCES

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $  175000
                    TASK CODE=V625A-53      **EPA=D5-E721-DS  ** ( IAG )      PRIOR       FY76  / $  418000
EPA  OFFICER.: CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.: RJ RUANE                   US TVA
               DB COX                     US TVA
               RP BETSON                  US TVA
               JS CROSSMAN                US TVA
               WC BARR                    US TVA
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004069            SSIE-GMA  2936 1       EPA -D5-E721-DS       TASK-V625A-53
               AP  -625A              DU  -N140              LABT-EMI
ABSTRACT.....: THE OBJECTIVES OF THIS PROJECT ARE TO (1) IDENTIFY THE OCCURRENCE AND SIGNIFICANCE OF TRACE METALS
                IN A STRIP MINED AREA; (2) CALIBRATE EXISTING REGIONALIZED HYDROLOGIC MODELS USING DATA FROM
                SURFACE MINED WATERSHEDS WITH SEVERAL TYPES OF RECLAMATION; (3) DEVELOP OR EXTEND NONPOINT SOURCE
                WATER QUALITY MODELS SO THAT THE NATURAL-AREA ENVIRONMENTAL LOADINGS OF IMPORTANT WATER QUALITY
                CONSTITUENTS CAN BE PREDICTED; (4) RELATE THE TRANSPORT OF SIGNIFICANT TRACE METALS AND OTHER
                IMPORTANT WATER QUALITY CONSTITUENTS TO THE HYDROLOGY OF SMALL STRIP MINED WATERSHEDS; (5) DEVELOP
                RELATIONSHIPS BETWEEN THE CHEMICAL COMPOSITION OF STRIP MINE OVERBURDEN AND THE DOWNSTREAM
                TRANSPORT OF IMPORTANT CONSTITUENTS OVER AND ABOVE THE NATURAL-AREA ENVIRONMENTAL LEVELS (6) RELATE
                THE TRANSPORT OF IMPORTANT CONSTITUENTS TO THE STRUCTURE AND FUNCTION OF BIOLOGICAL COMMUNITIES.
                THE GOAL OF THIS PROJECT IS TO DEMONSTRATE THE METHODOLOGIES FOR PREDICTING THE IMPACT ON
                DOWNSTREAM BIOTIC COMMUNITIES, BASED UPON THE CHARACTERISTICS OF THE SITE TO BE MINED. SAMPLING
                PROGRAMS ARE CONTINUING ON SIX AREA-MINED (JAMESTOWN, TENNESSEE) AND SIX CONTOUR-MINED (NEW RIVER
                BASIN, TENNESSEE) SITES. STORM EVENT SAMPLING HAS BEEN UNDERWAY AT EIGHT OF THESE SITES DURING THE
                PAST YEAR. ONE YEAR OF MONTHLY BIOLOGICAL AND FISHERIES DATA HAS BEEN COLLECTED AT THE JAMESTOWN
                SITES. CORE DRILLS HAVE BEEN PERFORMED FOR OVERBURDEN ANALYSIS AT THREE LOCATIONS IN THE
                CONTOUR-MINED SITES AND FOUR LOCATIONS IN THE AREA-MINED SITES. A DAILY STREAMFLOW AND STORM
                HYDROGRAPH MODEL HAVE BEEN CALIBRATED FOR PROJECT USE AND AN ALGORITHM FOR SUSPENDED SEDIMENT
                PRODUCTION AND TRANSPORT HAS BEEN MODIFIED AND IS BEING TESTED. A SEDIMENTATION BASIN MODEL IS ALSO
                BEING EVALUATED.
```

**PROJECT: 04070-PRODUCTION OF ARTHROPOD PESTS AND VECTORS IN COAL STRIP MINE POOLS

```
                    STARTING/ COMPLETION DATE : 09/75   05/80     FUNDING    ESTIMATED   FY77  / $   31000
                    TASK CODE=V625A-54      **EPA=D8-E721-DT  ** ( IAG )      PRIOR       FY76  / $   70000
EPA  OFFICER.  CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.. E  PICKARD                 US TVA
               JC COONEY                  US TVA
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004070            SSIE-GMA  2937 1       EPA -D8-E721-DT       TASK-V625A-54
               AP  -625A              DU  -N140              LABT-EMI
ABSTRACT.....: MONTHLY FIELD SURVEYS ARE BEING CONDUCTED TO QUALIFY AND QUANTIFY ARTHROPOD COMPOSITION IN STRIP
                MINE POOLS ACCORDING TO POND AGE CLASSIFICATION. PRIMARY CONSIDERATIONS ARE TO IDENTIFY AND
                QUANTIFY THE VECTOR AND NOXIOUS SPECIES OF ARTHROPODS PRESENT OR TO PREDICT THEIR APPEARANCE AND
                IMPORTANCE AS RELATED TO COAL STRIP MINING OPERATIONS AND SEASONAL CHANGES. SIX SPECIES
                REPRESENTING TWO GENERA OF MOSQUITOES HAVE BEEN COLLECTED FROM THE PONDS. A TOTAL OF 18 FAMILIES OF
                INSECTS HAVE BEEN COLLECTED BY AQUATIC DIP NET AND EKMAN DREDGE SAMPLING IN THE 9 STUDY POOLS
                RESULTS FROM VEGETATION INVENTORIES HAVE SHOWN A PAUCITY OF PLANTS, BOTH IN SPECIES AND IN NUMBERS.
                TYPHA LATIFOLIA AND SCIRPUS CYPERINUS WERE THE DOMINANT PLANTS IN THE PONDS. THERE APPEARS TO BE NO
                SIGNIFICANT DIFFERENCE IN THE PH OF THE WATER AMONG THE STUDY P
```

**PROJECT: 04072-IMPROVING ESTIMATES OF SODIUM HAZARD OF COAL SURFACE-MINED OVERBURDEN
706-15-14

```
                    STARTING/ COMPLETION DATE : 10/77   10/79 :   FUNDING    ESTIMATED   FY77  / $   15000
                    TASK CODE=V625A-70      **EPA=D7-E762     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.: WA BERG                    COLORADO STATE UNIV                 AGRIC EXP STA
PLAN ID......: (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004072            SSIE-GMA  4642         EPA -D7-E762          TASK-V625A-70
               AP  -625A              DU  -N140              LABT-EMI
ABSTRACT...... TO DETERMINE THE CHANGE IN SODIUM HAZARD OF WESTERN SURFACE-MINED COAL OVERBURDEN UPON EXPOSURE TO
                THE ATMOSPHERE AND SUBSEQUENT WEATHERING. ALSO TO DETERMINE IF THE CHANGE IS GREAT ENOUGH TO
                APPRECIABLY INCREASE THE WATER PERMEABILITY OF THE OVERBURDEN. THREE SAMPLES OF FRESHLY EXPOSED
                OVERBURDEN FROM EACH OF FOUR SURFACE COAL MINES IN THE WESTERN STATES WILL BE EXPOSED TO FIVE
                DIFFERENT LABORATORY AND GREENHOUSE WEATHERING TREATMENTS AND SAMPLED PERIODICALLY. UNWEATHERED AND
                WEATHERED SAMPLES WILL BE ANALYZED FOR THE SODIUM HAZARD BY DETERMINING THE SODIUM ADSORPTION
                RATIO, THE EXCHANGEABLE SODIUM PERCENTAGE, AND WATER PERMEABILITY. FRESH OVERBURDEN SAMPLES HAVE
                BEEN COLLECTED FROM SURFACE COAL MINES IN NORTH DAKOTA, MONTANA, NEW MEXICO, AND COLORADO. THE
                SAMPLES ARE NOW BEING GROUND (15 JAN 78) AND PREPARED FOR THE WEATHERING TREATMENTS.
```

**PROJECT: 04073-MINE SOIL RESOURCES IN THE POWDER RIVER BASIN CHARACTERIZATION, EVALUATION AND POTENTIALS 706-15-18

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING : ESTIMATED FY77 / $ 50000
TASK CODE=V625A-71 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR. GA NIELSEN MONTANA STATE UNIV
DJ DOLLHOPF MONTANA STATE UNIV
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004073 SSIE-GMA 4645 EPA -D7-E762 TASK-V625A-71
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: (1) A SPECTRUM OF MINE SOILS FROM THE NORTHERN GREAT PLAINS COAL PROVINCE WITH VARYING CHEMICAL AND PHYSICAL PROPERTIES WILL BE IDENTIFIED AND CHARACTERIZED. (2) CRITERIA WILL BE DEVELOPED FOR EVALUATING THE POTENTIAL OF MINE SOILS FOR SELECTED LAND USES. APPROACH: (1) SPECIAL EMPHASIS WILL BE PLACED ON CHARACTERIZING SPECIAL PROPERTIES OF MINE SOILS SUCH AS HIGH ROCK FRAGMENT CONTENT, WEATHERABILITY OF ROCK FRAGMENTS, AND STRATIFICATIONS OF CONTRASTING TEXTURE. METHODS WILL ALSO BE DEVELOPED AND PROPOSED FOR MAPPING MINE SOILS AND FOR DESCRIBING MAPPING UNITS OF SOILS ON MINED LAND. MINE SOIL VARIABILITY WILL ALSO BE STUDIED. (2) CRITERIA FOR EVALUATING MINE SOIL POTENTIAL WILL BE SELECTED ON THE BASIS OF EXTENSIVE REVIEW OF EXISTING LITERATURE AND ADDITIONAL FIELD RESEARCH. PROGRESS: INITIAL FIELD WORK, SITE SELECTION, AND LITERATURE REVIEW WERE BEGUN IN THE FALL OF 1977.

**PROJECT: 04074-ESTABLISHMENT, COMPOSITION AND PRODUCTIVITY OF SPECIES ADAPTED TO AREAS DISTURBED BY STRIP MINING 706-15-15

STARTING/ COMPLETION DATE : 10/77 10/79 FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V625A-72 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. L WIESNER MONTANA STATE UNIV
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004074 SSIE-GMA 4643 EPA -D7-E762 TASK-V625A-72
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: 1) EVALUATE THE PRODUCTIVITY AND COMPOSITION CHANGE OF NATIVE SPECIES RECENTLY ESTABLISHED ON MINE SPOILS. 2) EVALUATE NATURALIZED SPECIES TO DETERMINE THEIR ESTABLISHMENT AND PRODUCTIVITY CHARACTERISTICS. 3) CONTINUE TO DEVELOP METHODS FOR OVERCOMING SEED DORMANCY OF SPECIES WHICH SHOW PROMISE FOR USE IN RECLAIMING MINE SPOILS. 4) EVALUATE THE BUILDUP OF A DORMANT SEED POPULATION ON RECLAIMED AREAS IN COMPARISON TO THAT PRESENT IN UNDISTURBED AREAS. APPROACHES: 1) RESEARCH PLOTS WHICH WERE ESTABLISHED IN 1976 WILL BE EVALUATED FOR SPECIES COMPOSITION AND PRODUCTIVITY. 2) FIELD PLANTING WILL BE MADE TO EVALUATE ESTABLISHMENT AND PRODUCTIVITY OF INTRODUCED SPECIES WHICH ARE PRESENTLY BEING GROWN FOR FORAGE PRODUCTION NEAR STRIP MINED AREAS. 3) METHODS FOR OVERCOMING SEED DORMANCY OF PROBLEM SPECIES WILL BE DEVELOPED. DORMANT SEEDS WILL BE SUBJECTED TO SUCH TREATMENTS AS SCARIFICATION, PRESOAKING, PRECHILLING, AND VARIOUS CHEMICALS AND PLANT HORMONES. 4) SOIL CORES WILL BE TAKEN FROM 5-YEAR-OLD STANDS ESTABLISHED ON MINE SPOILS AND FROM UNDISTURBED AREAS. CURRENT PLANS AND/OR PROGRESS: THIS PROJECT IS FUNDED OCT. 1977 THEREFORE OUR MAJOR EFFORT HAS BEEN IN PLANNING THE FIELD PLANTINGS AND CONDUCTING DORMANCY BREAKING STUDIES.

**PROJECT: 04075-FLEXIBLE CULTURAL PRACTICES FOR ESTABLISHMENT OF PERENNIAL AND ANNUAL VEGETATION ON TOPSOILED STRIPMINES

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 45000
TASK CODE=V625A-73 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: L WIESNER MONTANA STATE UNIV
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004075 SSIE-GMA 4714 EPA -D7-E762 TASK-V625A-73
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: 1) TO ASSESS THE CAPABILITIES OF SEVERAL ANNUAL AND PERENNIAL CROP SERIES TO FUNCTION AS BARRIERS FOR THE TRAPPING AND RETENTION OF WINTER SNOWFALL. 2) TO DETERMINE IF SNOW RETENTION INCREASES SEEDLING ESTABLISHMENT AND SUBSEQUENT GROWTH OF A FORAGE MIXTURE. 3) UTILIZING ANNUAL NURSE CROPS, STUBBLE SEEDING TECHNIQUES AND FROST SEEDING TECHNIQUES, TO DETERMINE THEIR IMPACT ON THE SUCCESS OF PERENNIAL FORAGE SEEDINGS ON SPOILS MATERIALS. 4) GROWING A GREEN MANURE CROP ON STOCKPILED TOPSOIL TO DETERMINE IF A SIGNIFICANT DECREASE IN WEED SEED AND INCREASE IN NITROGEN CONTENT CAN BE MADE OVER UNCROPPED STOCKPILED TOPSOIL. APPROACH: 1) SEVERAL ANNUAL AND PERENNIAL GRASSES AND FORBS WILL BE PLANTED ON COAL MINE SPOILS TO BE EVALUATED FOR SNOW TRAPPING. 2) A SUCCESSFUL FORAGE MIXTURE WILL BE SEEDED BETWEEN THE BARRIERS TO DETERMINE VALUE OF BARRIERS. 3) DIFFERENT KINDS OF ANNUAL CROPS WILL BE EVALUATED ALONG WITH DIFFERENT CROPPING SYSTEMS AND SEEDING TECHNIQUES TO DETERMINE THEIR EFFECT ON ESTABLISHMENT OF NATIVE SPECIES AND SOIL EROSION. 4) SEVERAL GREEN MANURE CROPS WILL BE EVALUATED TO DETERMINE THEIR EFFECT ON ESTABLISHMENT OF NATIVE SPECIES AND CONTROL OF WEEDS. CURRENT PLANS AND/OR PROGRESS: THIS PROJECT WAS FUNDED IN OCT., 1977. THEREFORE, OUR MAJOR EFFORT HAS BEEN IN PLANNING FIELD PLANTING AND OBTAINING LAND.

**PROJECT: 04076-WATER HARVESTING PARAMETERS ON SALINE MEDIA UNDER ARID CONDITIONS
706-15-17

STARTING/ COMPLETION DATE : 10/77 10/79 · FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V625A-74 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. CM MCKELL UTAH STATE UNIV AGRIC EXP STA/PLANT SCI DEPT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004076 SSIE-GMA 4646 EPA -D7-E762 TASK-V625A-74
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: 1. TO DETERMINE THE QUANTITY OF HARVESTED WATER AND SALT CONCENTRATION IN RELATION TO SURFACE STABILIZATION TREATMENTS. 2. TO DETERMINE THE RATIO OF CATCHMENT SLOPE AREA TO TERRACE PLANTING AREA FOR EFFECTIVE PLANT ESTABLISHMENT IN AN ARID REGION. 3. TO DETERMINE THE QUALITY OF HARVESTED WATER FROM A SALINE MEDIA SURFACE. 4. TO DETERMINE HYDROLOGIC CHARACTERISTICS OF PROCESSED OIL SHALE. APPROACH: A SERIES OF 1 X 2 M FIELD PLOTS ON A 1:4 SLOPE OF PROCESSED OIL SHALE WILL BE TREATED WITH VARIOUS SURFACE STABILIZERS. SUBSEQUENTLY THE PLOTS WILL RECEIVE SIMULATED RAINFALL TREATMENTS TYPICAL OF SUMMER SHORT-DURATION INTENSE RAINSTORMS. WATER QUANTITY AND QUALITY WILL BE MEASURED. CURRENT PLANS AND/OR PROGRESS: A SERIES OF THREE PHYSICAL MODELS OF AN OIL SHALE DISPOSAL PILE WILL BE CONSTRUCTED WITH A 2 METER 1:4 SLOPE CATCHMENT AREA AND A 1 METER WIDE PLANTING TERRACE AREA. THESE MODELS WILL BE INSTRUMENTED FOR MOISTURE AND SALINITY MEASUREMENT PLUS SURFACE RUNOFF AND LEACHATE. WATER AND SALT MOVEMENTS IN THE OIL SHALE MASS WILL BE MATHEMATICALLY MODELED.

**PROJECT: 04077-CHARACTERISTICS OF MINE LAND OVERBURDEN DUE TO SHORT-TERM WEATHERING
706-15-8

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 60000
TASK CODE=V625A-75 **EPA=D7-E762-FN ** (IAG) PRIOR FY /

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: CB ROTH PURDUE UNIV
WW MCFEE PURDUE UNIV
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004077 SSIE-GMA 4644 EPA -D7-E762-FN TASK-V625A-75
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: (A) IDENTIFY OVERBURDEN STRATA WHOSE WEATHERING WOULD INFLUENCE MANAGEMENT OF RECLAIMED LANDS IN WESTERN INDIANA. CHARACTERIZE THEIR WEATHERING RATES AND TRENDS. (B) DETERMINE THE CHANGES THAT AFFECT PHYSICAL, CHEMICAL AND MINERALOGICAL PROPERTIES IMPORTANT TO PLANT GROWTH, HYDROLOGICAL CHARACTERISTICS OR PHYSICAL STABILITY. (C) RELATE WEATHERING TO CRITERIA USED TO EVALUATE MATERIALS FOR PLANT GROWTH POTENTIAL AND TO PROBLEMS OF STABILITY AND WATER MOVEMENT. APPROACH· SAMPLES WILL BE SELECTED FROM THE MORE IMPORTANT STRATA IN THE EASTERN EDGE OF THE ILLINOIS COAL BASIN, WITH EMPHASIS ON MATERIALS LIKELY TO BE IMPORTANT IN THE ROOT ZONE IN FUTURE RECLAIMED LANDS. A MEASURE OF CHEMICAL WEATHERING WILL BE OBTAINED FROM LEACHING. TRIPLICATE SAMPLES IN COLUMNS WILL BE SUBJECTED TO THE EQUIVALENT OF THREE YEARS' PRECIPITATION APPLIED IN AMOUNTS EQUIVALENT TO A MONTH'S PRECIPATION EACH WEEK (36 WEEKS). PHYSICAL PHENOMENA WILL BE EVALUATED BY SUBMITTING SAMPLES TO FREEZING-THAWING CYCLES AND WETTING-DRYING SAMPLES. PARTICLE SIZE DISTRIBUTION AND WET AGGREGATE STABILITY BOTH BEFORE AND AFTER TREATMENT WILL BE AN INDICATION OF PHYSICAL STABILITY, TENDENCY TO CRUMBLE AND SEAL, AND THE CHANGES IN WATER HOLDING CAPACITY. GREENHOUSE TRIALS WILL COMBINE PHYSICAL WEATHERING (CHANGES IN MOISTURE) WITH LEACHING (DUE TO PLANT WATERING) WITH BIOLOGICAL EFFECTS RELATED TO ROOT ACTIVITY AND ASSOCIATED RHIZOSPHERE ORGANISMS. THE EFFECT OF PLANT INDUCED WEATHERING WILL BE EVALUATED USING THE TECHNIQUE OF SPYRIDAKIS ET AL., (1967). CURRENT PROGRESS: WORK IS JUST BEGINNING ON INITIAL SAMPLES.

**PROJECT: 04078-DIRECT SEEDING OF COMMERCIAL FOREST TREES ON SURFACE MINE SOIL 706-15-7

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 20000
TASK CODE=V625A-76 **EPA=D7-E762-ES ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. DH GRAVES UNIV OF KENTUCKY AGRIC EXP STA/FORESTRY DEPT
MILESTONES.... 03/78 -INSTALL TEST PLOTS
10/79 -COMPLETION DATE
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004078 SSIE-GMA 4647 EPA -D7-E762-ES TASK-V625A-76
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: 1. DETERMINE THE EFFECTS OF SITE FACTORS (ASPECT, SLOPE, SPOIL MOISTURE AND TEMPERATURE) ON THE ESTABLISHMENT OF COMMERCIAL FOREST SPECIES BY DIRECT SEEDING. 2. DETERMINE THE EFFECTS OF VARIOUS CULTURAL PRACTICES, SUCH AS BURNING, FERTILIZATION, MULCHING, AND MULTIPLE TREE SPECIES MIXTURES ON THE SUCCESS OF DIRECT SEEDING. 3. DETERMINE THE EFFECTS OF GRASS-LEGUME SEEDING MIXTURES ON THE ESTABLISHMENT OF COMMERCIAL FOREST SPECIES BY DIRECT SEEDING. APPROACH: INITIALLY, MAJOR EMPHASIS WILL BE PLACED ON THE IDENTIFICATION OF ATMOSPHERIC AND SOIL ENVIRONMENTAL FACTORS CRITICAL TO THE ESTABLISHMENT OF TREES ON SURFACE-MINE SPOIL BY DIRECT SEEDING. SMALL, CAREFULLY INSTRUMENTED PLOTS WILL BE EVALUATED TO IDENTIFY THOSE ENVIRONMENTAL FACTORS. LARGE PLOT PILOT STUDIES WILL BE ESTABLISHED LATER TO TEST THE PRACTICAL VALUES OF DIRECT SEEDING AS A SILVICULTURAL PROCEDURE ON SURFACE MINE SPOIL. CURRENT PLANS: THE PLANNING PHASE OF THE STUDY IS IN PROGRESS. THE INSTALLATION OF PLOTS IS PLANNED FOR MARCH, 1978. DATA COLLECTION WILL BEGIN ALMOST IMMEDIATELY AND WILL CONTINUE THROUGH THE FINAL EVALUATION PHASE.

**PROJECT: 04080-METHODOLOGY DEVELOPMENT AND APPLICATION FOR DETERMINING INSTREAM FLOW NEEDS

```
                STARTING/ COMPLETION DATE : 00/77   UNK        FUNDING    ESTIMATED   FY77  / $  250000
                TASK CODE=V625A-78      **EPA=D7-E685      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.. C  STALNAKER             U.S. DEPT. OF THE INTERIOR
               K  BAYHA                 U.S. DEPT. OF THE INTERIOR
               BL LAMB                  U.S. DEPT. OF THE INTERIOR
               R  MILHOUS               U.S. DEPT. OF THE INTERIOR
               K  BOVEE                 U.S. DEPT. OF THE INTERIOR
               R  HYRA                  U.S. DEPT. OF THE INTERIOR
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004080          SSIE-GMA  4769        EPA -D7-E685          TASK-V625A-78
               AP  -625A            DU  -N140             LABT-EMI
ABSTRACT...... OBJECTIVE: DEVELOP IMPROVED METHODOLOGIES FOR DETERMINING THE INSTREAM FLOW REQUIREMENTS OF FISH,
                WILDLIFE, RECREATION AND AESTHETICS. APPROACH: DEVELOP, TEST AND EVALUATE METHODOLOGIES THROUGH AN
                INTERGOVERNMENTAL, MULTI-DISCIPLINARY TEAM. RELY HEAVILY ON EXISTING DATA AND REFINEMENTS TO
                EXISTING METHODS   PRIMARILY ENGINEERING AND BIOLOGICAL. CURRENT PLANS/PROGRESS: METHODOLOGIES
                CURRENTLY BEING TESTED, EVALUATED AND DOCUMENTATION PREPARED. PARTICULAR ATTENTION IS GIVEN TO
                PRIORITY NEEDS IN ARID WESTERN STATES WHERE ENERGY IMPACTS ON WATER RESOURCES ARE ANTICIPATED.
```

**PROJECT: 04079-EFFECTS OF COOLING TOWERS ON WEATHER

```
                STARTING/ COMPLETION DATE . 00/77   UNK        FUNDING    ESTIMATED   FY77  / $   80000
                TASK CODE=V625A-77      **EPA=D5-E681-CD   ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.  SR HANNA                 US DOE/OAK RIDGE LAB                ATMOS TURB & DIF DIV
               RP HOSKER                US DOE/OAK RIDGE LAB                ATMOS TURB & DIF DIV
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004079          SSIE-GMA  4766        EPA -D5-E681-CD       TASK-V625A-77
               AP  -625A            DU  -N140             LABT-EMI
ABSTRACT..... THE OBJECTIVES OF THIS PROJECT ARE TO STUDY THE INFLUENCE OF COOLING TOWER GEOMETRY ON A PLUME AND
                TO DEVELOP AND TEST NUMERICAL CLOUD GROWTH MODEL FOR SINGLE COOLING TOWER PLUMES. A SMALL
                METEOROLOGICAL WIND TUNNEL WITH 1 SQUARE METER CROSS SECTION WILL BE INSTALLED AND TESTED, AND
                MULTIPLE PLUME INTERACTION STUDIES WILL BE DESIGNED. THE ATDL NUMERICAL CLOUD GROWTH MODEL WILL BE
                APPLIED TO COOLING TOWER PLUMES AT POWER PLANTS WHERE OBSERVATION PROGRAMS ARE CURRENTLY UNDERWAY.
                THE WIND TUNNEL HAS BEEN INSTALLED AND TESTED, AND STUDIES OF THE FLOW AROUND COOLING TOWERS
                INITIATED. THE NUMERICAL MODEL OF COOLING TOWER PLUMES AND CLOUD GROWTH WAS VALIDATED USING
                OBSERVATIONS AT THE ST. LOUIS WOOD RIVER REFINERY, THE LOS ANGELES REFINERIES, AND THE CHALK POINT,
                MD., POWER PLANT. DESCRIPTIONS OF THESE VALIDATION EXERCISES WERE PUBLISHED IN THE JOURNAL OF
                APPLIED METEOROLOGY, 15, 1232-1233; PROCEEDINGS OF THE 6TH AMS CONF. ON PLANNED AND INADVERTANT
                WEATHER MODIFICATIONS, 75-78; AND COOLING TOWER ENVIRONMENT-1978 (UN. MARYLAND), RESPECTIVELY.
```

**PROJECT: 04082-DETERMINE WATER QUANTITY NEEDS OF FISH IN WESTERN STATES AFFECTED BY ENERGY DEVELOPMENT

```
                STARTING/ COMPLETION DATE . 00/77   UNK    :   FUNDING    ESTIMATED   FY77  / $  303000
                TASK CODE=V625A-79      **EPA=D7-E685      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.. JL BREITHAUPT            U.S. DEPT. OF THE INTERIOR
               A  ANDREWS               U.S. DEPT. OF THE INTERIOR
               H  DOEKSEN               U.S. DEPT. OF THE INTERIOR
PLAN ID....... (AP-625A)(DU-N140)  EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-004082           SSIE-GMA  4781        EPA -D7-E685          TASK-V625A-79
               AP  -625A            DU  -N140             LABT-EMI
ABSTRACT..... OBJECTIVES: A. ESTABLISH INSTREAM FLOW REQUIREMENTS NECESSARY TO MAINTAIN THE VIABILITY OF SPECIES
                PRESENT IN HIGH PRIORITY WESTERN STATES' STREAMS; B. DEVELOP AND DOCUEMENT METHODS, TECHNIQUES AND
                STRATEGIES FOR DETERMINING AND SECURING WATER QUANTITY NEEDS; TEST AND EVALUATE METHODS, TECHNIQUES
                AND STRATEGIES. APPROACH: USING IN-HOUSE AND CONTRACT RESEARCH AND DEMONSTRATION. CURRENT
                PLANS/PROGRESS: IDENTIFY PRIORITY STREAMS AND BEGIN FIELD STUDIES. PUBLISH REPORTS AS INFORMATION
                IS AVAILABLE. REPORTS TO INCLUDE DOCUMENTATION OF METHODS, FLOW REQUIREMENTS AND EVALUATIONS.
```

**PROJECT: 04084-ECOLOGICAL METHODS FOR RAPIDLY ASSESSING COAL DEVELOPMENT IMPACTS TO WILDLIFE HABITAT

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 700000
TASK CODE=V625A-80 **EPA=D7-E685 ** (IAG) PRIOR FY /

EPA OFFICER.: CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: RE STEWART U.S. DEPT. OF THE INTERIOR
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES.. RECN-004084 SSIE-GMA 4774 EPA -D7-E685 TASK-V625A-80
AP -625A DU -N140 LABT-EMI

ABSTRACT..... SUMMARY: THESE INVESTIGATIONS IDENTIFY, DEMONSTRATE, AND IMPLEMENT A RAPID, COST EFFECTIVE, RELIABLE METHOD OF INVENTORYING AND CHARACTERIZING WILDLIFE HABITAT. WILDLIFE HABITAT IS BEING MAPPED USING MODERN PHOTOGRAPHIC AND SATELLITE TECHNIQUES FOR WESTERN COAL AREAS WITH HIGH DEVELOPMENT POTENTIAL. EMPHASIS IS BEING GIVEN TO STANDARDIZING BASE LINE STUDIES, HABITAT REQUIREMENTS OF WILDLIFE SPECIES FOR FOOD, COVER, BREEDING, AND OTHER CRITICAL FACTORS, AND TO THE RELATIONSHIP OF THESE FACTORS TO TERRESTRIAL ECOSYSTEMS, OTHER SURFACE RESOURCES AND EVENTS. EMPHASIS IS ALSO GIVEN TO A DETERMINATION OF HOW VARIOUS COAL RELATED ACTIVITIES, PARTICULARLY PROCESSING AND POPULATION GROWTH, IMPACT WILDLIFE AND THE MAGNITUDE OF THAT IMPACT. RESULTS WILL CONSIST OF MAPS, COMPUTER SYSTEMS, INTERIM AND FINAL REPORTS OF FIELD AND LABORATORY WORK AND AN INTERAGENCY WORKSHOP STUDIES ARE BEING CONDUCTED ON WESTERN LABORATORY WORK AND AN INTERAGENCY WORKSHOP STUDIES ARE BEING CONDUCTED ON WESTERN ECOLOGICAL TEST AREAS WHERE COAL DEVELOPMENT IS OR WILL BE TAKING PLACE. MAJOR MILESTONES: (1) TEST, EVALUATE, AND IMPLEMENT A COMPOSITE MAPPING AND ANALYSIS DATA SYSTEM; (2) TEST, EVALUATE AND PUBLISH THE APPLICABILITY AND COSTS OF DIFFERENT METHODS TO OBTAIN HABITAT, ECOSYSTEMS AND CULTURAL GEOGRAPHIC INFORMATION; (3) PUBLISH A PRELIMINARY ECOLOGICAL CLASSIFICATION OF SURFACE RESOURCES IN TEST AREAS; (4) DEVELOP A MULTIPLE-USE DECISION-ORIENTED ECOLOGICAL CHARACTERIZATION SCHEME; (5) PUBLISH DETAILED WILDLIFE MAPS OF ECOLOGICAL TEST AREAS; (6) PUBLISH FISH AND WILDLIFE DATA BASE REQUIREMENTS AND STANDARDS; (7) EVALUATE AND PUBLISH METHODS TO RAPIDLY MEASURE FISH AND WILDLIFE POPULATION PARAMETERS AND THEIR APPLICABILITY TO COAL DEVELOPMENT DECISIONS; AND (8) DEVELOP, IMPLEMENT AND DOCUMENT APPROACHES TO RAPIDLY MEASURING FISH AND WILDLIFE/HABITAT INTERRELATIONSHIPS.

**PROJECT: 04086-MAJOR COASTAL ECOSYSTEM CHARACTERIZATION AND METHODOLOGY WITH EMPHASIS ON FISH AND WILDLIFE AS RELATED TO OIL AND GAS DEVELOPMENT

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 600000
TASK CODE=V625A-81 **EPA=D7-E685 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. H TAIT U.S. DEPT. OF THE INTERIOR
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004086 SSIE-GMA 4772 EPA -D7-E685 TASK-V625A-81
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: DEVELOP MULTI-YEAR PLAN FOR ECOLOGICAL CHARACTERIZATION OF COASTAL AREAS AND PREPARE STANDARDIZED METHODOLOGIES AND SPECIFICATIONS FOR CONDUCTING ECOLOGICAL CHARACTERIZATIONS. APPROACHES: DEVELOP PRIORITIES FOR RANKING CANDIDATE CHARACTERIZATION AREAS, A PROGRAMMATIC PLAN FOR COMPLETING ADDITIONAL CHARACTERIZATION STUDIES, AND A REPORT FOR THE REGIONALIZATION OF COASTAL ECOSYSTEMS. CURRENT PLANS: TO CHARACTERIZE FOUR SELECTED COASTAL ECOSYSTEMS (S.W. LOUISIANA, GEORGIA/SOUTH CAROLINA, MAINE, AND N.W. PACIFIC COAST) USING ABOVE METHODOLOGIES AND EVALUATE FACTORS WITH PREDICTIVE POTENTIAL.

**PROJECT: 04088-ECOLOGICAL AND PHYSIOLOGICAL/TOXICOLOGICAL EFFECTS OF OIL ON BIRDS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 440000
TASK CODE=V625A-82 **EPA=D7-E685 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: LF STICKEL US DOI FISH & WILDLIFE SERV
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004088 SSIE-GMA 4773 EPA -D7-E685 TASK-V625A-82
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: TO EVALUATE THE EFFECTS ON BIRDS OF EXPOSURE TO PETROLEUM AND/OR COMPONENTS BY DIETARY INTAKE OR BY EXPOSURE OF EGGS. EFFECTS MEASURED INCLUDE PHYSIOLOGICAL FUNCTIONS, REPRODUCTIVE PERFORMANCE, SURVIVAL, AND TISSUE ACCUMULATION.

**PROJECT: 04090-INTERACTIONS OF HARDWOOD TREE SEEDLINGS AND HERBACEOUS COVER ON SURFACE MINED LAND

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=V625A-83 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. RJ HUTNIK PENNSYLVANIA STATE UNIV AGRIC EXP STA/ECOL DEPT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004090 SSIE-GMA 4777 EPA -D7-E762 TASK-V625A-83
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: (1) TO EVALUATE COMPATIBILITY OF VARIOUS HARDWOOD TREE SPECIES WITH HERBACEOUS COVER. (2) TO DEVELOP A SYSTEM OF REVEGETATING SURFACE MINED LAND WHICH WILL FURNISH BOTH IMMEDIATE SITE PROTECTION THROUGH RAPID ESTABLISHMENT OF HERBACEOUS COVER AND LONG-TERM PROTECTION PLUS A POTENTIALLY VALUABLE PRODUCT THROUGH ESTABLISHMENT OF HARDWOOD TREES. APPROACH: SEEDLINGS OR CUTTINGS OF FIVE HARDWOOD SPECIES (BLACK LOCUST, BLACK WALNUT, YELLOW POPLAR, HYBRID POPLAR, AND RED OAK) WILL BE PLANTED IN THE SPRING ON SURFACE MINED LAND RECLAIMED UNDER PRESENT STATE REGULATIONS AT THREE LOCATIONS IN THE BITUMINOUS REGION OF PENNSYLVANIA. PLANTING WILL BE DONE IMMEDIATELY AFTER SOWING OF RECOMMENDED MIXTURES OF GRASS AND LEGUME SEED. SEEDLINGS WILL ALSO BE PLANTED IN NARROW, NON-SEEDED STRIPS TO PERMIT EVALUATION OF HERBACEOUS COMPETITION ON TREE SEEDLING SURVIVAL AND GROWTH. SEEDLINGS OF BLACK LOCUST AND RED OAK WILL BE PLANTED IN THE SPRING ON REGRADED, RESOILED, LIMED AND FERTILIZED SURFACE MINED SITES IN CENTRAL PENNSYLVANIA. VARIOUS SPECIES MIXTURES OF GRASSES AND LEGUMES AT DIFFERENT RATES WILL BE SOWN JUST PRIOR TO PLANTING. SEEDLINGS WILL ALSO BE PLANTED IN HERBACEOUS COVER ESTABLISHED DURING THE PREVIOUS GROWING SEASON. CURRRENT PLANS AND/OR PROGRESS. SITES ARE BEING SELECTED AND SEEDLINGS OBTAINED FOR PLANTING IN APRIL.

**PROJECT: 04091-UTILIZATION OF LEGUMES IN REVEGETATION OF ENVIRONMENTALLY STRESSED ARID MINE SPOILS

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=V625A-84 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: WF CAMPBELL UTAH STATE UNIV AGRIC EXP STA/PLANT SCI DEPT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004091 SSIE-GMA 4780 EPA -D7-E762 TASK-V625A-84
AP -625A DU -N140 LABT-EMI
ABSTRACT.....: A REPRESENTATIVE ARID AREA WESTERN COAL MINE WITH LARGE AREAS OF EXISTING AND PROJECTED MINE SPOILS, CLOSE TO LOGAN, UTAH AND ACCESSIBLE WITH VEHICLES AND OTHER EQUIPMENT WILL BE SELECTED. RHIZOBIUM STRAINS WILL BE ISOLATED FROM SELECTED HOST PLANT ASSOCIATIONS IN NEARBY, ENVIRONMENTALLY CLOSELY RELATED AREAS, AND EVALUATED ACCORDING TO THE FOLLOWING CRITERIA: 1) ABILITY TO COLONIZE THE HOST ROOTS RAPIDLY; 2) APPROPRIATE SPECIFICITY AND EFFECTIVENSS IN NITROGEN FIXATION WITH THE SELECTED HOST PLANTS; 3) SURVIVAL AND MULTIPLICATION CHARACTERISTICS; 4) ABILITY TO COMPETE WITH ANY NATURALLY OCCURRING RHIZOBIA IN PRODUCING NODULES. NODULES WILL BE COLLECTED FROM THE NATIVE LEGUMES AND RHIZOBIUM STRAINS ISOLATED. SOIL SAMPLES IN THE STRIP-MINED OVERBURDEN AND UNDISTURBED CONTROL AREAS WILL BE COLLECTED AND EXAMINED FOR WILD RHIZOBIUM STRAINS. ISOLATED RHIZOBIUM WILL BE IDENTIFIED BY MEANS OF AN INFECTION TEST WITH THE RESPECTIVE HOST AND BY CULTURAL CHARACTERISTICS AND BIOCHEMICAL PROPERTIES. ISOLATES WILL BE MAINTAINED BY LYOPHILIZATION. SUITABLE RHIZOBIUM STRAINS WILL ALSO BE OBTAINED FROM EXISTING CULTURE COLLECTIONS AND TESTED WITH THE SELECTED LEGUMES FOR INFECTIVITY AND EFFECTIVITY OF N2-FIXATION. WE WILL SURVEY AND SELECT SUITABLE SPECIES FROM THE LOCAL NATIVE LEGUMES SUCH AS EDIBLE LUPIN, HEDYSARUM BOREALE, LATHYRUS LANSZWERITII, VETCH AND NON-NATIVE MEDICAGO AND MELILOTUS SPP. CRESTED WHEATGRASS WILL BE USED WITH LEGUMES AS A NON-N2 FIXING PLANT INDICATOR OF THE LEGUMES' EFFICIENCY IN SUPPLYING NITROGEN FOR ASSOCIATED PLANTS. THE INITIAL ASSESSMENT OF THE QUALITY OF GROWTH AND YIELD PATTERNS OF THE SELECTED LEGUMES WILL BE EVALUATED BY INOCULATING THE SEEDS WITH THE SPECIFIC ISOLATED AND SELECTED RHIZOBIUM STRAINS AND GROWN IN THE MINE-SPOIL SOILS IN GREENHOUSE STUDIES. PROMISING RESULTS FROM THE GREENHOUSE STUDIES WILL BE TRANSFERRED TO FIELD STUDIES. NUTRITIONAL DEFICIENCIES (EXCEPT P AND N) WILL BE CORRECTED ACCORDING TO SOIL ANALYSES AND RECOMMENDATIONS.

**PROJECT: 04092-ALDER FOR MINELAND RESTORATION IN COLD-DOMINATED CLIMATES

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V625A-85 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. WW MITCHELL UNIVERSITY OF ALASKA
JD MCKENDRICK UNIVERSITY OF ALASKA
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004092 SSIE-GMA 4775 EPA -D7-E762 TASK-V625A-85
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: THE PRINCIPAL OBJECTIVE OF THE STUDY INCLUDES MEANS OF EVALUATING THE CULTURAL PRACTICES AND USES OF ALNUS SP. (ALDER) IN REHABILITATING DRASTICALLY DISTURBED SITES SUCH AS COAL-MINE SPOILS. SPECIFIC OBJECTIVES INCLUDE 1) THE DETERMINATION OF SEED AVAILABILITIES OF ALDER ON DISTURBED SITES, 2) THE EXAMINATION OF SOIL CONDITIONS FAVORABLE OR INHIBITORY TO ALDER ESTABLISHMENT, AND 3) THE DOCUMENTATION OF PHYSICAL AND CHEMICAL SOIL CHANGES OCCURRING AS THE RESULT OF ALDER INVASION. APPROACH: RESEARCH PLOTS WILL BE ESTABLISHED TO EVALUATE PHYSICAL AND CULTURAL ASPECTS OF ALDER ESTABLISHMENT ON TWO ALASKAN MINE SPOILS. STRATIFIED SEED WILL BE USED AS A SEED SOURCE. GERMINATION AND GROWTH CHARACTERISTICS WILL BE MONITORED. IN ANOTHER STUDY, ALDER STANDS OF VARYING AGE WILL BE EVALUATED IN RELATION TO SOIL AND PLANT PROPERTIES, THUS DOCUMENTING BENEFICIAL CONTRIBUTIONS OF ALDER IN A COLD-DOMINATED CLIMATE.CURRENT PLANS AND/OR PROGRESS: THE STUDY IS IN ITS INITIAL YEAR OF ESTABLISHMENT. ALDER SEEDS HAVE BEEN COLLECTED AND GERMINATION REQUIREMENTS ARE BEING ASSESSED.

**PROJECT: 04093-THE EFFECTS OF TOPSOIL DEPTH OVER SALINE-SODIC SPOILS ON THE PRODUCTIVITY OF NATIVE RANGE SPECIES

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=V625A-86 **EPA=D7-E762 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. WL GOULD NEW MEXICO STATE UNIV AGRIC EXP STA/AGRON DEPT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004093 SSIE-GMA 4778 EPA -D7-E762 TASK-V625A-86
AP -625A DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVES: DETERMINE THE OPTIMUM DEPTH OF TOPDRESSING MINE SPOILS FOR MAXIMUM PRODUCTION OF NATIVE RANGE PLANTS UNDER NATURAL RAINFALL CONDITIONS IN A SEMI-ARID CLIMATE; 2) EVALUATE THE EFFECT OF SOIL DEPTH ON UPWARD MIGRATION OF SALTS FROM THE UNDERLYING SPOIL; 3) EVALUATE THE EFFECT OF SOIL DEPTH ON ROOT GROWTH OF NATIVE PLANTS. APPROACH: GRADUALLY INCREASING DEPTHS OF SOIL FROM 0 TO 125 CM. WILL BE PLACED OVER SALINE-SODIC SPOILS TO FORM A "WEDGE-SHAPED" BLOCK WITH SURFACE DIMENSIONS OF ABOUT 15 BY 30 METERS. THIS AREA WILL BE SEEDED IN ROWS RUNNING IN THE DIRECTION OF INCREASING SOIL DEPTH TO THREE SPECIES OF NATIVE GRASSES AND ONE SPECIES OF SHRUB. THREE ROWS OF EACH GRASS SPECIES AND A SINGLE ROW OF SHRUBS WILL BE SEEDED IN EACH REPLICATION. FORAGE PRODUCTION WILL BE DETERMINED FROM THE CENTER ROW OF EACH GRASS SPECIES. THE SEEDED AREA WILL BE IRRIGATED DURING ONE SEASON TO GET GOOD PLANT ESTABLISHMENT. DURING THE SECOND SEASON IRRIGATION PLUS RAINFALL WILL EQUAL THE AVERAGE MONTHLY RAINFALL AMOUNTS. GRASS YIELDS WILL BE DETERMINED AT EACH 10 CM. INCREMENT OF SOIL DEPTH. SHRUB CANOPY VOLUME WILL BE DETERMINED. THE CHEMICAL CHARACTERISTICS OF THE SPOIL MATERIAL AND SOIL WILL BE DETERMINED BEFORE SEEDING, AND AT THE END OF THE GROWING SEASON EACH YEAR FOR FOUR OR MORE YEARS. CORE SAMPLES WILL BE OBTAINED TO DETERMINE THE BIOMASS AND ORIENTATION OF ROOTS IN THE VARIOUS DEPTHS OF SOIL OR SPOIL. PROGRESS: A TOPSOIL "WEDGE" HAS BEEN BUILT AND IS READY FOR SEEDING.

**PROJECT: 04094-EFFECT OF METALS IN MARINE ORGANISMS

STARTING/ COMPLETION DATE : 00/77 UNK FUNDING ESTIMATED FY77 / $ 80000
TASK CODE=V625A-87 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. BA FOWLER US HEW NATL INST OF HLTH /PHS
DW ENGEL US DOC
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004094 SSIE-GMA 4779 EPA -D5-E772 TASK-V625A-87
AP -625A DU -N140 LABT-EMI

ABSTRACT.....: OBJECTIVES: THIS STUDY WAS UNDERTAKEN TO DETERMINE THE PHYSIOLOGICAL, BIOCHEMICAL, AND ULTRASTRUCTURAL EFFECTS OF CADMIUM AND COPPER ON TISSUES OF MARINE SHELLFISH IN COMPARISON WITH THOSE PREVIOUSLY OBSERVED IN MAMMALS. LARGE NUMBERS OF SHELLFISH WILL BE EXPOSED TO CADMIUM FOR SUBSEQUENT INCORPORATION OF PROTEIN BOUND CADMIUM INTO RAT DIETS FOR EVALUATION OF PHARMACOKINETIC AND TOXICOLOGICAL DIFFERENCES IN COMPARISON TO SIMILAR DOSES OF THESE METALS ADMINISTERED IN DRINKING WATER. APPROACH: THE STUDY TO DATE HAS INVOLVED EXPOSING OYSTERS TO LOW CONCENTRATIONS OF COPPER AND CADMIUM IN A FLOWING SEAWATER SYSTEM AND EVALUATING METAL UPTAKE BY PROTON INDUCED X-RAY EMISSION ANALYSIS (PIXEA) IN RELATION TO ULTRASTRUCTURAL/BIOCHEMICAL CHANGES IN THE SAME ANIMALS. PROGRESS: STUDIES WERE CONDUCTED ON OYSTERS EXPOSED TO FLOWING NATURAL SEAWATER CONTAINING COPPER AT 0.1 PPM AS COPPER CHLORIDE FOR 14 DAYS. SAMPLES WERE TAKEN AT 1, 3, 7 AND 14 DAYS. THE ACCUMULATED COPPER IN THE OYSTER GILL TISSUE SIGNIFICANTLY AFFECTED THE TISSUE RESPIRATION RATE BY THE 14TH DAY. THERE WAS A STEADY INCREASE IN THE RESPIRATION RATES AND COPPER CONCENTRATIONS OF THE TREATED OYSTER TISSUE RELATIVE TO THE CONTROL TISSUE FROM THE 1ST THROUGH THE 14TH DAY. COLUMNAR GILL EPITHELIAL CELLS FROM THESE ANIMALS EXAMINED BY ELECTRON MICROSCOPY WERE SWOLLEN, CONTAINED NUMEROUS CLEAR VESICLES AND DAMAGED MITOCHONDRIA. GILL TISSUE FROM OYSTERS SIMILARLY EXPOSED TO CADMIUM AT 0.1 PPM AS CADMIUM CHLORIDE DID NOT SHOW THESE EFFECTS, OSTENSIBLY DUE IN PART TO THE PRESENCE OF A LOW MOLECULAR WEIGHT CADMIUM-SPECIFIC BINDING PROTEIN WHICH WAS FOUND TO BE RICH IN DICARBOXYLIC AMINO ACIDS AND CADMIUM ADSORPTION TO MUCUS COVERING THE OYSTERS. PROGRESS TO DATE USING PIXEA FOR METAL ANALYSIS HAS CENTERED ON OPTIMIZING SAMPLE PREPARATION PROCEDURES, BEAM CURRENTS, AND DETECTABILITY LIMITS IN RELATION TO THE DIAMETER OF THE PROTON BEAM AND POTENTIAL VOLATIZATION OF ELEMENTS FROM BIOLOGICAL TISSUE SAMPLES. A NUMBER OF BASELINE PIXEA STUDIES INCLUDING MICRO-SCANS FOR THE INTRA-ORGAN DISTRIBUTION OF 16 ELEMENTS WERE PERFORMED DURING THE LAST YEAR. THESE DATA WILL BE SUBJECTED TO STATISTICAL ANALYSIS IN THE NEXT FEW MONTHS.

**PROJECT: 04096-IN VITRO METABOLISM OF XENOBIOTICS BY SELECTED MARINE SPECIES

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 70000
TASK CODE=V625A-88 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. JR BEND US HEW NATL INST OF HLTH /PHS
MO JAMES US HEW NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES..: RECN-004096 SSIE-GMA 4743 EPA -D5-E772 TASK-V625A-88
AP -625A DU -N140 LABT-EMI

ABSTRACT..... WE ARE INVESTIGATING THE BIOTRANSFORMATION OF FOREIGN ORGANIC COMPOUNDS IN HEPATIC AND EXTRAHEPATIC TISSUES OF VERTEBRATE AND INVERTEBRATE MARINE SPECIES FROM COASTAL MAINE AND FLORIDA. BOTH CYTOCHROME P-450-DEPENDENT MICROSOMAL MIXED-FUNCTION OXIDASES AND ALKENE- AND ARENE OXIDE-METABOLIZING ENZYMES (EPOXIDE HYDRASE AND GLUTATHIONE S-TRANSFERASES) ARE BEING CHARACTERIZED IN CONTROL FISH AND IN FISH PRE-EXPOSED TO ENVIRONMENTAL CONTAMINANTS SUCH AS POLYCYCLIC AROMATIC HYD

**PROJECT: 04098-CARCINOGENIC EFFECTS OF PETROLEUM HYDROCARBONS ON SELECTED MARINE AND ESTUARINE ORGANISMS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING : ESTIMATED FY77 / $ 29000
TASK CODE=V625A-89 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. SP FELTON UNIV OF WASHINGTON SCH OF FISHERIES
BS MILLER UNIV OF WASHINGTON SCH OF FISHERIES
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004098 SSIE-GMA 4765 EPA -D5-E772 TASK-V625A-89
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: TO COMPARE INCIDENCE OF TUMORS, PARTICULARLY EPIDERMAL PAPILLOMAS, IN EXPOSURE AND CONTROL GROUPS OF SELECTED FLATFISH SPECIES IN RESPONSE TO EXPOSURE TO BENZO(A)PYRENE (BAP) AND/OR ITS ELECTROPHILIC DERIVATIVES AND TO QUALITATIVELY EXAMINE THE HISTOPATHOLOGY OF COMPARABLE TUMORS OCCURRING IN BOTH EXPOSURE AND CONTROL GROUPS. METHODS EMPLOYED: STATIC AND FLOWING SEA WATER SYSTEMS WITH AQUARIA AND SAND COATED WITH BAP. MONITORING OF BAP CONCENTRATIONS BY GAS CHROMATOGRAPHY, ASSAY OF ARYL HYDROCARBON HYDROXYLASE (AHH), EXAMINATION OF FISH TISSUE BY ROUTINE HISTOPATHOLOGICAL PROCEDURES. MAJOR FINDINGS AND PROPOSED COURSE: THE FIRST QUARTER EFFORTS HAVE BEEN DIRECTED TOWARDS DEVELOPING A SUITABLE EXPOSURE SYSTEM, OPTIMIZING AHH ASSAY CONDITIONS FOR FLATFISH, REFINING ANALYTICAL AND BIOPSY PROCEDURES FOR HISTOPATHOLOGICAL ASSESSMENT OF FISH TISSUES. THESE INITIAL GOALS ARE IN THE PROCESS OF COMPLETION; TREATMENT OF FISH IS EXPECTED TO BEGIN IN THE NEXT QUARTER.

**PROJECT: 04100-DEFINING AND DIAGNOSING ORPHAN LANDS FOR RECLAMATION AND LAND USE POTENTIAL

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING : ESTIMATED FY77 / $ 40000
TASK CODE=V625A-90 **EPA=D7-E762-FM ** (IAG) PRIOR FY76 / $ 80000

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.: RM SMITH WEST VIRGINIA UNIV
PLAN ID.....: (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004100 SSIE-GMA 5368 EPA -D7-E762-FM TASK-V625A-90
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: (1) IDENTIFY; (2) CLASSIFY BY IMPORTANT PROPERTIES; (3) PLAN FOR IMPROVEMENT; (4) TEST IMPROVEMENT MEASURES, PHYSICALLY, CHEMICALLY AND ECONOMICALLY. APPROACH AND PLANS: AFTER DETERMINING REQUIREMENTS OF FEDERAL AND STATE LAWS AND REGULATIONS, WE WILL CONSULT LOCAL PEOPLE IN NEIGHBORHOODS OF OUR COMPLETED OVERBURDEN STUDIES TO DETERMINE PRIORITIES AND METHODS FAVORED LOCALLY. WE WILL USE AVAILABLE OVERBURDEN AND MINESOIL INFORMATION PLUS OBSERVATIONS, DESCRIPTIONS, SAMPLES, AND LABORATORY MEASUREMENTS TO DETERMINE WHETHER MINESOILS INVOLVED CAN BE CLASSIFIED BY THE WEST VIRGINIA SYSTEM (AS DEFINED IN PROPOSED AMENDMENTS TO SOIL TAXONOMY, 1975) AND WHAT IDENTIFIABLE CLASSES INCLUDE MOST PROBLEMS IN EACH NEIGHBORHOOD. ON SELECTED SITES, RECOMMENDATIONS WILL BE DEVELOPED FOR IMPROVEMENT PRACTICES TO ASSURE A MAXIMUM OF THE MOST VALUABLE LAND FOR THE FUTURE. SIMPLE TRIALS WILL BE TESTED ON SITES SELECTED BY PROPERTIES TO REPRESENT IMPORTANT LANDS NEEDING IMPROVEMENT. PLANS FOR COMPLEX BUT ECONOMICALLY FAVORABLE IMPROVEMENT WILL BE DEVELOPED WHERE SIMPLE MEASURES ARE JUDGED INADEQUATE. ELIMINATION OF OFF-SITE DAMAGE AND ESTABLISHING A BASE FOR LONG-RANGE BENEFITS TO SOCIETY WILL GUIDE IMPROVEMENT DECISIONS.

**PROJECT: 04102-DETERMINING AND INTERPRETING MINESOIL PROPERTY VARIATIONS WITHIN MAPPABLE CLASSES

STARTING/ COMPLETION DATE : 10/77 10/79 FUNDING : ESTIMATED FY77 / $ 30000
TASK CODE=V625A-91 **EPA=D7-E762-FM ** (IAG) PRIOR FY /

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. RM SMITH WEST VIRGINIA UNIV
PLAN ID..... (AP-625A)(DU-N140) EFFECTS OF ENERGY-RELATED POLL. ON ORGANISMS & ECOSYSTEMS
ORDIS CODES... RECN-004102 SSIE-GMA 5365 EPA -D7-E762-FM TASK-V625A-91
AP -625A DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: (1) TO REFINE CHARACTERIZATION OF MINESOIL CLASSES FROM AVAILABLE SAMPLE; (2) TO DESCRIBE, SAMPLE AND CHARACTERIZE ADDITIONAL SELECTED PEDONS REPRESENTING IMPORTANT DEFINED CLASSES. APPROACH AND PLANS: THIS RESEARCH INVOLVES DETERMINING ACID-BASE ACCOUNTS AND SUCH EXTRACTABLE HEAVY METALS AS ALUMINUM, IRON, MANGANESE, ZINC AND CADMIUM ON MINESOIL PROFILE SAMPLES REPRESENTING PARTICULAR IDENTIFIED CLASSES (FAMILIES) OF SPOLENTS, AS DEFINED BY THE WEST VIRGINIA SYSTEM OF CLASSIFICATION OFFERED AS AN AMENDMENT TO SOIL TAXONOMY. MOST SAMPLES WILL BE SELECTED FROM LAYERS OF PROFILES THAT HAVE BEEN FULLY DESCRIBED AND PARTIALLY CHARACTERIZED BY OTHER MEASUREMENTS IN RECENTLY COMPLETED OR ON-GOING WORK. SUCH SAMPLES ARE AVAILABLE FROM THE CLASSIFICATION STUDY COMPLETED BY SENCINDIVER (PH.D. DISSERTATION, 1976) AS WELL AS FROM PRESENT STUDIES OF PLANT ROOTS, SOIL WATER PROPERTIES, AND COARSE FRAGMENTS BY GRADUATE STUDENTS, J.T. AMMONS AND ERIC PERRY. EXTRACTABLE PLANT NUTRIENT CONCENTRATIONS AND OTHER APPROPRIATE SPECIAL TESTS WILL ALSO BE APPLIED TO SELECTED MINESOIL SAMPLES ON WHICH SUCH DATA ARE INCOMPLETE. IN ADDITION, OTHER PROFILES WILL BE DESCRIBED, SAMPLED AND CHEMICALLY AND PHYSICALLY CHARACTERIZED WHEN SUCH INFORMATION APPEARS NEEDED TO COVER THE FULL RANGE OF IMPORTANT MINESOIL FAMILIES AND TO TEST FIELD VARIABILITY WITHIN MAPPING U

Transport and Fate

**PROJECT: 01922-AMBIENT HYDROCARBON AND OZONE MEASUREMENTS NEAR A REFINERY

STARTING/ COMPLETION DATE : 07/77 07/78 : FUNDING ESTIMATED FY77 / $ 79000
TASK CODE=G625B-EA-01 **EPA=R805376-01 ** (GRANT) PRIOR FY76 / $ 65000
EPA OFFICER.. JJ BUFALINI EPA/ESRL RTP
INVESTIGATOR.. H WESTBERG WASHINGTON STATE UNIV SCH OF ENG
MW HOLDREN WASHINGTON STATE UNIV SCH OF ENG
MILESTONES.... 03/79 -FINAL REPORT
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001922 SSIE-GMA 3787 EPA -R805376-01 TASK-G625B-EA-01
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THE PRIMARY OBJECTIVE OF THIS STUDY IS TO EXAMINE THE IMPACT OF A PETROLEUM REFINERY ON DOWNWIND AMBIENT AIR QUALITY. MONITORING THE PRODUCTION OF SECONDARY GASEOUS POLLUTANTS SUCH AS OZONE AND OTHER OXIDANTS IN THE PLUME IS AN IMPORTANT GOAL. BOTH GROUND AND AIRCRAFT MONITORING SYSTEMS WILL BE EMPLOYED TO RECORD CHEMICAL AND PHYSICAL CHANGES IN THE PLUME AS IT DISPERSES DOWNWIND OF THE REFINERY. DETAILED ANALYSES FOR HYDROCARBONS, THE OXIDES OF NITROGEN, OZONE, CARBON MONOXIDE, PAN AND SULFUR DIOXIDE WILL BE PERFORMED. THE FIELD PROGRAM WILL CONDUCTED DURING THE SUMMER OF 1977 NEAR A REFINERY THAT IS ISOLATED FROM OTHER MAJOR HYDROCARBON EMISSION SOURCES.

**PROJECT: 01926-KINETIC STUDY OF SIMULATED SO2, NOX, RH-POLLUTED ATMOSPHERES

STARTING/ COMPLETION DATE : 01/76 12/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=G625B-EA-02 **EPA=R804348-02 ** (GRANT) PRIOR FY76 / $ 50000
EPA OFFICER.: JJ BUFALINI EPA/ESRL RTP
INVESTIGATOR.: J CALVERT OHIO STATE UNIV MATH & PHYS SCI/CHEM DEPT
MILESTONES...: 12/78 -REPORT ON CHEMICAL KINETIC SO2 SUBMODEL
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001926 SSIE-GMA 3529 1 EPA -R804348-02 TASK-G625B-EA-02
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: KINETIC AND MECHANISTIC STUDIES WILL BE MADE TO RECOGNIZE AND TO QUANTITATIVELY CHARACTERIZE THE SEVERAL REACTION PATHWAYS WHICH RESULT IN THE CHEMICAL TRANSFORMATION AND REMOVAL OF SO2, NO, AND NO2 IN THE POLLUTED ATMOSPHERE. IN ONE PHASE OF THE WORK THE SEEMINGLY IMPORTANT REACTIONS OF THE ALKYL PEROXY AND HYDROPEROXY RADICALS WITH SO2, NO, AND NO2 ARE BEING INVESTIGATED. KINETIC FLASH SPECTROSCOPY, STEADY STATE PHOTOCHEMICAL SYSTEMS, AND STUDIES IN FLOW SYSTEMS ARE EMPLOYED TO FOLLOW THE KINETICS OF THE RO2 REACTIONS. THE IDENTIFICATION AND KINETIC CHARACTERIZATION OF THE INITIAL REACTIVE PRODUCTS OF THESE REACTIONS WILL BE ATTEMPTED USING INFRARED, VISIBLE, ULTRAVIOLET SPECTROSCOPY, MASS SPECTROSCOPY, AND MORE CONVENTIONAL CHEMICAL METHODS. IN OTHER PHASES OF THIS WORK WE PLAN TO STUDY THE REACTION PATHWAYS WHICH INVOLVE THE REACTIONS OF THE ELECTRONICALLY EXCITED SO2 WITH ATMOSPHERIC COMPONENTS AND THE REACTIONS OF THE HO RADICAL WITH SO2, NO, NO2, AND OTHER ATMOSPHERIC POLLUTANTS OF SPECIAL INTEREST. THE MECHANISM AND KINETIC INFORMATION OBTAINED IN THE STUDY WILL BE APPLIED DIRECTLY TO THE DEVELOPMENT OF A MORE REALISTIC COMPUTER SIMULATION SCHEME FOR THE PREDICTION OF RATES OF SO2 AND NOX REMOVAL REACTIONS AND THE NATURE OF THE INITIAL "SULFATE" AND OTHER UNIDENTIFIED AND RECOGNIZED PRODUCTS OF THE SUNLIGHT-IRRADIATED, NOX, SO2, RH-POLLUTED ATMOSPHERES.

**PROJECT: 01927-DEVELOPMENT OF A MODEL OF SO2 OXIDATION IN SMOG

STARTING/ COMPLETION DATE : 07/77 07/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=G625B-EA-04 **EPA=R805335-01 ** (GRANT) PRIOR FY76 / $ 73000
EPA OFFICER.: JJ BUFALINI EPA/ESRL RTP
INVESTIGATOR.: DF MILLER BATTELLE MEMORIAL INST
GM SVERDRUP BATTELLE MEMORIAL INST
MILESTONES...: 06/78 -FINAL REPORT
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001927 SSIE-GMA 3769 EPA -R805335-01 TASK-G625B-EA-04
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THE IMMEDIATE OBJECTIVE OF THIS STUDY IS TO PROVIDE A NEW AND MORE COMPREHENSIVE BODY OF DATA USEFUL IN EVALUATING CURRENT THEORIES FOR THE GAS-PHASE OXIDATION OF SO2 IN POLLUTED AIR. THE ULTIMATE GOAL OF THE PROGRAM IS TO DEVELOP AND VALIDATE A MODEL WHICH WILL BE USEFUL IN PREDICTING SO2 OXIDATION RATES FOR A VARIETY OF ATMOSPHERIC CONDITIONS, INCLUDING THOSE FOR PLUMES FROM COMBUSTION SOURCES, URBAN CORE SMOG AND URBAN PLUMES, AND LONG-RANGE TRANSPORT OF LARGE AIR MASSES. EXPERIMENTS OF SO2 OXIDATION WILL BE CONDUCTED WITH THREE SMOG SYSTEMS: PROPYLENE, A SURROGATE MIXTURE OF URBAN HYDROCARBONS, AND EARLY-MORNING AIR IN COLUMBUS, OHIO. COMPARATIVE DATA FROM THESE THREE SYSTEMS WILL BE USED TO ASSESS THE ADEQUACY OF EXISTING KINETIC MODELS FOR SO2 OXIDATION AND TO FORMULATE MORE UNIQUE MODELS WHERE NECESSARY.

**PROJECT: 01928-TRANSFORMATION AND TRANSPORT OF AIR POLLUTANTS

```
                    STARTING/ COMPLETION DATE : 07/75   07/80 :   FUNDING    ESTIMATED   FY77  / $   40000
                    TASK CODE=G625B-EA-05  **EPA=            ** (IN-HO)      PRIOR       FY    /
                IN-HOUSE EFFORT   FY 77  /        YEARS  ; TOTAL PROJECT  05.0
EPA  OFFICER..  WE WILSON                EPA/ESRL   RTP
INVESTIGATOR.   WE WILSON                US EPA                                ORD/ESRL
MILESTONES....  09/76 -FINAL REPORT
                12/77 -FINAL REPORT
                09/78 -FINAL REPORT
PLAN ID.......  (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES...  RECN-001928          SSIE-ZMA   914        TASK-G625B-EA-05      AP  -625B
                DU  -N140            LABT-ALW
ABSTRACT......  OBJECTIVES: DETERMINE THE RATES OF FORMATION AND REMOVAL OF SECONDARY POLLUTANTS, SUCH AS, SULFATES,
                 NITRATES, AND ORGANIC AEROSOLS, DURING TRANSPORT DISTANCES FROM TEN TO HUNDREDS OF KILOMETERS.
                 DETERMINE WHICH PARAMETERS INFLUENCE THE RATES OF FORMATION AND REMOVAL, AND THEIR FREQUENCY OF
                 OCCURRENCE. APPROACH: USE AIRCRAFT AT MOBILE GROUND UNITS TO MEASURE PERTINENT PARAMETERS IN PLUMES
                 FROM POINT AND AREA SOURCES AND STAGNANT AIR MASSES (HAZY BLOBS). DETERMINE MASS FLOW RATES OF
                 POLLUTANTS UNDER VARIOUS CONDITIONS AND INFER REACTION RATES AND MECHANISMS. CURRENT PLANS AND/OR
                 PROGRESS: MEASUREMENTS WERE MADE IN COAL-FIRED POWER PLANT PLUMES AND URBAN PLUMES DURING THE
                 SUMMER OF 1974, 1975, AND 1976, IN A HAZY BLOB IN AUGUST IN 1976, AND IN AN OIL-FIRED POWER PLANT
                 PLUME IN FEBRUARY 1977. PRELIMINARY REPORTS HAVE BEEN MADE AT APCA AND ACS MEETINGS. THE USE OF SF6
                 TRACERS AND CONTINUOUS SULFATE INSTRUMENTS WILL BE TESTED IN SPRING 1977. IN FY78 AND LATER,
                 MEASUREMENTS WILL BE MADE IN ADDITIONAL AREAS OF THE U.S. DATA ANALYSES AND INTERPRETATIONS ARE
                 CONTINUING WITH DATA PRESENTATIONS PLANNED FOR RTP (JUNE OR JULY 1977), DUBROVNIK (SEPTEMBER 1977)
                 AND A REGIONAL MEETING EARLY IN 1978. RATES OF CONVERSION OF SO2 TO SULFATE AND RATES OF REMOVAL OF
                 SO2 HAVE BEEN MEASURED UNDER SUMMER CONDITIONS. BACKGROUND AIR COMPOSITION, BACKGROUND OZONE AND
                 WATER VAPOR CONCENTRATIONS, AND EXTENT OF PLUME MIXING ARE PARAMETERS INFLUENCING REACTION RATES.
                 CONVERSION IS OBSERVED BOTH DURING DAYLIGHT AND NIGHTTIME HOURS.
```

**PROJECT: 01929-SULFUR BUDGET IN LARGE PLUMES

```
                    STARTING/ COMPLETION DATE : 04/77   03/78 :   FUNDING    ESTIMATED   FY77  / $  247000
                    TASK CODE=G625B-EA-06  **EPA=R803896-02  ** (GRANT)      PRIOR       FY76  / $  226000
EPA  OFFICER..  WE WILSON                EPA/ESRL   RTP
INVESTIGATOR..  RB HUSAR                 WASHINGTON UNIV
                NV GILLANI               WASHINGTON UNIV
                JD HUSAR                 WASHINGTON UNIV
MILESTONES....  09/76 -FINAL REPORT
                12/77 -FINAL REPORT
                09/78 -FINAL REPORT
PLAN ID.......  (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES...  RECN-001929          SSIE-GMA  3768       EPA -R803896-02       TASK-G625B-EA-06
                AP  -625B            DU  -N140            LABT-ALW
ABSTRACT......  THE OBJECTIVE OF THIS PROGRAM AS A PART OF PROJECT MISTT (MIDWEST INTERSTATE SULFUR TRANSFORMATION
                 AND TRANSPORT) IS THE QUANTITATIVE DETERMINATION OF THE FATE OF ATMOSPHERIC SULFUR, I.E., THE RATE
                 OF SULFATE FORMATION AND THE RATE OF SO2 REMOVAL TO THE GROUND. LARGE PLUMES EMITTED FROM THE
                 ELEVATED (POWER PLANT) AND LOW LEVEL SOURCES (URBAN) WERE STUDIED ON THE REGIONAL SCALE. AIRBORNE
                 MEASUREMENTS IN THE PLUMES AND BACKGROUND AIR OUTSIDE THE PLUME WERE CARRIED OUT FOR SO2 O3 NOX,
                 BSCAT, AEROSOL CHARGE, PARTICULATE SULFUR CONCENTRATION AND SUPPORTED BY EXTENSIVE METEOROLOGICAL
                 MEASUREMENTS. SULFUR BUDGETS OF WELL DEFINED PLUMES WERE ASSESSED. TRANSPORT OF POLLUTANTS IN
                 PLUMES WAS CHARACTERIZED IN TERMS OF HORIZONTAL "LONG RANGE TRANSPORT" AND VERTICAL TRANSPORT. THE
                 IMPORTANCE OF DRY REMOVAL FOR DIFFERENT TYPES OF PLUMES AND METEOROLOGICAL CONDITIONS WAS ASSESSED.
                 SO2 TO PARTICULATE SULFATE CONVERSION RATES WERE DETERMINED FOR THE COAL-FIRED LABADIE POWER PLANT
                 PLUME AND THE DIURNAL VARIABILITY ( 4 PERCENT PER HOUR FOR NOON HOURS AND 0.5 PERCENT PER HOUR FOR
                 NIGHT HOURS) WAS DETERMINED.
```

**PROJECT: 01930-AIRCRAFT MEASUREMENTS IN SUPPORT OF PROJECT MISTT, MIDWEST INTERSTATE SULFER TRANSFORMATION AND TRANSPORT

```
                    STARTING/ COMPLETION DATE : 06/75   12/78 :   FUNDING    ESTIMATED   FY77  / $   20000
                    TASK CODE=G625B-EA-07  **EPA=68-02-2411  ** (CNTR.)      PRIOR       FY76  / $  269000
EPA  OFFICER.:     DURHAM                EPA/ESRL   RTP
INVESTIGATOR.:     UNKNOWN               METEOROLOGY RES INC
MILESTONES...   12/77 -FINAL REPORT
PLAN ID.......  (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES...  RECN-001930          SSIE-GMA  3021 1     EPA -68-02-2411       TASK-G625B-EA-07
                AP  -625B            DU  -N140            LABT-ALW
ABSTRACT.....   THE PURPOSE OF THE 1976 MISTT STUDY IS TO EXTEND THE RESULTS OF PREVIOUS STUDIES TO COVER LARGER
                 DISTANCES FROM THE SOURCES AND OBTAIN MORE DETAILED KNOWLEDGE OF THE CHEMICAL PROCESSES OCCURRING
                 IN POLLUTED AIR. THE AEROSOL FORMATION PROCESSES AS WELL AS GASEOUS PLUME CHEMISTRY WILL BE THE
                 SUBJECT OF CONTINUED STUDY. CONVERSION RATES AND MECHANISMS IDENTIFIED EARLIER NEED TO BE VERIFIED
                 UNDER A VARIETY OF METEOROLOGICAL CONDITIONS. THE AEROSOL CHEMISTRY OF THE URBAN AND POWER PLANTS
                 PLUMES WILL BE EXAMINED USING NEW TECHNIQUES WHICH WILL YIELD INFORMATION ON SUBSTANCES OTHER THAN
                 SULFATE. IN ADDITION TO REFINING OUR UNDERSTANDING OF THE CHEMICAL PROCESSES, THE 1976 PROGRAM WILL
                 ATTEMPT TO BETTER DEFINE THE REGIONAL TRANSPORT AND ACCUMULATION MECHANISMS AT WORK IN THE EASTERN
                 UNITED STATES. THE PROJECT WILL BE EXPANDED FROM THE IMMEDIATE ST. LOUIS AREA TO INCLUDE THE STUDY
                 OF POLLUTANT ACCUMULATION AND TRANSPORT IN SYNOPTIC SCALE, SLOW MOVING, STABLE AIR MASSES.
```

**PROJECT: 01931-FORMATION OF ATMOSPHERIC AEROSOLS

STARTING/ COMPLETION DATE : 07/75 07/78 FUNDING ESTIMATED FY77 / $ 225000
TASK CODE=G625B-EA-08 **EPA=R803851-03 ** (GRANT) PRIOR FY76 / $ 74000

EPA OFFICER W WILSON EPA/ESRL RTP
INVESTIGATOR KT WHITBY UNIVERSITY OF MINNESOTA
DB KITTELSON UNIVERSITY OF MINNESOTA
BK CANTRELL UNIVERSITY OF MINNESOTA
MILESTONES. 09/76 -FINAL REPORT
12/77 -FINAL REPORT
09/78 -FINAL REPORT
PLAN ID .... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES.. RECN-001931 SSIE-GMA 3942 EPA -R803851-03 TASK-G625B-EA-08
AP -625B DU -N140 LABT-ALW
ABSTRACT..... AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST. LOUIS AREA AS PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND BASED SELF CONTAINED MOBILE LABORATORIES. THESE MEASUREMENTS WERE MADE WITH A GROUP OF COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOROLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL FIRED POWER PLANT PLUME. THE UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASUREMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND UNDER THE PLUMES. THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA SPONSORED PROJECT TO STUDY SULFUR AEROSOLS ON ROADWAYS. MUCH OF THE WORK DURING THE NEXT PROJECT YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED DURING THE PAST SEVERAL YEARS. ANALYSIS IS BEING DIRECTED TOWARD OBTAINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE AEROSOL SIZE DISTRIBUTIONS. LABORATORY WORK TOWARD THE DEVELOPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT.

**PROJECT: 01934-A STUDY OF THE IDENTITY AND SOURCES OF DENVER'S AEROSOLS

STARTING/ COMPLETION DATE : 06/75 06/78 : FUNDING ESTIMATED FY77 / $ 15000
TASK CODE=G625B-EA-09 **EPA=R803078 ** (GRANT) PRIOR FY76 / $ 20000

EPA OFFICER.: DURHAM EPA/ESRL RTP
INVESTIGATOR.: RG DRAFTZ I I T RES INST
JD STOCKHAM I I T RES INST
J GRAF I I T RES INST
MILESTONES.... 09/76 -FINAL REPORT
12/77 -FINAL REPORT
09/78 -FINAL REPORT
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001934 SSIE-GMA 3773 EPA -R803078 TASK-G625B-EA-09
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THE CITY OF DENVER EXPERIENCES OVER 200 ATMOSPHERIC INVERSIONS EACH YEAR WHICH PRODUCE HAZE AND DECREASED VISIBILITY OVER SIGNIFICANT PORTIONS OF DENVER. IN 1973, THE U.S. EPA BEGAN A RESEARCH STUDY TO DETERMINE THE CAUSE AND SOURCES OF THIS POLLUTION PROBLEM. ONE IMPORTANT ASPECT OF THE STUDY INVOLVES THE IDENTIFICATION OF AEROSOLS COLLECTED FROM THE ATMOSPHERE. IN A PREVIOUS PRELIMINARY STUDY (1972), POLARIZED LIGHT MICROSCOPY WAS USED SUCCESSFULLY TO IDENTIFY MANY OF THE AEROSOL PARTICLES. THE GOAL OF THIS CURRENT PROPOSED STUDY IS TO TRACE THE SOURCES OF AEROSOL PARTICLES COLLECTED BY THE EPA AND OTHER AGENCIES AT A NETWORK OF SAMPLING STATIONS, BY IDENTIFYING THE TYPES OF PARTICLES AND COMPARING THEM TO REFERENCE SAMPLES. THE PARTICLES WILL BE CHARACTERIZED AND IDENTIFIED BY POLARIZED LIGHT MICROSCOPY SUPPLEMENTED WITH SCANNING ELECTRON MICROSCOPY AND MASS SPECTROMETRY. THE DATA FROM THESE ANALYSES WILL BE CORRELATED WITH METEOROLOGICAL AND AEROSOL DATA TO DISCOVER THE IMPACT OF INDIVIDUAL SOURCES IN PRODUCING HAZE.

**PROJECT: 01935-INTERPRETATION OF DATA FROM BIOGENIC SULFUR FIELD STUDIES/MISTT
TECHNICAL SUPPORT

STARTING/ COMPLETION DATE : 04/77 05/78 FUNDING ESTIMATED FY77 / $ 34000
TASK CODE=G625B-EA-13 **EPA=68-02-2500 ** (CNTR.) PRIOR FY76 / $ 32000

EPA OFFICER. DURHAM EPA/ESRL RTP
INVESTIGATOR.: UNKNOWN ENV QUALITY RES INC
MILESTONES...: 01/77 -PREPARE TECHNICAL SERVICE CONTRACT
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001935 SSIE-GMA 3776 EPA -68-02-2500 TASK-G625B-EA-13
AP -625B DU -N140 LABT-ALW
ABSTRACT..... DURING THE CONTRACT PERIOD THE CONTRACTOR WILL PROVIDE TECHNICAL SERVICES AS DIRECTED BY THE PROJECT OFFICER THROUGH TASK ORDERS. SUCH SERVICES WILL INCLUDE BUT ARE NOT LIMITED TO: 1) PREDICTION OF SIZE, SHAPE AND DIRECTION OF POWER PLANT AND URBAN PLUMES, 2) PLANNING ASSISTANCE (SITE SELECTION AND EXPERIMENTAL DESIGN), 3) SURFACE AND VERTICAL PROFILE MEASUREMENTS (PILOT BALLOONS, RADIOSONDES, HELICOPTER FLIGHTS, TOWER MEASUREMENTS), 4) MEASUREMENT OF VERTICAL FLUXES OF POLLUTANTS, 5) CALCULATION OF WIND FIELDS AND TRAJECTORIES, AND 6) PREPARATION OF APPROPRIATE DATA AND INTERPRETIVE REPORTS. THESE SERVICES ARE EXPECTED TO REQUIRE APPROXIMATELY 700 MAN-HOURS DURING THE CONTRACT PERIOD, BUT THE CONTRACT SHOULD PROVIDE FOR THE PURCHASE OF ADDITIONAL SERVICES IN INCREMENTS OF 235 MAN-HOURS IF THEY ARE NEEDED. THE CONTRACTOR SHALL PROVIDE EQUIPMENT, MATERIALS, AND TRAVEL THAT MAY BE REQUIRED TO

**PROJECT: 01936-MESOSCALE SULFUR BALANCE STUDIES

```
                    STARTING/ COMPLETION DATE : 12/75   02/79 :   FUNDING    ESTIMATED   FY77  / $   35000
                    TASK CODE=G625B-EA-14  **EPA=R803887-02  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.: R  PATTERSON              EPA/ESRL   RTP
INVESTIGATOR.: JW WINCHESTER             FLORIDA STATE UNIV                   ARTS & SCI/CHEM DEPT
               JW NELSON                 FLORIDA STATE UNIV                   ARTS & SCI/CHEM DEPT
MILESTONES.... 12/78 -FINAL REPORT
PLAN ID...... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001936          SSIE-GMA  3952        EPA -R803887-02       TASK-G625B-EA-14
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... A COMPREHENSIVE STUDY IS BEING CONDUCTED TO CHARACTERIZE THE OCCURRENCE OF SULFUR IN AEROSOL
                PARTICLES AT SAMPLING STATIONS IN 14 LOCATIONS BETWEEN THE MID-CONTINENT AND EASTERN SEABOARD OF
                CONTINENTAL U.S.A. ADDITIONAL REMOTE STATIONS IN MARINE AND CONTINENTAL AREAS ARE ALSO BEING
                OPERATED TO PROVIDE IMPORTANT BACKGROUND INFORMATION. EMPHASIS IS BEING PLACED ON THE
                CONCENTRATIONS OF SULFUR IN RELATION TO OTHER ELEMENTS PRESENT IN THE AEROSOL AND ON THE TIME
                VARIABILITY OF THESE CONCENTRATIONS WITH A TIME RESOLUTION OF 2 HOURS. SAMPLING IS BEING CARRIED
                OUT CONTINUOUSLY AT HEIGHTS FROM GROUND LEVEL TO 30 METERS BY A UNIQUE TIME SEQUENCE FILTER SAMPLER
                WHICH HAS BEEN DEVELOPED AT FLORIDA STATE UNIVERSITY. ADDITIONAL SAMPLES ARE PLANNED TO BE TAKEN
                DURING INTENSIVE PERIODS DURING THE YEAR BY CASCADE IMPACTORS AT ABOUT FIVE OF THE FILTER SAMPLING
                SITES, USING CASCADE IMPACTORS FOR DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SULFUR AND
                RELATED ELEMENTS. ELEMENTAL ANALYSIS IS PERFORMED USING PROTON INDUCED X-RAY EMISSION, A HIGHLY
                SENSITIVE TECHNIQUE PERMITTING BOTH THE EXTREMELY SHORT 2-HOUR TIME RESOLUTION ON A CONTINUOUS
                BASIS FOR FILTER SAMPLES AS WELL AS THE SIZE RESOLUTION OF PARTICLES AS SMALL AS 0.25 MICRON
                DIAMETER BY CASCADE IMPACTORS. BY MEANS OF THE COMBINATION OF SAMPLING TECHNIQUES, THE IMPACT OF
                FOSSIL FUEL COMBUSTION AND OTHER ANTHROPOGENIC SOURCES OF SULFUR ON THE NATURAL CHARACTERISTICS OF
                THE ATMOSPH
```

**PROJECT: 01938-OPTICAL EFFECTS OF ATMOSPHERIC AEROSOL

```
                    STARTING/ COMPLETION DATE : 10/75   12/78     FUNDING    ESTIMATED   FY77  / $   25000
                    TASK CODE=G625B-EA-15  **EPA=R800665-13  ** (GRANT)      PRIOR       FY76  / $   35000
EPA  OFFICER.: II WILSON                 EPA/ESRL   RTP
INVESTIGATOR.: AP WAGGONER               UNIVERSITY OF WASHINGTON
               RJ CHARLSON               UNIVERSITY OF WASHINGTON
MILESTONES.... 12/78 -FINAL REPORT
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001938          SSIE-GMA  4519        EPA -R800665-13       TASK-G625B-EA-15
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THIS CONTINUE OUR PAST
                STUDIES RELATING AEROSOL SOURCES, PHYSICAL AND CHEMICAL PROPERTIES OF THE PARTICLES, EFFECTS OF
                RELATIVE HUMIDITY TO ATMOSPHERIC OPTICAL PROPERTIES SUCH AS RADIATIVE CLIMATE AND VISIBILITY.
                INCLUDED WILL BE STUDIES OF THE RELATIONSHIPS OF PARTICLE PROPERTIES AND SYNOPTIC SCALE TRANSPORT.
```

**PROJECT: 01939-HALOCARBON ANALYSES IN THE ST. LOUIS, MISSOURI METROPOLITAN AREA

```
                    STARTING/ COMPLETION DATE : 09/76   07/78 :   FUNDING    ESTIMATED   FY77  / $   12000
                    TASK CODE=G625B-EA-17  **EPA=68-02-2421  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER..    ELLESTAD               EPA/ESRL   RTP
INVESTIGATOR.. RA RASMUSSEN              WASHINGTON STATE UNIV                SCH OF ENG
MILESTONES.... 09/78 -FINAL REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001939          SSIE-GMA  3369 1      EPA -68-02-2421       TASK-G625B-EA-17
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... THE RESEARCH PROGRAM HAS TWO OBJECTIVES: 1) TO ANALYZE THE HALOCARBONS AND HYDROCARBONS IN AIR
                SAMPLES COLLECTED BY THE FIELD STUDIES IN THE ST. LOUIS AREA. PARTICULAR EMPHASIS WILL BE PLACED ON
                DETAILED C2 TO C12 HYDROCARBONS MEASUREMENTS FROM BOTH AIRCRAFT AND GROUND SAMPLING STATIONS. IN
                ADDITION, A COMPLETE ANALYSIS OF THE HALOCARBONS WILL BE ACCOMPLISHED, ESPECIALLY THE FLUOROCARBONS
                11 AND 12 AND THE CHLOROCARBON CLEANING SOLVENTS. 2) TO PROVIDE FUTURE FIELD SUPPORT VIA AN
                INSTRUMENTED FIELD LABORATORY, METEOROLOGICAL SUPPORT FOR COORDINATING AIRCRAFT STUDIES AND
                INTERPRETING STAGNATING ANTICLONE WEATHER SITUATIONS. IN ADDITION, THE INSTALLATION OF SPECIALLY
                PROGRAMMED AUTOMATED HALOCARBON INSTRUMENTATION, AND/OR MANUALLY OPERATED HIGH-RESOLUTION
                HYDROCARBON INSTRUMENTATION IN GOVERNMENT-OWNED MOBILE AEROSOL LABORATORY WILL BE ACCOMPLISHED AT
                THE REQUEST OF THE GOVERNMENT.
```

**PROJECT: 01940-DEVELOPMENT & APPLICATION OF MULTIPLE TRACER TECHNIQUES FOR THE STUDY OF POLLUTANT TRANSPORT AND DISPERSION IN THE ATMOSPHERE

```
                    STARTING/ COMPLETION DATE : 11/76   10/77 :   FUNDING :  ESTIMATED   FY77  / $   13500
                    TASK CODE=G625B-EA-18  **EPA=R804990-01  ** (GRANT)      PRIOR       FY76  / $   54000
EPA  OFFICER..    SCHIERMEIER            EPA/ESRL   RTP
INVESTIGATOR.. FH SHAIR                  CALIFORNIA INST OF TECH              DEPT OF CHEM & CHEM ENGIN
MILESTONES.... 09/77 -DATA REPORT
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001940          SSIE-GMA  3430        EPA -R804990-01       TASK-G625B-EA-18
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... THIS IS A PROPOSAL REQUESTING SUPPORT FOR THE FURTHER DEVELOPMENT AND APPLICATION OF MULTIPLE
                ATMOSPHERIC TRACER TECHNIQUES. THE ANALYTICAL APPROACH IS TO EXTEND THE USE OF ELECTRON CAPTURE GAS
                CHROMATOGRAPHY. RECENTLY, WITH THE HELPFUL SUGGESTIONS GIVEN TO US BY RAY DIXON, WE HAVE DEVELOPED
                SYSTEMS WHICH SEPARATE SF6, CBRF3, CCL2F2, O2, AND CBR2F2 INTO SHARP DISTINCT PEAKS, THE LAST OF
                WHICH ELUTES WITHIN 200 SECONDS FROM THE TIME OF INJECTION. THE REST OF THE SYSTEM DEVELOPMENT IS
                TO DEVELOP THE CAPABILITY TO ACCURATELY ANALYZE AT LEAST 1000 AIR SAMPLES PER DAY. THE FIRST
                EXTENDED APPLICATION OF THIS MULTIPLE TRACER TECHNIQUE WOULD BE TO DETERMINE THE TRANSPORT AND
                EXTENT OF DISPERSION ASSOCIATED WITH: (1) URBAN SOURCES (EMITTED AT LOW LEVELS) AND (2) RURAL POWER
                PLANT PLUMES EMITTED AT HIGH LEVELS. SPECIFIC EXPERIMENTS ARE PLANNED TO ACCURATELY DETERMINE THE
                EXTENT OF VERTICAL DISPERSION ASSOCIATED WITH PLUMES TRAVELING OVER RURAL REGIONS AND OVER URBAN
                REGIONS.
```

**PROJECT: 01942-INTERNATIONAL SYMPOSIUM ON SULFUR IN THE ATMOSPHERE, DUBROVNIK, YUGOSLAVIA

STARTING/ COMPLETION DATE : 03/77 03/78 : FUNDING ESTIMATED FY77 / $ 43000
TASK CODE=G625B-EA-19 **EPA=R805043-01 ** (GRANT) PRIOR FY /

EPA OFFICER.: WE WILSON EPA/ESRL RTP
INVESTIGATOR.: RB HUSAR WASHINGTON UNIV
JD HUSAR WASHINGTON UNIV
MILESTONES...: 03/78 -PUBLICATION OF PROCEEDINGS
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001942 SSIE-GMA 3771 EPA -R805043-01 TASK-G625B-EA-19
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: THIS SYMPOSIUM SHOULD BRING TOGETHER AMERICAN, EUROPEAN AND OTHER PARTICIPANTS TO REPORT AND DISCUSS THE CURRENT ISSUES ON THE ATMOSPHERIC SULFUR PROBLEMS. IT IS ESTIMATED THAT THE GLOBAL EMISSION FROM ANTHROPOGENIC SOURCES ARE OF THE SAME ORDER OF MAGNITUDE AS EMISSION FROM NATURAL SOURCES. HOWEVER, MORE THAN 90% OF ANTHROPOGENIC SO2 EMISSIONS ARE IN THE NORTHERN ATMOSPHERE. IT HAS BEEN RECOGNIZED THAT THE ANTHROPOGENIC SULFUR PROBLEM IS A REGIONAL ONE ON THE SPATIAL SCALE OF THOUSANDS OF KILOMETERS. THE HORIZONTAL AND VERTICAL DISPERSION MECHANISMS, REMOVAL RATES BY DRY AND WET DEPOSITION, SO2 OXIDATION RATES AND MECHANISMS, THE PARTICULATE SULFUR SIZE DISTRIBUTION, SPATIO-TEMPORAL DISTRIBUTION AND CHEMISTRY OF AEROSOL SULFUR COMPOUNDS AND ASSOCIATED MEASUREMENT TECHNIQUES WILL BE DISCUSSED. THE SYMPOSIUM IS CO-SPONSORED BY UNITED NATIONS ENVIRONMENT PROGRAMME, ELECTRIC POWER RESEARCH INSTITUTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, AMERICAN METEOROLOGICAL SOCIETY UNDER THE AUSPICES OF YUGOSLAV ACADEMY OF SCIENCES AND ARTS.

**PROJECT: 01943-DETERMINE THE CHARACTER AND ORIGIN OF AEROSOLS AND DEVELOPMENT OF FINE PARTICLE METHODOLOGIES

STARTING/ COMPLETION DATE : 03/76 09/79 : FUNDING ESTIMATED FY77 / $ 68000
TASK CODE=G625B-EA-20 **EPA=68-02-2454 ** (CNTR.) PRIOR FY76 / $ 45000

EPA OFFICER.. PATTERSON EPA/ESRL RTP
INVESTIGATOR.. RE HEFFELFINGER BATTELLE MEMORIAL INST
PW JONES BATTELLE MEMORIAL INST
D MENDENHALL BATTELLE MEMORIAL INST
D CHASE BATTELLE MEMORIAL INST
MILESTONES.... 06/78 -REPORT ON NON-URBAN AEROSOL COMPOSITION ESRL MODELER
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001943 SSIE-GMA 3125 1 EPA -68-02-2454 TASK-G625B-EA-20
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: OBJECTIVES: THE OBJECTIVE OF THE PROJECT IS TO PROVIDE THE ANALYTICAL CHEMISTRY AND SMOG CHAMBER STUDIES SUPPORT NECESSARY TO DETERMINE THE CHARACTER AND ORIGIN OF AEROSOLS. APPROACH: THE APPROACH IS TO APPLY ALL INORGANIC AND ORGANIC ANALYSIS TECHNIQUES NECESSARY TO CHARACTERIZE AEROSOLS WITH REGARD TO ELEMENTS, IONS, AND COMPOUNDS. IN ADDITION SMOG CHAMBER STUDIES WILL BE CARRIED OUT IN ORDER TO ILLUCIDATE THE PROCESSES OF FORMATION OF AEROSOLS FROM GASEOUS PRODUCTS.

**PROJECT: 01945-STRUCTURE AND REACTIVITY OF ADSORBED OXIDES OF SULFUR

STARTING/ COMPLETION DATE : 12/73 12/78 : FUNDING ESTIMATED FY77 / $ 10000
TASK CODE=G625B-EA-21 **EPA=R801136-06 ** (GRANT) PRIOR FY76 / $ 10000

EPA OFFICER. J DURHAM EPA/ESRL RTP
INVESTIGATOR.. JH LUNSFORD TEXAS A & M UNIV
MILESTONES...: 12/78 -FINAL REPORT
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001945 SSIE-AO 17607 4 EPA -R801136-06 TASK-G625B-EA-21
AP -625B DU -N140 LABT-ALW
ABSTRACT..... OBJECTIVES: THE OVERALL OBJECTIVE OF THIS RESEARCH IS TO DETERMINE THE STRUCTURE AND REACTIVITY OF ABSORBED OXIDES OF SULFUR. RESULTS FROM SUCH A STUDY WILL BE USEFUL IN IDENTIFYING THE PHOTOCHEMICAL AND THERMAL REACTIONS WHICH TAKE PLACE ON ATMOSPHERIC AEROSOLS. THE SPECIFIC GOALS DURING THE CURRENT YEAR WERE (A) TO DEVELOP PHOTOELECTRON INFRARED SPECTROSCOPY AS A TECHNIQUE FOR STUDYING OXIDES OF SULFUR ON AEROSOLS, (B) TO DETERMINE THE MECHANISMS FOR THE OXIDATION OF SO2 TO SO4 ON SURFACES, (C) TO IDENTIFY IONS SUCH AS S2O IONS AND H2S ION WHICH MAY BE PRODUCED DURING THE PHOTOCHEMICAL REACTION OF H2S WITH SO2 ON MAGNESIUM OXIDE. EMPHASIS IN FUTURE WORK WILL BE PLACED ON THE CATALYTIC OXIDATION OF SO2 IN FILMS OF ABSORBED WATER.

**PROJECT: 01946-REACTIONS OF SULFUR DIOXIDE IN AEROSOLS

STARTING/ COMPLETION DATE : 08/76 07/78 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=G625B-EA-22 **EPA=R803814-02 ** (GRANT) PRIOR FY76 / $ 20000

EPA OFFICER. DURHAM EPA/ESRL RTP
INVESTIGATOR.. DM HIMMELBLAU UNIV OF TEXAS SCH OF ENG/CHEM ENG
MILESTONES.... 06/78 FINAL REPORT
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001946 SSIE-GMA 3578 2 EPA -R803814-02 TASK-G625B-EA-22
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE RATE AND EXTENT OF REACTION OF SULFUR DIOXIDE AND OTHER AIR POLLUTANTS AT PPM CONCENTRATIONS WITH AEROSOL DROPLETS OF THE ORDER OF SIZE OF ONE MICRON. IN THE INITIAL EXPERIMENTS RADIOACTIVE 35SO2 WILL BE TRANSFERRED TO AEROSOLS, AND THE TOTAL RADIOACTIVE SULFUR TRANSFERRED COUNTED. MODELS OF THE MASS TRANSFER AND REACTION WILL BE FIT BY THE EXPERIMENTAL DATA, AND USED TO ELUCIDATE THE EXTENT OF REACTION AND OXIDATION TO SULFATE.

**PROJECT: 01947-AEROSOL DEPOSITION RATES

```
                    STARTING/ COMPLETION DATE : 10/75   10/78 :   FUNDING    ESTIMATED   FY77  / $   55000
                    TASK CODE=G625B-EA-24  **EPA=            ** (GRANT)      PRIOR       FY    /
EPA  OFFICER..    DURHAM                  EPA/ESRL   RTP
INVESTIGATOR..    HICKS                   ARGONNE NATL LAB
MILESTONES.... 10/80 -FINAL REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001947            SSIE-GMA  4599        TASK-G625B-EA-24      AP  -625B
               DU  -N140              LABT-ALW
ABSTRACT...... ATMOSPHERIC MEASUREMENTS WILL BE MADE TO DETERMINE THE RATE OF DRY DEPOSITION AT A VARIETY OF
                SURFACES, INCLUDING GRASS, CROPS, FOREST, SNOW, AND WATER. THES DATA ARE NEEDED FOR CALCULATION OF
                LONG RANGE AEROSOL TRANSPORT. 1. FIELD STUDY 1: WINTER GRASS IN THE MIDWEST. 2. FIELD STUDY 2: OVER
                CROPS IN THE MIDWEST. 3. FIELD STUDY 3: OVER SNOW. 4. FIELD STUDY 4: ON FOREST. 5. FIELD STUDY 5·
                ON WINTER GRASS IN THE SOUTH. 6. FIELD STUDY 6: ON LAKE WATER.
```

**PROJECT: 01949-AEROMETRIC FIELD STUDY IN VICINITY OF A LARGE POWER PLANT IN COMPLEX TERRAIN

```
                    STARTING/ COMPLETION DATE : 05/76   09/78     FUNDING    ESTIMATED   FY77  / $  255000
                    TASK CODE=G625B-EA-25  **EPA=68-02-2260  ** (CNTR.)      PRIOR       FY76  / $  413000
EPA  OFFICER.: GC HOLZWORTH               EPA/ESRL   RTP
INVESTIGATOR.: WG BIGGS                   GEOMET INC
               PF STENBERG                GEOMET INC
               DE COVER                   GEOMET INC
MILESTONES.... 08/78 -REPORT ON FIELD STUDY ON A POWER PLANT IN COMPLEX TERRAIN
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES.   RECN-001949            SSIE-GMA  3113 1      EPA -68-02-2260       TASK-G625B-EA-25
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THE OBJECTIVE OF THIS FIELD MEASUREMENT PROGRAM IS TO COLLECT A SET OF RELIABLE AEROMETRIC
                MEASUREMENTS IN THE VICINITY OF THE CLINCH RIVER POWER PLANT IN RUSSELL COUNTY OF SOUTHWESTERN
                VIRGINIA. CONTINUOUS MEASUREMENTS OF SO2; NO, WIND, AND TEMPERATURE ARE MADE AT 8 FIXED SITES OUT
                TO 30 KM FROM THE PLANT. AN INSTRUMENTED VAN ROUTINELY MONITORS AIR QUALITY AT LIKELY RECEPTOR
                LOCATIONS SO2 AND NO ARE MONITORED CONTINUOUSLY AT THE PLANT AND PIBAL AND TEMPERATURE SOUNDINGS
                ARE MADE DAILY. AFTER THE FIELD DATA ARE ARCHIVED THEY WILL BE ANALYZED TO DETERMINE EFFECTS OF
                COMPLEX TERRAIN ON TRANSPORT AND DIFFUSION, AND THE AEROMETRIC DATA WILL BE MADE AVAILABLE TO
                OTHERS, ANALYSTS, M
```

**PROJECT: 01951-INDEPENDENT AUDIT OF CLINCH RIVER FIELD STUDY

```
                    STARTING/ COMPLETION DATE : 01/77   09/77 :   FUNDING :  ESTIMATED   FY77  / $   14000
                    TASK CODE=G625B-EA-26  **EPA=68-02-2156  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. GC HOLZWORTH               EPA/ESRL   RTP
INVESTIGATOR.. DE WAGONER                 RESEARCH TRIANGLE INST
               CE DECKER                  RESEARCH TRIANGLE INST
MILESTONES...: 09/77 -FINAL REPORT
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001951            SSIE-GMA  2870 1      EPA -68-02-2156       TASK-G625B-EA-26
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THE OBJECTIVE OF THIS WORK IS TO CONDUCT AN INDEPENDENT AUDIT OF THE AEROMETRIC MEASUREMENTS IN
                ORDER TO ESTABLISH THEIR RELIABILITY. AN AUDIT OF THE SYSTEMS (OPERATING PROCEDURES) HAS INDICATED
                SOME POTENTIAL PROBLEM AREAS, WHICH HAVE BEEN CORRECTED. AN AUDIT OF THE INSTRUMENT MEASUREMENTS
                HAS BEEN COMPLETED BUT NOT YET RECEIVED. ANOTHER AUDIT OF INSTRUMENT MEASUREMENTS WILL BE
                CONDUCTED, PROBABLY IN JULY, 19
```

**PROJECT: 01952-NORTHROP SUPPORT SERVICES

```
                    STARTING/ COMPLETION DATE : 10/76   09/77 :   FUNDING    ESTIMATED   FY77  / $   40000
                    TASK CODE=G625B-EA-30  **EPA=68-02-2566  ** (CNTR.)      PRIOR       FY76  / $   40000
EPA  OFFICER.. M  BUFALINI                EPA/ESRL   RTP
INVESTIGATOR.. S  COLOFF                  NORTHROP SERVICES INC
MILESTONES.... 00/00 -CONTINUING
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES.. RECN-001952             SSIE-GMA  3926        EPA -68-02-2566       TASK-G625B-EA-30
              AP  -625B               DU  -N140             LABT-ALW
ABSTRACT...... THE CONTRACTOR, NORTHROP SERVICES INC., OPERATES AND MAINTAINS GOVERNMENT PROVIDED FACILITIES AT
                EPA'S ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA, IN PROVIDING TECHNICAL
                SUPPORT TO THE ENVIRONMENTAL SCIENCES RESEARCH LABORATORY IN THE FOLLOWING ACTIVITIES: 1. MOBILE
                SOURCE EMISSIONS RESEARCH; 2. STATIONARY SOURCE EMISSIONS RESEARCH; 3. GAS KINETICS AND PHYSICS
                RESEARCH; 4. SPECIAL TECHNIQUES RESEARCH; 5. AEROSOL RESEARCH; 6. AIR INSTRUMENTATION DEVELOPMENT
                AND TESTING; 7. FLUID MODELING FACILITY OPERATING AND TESTING; 8. SAMPLING AND ANALYSIS METHODS
                RESEARCH.
```

**PROJECT: 01953-NORTHROP SUPPORT SERVICES

```
                    STARTING/ COMPLETION DATE : 10/76   09/77 :   FUNDING    ESTIMATED   FY77  / $    6000
                    TASK CODE=G625B-EA-31  **EPA=68-02-2566  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. M  BUFALINI                EPA/ESRL   RTP
INVESTIGATOR.  S  COLOFF                  NORTHROP SERVICES INC
MILESTONES...  00/00 -CONTINUING
PLAN ID......  (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001953            SSIE-GMA  3918        EPA -68-02-2566       TASK-G625B-EA-31
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THE CONTRACTOR, NORTHROP SERVICES INC., OPERATES AND MAINTAINS GOVERNMENT PROVIDED FACILITIES AT
                EPA'S ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA, IN PROVIDING TECHNICAL
                SUPPORT TO THE ENVIRONMENTAL SCIENCES RESEARCH LABORATORY IN THE FOLLOWING ACTIVITIES: 1. MOBILE
                SOURCE EMISSIONS RESEARCH; 2. STATIONARY SOURCE EMISSIONS RESEARCH; 3. GAS KINETICS AND PHYSICS
                RESEARCH; 4. SPECIAL TECHNIQUES RESEARCH; 5. AEROSOL RESEARCH; 6. AIR INSTRUMENTATION DEVELOPMENT
                AND TESTING; 7. FLUID MODELING FACILITY OPERATING AND TESTING; 8. SAMPLING AND ANALYSIS METHODS
                RESEARCH.
```

**PROJECT: 01954-ANALYSIS OF LIDAR DATA

```
                    STARTING/ COMPLETION DATE : 06/76   09/77 :   FUNDING :  ESTIMATED   FY77  / $   14000
                    TASK CODE=G625B-EA-32  **EPA=68-02-2418  ** (CNTR.)      PRIOR       FY76  / $   40000
EPA  OFFICER..    WILSON                  EPA/ESRL   RTP
INVESTIGATOR..    UTHE                    S R I INTERNATL
MILESTONES.... 09/77 -FINAL REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001954            SSIE-GMA  4564        EPA -68-02-2418       TASK-G625B-EA-32
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... LIDAR DATA OBTAINED DURING THE SUMMER OF 1976 MISTT FIELD STUDY WILL BE ANALYZED. DURING THAT STUDY
                THE LIDAR WAS USED PRIMARILY TO LOCATE THE PLUME AT NIGHT. A REPORT DEMONSTRATING THE TYPE OF
                RESULTS AVAILABLE FROM A LIDAR PROGRAM WILL BE PREPARED.
```

**PROJECT: 01956-NOAA SUPPORT SERVICES TO EPA

```
                    STARTING/ COMPLETION DATE : 01/77   01/78 :   FUNDING    ESTIMATED   FY77  / $    5000
                    TASK CODE=G625B-EA-33  **EPA=D7-0305     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER..    NIEMEYER                EPA/ESRL   RTP
INVESTIGATOR.:    HESS                    US DOC                              NATL OCEANIC & ATMOSPHERIC ADMIN
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001956            SSIE-GMA  4598        EPA -D7-0305          TASK-G625B-EA-33
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... PURCHASE VISIBILITY AND RELATED METEOROLOGICAL DATA TAPES FROM THE NATIONAL CLIMATIC CENTER, NOAA.
```

**PROJECT: 01959-AEROSOL FORMATION AND DEPOSITION IN A FOREST CANOPY

```
                    STARTING/ COMPLETION DATE : 05/77   12/77 :   FUNDING :  ESTIMATED   FY77  / $   15000
                    TASK CODE=G625B-EA-34  **EPA=R804860-01S3** (GRANT)      PRIOR       FY    /
EPA  OFFICER..    DURHAM                  EPA/ESRL   RTP
INVESTIGATOR.. KR KNOERR                  DUKE UNIV
MILESTONES.... 12/77 -FINAL REPORT
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001959            SSIE-GMA  4601        EPA -R804860-01S3     TASK-G625B-EA-34
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT.....: AN EXISTING GRANT (#804860, TASK AG-10) WITH DUKE U. WILL BE SUPPLEMENTED FOR CONTINUED OPERATION
                THOUGH FALL OF 1977. THIS GRANT WILL PROVIDE INFORMATION ON TURBULENT TRANSFER OF HEAT AND MOISTURE
                WHICH WILL BE USED WITH POLLUTANT PROFILES TO DETERMINE POLLUTANT EMISSION AND DEPOSITION RATES.
                GKPB WILL CONTINUE THEIR HC EMISSION STUDIES; ARB WILL PERFORM AEROSOL DEPOSITION STUDIES WITH THE
                PARTICIPATION OF HICKS (ANL) AND BROCK (U. OF TEXAS).
```

**PROJECT: 01961-AIRCRAFT MEASUREMENTS IN SUPPORT OF AEROSOL RESEARCH STUDIES OF SULFUR INFORMATION AND TRANSPORTS

```
                    STARTING/ COMPLETION DATE : 04/77   04/80 :   FUNDING    ESTIMATED   FY77  / $    5800
                    TASK CODE=G625B-EA-36  **EPA=68-02-2709  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.:    DURHAM                  EPA/ESRL   RTP
INVESTIGATOR.: W  VAUGHAN                 ENVIRONMENTAL MEASUREMENTS INC
               GM KLAUBER                 ENVIRONMENTAL MEASUREMENTS INC
               CL WHITE                   ENVIRONMENTAL MEASUREMENTS INC
               GS NEWCOMB                 ENVIRONMENTAL MEASUREMENTS INC
MILESTONES.... 04/80 -FINAL REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001961            SSIE-GMA  3778        EPA -68-02-2709       TASK-G625B-EA-36
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... ENVIRONMENTAL MEASUREMENTS, INC. (EMI) WILL ORGANIZE AND EXECUTE FIELD PROGRAMS FOR THE MEASUREMENT
                OF POWER PLANT PLUME TRANSPORT, USING AIRCRAFT PLATFORMS AND A VARIETY OF AIR QUALITY INSTRUMENTS.
                THE PURPOSES OF THESE FIELD PROGRAMS ARE TO: 1. OBTAIN MEASUREMENTS OF CHANGES IN PLUME CHEMISTRY
                OF THE SAME AIR PARCEL DURING ITS LONG-RANGE TRANSPORT AWAY FROM A POWER PLANT. 2. DEVELOP AN EPA
                DATA BASE PARALLEL AND COMPLEMENTARY TO THAT OBTAINED BY OTHERS AS PART OF SUCH PROGRAMS AS THE
                SULFATE REGIONAL EXPERIMENT (SURF). 3. TEST FLY A NEW AND INNOVATIVE INSTRUMENTATION. MEASUREMENTS
                FOR THE FOLLOWING PARAMETERS WILL BE INCLUDED: SULFATES, SO2, SUB MICRON AEROSOLS, SF6, BSCAT. THIS
                WORK WILL BE COORDINATED WITH OTHER CONTRACTORS TO PROVIDE BROAD FIELD MEASUREMENTS, DATA ANALYSES
                AND A FINAL REPORT. AN INITIAL PROJECT WILL BE IN COOPERATION WITH THE ACTIVITIES OF THE
                ATMOSPHERIC DYNAMICS AND CHEMISTRY SECTION OF BATTELLE-PACIFIC NORTHWEST LABORATORIES (BNW), AS
                SUPPORTED BY THE ELECTRIC POWER RESEARCH INSTITUTE (EPRI). THE WORK WILL TAKE PLACE IN THE VICINITY
                OF TWO POWER PLANTS LOCATED IN MICHIGAN AND INDIANA IN MAY 1977.
```

**PROJECT: 01963-PHOTOCHEMICAL MODEL DEVELOPMENT

```
                    STARTING/ COMPLETION DATE : 00/77   UNK        FUNDING    ESTIMATED   FY77  / $   18000
                    TASK CODE=G625B-EA-39  **EPA=68-02-2427  ** (CNTR.)       PRIOR       FY    /
EPA  OFFICER..    BUFALINI                EPA/ESRL   RTP
INVESTIGATOR..    UNKNOWN                 S R I INTERNATL
MILESTONES.... 09/78 -REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001963            SSIE-GMA  4611        EPA -68-02-2427       TASK-G625B-EA-39
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVE OF THIS
                PROGRAM IS TO REFINE AND UPDATE EXISTING KINETIC MECHANISMS THAT DESCRIBE THE FORMATION OF
                PHOTOCHEMICAL SMOG. TO MEET THIS OBJECTIVE, WE WILL TEST AND MODIFY THESE MECHANISMS BY COMPARING
                COMPUTED CONCENTRATION-TIME DEPENDENCE OF VARIOUS REACTANTS AND PRODUCTS WITH THOSE OBSERVED
                EXPERIMENTALLY IN THE SMOG CHAMBER FACILITY AT THE STATEWIDE AIR POLLUTION RESEARCH CENTER (SAPRC),
                RIVERSIDE, CALIFORNIA. INDIVIDUAL KINETIC MODELS WILL BE DEVELOPED IN CONJUNCTION WITH DATA FOR THE
                HYDROCARBONS, ETHYLENE, PROPENE, BUTENE-1, TRANS-2-BUTENE, N-BUTENE, 2,3-DIMETHYL-BUTANE, AND
                TOLUENE. THE MODELS WILL BE COMBINED AND TESTED IN CONJUNCTION WITH SMOG CHAMBER DATA FOR MIXTURES
                OF HYDROCARBONS THAT MIMICK HYDROCARBON REACTIVITY IN VARIOUS URBAN ATMOSPHERES.
```

**PROJECT: 01974-IDENTIFICATION AND MEASUREMENT OF INORGANIC COMPOUND EMISSIONS

```
                    STARTING/ COMPLETION DATE : 09/75   09/78 :    FUNDING    ESTIMATED   FY77  / $   70000
                    TASK CODE=G625B-EB-01  **EPA=68-02-2296  ** (CNTR.)       PRIOR       FY76  / $  216000
EPA  OFFICER..    KNAPP                   EPA/ESRL   RTP
INVESTIGATOR..    HENRY                   BATTELLE MEMORIAL INST
MILESTONES.... 01/79 -ISSUE FINAL REPORT
PLAN ID.......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001974            SSIE-GMA  3756        EPA -68-02-2296       TASK-G625B-EB-01
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THE CONTRACTOR SHALL REVIEW METHODS AND DEVELOP PROCEDURES FOR THE COLLECTION, IDENTIFICATION, AND
                MEASUREMENT OF THE AMOUNTS OF INORGANIC COMPOUNDS EMITTED FROM SOURCES USING FOSSIL FUELS.
                LABORATORY EVALUATION AND FIELD TESTING AT SOURCES USING OR PROCESSING FOSSIL FUEL (FOSSIL FUEL
                POWER PLANT, OIL REFINERY, AND COAL CONVERSION) OF THE METHODS SHALL BE CONDUCTED TO OBTAIN
                EMISSION CHARACTERIZATION DATA. THIS REPORT SHALL BE PERFORMED IN THREE (3) DISTINCT PHASES.
```

**PROJECT: 01976-THEORETICAL DATA BASE FOR QUANTITATIVE ANALYSIS OF EMPIRICAL DATA ON MOLECULAR COMPOSITION OF PARTICLES BY RAMAN SCATTERING

```
                    STARTING/ COMPLETION DATE : 07/76   10/77 :    FUNDING    ESTIMATED   FY77  / $   18000
                    TASK CODE=G625B-EB-03  **EPA=R804659-01S1** (GRANT)       PRIOR       FY    /
EPA  OFFICER.. J  NADER                   EPA/ESRL   RTP
INVESTIGATOR.: M  KERKER                  CLARKSON COLLEGE OF TECH              ARTS & SCI/CHEM DEPT
MILESTONES...: 06/77 -INTERIM REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001976            SSIE-GMA  3212 1      EPA -R804659-01S1     TASK-G625B-EB-03
               AP  -625B              DU  -N140             LABT-ALW
ABSTRACT...... THE INVESTIGATOR PROPOSES TO PERFORM CALCULATIONS USING A RECENTLY DEVELOPED THEORY TO ESTIMATE THE
                EFFECT OF PARTICLE SIZE AND REFRACTIVE INDEX ON THE RAMAN SCATTERING CROSS-SECTIONS FOR MOLECULES
                COMPRISING ALL OR A CONSTITUENT PART OF SMALL PARTICLES. THESE CALCULATIONS WILL BE COORDINATED
                WITH EXPERIMENTAL WORK AT THE NATIONAL BUREAU OF STANDARDS DIRECTED TOWARDS THE ANALYSIS OF
                MOLECULAR SPECIES CONTAINED IN SMALL PARTICLES. THE NBS WORK IS BEING SUPPORTED BY EPA THROUGH AN
                INTERAGENCY AGREEMENT. THE INVESTIGATOR WILL UNDERTAKE THEORETICAL STUDIES TO EXTEND THE PRESENT
                THEORY TO NONSPHERICAL PARTICLES AND TO NONUNIFORM LIGHT SOURCES. THE NUMERICAL STUDIES WILL PERMIT
                EXTENSION OF THE PRESENT TECHNIQUE FOR QUALITATIVE ANALYSIS FOR PARTICULATES TO A MORE QUANTITATIVE
                BASIS. TO THIS TIME NO THEORY HAS BEEN AVAILABLE TO PREDICT THE DEPENDENCE OF THE TOTAL RAMAN
                SIGNAL ON PARTICLE SIZE, SHAPE, REFRACTIVE INDEX AND ORIENTATION WITH RESPECT TO THE DIRECTIONS OF
                ILLUMINATION AND COLLECTION. CALCULATIONS TO ELUCIDATE THESE DEPENDENCIES MAY ALSO LEAD TO
                ESTIMATES OF THE DISTRIBUTION OF THE MOLECULAR SPECIES WITHIN THE PARTICLE (I.E. UNIFORM
                DISTRIBUTION THROUGHOUT THE PARTICLE OR CONCENTRATION IN A SURFACE LAYER). IF THE THEORY CAN BE
                EXTENDED TO NONSPHERICAL PARTICLES, THEN COMPUTATIONS CAN BE MADE TO INCLUDE MORE REAL WORLD
                PARTICLES OTHER THAN SIMPLY SPHERICAL PARTICLES. THE THEORETICAL COMPUTATIONS AND THE EXPERIMENTAL
                STUDY WILL BE COMPLEMENTARY AND WILL PROVIDE A MORE COMPLETE ASSESSMENT OF RAMAN SCATTERING AS A
                NONDESTRUCTIVE ANALYTICAL TECHNIQUE FOR DETERMINING MOLECULAR COMPOSITION OF SMALL PARTICLES.
```

**PROJECT: 01977-FABRICATE ADVANCED SOFTWARE PROGRAMS FOR THE EVALUATION OF GC/MS DATA

```
                    STARTING/ COMPLETION DATE : 10/77   10/78 :    FUNDING    ESTIMATED   FY77  / $   11000
                    TASK CODE=G625B-EB-06  **EPA=            ** (IN-HO)       PRIOR       FY    /
               IN-HOUSE EFFORT : FY 77  /        YEARS  ; TOTAL PROJECT
EPA  OFFICER..    KROST                   EPA/ESRL   RTP
INVESTIGATOR.:    UNKNOWN                 US EPA                                ORD/ESRL
MILESTONES...: 10/78 -FINAL REPORT
PLAN ID.......  (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001977            SSIE-ZMA  1434        TASK-G625B-EB-06      AP  -625B
               DU  -N140              LABT-ALW
ABSTRACT...... EXISTING DECONVOLUTION SOFTWATER PROGRAMS FOR OVERLAPPING MS PATTERNS WILL BE EVALUATED AND NEW
                ADVANCED SOFTWARE ROUTINE WILL BE FABRICATE
```

**PROJECT: 01978-COLLECTION AND ANALYSIS OF CARCINOGENIC VAPORS

STARTING/ COMPLETION DATE : 06/73 06/77 : FUNDING ESTIMATED FY77 / $ 45000
TASK CODE=G625B-EB-07 **EPA=68-02-1228 ** (CNTR.) PRIOR FY76 / $ 80000
EPA OFFICER.: SAWICKI EPA/ESRL RTP
INVESTIGATOR.: ED PELLIZZARI RESEARCH TRIANGLE INST
MILESTONES...: 06/77 -FINALIZE DEVICES & EQUIPMENT
00/00 -FINAL REPORT
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001978 SSIE-GMA 4558 EPA -68-02-1228 TASK-G625B-EB-07
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: PERFECTION OF PREVIOUSLY DEVELOPED INSTRUMENTATION FOR COLLECTION AND ANALYSIS OF CARCINOGENIC VAPORS IN AMBIENT-ATMOSPHERES. DEVELOPMENT OF ANALYTICAL METHODOLOGY TO QUANTITATE AND CHARACTERIZE ALL KNOWN CARCINOGENIC VAPORS PRESENT IN AMBIENT ENVIRONMENTS.

**PROJECT: 01979-TECHNIQUES FOR THE MEASUREMENT OF AEROSOL SIZE DISTRIBUTION AND CARBON AND SULFUR CONTENT

STARTING/ COMPLETION DATE : 10/76 10/79 : FUNDING ESTIMATED FY77 / $ 50000
TASK CODE=G625B-EB-08 **EPA=R803115-03 ** (GRANT) PRIOR FY76 / $ 25000
EPA OFFICER.. C SAWICKI EPA/ESRL RTP
INVESTIGATOR.. ES MACIAS WASHINGTON UNIV
RB HUSAR WASHINGTON UNIV
MILESTONES.... 11/79 -FINAL REPORT
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001979 SSIE-GMA 2717 1 EPA -R803115-03 TASK-G625B-EB-08
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: OBJECTIVES AND APPROACH: TO PURSUE WORK IN THREE DISTINCT AREAS OF AEROSOL INSTRUMENTATION AND CHARACTERIZATION. THESE INCLUDE DEVELOPMENT OF (A) A SHAPE SENSITIVE AEROSOL PARTICLE SIZE SPECTROMETER, (B) A NUCLEAR GAMMA-RAY METHOD TO MEASURE THE CONCENTRATIONS OF LIGHT ELEMENTS SUCH AS CARBON, NITROGEN, OXYGEN AND SULFUR AND (C) A PARTICULAR SULFUR ANALYZER. CURRENT PLANS/PROGRESS: DURING THE CURRENT PERIOD THE DEVICE AND TECHNIQUES TO MEASURE PARTICLE SIZE HAVE BEEN DOCUMENTED WITH LABORATORY AEROSOLS. ADDITIONAL MEASUREMENTS ON ATMOSPHERIC AEROSOLS WILL BE MADE IN THE UPCOMING PERIOD. IN THIS PERIOD THE NUCLEAR GAMMA-RAY METHOD WAS BROUGHT INTO ROUTINE OPERATION FOR ALL ELEMENTS EXCEPT OXYGEN, AND THIS ANALYTICAL TECHNIQUE WILL BE DEVELOPED IN THE NEXT PERIOD. SOME WORK HAS ALSO BEEN DONE ON THE IN-SITU ANALYSIS OF SULFATE AEROSOLS USING THERMAL ANALYSIS TECHNIQUES. A MALLOY FPD SULFUR ANALYZER WAS OBTAINED AND LABORATORY TESTED AND CALIBRATED AND WILL BE FIELD TESTED UNDER A VARIETY OF CONDITIONS IN THE NEXT YEAR.

**PROJECT: 01981-INTERCOMPARISON OF METHODS TO COLLECT AND ANALYZE AEROSOLS

STARTING/ COMPLETION DATE : 08/76 00/78 FUNDING ESTIMATED FY77 / $ 22000
TASK CODE=G625B-EB-09 **EPA=D6-0800 ** (IAG) PRIOR FY /
EPA OFFICER.. TG DZUBAY EPA/ESRL RTP
INVESTIGATOR.. DC CAMP UNIV OF CALIFORNIA LIVERMORE LAB/CHEM DIV
BW LOO UNIV OF CALIFORNIA LIVERMORE LAB/CHEM DIV
MILESTONES....: 06/78 -RESULTS OF FIELD STUDY FINAL REPORT
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001981 SSIE-GMA 3791 EPA -D6-0800 TASK-G625B-EB-09
AP -625B DU -N140 LABT-ALW
ABSTRACT.....: OBJECTIVE: DETERMINE THE ABILITY OF RECENTLY DEVELOPED AND PREVIOUSLY AVAILABLE AEROSOL INSTRUMENTATION TO QUANTITATIVELY DETERMINE THE CONCENTRATION OF THE TOTAL MASS, SULFATE, LEAD, AND OTHER CHEMICAL SPECIES IN THE ATMOSPHERE. APPROACH: CONDUCT AN INTERMETHOD COMPARISON IN WHICH REPRESENTATIVE SAMPLERS OF EACH TYPE ARE INCLUDED. CURRENT PLANS/PROGRESS: CONDUCT AN 8-DAY INTERCOMPARISON IN CHARLESTON, W.V. DURING MAY OF 1977. THE SAMPLER TYPES TO BE INCLUDED ARE MANUAL DICHOTOMOUS, AUTOMATED DICHOTOMOUS, STREAKER, BATELLE IMPACTOR, FILTERS IN SERIES, HI VOL, TWO MASS, DIFFUSION BATTERY, AND LUNDGREN IMPACTOR. THE PARTICIPANTS WILL RETURN THE SAMPLES TO THE LABORATORY AND PERFORM THE ANALYSES. THE RESULTS FROM EACH PARTICIPANT REPRESENTING EACH METHOD WILL BE INTERCOMPARED USING APPROPRIATE STATISTICAL TECHNIQUES. RESULTS TO DATE: STATE OF THE ART INSTRUMENTATION WERE INTERCOMPARED FOR MEASURING AIRBORNE PARTICULATE MASS, NITRATE, SULFATE, LEAD, AND TRACE ELEMENTS. A MATHEMATICAL TREATMENT OF THE DATA REVEALS THE RELATIVE PERFORMANCE OF THE INSTRUMENTS.

**PROJECT: 01983-NORTHROP SUPPORT SERVICES

STARTING/ COMPLETION DATE : 10/76 CONT FUNDING ESTIMATED FY77 / $ 86000
TASK CODE=G625B-EB-13 **EPA=68-02-2566 ** (CNTR.) PRIOR FY /
EPA OFFICER. M BUFALINI EPA/ESRL RTP
INVESTIGATOR. S COLOFF NORTHROP SERVICES INC
MILESTONES...: 00/00 -CONTINUING
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001983 SSIE-GMA 3911 EPA -68-02-2566 TASK-G625B-EB-13
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THE CONTRACTOR, NORTHROP SERVICES INC., OPERATES AND MAINTAINS GOVERNMENT PROVIDED FACILITIES AT EPA'S ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA, IN PROVIDING TECHNICAL SUPPORT TO THE ENVIRONMENTAL SCIENCES RESEARCH LABORATORY IN THE FOLLOWING ACTIVITIES: 1. MOBILE SOURCE EMISSIONS RESEARCH; 2. STATIONARY SOURCE EMISSIONS RESEARCH; 3. GAS KINETICS AND PHYSICS RESEARCH; 4. SPECIAL TECHNIQUES RESEARCH; 5. AEROSOL RESEARCH; 6. AIR INSTRUMENTATION DEVELOPMENT AND TESTING; 7. FLUID MODELING FACILITY OPERATION AND TESTING; 8. SAMPLING AND ANALYSIS METHODS RESEARCH.

**PROJECT: 01984-TASK ORDER TECHNICAL SUPPORT

```
                    STARTING/ COMPLETION DATE : 12/76   12/78 :   FUNDING    ESTIMATED   FY77  / $   30000
                    TASK CODE=G625B-EB-14  **EPA=            ** (IN-HO)      PRIOR       FY    /
                IN-HOUSE EFFORT   FY 77  /        YEARS  ; TOTAL PROJECT
EPA  OFFICER..    HOMOLYA                EPA/ESRL   RTP
INVESTIGATOR..    UNKNOWN                US EPA                              ORD/ESRL
MILESTONES...: 06/77 -EMISSIONS OF HC COMPOUNDS FROM COAL GASIFICATION
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001984          SSIE-ZMA  1426        TASK-G625B-EB-14      AP  -625B
               DU  -N140            LABT-ALW
ABSTRACT...... FOR FIELD SERVICES IN SUPPORT OF IN-HOUSE STATIONARY SOURCE CHARACTERIZATION OF HC EMISSIONS FROM
                POWER PLANT, COAL GASIFICATION, AND OTHER ENERGY-RELATED SOURCES.
```

**PROJECT: 01985-NORTHROP SUPPORT SERVICES

```
                    STARTING/ COMPLETION DATE : 10/76   CONT      FUNDING    ESTIMATED   FY77  / $   15000
                    TASK CODE=G625B-EB-15  **EPA=68-02-2566  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.. M  BUFALINI               EPA/ESRL   RTP
INVESTIGATOR.. S  COLOFF                 NORTHROP SERVICES INC
MILESTONES.... 00/00 -CONTINUING
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-001985          SSIE-GMA  3910        EPA -68-02-2566       TASK-G625B-EB-15
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... THE CONTRACTOR, NORTHROP SERVICES INC., OPERATES AND MAINTAINS GOVERNMENT PROVIDED FACILITIES AT
                EPA'S ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA, IN PROVIDING TECHNICAL
                SUPPORT TO THE ENVIRONMENTAL SCIENCES RESEARCH LABORATORY IN THE FOLLOWING ACTIVITIES: 1. MOBILE
                SOURCE EMISSIONS RESEARCH; 2. STATIONARY SOURCE EMISSIONS RESEARCH; 3. GAS KINETICS AND PHYSICS
                RESEARCH; 4. SPECIAL TECHNIQUES RESEARCH; 5. AEROSOL RESEARCH; 6. AIR INSTRUMENTATION DEVELOPMENT
                AND TESTING; 7. FLUID MODELING FACILITY OPERATION AND TESTING; 8. SAMPLING AND ANALYSIS METHODS
                RESEARCH.
```

**PROJECT: 01986-NORTHROP SUPPORT SERVICES

```
                    STARTING/ COMPLETION DATE · 10/77   09/78 :   FUNDING    ESTIMATED   FY77  / $   13000
                    TASK CODE=G625B-EB-18  **EPA=68-02-2566  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: M  BUFALINI               EPA/ESRL   RTP
INVESTIGATOR.: S  COLOFF                 NORTHROP SERVICES INC
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-001986          SSIE-GMA  3909        EPA -68-02-2566       TASK-G625B-EB-18
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT.....  THE CONTRACTOR, NORTHROP SERVICES INC., OPERATES AND MAINTAINS GOVERNMENT PROVIDED FACILITIES AT
                EPA'S ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA, IN PROVIDING TECHNICAL
                SUPPORT TO THE ENVIRONMENTAL SCIENCES RESEARCH LABORATORY IN THE FOLLOWING ACTIVITIES: 1. MOBILE
                SOURCE EMISSIONS RESEARCH; 2. STATIONARY SOURCE EMISSIONS RESEARCH; 3. GAS KINETICS AND PHYSICS
                RESEARCH; 4. SPECIAL TECHNIQUES RESEARCH; 5. AEROSOL RESEARCH; 6. AIR INSTRUMENTATION DEVELOPMENT
                AND TESTING; 7. FLUID MODELING FACILITY OPERATION AND TESTING; 8. SAMPLING AND ANALYSIS METHODS
                RESEARCH.
```

**PROJECT: 03160-INPUT, DEPOSITION, AND POST DEPOSITIONAL CONVERSION OF ARSENIC

```
                    STARTING/ COMPLETION DATE : 10/76   10/78 :   FUNDING    ESTIMATED   FY77  / $       0
                    TASK CODE=K625B-210    **EPA=R804881     ** (GRANT)     PRIOR       FY76  / $  115000
EPA  OFFICER.. NL WOLFE                  EPA/ERL   ATHENS
INVESTIGATOR.  M  ANDERSON               UNIVERSITY OF WISCONSIN
               A  ANDREN                 UNIVERSITY OF WISCONSIN
               D  ARMSTRONG              UNIVERSITY OF WISCONSIN
MILESTONES.... 10/76 -FUND GRANT
               10/77 -ANNUAL REPORT
               10/78 -FINAL REPORT
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-003160          SSIE-GMA  4145        EPA -R804881          TASK-K625B-210
               AP  -625B            DU  -N140             LABT-ALW
ABSTRACT...... THE INPUT, DEPOSITION, AND POST DEPOSITIONAL TRANSPORT AND CONVERSION OF ARSENIC IS BEING EVALUATED
                IN THE LOWER SECTION OF THE MENOMINEE RIVER AT THE ENTRANCE TO GREEN BAY. ATMOSPHERIC MOBILIZATION
                AND INPUTS OF ARSENIC TO THE AQUATIC SYSTEM ARE ALSO BEING ASSESSED. THE OBJECTIVES OF THE
                INVESTIGATION ARE TO : (1) OBTAIN A TOTAL MASS BALANCE OF ARSENIC BY DESCRIBING THE NET ATMOSPHERIC
                DEPOSITIONAL INPUT, SEDIMENTATION, RESUSPENSION RATES, AND CONVECTIVE TRANSPORT OF ARSENIC; AND (2)
                ELUCIDATE THE MAJOR CONTROLLING MECHANISMS FOR ARSENIC IN THIS AND OTHER AQUEOUS SYSTEMS IN
                GENERAL.
```

**PROJECT: 03162-SORPTION PROPERTIES OF SOILS AND ENERGY-RELATED POLLUTANTS

STARTING/ COMPLETION DATE : 07/77 07/79 FUNDING ESTIMATED FY77 / $ 458000
TASK CODE=K625B-215 **EPA=68-03-2555 ** (CNTR.) PRIOR FY /

EPA OFFICER.: DS BROWN EPA/ERL ATHENS
INVESTIGATOR.: JC MEANS UNIVERSITY OF ILLINOIS
J HASSETT UNIVERSITY OF ILLINOIS
W BANWART UNIVERSITY OF ILLINOIS
K REINBOLD UNIVERSITY OF ILLINOIS
S WOOD UNIVERSITY OF ILLINOIS
MILESTONES.... 04/78 -LITERATURE REVIEW REPORT
07/79 -FINAL REPORT
PLAN ID..... (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-003162 SSIE-GMA 3934 EPA -68-03-2555 TASK-K625B-215
AP -625B DU -N140 LABT-ALW
ABSTRACT..... THIS TWO-YEAR STUDY WILL CENTER ON THE STUDY OF SORPTION PROPERTIES OF ENERGY-RELATED ORGANIC POLLUTANTS AND VARIOUS TYPES OF SOILS AND SEDIMENTS. THE STUDY WILL INCLUDE A DETAILED REVIEW OF THE LITERATURE ON SOIL SORPTION OF ORGANICS AND THE PREPARATION OF A CRITICAL REVIEW ON THE SUBJECT. LABORATORY STUDIES WILL BE CONDUCTED ON TEN SOIL SAMPLES OF VARYING TYPES AND CHARACTERISTICS WITH AT LEAST ELEVEN ORGANIC COMPOUNDS HAVING A BROAD RANGE OF CHEMICAL PROPERTIES. SORPTION ISOTHERMS FOR EACH COMPOUND ON EACH SOIL-SEDIMENT WILL BE DETERMINED USING RADIO-LABELLED CHEMICALS. STATISTICAL ANALYSES OF THE DATA WILL BE RUN USING MULTIVARIANT ANALYSIS TO DETERMINE IF CHEMICAL PROPERTIES AND SOIL/SEDIMENT PROPERTIES CAN BE RELATED TO YIELD PREDICTIVE INFORMATION ABOUT THE BEHAVIOR OF OTHER COMPOUNDS ON THE SOILS STUDIED.

**PROJECT: 03401-MINERALOGY OF OVERBURDEN AS RELATED TO GROUNDWATER DEGRADATION IN THE STRIP MINING OF COAL

STARTING/ COMPLETION DATE : 12/75 UNK FUNDING ESTIMATED FY77 / $ 275000
TASK CODE=L625B-03 **EPA=R804162-01 ** (GRANT) PRIOR FY76 / $ 300000

EPA OFFICER.. B NEWPORT EPA/ERL ADA
INVESTIGATOR.. DL KLOEPPER COLORADO SCHOOL OF MINES
JS FRYBERGER COLORADO SCHOOL OF MINES
MILESTONES...: 01/78 -OVERBURDEN MINERALOGY GROUND WATER QUALITY CORRELATION
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-003401 SSIE-GMA 4590 EPA -R804162-01 TASK-L625B-03
AP -625B DU -N140 LABT-ALW
ABSTRACT..... OBJECTIVE: THE OBJECTIVE IS TO DEVELOP A METHOD OF PREDICTING POTENTIAL GROUNDWATER DEGRADATION IN STRIP COAL MINING ON THE BASIS OF THE MINERALOGY OF THE OVERBURDEN. APPROACH: THE APPROACH IS TO DETERMINE THE MINERALOGY OF CORES IN UNDISTURBED OVERBURDEN ADJACENT TO SPOIL PILES WHICH HAVE UNDERGONE EXTENSIVE CHEMICAL AND BIOLOGICAL WEATHERING. EXTENSIVE GROUNDWATER QUALITY DATA WILL BE GATHERED FROM WELLS DRILLED THROUGH AND DOWN-DIP FROM SPOIL PILES. USING THIS DATA BASE, A METHOD OF PREDICTING GROUNDWATER QUALITY IN POST COAL STRIP MINING OPERATIONS WILL BE DEVELOPED. CURRENT PROGRESS: THIS PROJECT WAS FUNDED ON DECEMBER 22, 1975. DUE TO ADVERSE CLIMATICAL CONDITIONS IN N.W. COLORADO, INITIAL DRILLING, CORING AND COMPLETION OPERATIONS WERE DELAYED UNTIL MARCH 22, 1976. CORING OPERATIONS HAVE BEEN PARTICULARLY SUCCESSFUL EXCEPT IN SPOIL PILES WHERE HIGH PERCENTAGE CORE RECOVERY IN THIS UNCONSOLIDATED MATERIAL HAS BEEN DIFFICULT TO ATTAIN. PORTABLE WELL PUMPING AND SAMPLING EQUIPMENT UTILIZING EXPANDABLE PACKERS FOR ZONE ISOLATION HAS BEEN SUCCESSFULLY DEMONSTRATED. LYSIMETERS AND ASSOCIATED FLUID RECOVERY SYSTEMS HAVE BEEN INSTALLED IN SELECTED WELLS. WELL SAMPLING WAS BEGUN IN JUNE 1976. ANALYTICAL DATA GENERATED FROM THE INITIAL SAMPLES WILL CONSIST OF OVER 45 PARAMETERS FROM APPROXIMATELY 25 SAMPLES. MINERALOGY OF CORE SAMPLES ARE BEING DETERMINED UTILIZING X-RAY DIFFRACTION AND X-RAY FLUORESCENCE. THE FIRST INTERIM REPORT ON THIS PROJECT IS ON SCHEDULE AND WILL BE FORTHCOMING IN OCTOBER, 1976. A GRANT AMENDMENT, R-804162-01-01, IS DIRECTED TOWARD EXPANDING THE "SCOPE OF WORK" OUTLINED IN EXISTING GRANT 804162-01. THIS AMENDMENT WILL PERMIT SEVERAL ADDITIONAL MINING SITES TO BE STUDIED, THUS BROADENING THE DATA BASE TO INCLUDE VARYING MINERALOGICAL AND CLIMATOLOGICAL CONDITIONS AND STRENGTHENING THE ACCURACY AND APPLICABILITY OF THE PREDICTIVE NATURE OF FINDINGS FORMULATED IN THE ORIGINAL GRANT.

**PROJECT: 04105-FATE AND EFFECTS OF PETROLEUM HYDROCARBONS AND SELECTED TOXIC METALS IN SELECTED MARINE ECOSYSTEMS AND ORGANISMS

STARTING/ COMPLETION DATE : 08/75 00/80 : FUNDING ESTIMATED FY77 / $ 475000
TASK CODE=V625B-33 **EPA=D6-E693-EM ** (IAG) PRIOR FY76 / $ 1117500

EPA OFFICER.. CW HALL EPA/HDQTRS- OEMI
INVESTIGATOR.. DA WOLFE US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
PLAN ID.....: (AP-625B)(DU-N140) TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-004105 SSIE-GMA 3038 1 EPA -D6-E693-EM TASK-V625B-33
AP -625B DU -N140 LABT-EMI
ABSTRACT.....: THE OVERALL APPROACH OF THIS PROJECT WILL BE TO STUDY EXPERIMENTALLY SPECIFIC PROCESSES CONTROLLING THE DISTRIBUTION, TRANSPORT, AND EFFECTS (BOTH PHYSIOLOGICAL AND ECOLOGICAL) OF PETROLEUM HYDROCARBONS AND SELECTED TOXIC METALS IN SUBARCTIC COASTAL MARINE ECOSYSTEMS TO FACILITATE THE ASSESSMENT OF THE IMPACTS OF PETROLEUM RELEASES IN THIS ECOSYSTEM TYPE. THE PROJECT INCLUDES FOUR INTERDEPENDENT TASKS WITH THE FOLLOWING OBJECTIVES: A. ESTABLISH A NATIONAL NOAA ANALYTICAL CAPABILITY FOR PETROLEUM HYDROCARBONS AND TOXIC METALS IN THE MARINE ENVIRONMENT FOR PURPOSES OF STANDARDIZING ANALYTICAL TECHNIQUES, PROVIDING INTERCALIBRATION SERVICES AND CONDUCTING ROUTINE ANALYSES ON A CONTRACT BASIS. B. IDENTIFY CURRENT STATUS OF KNOWLEDGE AND INFORMATION GAPS ON THE FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE SYSTEMS. C. SELECT, ON A PRIORITY BASIS, AND CONDUCT SPECIFIC LABORATORY EXPERIMENTS ON FATE AND EFFECTS OF METALS AND HYDROCARBONS. D. DESIGN AND CONDUCT CONTROLLED EXPERIMENTAL ECOSYSTEM RESEARCH TO DETERMINE CHANGES AT THE ECOSYSTEM LEVEL AND TO TEST OUR ABILITY TO PREDICT ECOLOGICAL AND BIOLOGICAL IMPACTS OF PETROLEUM IN SUBARTIC ECOSYSTEMS. CURRENT APPROACHES OR PROGRESS ARE, BY OBJECTIVE, AS FOLLOWS: A. ROUTINE ANALYSES OF PETROLEUM HYDROCARBONS IN ENVIRONMENTAL SAMPLES ARE NOW BEING CONDUCTED, AND ANALYTICAL INTERCOMPARISONS ARE BEING COORDINATED, BY THE NATIONAL ANALYTICAL FACILITY AT THE NMFS NORTHWEST AND ALASKA FISHERIES CENTER IN SEATTLE, WASHINGTON. B A MAJOR SYMPOSIUM, FATE AND EFFECTS OF PETROLEUM HYDROCARBONS IN MARINE ECOSYSTEMS AND ORGANISMS, WAS HELD IN SEATTLE IN NOVEMBER 1976, AND THE PROCEEDINGS WERE PUBLISHED BY PERGAMON PRESS. C. STUDIES UNDERWAY INCLUDE INTERACTING EFFECTS OF HYDROCARBONS AND OTHER POLLUTANTS ON MARINE ORGANISMS; PETROLEUM EFFECTS ON METALS IN SEDIMENTS; EFFECTS OF PETROLEUM ON CRAB CHEMORECEPTION; AND PETROLEUM EFFECTS ON SEABIRD REPRODUCTION D A REPORT ON DESIGN AND FEASIBILITY OF FIELD EXPERIMENTS HAS BEEN PREPA

**PROJECT: 04106-ATMOSPHERIC INTERACTION STUDIES

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $  174000
                    TASK CODE=V625B-38      **EPA=D6-E721-DL  ** ( IAG )      PRIOR       FY76  / $  427000
EPA  OFFICER.. GD A'LESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.. JF MEAGHER                 US TVA
               HC JONES                   US TVA
               O  HUFF                    US TVA
               L  STOCKBURGER             US TVA
               G  SHANNON                 US TVA
               E  BAILEY                  US TVA
MILESTONES.... 01/78 -SO2 REACTION CHAMBER INSTALLED
               05/79 -MILESTONE REPORT   PHOTOOXIDATION OF SO2
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-004106            SSIE-GMA  4676        EPA -D6-E721-DL       TASK-V625B-38
               AP  -625B              DU  -N140             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE CHEMICAL INTERACTIONS OF EMISSIONS FROM COAL-FIRED
                POWER PLANTS WITH EMPHASIS ON THE RATE OF OXIDATION OF SO2. THE GOAL IS TO PREDICT THE
                CONCENTRATIONS OF MAJOR CONSTITUENTS AT VARIOUS LOCATIONS DOWNWIND. HIGHLY INSTRUMENTED AIRCRAFT
                MEASURE THE FLUXES OF THE CONSTITUENTS THROUGH THE PLUME AT A NUMBER OF DOWNWIND DISTANCES.
                PERTINENT METEOROLOGICAL PARAMETERS ARE MEASURED WITH INSTRUMENTS ON THE AIRCRAFT AND A GROUND
                STATION. THESE DATA WILL BE UTILIZED TO DEVELOP A PLUME CHEMISTRY MODEL WHICH WILL DETAIL THE
                PLAUSIBLE MECHANISMS AND KINETICS OF CHEMICAL REACTIONS OCCURRING IN THE PLUME AND THE
                METEOROLOGICAL INFLUENCES ON THESE REACTIONS. CHAMBER STUDIES OF STACK GASES ARE ALSO BEING
                INITIATED TO OBTAIN SOME FUNDAMENTAL INFORMATION ON PLUME CHEMISTRY. EMPHASIS FOR THE IMMEDIATE
                FUTURE STUDIES WILL BE PLACED ON OBTAINING RATES OF OXIDATION OF SO2 IN STACK GAS. TWO STUDIES WERE
                CONDUCTED IN OCTOBER, 1976 AND AUGUST, 1977 AT TVA'S CUMBERLAND STEAM PLANT. THIS PLANT HAS TWO
                1300-MW UNITS EACH FITTED WITH A 1,000-FOOT STACK. THE SECOND STUDY WAS TO DETERMINE THE EFFECT OF
                INCREASING THE PARTICULATE MASS LOADING ON THE CONVERSION OF SO2 TO SULFATE. SECTIONS OF THE
                ELECTROSTATIC PRECIPITATOR WERE TURNED OFF TO INCREASE THE PARTICULATE CONCENTRATION. PRELIMINARY
                RESULTS INDICATE LITTLE OR NO EFFECT OF MASS LOADING ON THE CONVERSION OF SO2 TO SULFATE. AT
                DISTANCES OF 5 TO 120 KILOMETERS (0.16 TO 11.0 HOURS OF DRIFT) DOWNWIND FROM THE POWER PLANT THE
                SO2 TO SULFATE CONVERSION WAS LESS THAN 2% PER HOUR. A MILESTONE REPORT ON THE SOX POWER PLANT
                PLUME CHEMISTRY IS DUE IN NOVEMBER, 1978. THE CONSTRUCTION OF THE REACTION CHAMBER IS COMPLETE WITH
                EQUIPMENT INSTALLATION TO BE COMPLETED IN JANUARY, 1978. A MILESTONE REPORT ON THE PHOTOOXIDATION
                OF SO2 IS DUE IN MAY, 1979.
```

**PROJECT: 04108-REGIONAL ATMOSPHERIC TRANSPORT OF COAL-FIRED POWER PLANT EMISSIONS

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $   75000
                    TASK CODE=V625B-39      **EPA=D6-E721-DL  ** ( IAG )      PRIOR       FY76  / $  169000
EPA  OFFICER.. GD D'ALESSIO               EPA/HDQTRS- OEMI
INVESTIGATOR.. V  SHARMA                  US TVA
               HC JONES                   US TVA
               LM REISINGER               US TVA
MILESTONES.... 09/70 -MAJOR PROJECT REPORT
PLAN ID......: (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES..: RECN-004108            SSIE-GMA  2955 1      EPA -D6-E721-DL       TASK-V625B-39
               AP  -625B              DU  -N140             LABT-EMI
ABSTRACT...... THE SULFUR DIOXIDE/SULFATE ISSUE REQUIRES DEVELOPMENT OF A SCIENTIFIC DATA BASE TO DELINEATE
                REGIONAL EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS, AND CHARACTERIZATION AND QUANTIFICATION OF
                THE MECHANISMS OF LONG-RANGE TRANSPORT OF EMISSIONS. A LONG-RANGE TRANSPORT MODEL DESCRIBING THE
                CONSERVATION BALANCE OF SO2/SULFATE COMPLEX IS BEING DEVELOPED AND APPLIED TO A MESO-SCALE REGION
                (APPROXIMATELY 1,000 KM) CENTERED OVER THE TENNESSEE VALLEY WATERSHED. AMONG FACTORS BEING
                CONSIDERED ARE ADVECTION BY WIND FIELD, AIR PARCEL TRAJECTORIES, DIFFUSION BY ATMOSPHERIC
                TURBULENCE, SOURCE/SINK MECHANISMS, AND CHEMICAL TRANSFORMATIONS. A REGIONAL SO2 EMISSIONS
                INVENTORY HAS BEEN ACQUIRED AND MAINTAINED BY CONTINUAL UPDATING. FIELD STUDIES WERE CONDUCTED IN
                SPRING 1976 AND SUMMER 1977. DATA ARE BEING ANALYZED AND A REGIONAL ATMOSPHERIC TRANSPORT MODEL IS
                BEING DEVELOPED. SOME FINDINGS HAVE BEEN REPORTED IN INTERNAL REPORTS AND PROFESSIONAL JOURNALS.
                MAJOR M
```

**PROJECT: 04110-EVALUATION AND IMPROVEMENT OF MODELS USED FOR RADIOLOGICAL IMPACT ASSESSMENT OF GASEOUS RELEASES FROM NUCLEAR POWER PLANTS

```
                    STARTING/ COMPLETION DATE : 05/75   04/78 :   FUNDING    ESTIMATED   FY77  / $   44000
                    TASK CODE=V625B-41      **EPA=D7-E721-DM  ** ( IAG )      PRIOR       FY76  / $  105000
EPA  OFFICER.. CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.. EA BELVIN                  US TVA
               EA BELVIN                  US TVA
               PH JENKINS                 US TVA
               RL DOTY                    US TVA
MILESTONES.... 10/78 -PROJECT TERMINATION
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-004110            SSIE-GMA  4675        EPA -D7-E721-DM       TASK-V625B-41
               AP  -625B              DU  -N140             LABT-EMI
ABSTRACT.....: OBJECTIVE: TO OBTAIN DATA USABLE IN THE EVALUATION AND REFINEMENT OF ANALYTICAL MODELS USED FOR
                RADIOLOGICAL IMPACT ASSESSMENT OF NUCLEAR POWER OPERATIONS. EMPHASIS WILL BE PLACED ON THE
                COLLECTION OF DATA RELATED TO MODELS USED TO PREDICT RADIATION DOSES FROM TWO COMPONENTS OF DIRECT
                RADIATION· (A) FROM RADIOACTIVE MATERIALS CONFINED WITHIN THE PLANT AND (B) FROM RADIOACTIVE
                MATERIALS IN THE GASEOUS EFFLUENT PLUME. APPROACH: EXTERNAL GAMMA RADIATION EXPOSURE RATES WILL BE
                MEASURED IN THE VICINITY OF A RIVERSIDE NUCLEAR POWER REACTOR USING PRESSURIZED IONIZATION
                CHAMBERS. BACKGROUND RADIATION LEVELS WILL BE DETERMINED. RADIATION LEVELS DURING PLANT OPERATION
                WILL BE DETERMINED AND METHODS FOR DETECTION OF A GASEOUS EFFLUENT PLUME WILL BE STUDIED. ATTEMPTS
                WILL BE MADE TO CORRELATE EXPOSURE RATES IN THE ENVIRONMENT WITH EFFLUENT CHARACTERISTICS OF THE
                REACTOR COMPLEX. RESULTS/STATUS: BACKGROUND RADIATION LEVELS AROUND BROWNS FERRY NUCLEAR PLANT WERE
                DETERMINED AND PRELIMINARY OPERATIONAL DATA WERE COLLECTED. ANALYSES OF THE DATA FROM THE
                ENVIRONMENT AND EFFLUENT INFORMATION FROM THE PLANT ARE BEING PERFORMED IN TERMINATING THIS
                PROJECT. (PROJECT TO BE TERMINATED IN F.Y. 1978 DUE TO TERMINATION OF CONGRESSIONAL FUNDING).
```

****PROJECT: 04113-SIMULATION OF THERMAL DISPERSION AND FLUID MECHANICS AT CRITICAL LOCATIONS IN STREAMS & RESERVOIRS**

```
                    STARTING/ COMPLETION DATE : 05/75   05/80 :   FUNDING    ESTIMATED   FY77  / $   31000
                    TASK CODE=V625B-58      **EPA=D5-E721-DN  ** ( IAG )      PRIOR       FY76  / $   74000
EPA  OFFICER.: CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.: WR WALDROP               US TVA
               WL HARPER                US TVA
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-004113           SSIE-GMA  2988 1       EPA -D5-E721-DN       TASK-V625B-58
               AP  -625B             DU  -N140              LABT-EMI
ABSTRACT...... THE OBJECIVE OF THIS STUDY IS TO DEVELOP COMPUTER MODELS FOR ANALYZING THE EFFECTS OF THERMAL
                DISCHARGES ON THE TEMPERATURE AND VELOCITY DISTRIBUTIONS IN THE RECEIVING WATER BODY.
                THREE-DIMENSIONAL NEAR-FIELD AND FAR-FIELD MODELS ARE BEING DEVELOPED. A THREE-DIMENSIONAL MODEL
                HAS BEEN USED FOR THE EVALUATION OF A TVA STEAM PLANT, AND A TWO-DIMENSIONAL MODEL PRESENTLY UNDER
                DEVELOPMENT WILL BE USED AS AN AID IN ASSESSING THE CUMULATIVE EFFECTS OF MULTIPLE STEAM-NUCLEAR
                PLA
```

****PROJECT: 04115-EFFECTS OF ENTRAINMENT IN COOLING SYSTEMS ON FISH EGGS AND LARVAE**

```
                    STARTING/ COMPLETION DATE : 07/75   10/79     FUNDING    ESTIMATED   FY77  / $  250000
                    TASK CODE=V625B-60      **EPA=D5-E681-CD  ** ( IAG )      PRIOR       FY76  / $  250000
EPA  OFFICER.: CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.: JS SUFFERN               U.S. DEPT. OF ENERGY
               KD KUMAR                 U.S. DEPT. OF ENERGY
               RJ KEDL                  U.S. DEPT. OF ENERGY
               CC COUTANT               U.S. DEPT. OF ENERGY
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-004115           SSIE-GMA  5366        EPA -D5-E681-CD       TASK-V625B-60
               AP  -625B             DU  -N140              LABT-EMI
ABSTRACT.....: THE KEY OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE QUANTITATIVE RELATIONSHIPS BETWEEN MORTALITY
                OF FISH EGGS AND LARVAE AND FLUID-INDUCED PHYSICAL STRESSES ENCOUNTERED IN POWER PLANT COOLING
                SYSTEMS, BOTH ALONE AND IN COMBINATION WITH OTHER STRESSES (THERMAL, CHEMICAL, MECHANICAL) IN ORDER
                TO DETERMINE THE THRESHOLD VALUES OF ENGINEERING PARAMETERS BELOW WHICH MORTALITIES ARE MINIMIZED.
                THE CURRENT CRITICAL OBJECTIVE OF THIS MULTIDISCIPLINARY PROJECT IS TO EVALUATE THE ENGINEERING
                CHARACTERISTICS AND FISH-PASSAGE PERFORMANCES OF CIRCULATING WATER PUMPS. SPECIFIC OBJECTIVES
                TOWARD ATTAINING THE CURRENT CRITICAL OBJECTIVES ARE: 1) TO ESTIMATE, THROUGH ENGINEERING
                EVALUATION, THE MECHANICAL AND HYDRAULIC CHARACTERISTICS OF CONTEMPORARY POWER STATION PUMPS (AND
                THEIR PRINCIPAL ALTERNATIVES) THAT CONTRIBUTE MOST TO DAMAGE OF FISH EGGS AND LARVAE. 2) TO PROVIDE
                AN EXPERIMENTAL PUMP SYSTEM CAPABLE OF PASSING TEST FISH THROUGH A VARIETY OF DESIGN CONFIGURATION.
                3) TO SPAWN AND REAR SUFFICIENT FISH FOR CONDUCT OF EXPERIMENTS HAVING LARGE ENOUGH SAMPLE SIZES
                FOR HIGH STATISTICAL CONFIDENCE IN THE RESULTS. 4) TO DETERMINE THE SURVIVAL OF FISH EGGS AND
                LARVAE OF SEVERAL SPECIES AFTER PASSAGE THROUGH A VARIETY OF HYDRAULIC CONFIGURATIONS IN THE TEST
                PUMP APPARATUS. PROGRESS TO DATE: THE TEST PUMP APPARATUS (CALLED A POWER PLANT COOLING SYSTEM
                SIMULATOR) HAS BEEN DESIGNED, BUILT AND TESTED. CONTAINING A MIXED-FLOW PUMP PIPING AND CONDENSER
                TUBING, THE DEVICE WILL ALLOW DETAILED EXAMINATION OF THE PHYSICAL STRESSES ASSOCIA
```

****PROJECT: 04118-LONG-TERM EFFECTS OF OIL ON MARINE COMMUNITIES AND ASSOCIATED ORGANISMS**

```
                    STARTING/ COMPLETION DATE : 06/75   05/78 :   FUNDING    ESTIMATED   FY77  / $  190000
                    TASK CODE=V625B-61      **EPA=D6-E681-CF  ** ( IAG )      PRIOR       FY76  / $  488000
EPA  OFFICER.: CW HALL                  EPA/HDQTRS- OEMI
INVESTIGATOR.: JW ANDERSON              BATTELLE MEMORIAL INST              ECOSYSS
               RM BEAN                  BATTELLE MEMORIAL INST              ECOSYSS
               RG RILEY                 BATTELLE MEMORIAL INST              ECOSYSS
PLAN ID....... (AP-625B)(DU-N140)  TRANSPORT AND FATE OF ENERGY-RELATED POLL. IN ECOSYSTEMS
ORDIS CODES... RECN-004118           SSIE-GMA  5360        EPA -D6-E681-CF       TASK-V625B-61
               AP  -625B             DU  -N140              LABT-EMI
ABSTRACT.....: THE OBJECTIVE, OF THIS PROGRAM IS TO DEFINE THE CONCENTRATIONS OF HYDROCARBONS FROM PRUDHOE BAY
                CRUDE OIL, WHICH ARE DELETERIOUS TO MARINE ORGANISMS AND COMMUNITIES WHEN PRESENT IN THE WATER
                COLUMN OR ASSOCIATED WITH SEDIMENTS FOR PERIODS OF MONTHS. OUR RESEARCH PROGRAM HAS BEEN DESIGNED
                TO PROVIDE THE DATA NECESSARY TO ASSESS THE EFFECTS OF LONG-TERM EXPOSURE TO PETROLEUM HYDROCARBONS
                ON SELECTED ORGANISMS AND COMMUNITIES FROM THE NORTHWEST U. S. COASTAL ECOSYSTEMS. THE TYPES OF
                STUDIES IN PROGRESS INCLUDE: (A) CONSTANT EXPOSURE OF SELECTED SPECIES TO A WELL-CHARACTERIZED
                EXTRACT OF PRUDHOE BAY CRUDE OIL TO DETERMINE RELATIONSHIPS BETWEEN CONCENTRATION, EXPOSURE TIME,
                AND MORTALITY, AS WELL AS HYDROCARBON UPTAKE AND RELEASE RATES, (B) EXPOSURE OF ORGANISMS EITHER IN
                THE FIELD OR LABORATORY TO SEDIMENTS CONTAMINATED WITH HYDROCARBONS TO VARYING DEGREES TO DETERMINE
                BIOAVAILABILITY AND EFFECTS, AND (C) IN SITU DEPURATION STUDIES ON THE RATES OF RELEASE OF
                HYDROCARBONS FROM SEDIMENT PREVIOUSLY CONTAMINATED, WHILE, AT THE SAME TIME, MONITORING OF THE
                RECRUITMENT RATE OF BENTHIC ORGANISMS IN THESE SEDIMENTS. THE ENTIRE PROGRAM CLOSELY INTEGRATES THE
                ANALYTICAL EXPERTISE OF THE ENVIRONMENTAL CHEMISTRY SECTION WITH THE EXPERIMENTAL APPROACHES OF
                MARINE BIOLOGISTS IN THE MARINE SCIENCES SECTION. WHILE UTILIZING "STATE-OF-THE-ART" TECHNIQUES,
                DEVELOPMENT IS TAKING PLACE TO PRODUCE BETTER ANALYTICAL METHODS AND EXPERIMENTAL APPROACHES TO
                MORE CLOSELY DEFINE THE TRANSPORT OF HYDROCARBONS AND THEIR EFFECTS UNDER NATURAL CONDITIONS.
```

Measurement Systems and Instrumentation

**PROJECT: 00107-CONTINUOUS MONITORING OF TOTAL DISSOLVED GAS PRESSURE

STARTING/ COMPLETION DATE : 12/75 12/77 : FUNDING ESTIMATED FY77 / $ 25000
TASK CODE=A625C-14 **EPA=R804175-02 ** (GRANT) PRIOR FY /
EPA OFFICER.: JF KOPP EPA/EMSL CINC
INVESTIGATOR.. BG DAOUST VIRGINIA MASON RES CTR
HR SEIBOLD VIRGINIA MASON RES CTR
PLAN ID.....: (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-000107 SSIE-GMA 3532 1 EPA -R804175-02 TASK-A625C-14
AP -625C DU -N140 LABT-MTS
ABSTRACT.....: SUPERSATURATION OF AIR IN NATURAL WATERS EITHER BY HYDROELECTRIC PLANTS OR THERMAL EFFLUENTS IS BECOMING AN INCREASING ENVIRONMENTAL PROBLEM AND HAS ALREADY ACCOUNTED FOR LARGE MORTALITIES OF ANANDROMOUS FISH IN THE NORTHWESTERN UNITED STATES. INCREASING DEVELOPMENT OF HYDROELECTRIC AND/OR NUCLEAR PLANTS AS A RESULT OF INCREASED ENERGY NEEDS CAN BE EXPECTED TO INCREASE THIS PROBLEM, DEFINITION OF WHICH REQUIRES LESS SPECIALIZED, EASILY AVAILABLE ANALYTICAL TECHNIQUES. THE METHODS CURRENTLY AVAILABLE FOR MEASURING AND/OR MONITORING TOTAL DISSOLVED GAS PRESSURE IN LIQUIDS, WHILE ACCURATE AND RELIABLE, ARE EXPENSIVE, REQUIRE SPECIALISTS FOR OPERATION, AND ARE NOT SUITABLE FOR CONTINUOUS UNATTENDED MONITORING. THE OBJECTIVE OF THE PROJECT IS THE FURTHER DEVELOPMENT OF SIMPLE, INEXPENSIVE INSTRUMENTATION USING THE EXISTING PRINCIPLE OF A DIFFUSION MEMBRANE AND ELECTRONIC PRESSURE TRANSDUCER TO MEASURE AND RECORD TOTAL DISSOLVED GAS PRESSURES. ALTERNATIVES FOR MEMBRANE MATERIALS, CONFIGURATIONS AND MECHANICAL INTERFACES AND SIGNAL ANALYSIS WILL BE EXPLORED, CONSTRUCTED AND FIELD TESTED.

**PROJECT: 00110-ION EXCHANGE MEMBRANES APPLIED TO NEW METHODS OF SAMPLING, ENRICHMENT AND SPECIATION IN WATER ANALYSIS

STARTING/ COMPLETION DATE : 10/75 10/78 : FUNDING ESTIMATED FY77 / $ 32692
TASK CODE=A625C-15 **EPA=R804179-01 ** (GRANT) PRIOR FY /
EPA OFFICER.: JF KOPP EPA/EMSL CINC
INVESTIGATOR.. WJ BLAEDEL UNIV OF WISCONSIN LETTERS & SCI/CHEM DEPT
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-000110 SSIE-GMA 3536 EPA -R804179-01 TASK-A625C-15
AP -625C DU -N140 LABT-MTS
ABSTRACT..... A CATION EXCHANGE MEMBRANE ENVELOPE FOR SAMPLING AND ENRICHMENT OF TRACE CATION IN A WATER SAMPLE WILL BE DESIGNED, CONSTRUCTED, AND STUDIED. IN PRINCIPLE, FOR WATER SAMPLES OF LOW OR MODERATE IONIC STRENGTHS, ENRICHMENTS OF TWO ORDERS OF MAGNITUDE SHOULD BE ACHIEVABLE BY TRANSPORT OF THE TRACE CATIONS FROM THE WATER SAMPLE THROUGH THE MEMBRANE INTO A SMALL VOLUME OF AN ACCEPTOR SOLUTION OF CONTROLLED COMPOSITION. THE ACCEPTOR SOLUTION WOULD THEN BE USED FOR MEASUREMENT OF THE TRACE ION CONCENTRATIONS, AT HIGHER LEVELS, AND MORE EASILY THAN THE ORIGINAL WATER SAMPLE. A COPPER ION-SELECTIVE ELECTRODE WILL BE COVERED WITH A CATION EXCHANGE MEMBRANE TRAPPING A SMALL VOLUME OF AN ACCEPTOR SOLUTION OF CONTROLLED COMPOSITION IN BETWEEN. UPON IMMERSION IN A WATER SAMPLE, ANY TRACE CU(II) IN THE WATER SAMPLE SHOULD BE ENRICHED IN THE ACCEPTOR SOLUTION, TO LEVELS THAT CAN BE MORE EASILY MEASURED BY THE COPPER ION-SELECTIVE ELECTRODE. THE ENRICHMENT FACTORS FOR BOTH OF THESE DEVICES ARE IN PRINCIPLE INDEPENDENT OF THE PROPERTIES OF THE MEMBRANE AND OF ALL OF THE PROPERTIES OF THE TRACE CATION EXCEPT THE CHARGE. WITH PROPER DESIGN, THESE DEVICES SHOULD OPERATE IN THE NANOMOLAR CONCENTRATION REGION. (TEXT ABRIDGED.)

**PROJECT: 00112-A COMPARATIVE SELECTIVITY STUDY OF THE NITROGEN OXIDE ELECTRODE AND THE SOLID STATE NITRATE ELECTRODE FOR DETERMINATION OF NITRATE

STARTING/ COMPLETION DATE : 10/77 10/79 : FUNDING ESTIMATED FY77 / $ 28000
TASK CODE=A625C-20 **EPA=R805212-01 ** (GRANT) PRIOR FY /
EPA OFFICER.: ME GALES EPA/EMSL CINC
INVESTIGATOR.: RF WILSON TEXAS SOUTHERN UNIV ARTS & SCI/CHEM DEPT
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-000112 SSIE-GMA 3816 EPA -R805212-01 TASK-A625C-20
AP -625C DU -N140 LABT-MTS
ABSTRACT..... THE OBJECTIVE OF THIS STUDY IS TO EVALUATE THE NITRATE ELECTRODES AND OPTIMIZE CONDITION FOR THE ANALYSIS OF NITRATE IN A VARIETY OF WATER AND WASTE WATER SAMPLES. THE COMPLETION OF THIS RESEARCH SHOULD PROVIDE EPA WITH A SELECTIVE, EFFICIENT AND ECONOMICAL METHOD FOR THE QUANTITATIVE DETERMINATION OF NITRATE.

**PROJECT: 00114-EVALUATION OF THE DIONEX ION EXCHANGE CHROMATOGRAPH FOR NATURAL WATER SAMPLES ANALYSIS

STARTING/ COMPLETION DATE : 08/77 01/79 : FUNDING ESTIMATED FY77 / $ 28058
TASK CODE=A625C-22 **EPA=R805329-01 ** (GRANT) PRIOR FY /
EPA OFFICER.: ME GALES EPA/EMSL CINC
INVESTIGATOR.: A SCHLUETER CENTRAL STATE UNIV
PLAN ID.....: (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-000114 SSIE-GMA 3813 EPA -R805329-01 TASK-A625C-22
AP -625C DU -N140 LABT-MTS
ABSTRACT..... THE ION-EXCHANGE CHROMATOGRAPH MANUFACTURED BY DIONEX CORP. HAS THE POTENTIAL OF SEPARATING AND QUANTITATIVELY DETERMINING THE CONCENTRATIONS OF ANIONS AND CATIONS PRESENT IN NATURAL WATERS. THIS PROJECT WILL EVALUATE THE DIONEX ION-EXCHANGE CHROMATOGRAPH TO DETERMINE ITS ABILITY AND LIMITATIONS IN ANALYZING NATURAL WATER SAMPLES FOR ANIONS A

**PROJECT: 00115-PROVIDE QUANTITATIVE ANALYTICAL SERVICES TO THE QA BRANCH

STARTING/ COMPLETION DATE : 06/76 06/79 : FUNDING ESTIMATED FY77 / $ 15000
TASK CODE=A625C-36 **EPA=68-03-2404 ** (CNTR.) PRIOR FY76 / $ 20000
EPA OFFICER.: E BERG EPA/EMSL CINC
INVESTIGATOR.: G DUNSTAN L F E CORP ENV ANALYSIS LABS DIV
MILESTONES.... 09/77 -COMPLETE ANALYTICAL VERIFICATION OF QC SAMPLES PRODUCED INHOUSE
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-000115 SSIE-GMA 3169 1 EPA -68-03-2404 TASK-A625C-36
AP -625C DU -N140 LABT-MTS
ABSTRACT..... QUALITY CONTROL SAMPLES ARE DESIGNED, DEVELOPED AND PRODUCED BY THE QUALITY ASSURANCE BRANCH OF AN OUTSIDE CONTRACTOR. WHATEVER THE PRODUCTION SOURCE, A SIGNIFICANT NUMBER OF SAMPLES MUST BE WITHDRAWN FROM THE LOT AND SUBMITTED TO A REFEREE ANALYTICAL LABORATORY TO VERIFY THAT THE QC SAMPLES ARE PREPARED ACCORDING TO SPECIFICATIONS. LFE ENVIRONMENTAL ANALYSIS, INC. IS ONE OF TWO REFEREE LABORATORIES ENGAGED IN VERIFYING ORGANIC AND INORGANIC QUALITY CONTROL SAMPLES.

**PROJECT: 01346-QUALITY ASSURANCE IN SUPPORT OF ENERGY-RELATED MONITORING ACTIVITIES IN THE WESTERN USA

STARTING/ COMPLETION DATE : 07/76 07/81 : FUNDING ESTIMATED FY77 / $ 200000
TASK CODE=E625C-11 **EPA=68-02-2412 ** (CNTR.) PRIOR FY76 / $ 522000
EPA OFFICER.. SM BROMBERG EPA/EMSL RTP
INVESTIGATOR.. M CHER ROCKWELL INTERNATIONAL CORP
MILESTONES.... 09/76 -CONDUCTED ON-SITE SYSTEMS REVIEWS AND ASSESSMENTS
01/77 -INITIATED QUARTERLY "BLIND" SAMPLE PERFORMANCE EVALUATIONS
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-001346 SSIE-GMA 3116 1 EPA -68-02-2412 TASK-E625C-11
AP -625C DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVES: DEVELOP AND IMPLEMENT A QUALITY ASSURANCE PROGRAM FOR AIR POLLUTION MONITORING IN THE VICINITY OF PRESENT AND PROPOSED ENERGY DEVELOPMENT PROJECTS IN THE WESTERN USA. APPROACHES: 1) PROVIDE ON-SITE SYSTEMS REVIEWS AND ASSESSMENTS FOR AGENCIES MONITORING FOR AIR POLLUTANTS IN 8 WESTERN STATES; 2) CONDUCT QUARTERLY PERFORMANCE EVALUATION USING "BLIND" SAMPLES; AND 3) PROVIDE TECHNICAL ASSISTANCE AS REQUIRED. OUTPUTS: REPORTS ON EACH OF THE ABOVE ACTIVITIES AND AIR QUALITY DATA OF IMPROVED QUALITY.

**PROJECT: 02953-MONITORING THE IMPACT OF WESTERN COAL STRIP MINING AND OIL SHALE EXTRACTION ON GROUNDWATER QUALITY

STARTING/ COMPLETION DATE : 09/76 10/81 : FUNDING ESTIMATED FY77 / $ 265000
TASK CODE=J625C-65 **EPA=68-03-2449 ** (CNTR.) PRIOR FY76 / $ 600000
EPA OFFICER.. LG MCMILLION EPA/EMSL LAS VEGAS
INVESTIGATOR.. R TINLIN GENERAL ELECTRIC CO
MILESTONES.... 10/77 -COLLECT, ORGANIZE, AND INTERPRET BACKGROUND DATA
06/78 -DESIGN THE MONITORING PROGRAM
01/79 -IMPLEMENT THE MONITORING PROGRAM FOR COAL STRIP MINING
10/81 -IMPLEMENT THE MONITORING PROGRAM FOR OIL SHALE
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002953 SSIE-GMA 3189 1 EPA -68-03-2449 TASK-J625C-65
AP -625C DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVES: THE PRINCIPAL OBJECTIVE IS TO DEVELOP AND VALIDATE IN AT LEAST TWO AREAS A STRATEGY FOR MONITORING GROUNDWATER QUALITY ALTERATIONS THAT ARE OCCURRING OR COULD POTENTIALLY OCCUR AS A CONSEQUENCE OF THE STRIP MINING OF COAL; MINING AND PROCESSING OF OIL SHALE; CONVERSION OF THESE RESOURCES; AND EFFECTS OF OTHER RELATED SITUATIONS (SUCH AS POPULATION INCREASES AND INDUSTRIAL DEVELOPMENTS). THE AREAS TO BE MONITORED WILL BE IN THE WESTERN UNITED STATES. APPROACH: THE DEVELOPMENT OF THE MONITORING STRATEGY WILL FOLLOW, IN GENERAL, THE METHODOLOGY THAT IS DESCRIBED IN THE RECENTLY PRINTED EPA REPORT ENTITLED "MONITORING GROUNDWATER QUALITY: MONITORING METHODOLOGY." A NECESSARY PREREQUISITE TO THE DEVELOPMENT OF THE STRATEGY WILL BE THE COLLECTION AND EVALUATION OF CONSIDERABLE DATA ON SUBJECTS SUCH AS THE FOLLOWING: GEOLOGY, WATER CHEMISTRY, IDENTIFIABLE POLLUTANTS, AQUIFER HYDRAULIC CHARACTERISTICS, MINING METHODS, LAND RECLAMATION PROCESSES, OIL SHALE PROCESSING METHODS, AND PRACTICES FOR DISPOSAL OF WASTE SUBSTANCES. THE EVALUATIONS WILL INCLUDE IDENTIFICATION OF POLLUTANTS AND THE PRIORITIZATION OF POLLUTION SOURCES. ACTUAL FIELD MONITORING WILL BE CONDUCTED TO SHOW THE VALIDITY AND METHOD OF APPLICATION OF THE MONITORING STRATEGY. OUTPUTS: OUTLINES AND DRAFT MATERIALS FOR THE FIRST PHASE OF THE WORK HAVE BEEN PREPARED FOR MONITORING APPROACHES AND METHODS; SOURCES OF POLLUTION AND METHODS OF WASTE DISPOSAL, IDENTIFICATION OF POTENTIAL POLLUTANTS; GROUNDWATER USAGE; AND HYDROLOGIC FRAMEWORK.

**PROJECT: 02955-ENERGY-RELATED RADIOLOGICAL POLLUTANT MONITORING AND TECHNIQUES DEVELOPMENT

STARTING/ COMPLETION DATE : 10/74 12/80 FUNDING ESTIMATED FY77 / $ 23500
TASK CODE=J625C-66 **EPA= ** (IN-HO) PRIOR FY76 / $ 144000
IN-HOUSE EFFORT FY 77 / 01.0 YEARS ; TOTAL PROJECT 01.0
EPA OFFICER.. EW BRETTHAUER EPA/EMSL LAS VEGAS
INVESTIGATOR.. EW BRETTHAUER US EPA
MILESTONES.... 07/77 -CHARACTERIZATION OF EMISSIONS FROM A PU-U OXIDE FUEL FABRICATION
07/77 -COLLABORATIVELY TESTED METHOD FOR MEASURING PLUTONIUM IN SOIL (FU
01/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING PLUTONIUM IN SOIL (AC I
10/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING PLUTONIUM IN AIR
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002955 SSIE-ZMA 1057 TASK-J625C-66 AP -625C
DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVE: CONDUCT RESEARCH ON THE DEVELOPMENT OF TECHNIQUES TO MONITOR POTENTIALLY HAZARDOUS EFFLUENTS AND EMISSIONS FROM NUCLEAR FUEL CYCLE FACILITIES. APPROACH: CHARACTERIZE THE PHYSICAL AND CHEMICAL PROPERTIES AND RADIATION LEVELS OF PLUTONIUM AND OTHER ACTINIDE DISCHARGES FROM A MIXED URANIUM AND PLUTONIUM OXIDE FUEL FABRICATION FACILITY. RECOMMEND AND COLLABORATIVELY TEST METHODS FOR MONITORING PLUTONIUM, URANIUM AND THORIUM IN SOIL, AIR AND WATER, INCLUDING THE DEVELOPMENT OF APPROPRIATE REFERENCE MATERIALS FOR CALIBRATION. OUTPUTS: THE PHYSICAL AND CHEMICAL PROPERTIES AND RADIATION LEVELS OF PLUTONIUM AND URANIUM DISCHARGES HAVE BEEN CHARACTERIZED FROM STACK AND ENVIRONMENTAL SAMPLES COLLECTED AT A MIXED URANIUM-PLUTONIUM OXIDE FUEL FABRICATION FACILITY. THE SAMPLES WERE ANALYZED AND INDIVIDUAL EFFLUENT PARTICLES WERE CHARACTERIZED IN TERMS OF ACTIVITY, SIZE, SHAPE, ELEMENTAL COMPOSITION AND OTHER PARAMETERS BY INTERAGENCY AGREEMENT WITH THE U.S. AIR FORCE TECHNICAL APPLICATIONS CENTER. A FUSION METHOD AND AN ACID DISSOLUTION METHOD FOR THE MEASUREMENT OF PLUTONIUM IN SOIL HAVE BEEN EVALUATED AND COLLABORATIVELY TESTED. EFFORTS ARE UNDERWAY TO PREPARE APPROPRIATE REFERENCE MATERIAL AND COLLABORATIVELY TEST A METHOD FOR MEASURING PLUTONIUM IN AIR.

**PROJECT: 02957-COLLABORATIVELY TEST METHODS FOR MEASURING URANIUM IN ENVIRONMENTAL SAMPLES

STARTING/ COMPLETION DATE : 07/76 06/78 : FUNDING ESTIMATED FY77 / $ 51500
TASK CODE=J625C-67 **EPA=D7-0015 ** (IAG) PRIOR FY76 / $ 65000
EPA OFFICER.. EW BRETTHAUER EPA/EMSL LAS VEGAS
INVESTIGATOR.. B ROBINSON MONSANTO RES CORP MOUND LAB
MILESTONES.... 10/77 -COLLABORATIVELY TESTED METHOD FOR MEASURING PLUTONIUM IN WATER
01/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING URANIUM IN WATER
06/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING AMERICIUM IN SOIL
10/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING URANIUM IN AIR
10/78 -COLLABORATIVELY TESTED METHOD FOR MEASURING URANIUM IN SOIL
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-002957 SSIE-GMA 4083 EPA -D7-0015 TASK-J625C-67
AP -625C DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVE: CONDUCT RESEARCH ON THE DEVELOPMENT OF TECHNIQUES TO MONITOR POTENTIALLY HAZARDOUS EFFLUENTS AND EMISSIONS FROM NUCLEAR FUEL CYCLE FACILITIES. APPROACH: DEVELOP OR EVALUATE METHODS FOR MONITORING PLUTONIUM IN WATER, URANIUM IN WATER, SOIL AND AIR, AND AMERICIUM IN SOIL. RECOMMEND METHODS WHICH BEST MEET ESTABLISHED CRITERIA AND CONDUCT AND EVALUATE RESULTS OF INTERLABORATORY COLLABORATIVE TESTS OF THESE METHODS. THIS INCLUDES THE DEVELOPMENT OF APPROPRIATE REFERENCE MATERIALS FOR CALIBRATION AND ANALYSIS. OUTPUTS: METHODS FOR MEASURING PLUTONIUM IN WATER AND URANIUM IN WATER HAVE BEEN COLLABORATIVELY TESTED. EFFORTS ARE UNDERWAY TO DEVELOP AND EVALUATE METHODS FOR AMERICIUM IN SOIL AND URANIUM IN SOIL AND AIR.

**PROJECT: 02959-ENERGY-RELATED RADIOLOGICAL MONITORING QUALITY ASSURANCE

STARTING/ COMPLETION DATE : 00/75 10/77 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=J625C-68 **EPA= ** (IN-HO) PRIOR FY76 / $ 188000
IN-HOUSE EFFORT FY 77 / 02.0 YEARS ; TOTAL PROJECT 05.0
EPA OFFICER.. AN JARVIS EPA/EMSL LAS VEGAS
INVESTIGATOR.. LH ZIEGLER US EPA
MILESTONES... 04/77 -DETERMINATION OF THE POTENTIAL RADIOACTIVE POLLUTANTS FOR WHICH Q
05/77 -PRODUCTION OF RADIUM-228 STANDARDS AND CONTINUING TRACEABILITY ST
00/00 -LABORATORY INTERCOMPARISON STUDIES
10/76 -PUBLICATION OF GUIDELINE DESCRIBING CALIBRATION PROCEDURES FOR GA
11/76 -PUBLICATION OF A GUIDELINE ON THE PREPARATION AND USE OF RADIATIO
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002959 SSIE-ZMA 1059 TASK-J625C-68 AP -625C
DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVE: THE OBJECTIVE IS TO DETERMINE THE POTENTIAL RADIOACTIVE POLLUTANTS FOR WHICH QUALITY CONTROL STANDARDS, SRM'S, AND PROCEDURES WILL BE NEEDED AS THE RESULT OF EXPANDED NUCLEAR POWER, FOSSIL-FUEL EXTRACTION, AND GEOTHERMAL ACTIVITIES AND TO SUPPLY THESE STANDARDS, SRM'S AND PROCEDURES TO INTERESTED LABORATORIES. APPROACH: A REPORT, "POTENTIAL RADIOACTIVE POLLUTANTS RESULTING FROM EXPANDED ENERGY PROGRAMS," WAS PREPARED FOR THE EPA THROUGH A CONTRACTUAL AGREEMENT. BASED ON THE RESULTS OF THIS REPORT, STANDARD REFERENCE MATERIALS AND CALIBRATED SAMPLES, REQUIRED FOR THE ANALYSIS OF SAMPLES OBTAINED BY MONITORING ACTIVITIES IN THE VICINITY OF NUCLEAR FACILITIES, FOSSIL-FUEL EXTRACTION AND UTILIZATION ACTIVITIES, AND GEOTHERMAL SITES, ARE BEING DEVELOPED. OUTPUTS: LABORATORY INTERCOMPARISON STUDIES HAVE CONTINUED. STANDARDS, INCLUDING RADIUM-228, HAVE BEEN MADE AVAILABLE TO LABORATORIES UPON REQUEST. SEVERAL GUIDELINES, INCLUDING USE OF RADIATION STANDARDS AND GAMMA MEASUREMENTS TECHNIQUES, HAVE BEEN PREPARED.

**PROJECT: 02961-DEVELOPMENT OF BACKGROUND EVALUATIONS FOR VALIDATIONS OF GROUNDWATER QUALITY MONITORING METHODOLOGY

STARTING/ COMPLETION DATE : 07/77 09/78 : FUNDING ESTIMATED FY77 / $ 0
TASK CODE=J625C-69 **EPA=68-03-2564 ** (CNTR.) PRIOR FY77 / $ 55000

EPA OFFICER.. LG MCMILLION EPA/EMSL LAS VEGAS
INVESTIGATOR.. J MULLICAN STATE WATER QUALITY BOARD GEOLOGICAL SERVS
MILESTONES.... 12/77 -DETERMINE AND DESCRIBE THE HYDROGEOLOGY AND GROUND WATER USE
02/78 -INVENTORY POLLUTION SOURCES AND IDENTIFY POTENTIAL POLLUTANTS
04/78 -COLLECT AND ANALYZE EXISTING GROUND WATER QUALITY DATA
10/78 -REPORT ON EVALUATION OF GROUND WATER DATA INTERPRETED WITH RESPE
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002961 SSIE-GMA 4095 EPA -68-03-2564 TASK-J625C-69
AP -625C DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVES: THIS PROJECT FOCUSES ON THE FIELD VALIDATION OF A RESEARCH-DEVELOPED METHODOLOGY FOR MONITORING CHANGES IN GROUNDWATER QUALITY PRESENTED IN THE REPORT "MONITORING GROUNDWATER QUALITY: MONITORING METHODOLOGY." BY APPLYING THE METHODOLOGY TO A REGION RELATED TO ENERGY DEVELOPMENT, AN EARLY APPRAISAL CAN BE MADE OF THE IMPACT THESE ACTIVITES MAY HAVE ON THE ENVIRONMENT. APPROACH: THE STUDY AREA SELECTED FOR THIS FIELD VALIDATION IS 17 COUNTIES IN THE EASTERN PART OF TEXAS WHICH CONTAIN ENORMOUS AND WIDESPREAD QUANTITIES OF LIGNITE AND SOME OF THE NATION'S LARGEST OIL FIELDS. A SERIES OF PROCEDURAL STEPS DESIGNED TO LEAD TO A PROGRAM TO MONITOR GROUNDWATER-QUALITY DETERIORATION RESULTING FROM MAN'S ACTIVITES ARE AS FOLLOWS: STEP 1 SELECT AREA OR BASIN FOR MONITORING; STEP 2 -IDENTIFY POLLUTION SOURCES, CAUSES, AND METHODS OF WASTE DISPOSAL; STEP 3 IDENTIFY POTENTIAL POLLUTANTS; STEP 4 DEFINE GROUNDWATER USAGE; STEP 5 DEFINE HYDROGEOLOGIC SITUATION; AND STEP 6 STUDY EXISTING GROUNDWATER QUALITY AND DESCRIBE THE EXISTING MONITORING PROGRAM. COMPLETION OF THESE STEPS WILL PROVIDE THE BACKGROUND INFORMATION NEEDED TO SELECT MORE LOCALIZED DEMONSTRATION SITES TO BE INCLUDED IN FUTURE EPA PROJECTS TO VERIFY THE REMAINDER OF THE MONITORING METHODOLOGY. OUTPUTS: CONTRACT WORK INITIATED AT THE TIME OF THIS REPORT. CONTRACT REPORTING SCHEDULE IS AS FOLLOWS: DETERMINE AND DESCRIBE THE HYDROGEOLOGY AND GROUNDWATER USE (12/77); INVENTORY POLLUTION SOURCES AND IDENTIFY POTENTIAL POLLUTANTS (2/78); COLLECT AND ANALYZE EXISTING GROUNDWATER-QUALITY DATA (4/78); REPORT ON EVALUATION OF GROUNDWATER DATA INTERPRETED WITH RESPECT TO HYDROGEOLOGY AND POLLUTION SOURCE (10/78).

**PROJECT: 02963-ACQUIRE FROM NASA AND PUT INTO USE, THE DATA ANALYSIS SYSTEM (DAS) FOR MULTISPECTRAL INFORMATION

STARTING/ COMPLETION DATE : 10/76 00/77 : FUNDING ESTIMATED FY77 / $ 40000
TASK CODE=J625C-70 **EPA= ** (IN-HO) PRIOR FY76 / $ 200000
IN-HOUSE EFFORT FY 77 / 00.5 YEARS ; TOTAL PROJECT

EPA OFFICER.: M DOCKTER EPA/EMSL LAS VEGAS
INVESTIGATOR.: M DOCKTER US EPA/ORD EMSL/REM MON METH BR
MILESTONES.... 09/66 -DEMONSTRATION OF TECHNIQUE
07/77 -TRAINING EMSL-LV PERSONNEL
09/77 -ACQUIRE COMPLETE DAS FOR EMSL-LV
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002963 SSIE-ZMA 1102 TASK-J625C-70 AP -625C
DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVES: A) TRAINING OF EMSL-LV REMOTE SENSING DIVISION PERSONNEL BY NASA IN THE USE OF THE AUTOMATED MULTISPECTRAL ANALYSIS SYSTEM. B) ACQUIRE FROM NASA AND PUT INTO OPERATIONAL USE THE DATA ANALYSIS SYSTEM, C) PERFORM ANALYSIS AND PREPARE A FINAL REPORT ON COMPLETION OF THE TRANSFER OF TECHNOLOGY. APPROACH· THE TRAINING OF EMSL-LV REMOTE SENSING DIVISION PERSONNEL ON THE ACTUAL DAS WITH OPERATIONAL TYPE REQUIREMENTS WILL GREATELY ENHANCE THE NASA TO EPA TECHNOLOGY TRANSFER. THE DAS WAS DESIGNED WITH THE CAPABILITY TO REDUCE A BROAD RANGE OF REMOTE SENSOR DATA AND WILL BE USED TO REDUCE THE MULTISPECTRAL SCANNER AND ERTS DATA FOR LAND USE MAPPING AND WATER MONITORING PURPOSES. THE DAS OUTPUT MAY BE RECORDED ON NINE TRACK DIGITAL COMPUTER COMPATIBLE TAPE FOR FURTHER PROCESSING, DISPLAYED ON A HIGH-RESOLUTION COLOR TELEVISION MONITOR, RECORDED ON 9.5 INCH WIDE COLOR OR BLACK AND WHITE FILM, OR LISTED ON A HIGH-SPEED LINE PRINTER. A VERSATILE INTERACTIVE OPERATOR CONTROL CONSOLE IS INCLUDED TO PROVIDE COMPLETE OPERATOR-PROCESSOR COMMUNICATION AND CONTROL. CURRENT PLANS/PROGRESS: A) DEMONSTRATION OF TECHNIQUE USING EXISTING NASA SYSTEM (COMPLETE). B) TRAINING OF EMSL-LV PERSONNEL (OCTOBER 1976 TO JULY 1977). 3) ACQUIRE COMPLETE DAS SYSTEM FOR EMSL-LV (JUNE 1976 TO SEPTEMBER 1977).

**PROJECT: 02964-ENERGY-RELATED OVERHEAD MONITORING AND TECHNIQUES DEVELOPMENT

STARTING/ COMPLETION DATE : 00/75 00/81 : FUNDING ESTIMATED FY77 / $ 58000
TASK CODE=J625C-71 **EPA= ** (IN-HO) PRIOR FY76 / $ 100000
IN-HOUSE EFFORT : FY 77 / 01.0 YEARS ; TOTAL PROJECT 05.0

EPA OFFICER. R LANDERS EPA/EMSL LAS VEGAS
INVESTIGATOR.. R LANDERS US EPA/ORD EMSL/REM MON METH BR
MILESTONES.... 08/76 -BASELINE STUDIES
08/76 -DEMONSTRATION OF TECHNIQUE
08/76 -ASSESS ENVIRONMENTAL IMPACT
12/76 -UTILIZE DS-1260 MULTISPECTRAL SCANNER
01/77 -PREPARE REPORT
01/77 -PREPARE ATLAS
06/77 -COMPLETE EVALUATION REPORT
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES.. RECN-002964 SSIE-ZMA 1103 TASK-J625C-71 AP -625C
DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVE: ESTABLISH PRELIMINARY GUIDELINES FOR AND DEMONSTRATION OF OVERHEAD REMOTE MONITORING OF WESTERN ENERGY-RELATED ACTIVITIES. APPROACH: COOPERATIVE WESTERN ENERGY-RELATED OVERHEAD MONITORING PROGRAM BETWEEN NASA AND EPA HAS BEEN ESTABLISHED WITH THE PURPOSE TO DEFINE, DEMONSTRATE AND DEVELOP OPERATIONAL REMOTE SENSOR TECHNIQUES TO RAPIDLY MONITOR, IN A COST-EFFECTIVE, QUANTITATIVE MANNER, THE SUCCESS WITH WHICH AN ENERGY-RELATED EXTRACTION SITE HAS BEEN OR IS BEING REHABILITATED TO A STATE SUITABLE FOR ITS INTENDED OR PREVIOUS LAND USAGE. THIS INCLUDES THE DETERMINATION OF ENVIRONMENTAL BASELINES FOR THE PURPOSE OF ESTABLISHING REHABILITATION CRITERIA AS WELL AS ENVIRONMENTAL EFFECTS OF MINE MOUTH POWER PLANTS. CURRENT PLANS/PROGRESS: A) INITIATE BASE LINE INFORMATION STUDIES (COMPLETED), B) DEMONSTRATION OF MULTISPECTRAL SCANNER TECHNIQUES USING EXISTING NASA SYSTEM (COMPLETED), C) UTILIZING MANUAL PHOTOINTERPRETATION TECHNIQUES OF AERIAL PHOTOGRAPHS, PERFORM ASSESSMENTS OF ENVIRONMENTAL IMPACT AND REHABILITATION EFFORTS (AUGUST 1975 AUGUST 1976), D) UTILIZING MULTISPECTRAL SCANNER (MSS) DATA, PERFORM ASSESSMENT OF ENVIRONMENTAL IMPACT AND REHABILITATION EFFORTS (8/75-9/76), E) PHOTOINTERPRETATION REPORT PREPARATION (8/76-9/76), F) MSS DATA REPORT PREPARATION (12/76-1/77), G) PREPARE WESTERN ENERGY "ATLAS" (8/76-12/76), H) EVALUATION REPORT (1/77-6/77).

**PROJECT: 02966-DEVELOPMENT OF TECHNIQUES FOR REMOTE MONITORING OF ORGANIC POLLUTION IN SURFACE WATERS

STARTING/ COMPLETION DATE : 00/75 00/81 : FUNDING ESTIMATED FY77 / $ 39300
TASK CODE=J625C-72 **EPA= ** (IN-HO) PRIOR FY76 / $ 76000
IN-HOUSE EFFORT FY 77 / 01.0 YEARS ; TOTAL PROJECT 06.0

EPA OFFICER.: M BRISTOW EPA/EMSL LAS VEGAS
INVESTIGATOR.: M BRISTOW US EPA/ORD EMSL/REM MON METH BR
MILESTONES...: 09/77 -FEASIBILITY REPORT ON ORGANIC CARBON LASER FLUOROSENSOR
01/79 -DESIGN AND CONSTRUCT CARBON LASER FLUOROSENSOR
01/81 -DESIGN, CONSTRUCT, TEST AND REPORT ON ADVANCE SYSTEM
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002966 SSIE-ZMA 1062 TASK-J625C-72 AP -625C
DU -N140 LABT-MTS
ABSTRACT..... OBJECTIVE: THE ULTIMATE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP AN ACTIVE AIRBORNE MONITORING SYSTEM CAPABLE OF PROVIDING QUANTITATIVE DATA ON THE CONCENTRATION OF TOTAL ORGANICS IN SURFACE WATERS. APPROACH: THE PRINCIPLE EMPLOYED IS AN EXTENSION OF THE LABORATORY TECHNIQUE OF SPECTROFLUOROMETRY. A WATER SAMPLE IS IRRADIATED WITH ULTRAVIOLET (UV) LIGHT OF A SPECIFIC WAVELENGTH AND INTENSITY, AND THE RESULTANT FLUORESCENCE EMISSION IS THEN MONITORED USING A MONOCHROMATOR-MULTICHANNEL DETECTOR COMBINATION. THE FLUORESCENCE SIGNAL ARISES FROM DISSOLVED ORGANIC MATERIALS BOTH MAN-MADE AND NATURAL IN ORIGIN RATHER THAN FROM THE WATER ITSELF, WHICH DOES NOT FLUORESCE. HOWEVER, THE WATER MOLECULE EMITS A RAMAN BAND WHICH, FOR VERY DILUTE AQUEOUS SOLUTIONS OF ORGANICS, HAS A CONSTANT AMPLITUDE FOR A GIVEN INTENSITY OF EXCITATION RADIATION. THIS WATER RAMAN EMISSION BAND IS THEN CONVENIENTLY EMPLOYED AS A BUILT-IN REFERENCE SOURCE WITH WHICH TO COMPARE THE AMPLITUDE OF THE CONCURRENT FLUORESCENCE EMISSION. THE NORMALIZED AMPLITUDE OF THE SIGNAL THEN PROVIDES INFORMATION CONCERNING THE CONCENTRATION OF THE DISSOLVED ORGANICS. CURRENT PLANS: A NUMBER OF REPORTS HAVE BEEN PUBLISHED RECENTLY WHICH INDICATE THAT THE UV-INDUCED FLUORESCENCE EMISSION IS PROPORTIONAL TO THE CONCENTRATION OF DISSOLVED ORGANIC CARBON. IT IS PLANNED TO EXPLORE THIS RELATIONSHIP IN MORE DETAIL WITH THE PURPOSE OF ESTABLISHING A FIRM VALUE FOR A CORRELATION COEFFICIENT. BASED ON THE FINDINGS OF THIS CORRELATION STUDY, AN AIRBORNE LASER FLUOROSENSOR WILL BE DESIGNED, BUILT AND TESTED. THIS SYSTEM WILL HAVE THE CAPABILITY OF CONTINUOUSLY MONITORING AND RECORDING THE DISSOLVED ORGANIC CARBON CONCENTRATION FOR THE SURFACE WATER BELOW THE AIRCRAFT.

**PROJECT: 02967-ENERGY RELATED WATER MONITORING DATA INTEGRATION

```
                    STARTING/ COMPLETION DATE : 00/75   00/80     FUNDING    ESTIMATED   FY77  / $   84000
                    TASK CODE=J625C-73      **EPA=              ** (IN-HO)     PRIOR       FY76  / $  177000
                IN-HOUSE EFFORT   FY 77  /  03.0  YEARS  ; TOTAL PROJECT  15.0
EPA  OFFICER.. VW LAMBOU                EPA/EMSL   LAS VEGAS
INVESTIGATOR.. R  THOMAS                US EPA
               VW LAMBOU                US EPA
MILESTONES.... 06/76 -PUBLICATION OF WESTERN ENERGY MONITORING ATLAS
               12/77 -ENERGY RESOURCE DEVELOPMENT IMPACT-SAN JUAN BASIN, UTAH, COLORADO
               03/78 -WESTERN ENERGY RESOURCE DEVELOPMENT, BASELINE DATA & LONG TERM WA
               06/78 -ENERGY RESOURCE DEVELOPMENT IMPACT   POWDER RIVER BASIN
               07/78 -ENERGY RESOURCE DEVELOPMENT IMPACT   TONGUE RIVER BASIN
               08/78 -ENERGY RESOURCE DEVELOPMENT IMPACT   LITTLE MISSOURI RIVER BASIN
               09/78 -ENERGY RESOURCE DEVELOPMENT IMPACT   BELLE FORCHE RIVER
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002967          SSIE-ZMA  1056        TASK-J625C-73        AP  -625C
               DU  -N140            LABT-MTS
ABSTRACT...... OBJECTIVE: ESTABLISH A WATER MONITORING NETWORK THROUGHOUT THE WESTERN STATES TO MONITOR AND ASSESS
                THE IMPACT OF ENERGY RESOURCE DEVELOPMENT. APPROACH: THROUGH THE USE OF COMPUTER DATA BANKS,
                PRIMARILY STORET, WATER MONITORING STATIONS THAT ARE CURRENTLY IN OPERATION, BACK PAST 1970, AND
                HAVE REPORTED A LARGE NUMBER OF MEASURED PARAMETERS WERE SELECTED FOR INCORPORATION INTO A PRIMARY
                MONITORING NET. PARAMETERS OF INTEREST WERE IDENTIFIED AND A QUALITY ASSURANCE PROGRAM IS BEING
                ESTABLISHED IN PARTICIPATING LABORATORIES. HISTORICAL DATA HAVE BEEN REVIEWED AND BASELINE WATER
                QUALITY CONDITIONS ARE BEING ESTABLISHED. A WESTERN ENERGY RESOURCES ATLAS HAS BEEN PUBLISHED IN
                CONJUNCTION WITH A SIMILAR EFFORT ON AIR MONITORING. OUTPUTS: DATA FROM THE PRIMARY NET STATIONS IS
                BEING AUGMENTED WITH DATA FROM OTHER STATIONS. AN ASSESSMENT OF BASELINE WATER QUALITY, TRENDS, AND
                IMPACTS ON A BASIN BY BASIN BASIS IS UNDERWAY. AS DATA GAPS, EITHER DESIRED PARAMETERS, SAMPLING
                FREQUENCY, OR ADDITIONAL STATIONS ARE IDENTIFIED, ACTIONS WILL BE TAKEN WITH APPROPRIATE EPA
                REGIONAL OFFICES OR OTHER GOVERNMENTAL AGENCIES TO CORRECT THEM. THE PRIMARY NET WILL BE UPDATED
                PERIODICALLY AND EXTENDED INTO AREAS NOT PRESENTLY ADDRESSED.
```

**PROJECT: 02969-FOUR CORNERS AMBIENT AIR MONITORING NETWORK

```
                    STARTING/ COMPLETION DATE : 11/75   09/80 :   FUNDING    ESTIMATED   FY77  / $  175000
                    TASK CODE=J625C-74      **EPA=68-03-2345  ** (CNTR.)     PRIOR       FY76  / $  425000
EPA  OFFICER.. DN MCNELIS               EPA/EMSL   LAS VEGAS
INVESTIGATOR.. DN MCNELIS               UTE RES LABS
               DN MCNELIS               US EPA
MILESTONES.... 01/76 -NETWORK OPERATIONAL
               06/77 -SULFATE NITRATE ANALYSIS OPERATIONAL
               12/77 -ANNUAL REPORT   DATA SUMMARY
               12/78 -ANNUAL REPORT   DATA SUMMARY
               12/79 -ANNUAL REPORT   DATA SUMMARY
               12/80 -ANNUAL REPORT   DATA SUMMARY
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-002969          SSIE-GMA  4072        EPA -68-03-2345      TASK-J625C-74
               AP  -625C            DU  -N140             LABT-MTS
ABSTRACT...... OBJECTIVES: MAINTAIN AN AIR QUALITY MONITORING NETWORK IN THE FOUR CORNERS AREA TO EVALUATE THE
                PRESENT AND FUTURE AIR QUALITY IMPACT OF ENERGY-RELATED DEVELOPMENTS IN THE WESTERN UNITED STATES.
                INTEGRATE THE AIR QUALITY MONITORING DATA COLLECTED BY THIS NETWORK WITH DATA COLLECTED ELSEWHERE.
                APPROACH: A 28-STATION HI-VOL NETWORK IS OPERATED OVER THE FOUR CORNERS REGION. A 24-HOUR SAMPLE IS
                COLLECTED THREE TIMES PER WEEK. EACH SAMPLE IS ANALYZED FOR TRACE ELEMENTS (PB, CR, CU, NI, FE, AND
                CD), SULFATE NITRATE, AND TOTAL SUSPENDED PARTICULATES. ALL DATA ARE ENTERED INTO THE EPA SAROAD
                SYSTEM. OUTPUTS: ANNUAL SUMMARY OF DATA. QUARTERLY PROGRESS REPORTS.
```

**PROJECT: 02971-ENERGY-RELATED AMBIENT AIR QUALITY MONITORING IN THE WESTERN ENERGY DEVELOPMENT AREA

```
                    STARTING/ COMPLETION DATE : 07/75   09/80 :   FUNDING    ESTIMATED   FY77  / $  230000
                    TASK CODE=J625C-75      **EPA=              ** (IN-HO)     PRIOR       FY76  / $  290000
                IN-HOUSE EFFORT   FY 77  /  04.0  YEARS  ; TOTAL PROJECT  20.0
EPA  OFFICER.: RN SNELLING              EPA/EMSL   LAS VEGAS
INVESTIGATOR.: RN SNELLING              US EPA
MILESTONES...: 06/77 -ENERGY ATLAS (INVENTORY)
               10/77 -AIRCRAFT MONITORING OPERATIONAL
               12/77 -ANNUAL REPORT SUMMARIZING GROUND-BASED AND AIRBORNE SAMPLING DATA
               12/78 -ANNUAL REPORT SUMMARIZING GROUND-BASED AND AIRBORNE SAMPLING DATA
               12/79 -ANNUAL REPORT SUMMARIZING GROUND-BASED AND AIRBORNE SAMPLING DATA
               12/80 -ANNUAL REPORT SUMMARIZING GROUND-BASED AND AIRBORNE SAMPLING DATA
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-002971          SSIE-ZMA  1053        TASK-J625C-75        AP  -625C
               DU  -N140            LABT-MTS
ABSTRACT.....: OBJECTIVE: PROVIDE INTEGRATED AND VALIDATED AIR QUALITY MONITORING DATA (BASE LINE AND TREND) FOR
                THE WESTERN AREA OF THE U.S. WHICH ARE OR WILL BE IMPACTED BY ENERGY-RELATED DEVELOPMENT
                ACTIVITIES. THE GEOGRAPHIC COVERAGE INCLUDES THE NORTHERN GREAT PLAINS, FOUR CORNERS AREA, COLORADO
                PLATEAU (OIL SHALE), BLACK MESA, ARIZONA, AND AREAS OF NEW MEXICO. APPROACH: 1. MAINTAIN INVENTORY
                OF EXISTING AND PROJECTED POLLUTION SOURCES AND MONITORING NETWORKS. 2. INTEGRATE AIR QUALITY
                MONITORING DATA AND ASSESS IMPACT OF ENERGY-RELATED ACTIVITIES. 3. CONDUCT AIRCRAFT AIR QUALITY
                MONITORING MISSIONS TO SUPPLEMENT GROUND-BASED NETWORK DATA.OUTPUTS: 1. ANNUAL REPORTS OF
                GROUND-BASED MONITORING DATA; 2. ANNUAL REPORTS OF AIRBORNE MONITORING DATA.
```

**PROJECT: 04121-OCEAN OIL SPILL CONCENTRATION AND TRAJECTORY FORECAST

STARTING/ COMPLETION DATE : 07/75 12/79 : FUNDING : ESTIMATED FY77 / $ 170000
TASK CODE=V625C-10 **EPA=D5-E693-DY ** (IAG) PRIOR FY76 / $ 388000
EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. CS BARRIENTOS US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
KW HESS US DOC NATL OCEANIC & ATMOSPHERIC ADMIN
L BURROUGHS US DOC TECHNIQUES DEV LAB
AD TAYLOR US DOC
MILESTONES.... 09/78 -PROGRESS REPORT ON OIL SPILL TRAJECTORY MODEL
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004121 SSIE-GMA 4651 EPA -D5-E693-DY TASK-V625C-10
AP -625C DU -N140 LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP AN OIL SPILL TRAJECTORY MODEL AND TO IMPLEMENT THE MODEL IN THE NATIONAL WEATHER SERVICE, NOAA. THE MODEL WILL BE USED IN AN OPERATIONAL MODE DURING OIL SPILL EPISODES. IT WILL ALSO BE USED WITH CLIMATOLOGICAL DATA FOR COASTAL IMPACT DETERMINATION AND ASSESSMENT. THE PROGRAM INCLUDES PROVISIONS TO DEVELOP TECHNIQUES FOR FORECASTING CURRENT, WIND, AND WAVE FIELDS THAT HAVE NOT PREVIOUSLY BEEN AVAILABLE. A LARGE PORTION OF THE EFFORT IS ON METEOROLOGICAL MODELINGS TO GET THE PROPER ATMOSPHERIC FORCINGS FOR THE OCEANIC MODELS. A REGIONAL ATMOSPHERIC MODEL IS BEING DEVELOPED. THE PROGRAM IS DIVIDED INTO FIVE PROCESSES AND MANAGEMENT TASKS: 1) WEATHERING, 2) SPREADING, 3) DIFFUSION, 4) TRANSPORT, AND 5) MODEL INTEGRATION. SIX CONTRACTS HAVE BEEN AWARDED; TWO WERE COMPLETED AND ONE WAS RENEWED. WE HAVE COMPLETED PROGRAMMING A SPREADING DIFFUSION MODEL AND HAVE PERFORMED VARIOUS EXPERIMENTS. A METEOROLOGICAL ANALYSIS PROGRAM HAS BEEN ADAPTED FOR THE U.S. EAST COAST. WE ARE DEVELOPING A DYNAMIC MODEL TO COMPUTE WATER TRANSPORT FOR THE CASE OF STRONG BAROMETRIC AND WIND FORCINGS OVER SHALLOW SHELVES. WE ARE USING OIL SPILL DATA (E.G. ARGO MERCHANT) TO DERIVE MODEL PARAMETERS. WE WILL CONTINUE DEVELOPMENT OF ATMOSPHERIC AND OCEANIC MODELS FOR USE IN DETERMINING OIL SPILL TRAJECTORIES. RESULTS OF CONTRACT PROJECTS WILL BE INTEGRATED IN THE MODELING AS SOON AS THEY BECOME AVAILABLE. A PROGRESS REPORT OF THE PROGRAM IS DUE IN SEPTEMBER 1978.

**PROJECT: 04123-STANDARDIZATION AND INTERCALIBRATION TECHNIQUES FOR MARINE MONITORING

STARTING/ COMPLETION DATE : 07/75 12/79 FUNDING ESTIMATED FY77 / $ 250000
TASK CODE=V625C-12 **EPA=D5-E693-EA ** (IAG) PRIOR FY76 / $ 562000
EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. M BASILEO US DOC TEST & EVALUATION LAB
MILESTONES.... 12/78 -DEVELOP CTD SENSING SYSTEM FIELD VERIFICATION STANDARDS
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004123 SSIE-GMA 2984 1 EPA -D5-E693-EA TASK-V625C-12
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: TO DEVELOP TECHNIQUES FOR THE STANDARDIZATION AND INTERCALIBRATION OF MARINE WATER QUALITY MEASUREMENTS (IN SITU, SAMPLING AND ANALYTICAL METHODOLOGIES) SUCH THAT THE UNCERTAINTY LEVELS OF THE MEASUREMENTS CAN BE DEFINED IN RELATION TO ACCEPTED STANDARDS. APPROACH: DEVELOP LABORATORY, TRANSFER AND FIELD STANDARDS FOR SELECTED MARINE WATER QUALITY PARAMETERS TO SERVE AS A BASIS FOR ESTABLISHING MEASUREMENT UNCERTAINTY LEVELS; INVESTIGATE THE COMPARABILITY OF RESULTS BETWEEN ACCEPTED ANALYTICAL CHEMISTRY TECHNIQUES AND MORE RECENTLY DEVELOPED IN SITU MEASUREMENT METHODS; DETERMINE THE COMPARABILITY OF RESULTS BETWEEN ACCEPTED ANALYTICAL TECHNIQUES DEVELOPED FOR FRESHWATER AND METHODS CURRENTLY USED IN ANALYSIS OF ESTUARINE AND SEA WATER. PROGRESS/PLANS: LABORATORY DISSOLVED OXYGEN STANDARD, CTD AND PRECISION PRESSURE TRANSFER STANDARDS ARE UNDER DEVELOPMENT; INVESTIGATIONS INTO THE COMPARABILITY OF WATER QUALITY "TEST KITS" AND SALINE WATER ANALYTICAL METHODS TO ACCEPTED ANALYTICAL METHODS HAS BEEN CONTRACTED. THE DEVELOPMENT OF A FIELD VERIFICATION STANDARD FOR CTD SENSING SYSTEMS WILL BE UNDERTAKEN DURING FY 1978.

**PROJECT: 04125-BYPRODUCT MARKETING

STARTING/ COMPLETION DATE : 05/75 10/79 : FUNDING ESTIMATED FY77 / $ 150000
TASK CODE=V625C-15 **EPA=D7-E721-BJ ** (IAG) PRIOR FY76 / $ 700000
EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. WE OBRIEN US TVA
WL ANDERS US TVA
MILESTONES...: 03/76 -INTERIM REPORT ON STUDY PUBLISHED, REPORT, S-469
10/77 -FINAL REPORT ON ABATEMENT PRODUCTION OF H2SO4 SUBMITTED TO EPA
10/77 -FINAL REPORT ON ABATEMENT PRODUCTION OF GYPSUM
01/78 -FINAL REPORT ON GYPSUM PRODUCTION TO EPA
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004125 SSIE-GMA 4677 EPA -D7-E721-BJ TASK-V625C-15
AP -625C DU -N140 LABT-EMI
ABSTRACT..... THE OBJECTIVES OF THIS STUDY ARE TO ESTIMATE THE COSTS AND QUANTITIES OF ABATEMENT BYPRODUCTS WHICH COULD BE PRODUCED WITH AIR POLLUTION ABATEMENT PROCESSES INSTALLED AT POWER PLANTS; TO DETERMINE THE COMPETITIVE COSTS OF EXISTING/PLANNED PRODUCTION PROCESSES THAT THE ABATEMENT BYPRODUCTS COULD LOGICALLY REPLACE; AND TO MODEL AN OPTIMUM DISTRIBUTION SYSTEM OF THE POWER PLANTS POTENTIALLY PRODUCING ABATEMENT BYPRODUCTS, THE POTENTIAL PURCHASERS OF THE ABATEMENT BYPRODUCTS, AND THE TRANSPORTATION CONNECTIONS BETWEEN THEM. A SYSTEMS APPROACH IS USED FOR THE PROJECT. REFINEMENT, VERIFICATION, DOCUMENTATION, CONSISTENCY WITH ENGINEERING CALCULATIONS, AND DETAILED ANALYSIS OF RESULTS ARE USED TO ACCOMPLISH PROJECT OBJECTIVES. A FINAL REPORT HAS BEEN SUBMITTED TO EPA, AND WORK IS CONTINUING TO DEVELOP A USER MANUAL FOR USE OF THE AUTOMATED SYSTEM DEVELOPED DURING THE PROJECT.

**PROJECT: 04126-DEVELOP A SOFTWARE MODULE WHICH REMOVES GEOMETRIC DISTORTIONS FROM AIRCRAFT MULTISPECTRAL CLASSIFIED DATA

STARTING/ COMPLETION DATE : 04/77 07/78 : FUNDING : ESTIMATED FY77 / $ 20000
TASK CODE=V625C-16 **EPA=D5-E771 ** (IAG) PRIOR FY /

EPA OFFICER.: GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.: AT JOYCE US NASA
W STONEY US NASA
EL TILTON US NASA
MILESTONES.... 10/77 -SOFTWARE DEVELOPMENT
06/78 -FINAL REPORT
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004126 SSIE-GMA 4673 EPA -D5-E771 TASK-V625C-16
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: DEVELOP A TECHNIQUE OF RESAMPLING THE MULTISPECTRAL AIRCRAFT DATA SO THAT MOST GEOMETRIC DISTORTIONS ARE REMOVED AND THE DATA ARE REGISTERED TO THE U.T.M. GRID. THIS TECHNIQUE IS TO BE INCORPORATED INTO A COMPUTER SOFTWARE MODULE THAT CAN BE ADAPTED TO THE EPA/EMSL COMPUTER SYSTEM. TECHNICAL APPROACH: THE SOFTWARE MODULE WILL BASICALLY CONSIST OF TWO COMPUTER PROGRAMS. THE FIRST PROGRAM WILL ACCEPT AS INPUTS GROUND CONTROL POINTS AND OTHER PARAMETERS SUCH AS BOUNDARIES OF THE AREA TO BE RESAMPLED AND CELL SIZE TO BE USED. THE OUTPUTS WILL BE MAPPING COEFFICIENTS WHICH WILL BE ACCEPTED BY THE SECOND PROGRAM WHICH WILL ACTUALLY DO THE RESAMPLING AND OUTPUT THE GEOGRAPHICALLY CORRECTED DATA. THE MAPPING COEFFICIENTS, WHICH ARE BASED ON CONTROL POINTS, WILL BE USED TO DETERMINE SCAN LINES AND ELEMENT NUMBERS AS FUNCTIONS OF EASTINGS AND NORTHINGS. THE TYPE AND NUMBER OF COEFFICIENTS TO BE USED WILL BE DETERMINED BY THE RELATIVE STABILITY OF THE AIRCRAFT PLATFORM FOR THE PARTICULAR FLIGHT.PROGRESS: TEST AIRCRAFT DATA SETS ACQUIRED AND SOFTWARE DEVELOPMENT HAS BEGUN; 06/78 FINAL REPORT.

**PROJECT: 04127-DEVELOP A DATA BASE CLASSIFICATION SYSTEM FOR DETERMINING THE REHABILITATION POTENTIALS OF SURFACE MINED LANDS

STARTING/ COMPLETION DATE : 04/77 07/78 : FUNDING ESTIMATED FY77 / $ 90000
TASK CODE=V625C-17 **EPA=D5-E771 ** (IAG) PRIOR FY /

EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. AT JOYCE US NASA
W STONEY US NASA
EL TILTON US NASA
MILESTONES.... 06/78 -FINAL REPORT
PLAN ID.....: (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-004127 SSIE-GMA 4672 EPA -D5-E771 TASK-V625C-17
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: DEVELOP A PROCEDURE WHICH UTILIZES BOTH LANDSAT AND ANCILLARY DATA IN SUCH A MANNER THAT A CLASSIFICATION OF VARIOUS REHABILITATION POTENTIALS CAN BE MADE. ANCILLARY DATA RELATES TO SOIL TYPE, SLOPE, ASPECT, RAINFALL, ELEVATION, TEMPERATURE, AND EVAPORATION NOT DIRECTLY ASSOCIATED WITH THE LANDSAT DATA, BUT NONETHELESS CONSIDERED AS BEING OF SIGNIFICANT IMPORTANCE TO THE OVERALL EFFECTIVENESS OF THE REHABILITATION CLASSIFICATION PROCEDURE DEVISED. TECHNICAL APPROACH: DERIVE LAND COVER INFORMATION FROM LANDSAT DIGITAL DATA USING STANDARD LANDSAT COMPUTER IMPLEMENTED TECHNIQUES. ALL INFORMATION WILL BE INTEGRATED INTO A DATA BASE FILE SPECIFICALLY CONSTRUCTED FOR THE 1 DEGREE BY 1 DEGREE CAMPBELL CO., WY STUDY AREA. ALL PARAMETERS WILL THEN BE UTILIZED BY SPECIFIC APPLICATIONS SOFTWARE TO ESTIMATE THE REHABILITATION POTENTIAL FOR SITES WITHIN THE STUDY AREA. AN HIERARCHICAL SCHEME IS TO BE DEVELOPED WHICH CAN BE USED AS AN INDICATOR OF REHABILITATION POTENTIAL. PROGRESS: DIGITIZATION OF ANCILLARY PARAMETERS UNDERWAY, LANDSAT DIGITAL DATA LOCATED AND ACQUISITION IS IN PROGRESS, GROUND TRUTH AT TIME OF SATELLITE OVERPASS COMPLETE. 06/78 FINAL REPORT.

**PROJECT: 04129-UTILIZATION OF AIRCRAFT-ACQUIRED MULTISPECTRAL DATA TO MONITOR CHANGE ON SURFACE MINED LANDS

STARTING/ COMPLETION DATE : 04/77 07/78 : FUNDING ESTIMATED FY77 / $ 75000
TASK CODE=V625C-18 **EPA=D5-E771 ** (IAG) PRIOR FY /

EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. AT JOYCE US NASA
W STONEY US NASA
EL TILTON US NASA
MILESTONES.... 06/78 -FINAL REPORT
PLAN ID.....: (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-004129 SSIE-GMA 4662 EPA -D5-E771 TASK-V625C-18
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: TO DEVELOP A TECHNIQUE THAT WOULD ALLOW FOR THE AUTOMATED PROCESSING OF AIRCRAFT-ACQUIRED MULTISPECTRAL SCANNER DATA WITHOUT THE NECESSARY PRE-MISSION GROUND TRUTH ACTIVITIES. THIS WOULD FACITITATE THE REAL TIME PROCESSING OF THE NUMEROUS DATA SETS THAT WILL BE NECESSARY IF SURFACE MINES IN THE WESTERN U.S. ARE TO BE MONITORED ON A CONTINUAL BASIS. TECHNICAL APPROACH: AIRCRAFT-ACQUIRED (1975) MULTISPECTRAL SCANNER DATA WILL BE PROCESSED USING NASA/ERL SOFTWARE PACKAGE "SEARCH". THIS PROGRAM PERMITS THE INVESTIGATOR TO AUTOMATICALLY SCAN AN ENTIRE DATA SET, LOCATE AREAS OF HOMOGENEOUS LAND COVER (BY SPECIFYING THE MAGNITUDE OF SEVERAL STATISTICAL PARAMETERS) AND SUBSEQUENTLY CLASSIFY THE ENTIRE DATA SET BASED ON THE SELECTED AREAS, WITHOUT MANUAL SELECTION OF TRAINING SAMPLES AND THE ASSOCIATED STATISTICS DEVELOPMENT. AT THIS TIME, THE DATA WILL BE SUBJECTED TO A STRUCTURED EXPERIMENT, DURING WHICH TIME THE VARIOUS INPUT PARAMETERS WILL BE SYSTEMATICALLY ALTERED. THE RESULTS WILL BE ANALYZED AND THE RESULTS FORWARDED TO EPA/EMSL. DATA FROM 1977 WILL THEN BE ANALYZED, USING THE REFINED TECHNIQUE DEVELOPED FROM THE ABOVE EXPERIMENT. THE RESULTS OF THIS RUN WILL ALSO BE FORWARDED TO EPA/EMSL. PROGRESS: INITIAL "SEARCH" RUNS COMPLETE, STRUCTURED EXPERIMENT UNDERWAY; 1977 DATA IN HOUSE. 06/78 FINAL REPORT.

**PROJECT: 04130-SHIPBOARD ENVIRONMENTAL DATA ACQUISITION SYSTEM (SEAS)

```
                    STARTING/ COMPLETION DATE : 00/75   09/78 :   FUNDING :  ESTIMATED   FY77  / $   80000
                    TASK CODE=V625C-30      **EPA=D5-E693-DZ  ** ( IAG )      PRIOR       FY76  / $  180000
EPA  OFFICER.. GJ D'ALESSIO              EPA/HDQTRS- OEMI
INVESTIGATOR.. RR REYNOLDS               US DOC                                NATL OCEANIC & ATMOSPHERIC ADMIN
               RR REYNOLDS               US DOC
MILESTONES...: 09/78 -COMPLETE PROTOTYPE MODEL SPECIFICATIONS
PLAN ID......: (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004130           SSIE-GMA  4652        EPA -D5-E693-DZ       TASK-V625C-30
               AP  -625C             DU  -N140             LABT-EMI
ABSTRACT.....: THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. OBJECTIVE  THE SEAS
                PROGRAM OBJECTIVE IS TO DEVELOP AN AUTOMATED METEOROLOGICAL/OCEANOGRAPHIC OBSERVATION SYSTEM FOR
                USE ON BOARD SHIPS. APPROACH: (A) DEVELOP AN ENGINEERING MODEL SEAS AND TEST IT IN AN OPERATIONAL
                ENVIRONMENT. (COMPLETED.) (B) DEVELOP AN AUTOMATED EXPENDABLE BATHYTHERMOGRAPH (XBT) CAPABILITY AS
                AN ADD-ON SENSOR TO THE SEAS SYSTEM. (ENGINEERING MODEL COMPLETED.) (C) PREPARE PROTOTYPE MODEL
                SEAS SPECIFICATIONS. CURRENT PROGRESS: THE ENGINEERING MODEL (SEAS-1) HAS BEEN DEVELOPED AND TESTED
                ON THE NOAA SHIP RESEARCHER. AN ENGINEERING MODEL AUTOMATED XBT SYSTEM WAS COMPLETED IN EARLY FY
                1977 AND INTEGRATED WITH SEAS-1 FOR TESTING. CURRENT PLANS: PROTOTYPE MODEL SPECIFICATIONS WILL BE
                COMPLETED BY SEPTEMBER 1, 1978.
```

**PROJECT: 04132-ENVIRONMENTAL EFFECTS OF POLLUTANTS FROM ENERGY PRODUCTION

```
                    STARTING/ COMPLETION DATE : 07/75   07/80     FUNDING    ESTIMATED   FY77  / $  200000
                    TASK CODE=V625C-31      **EPA=D5-3693-EG  ** ( IAG )      PRIOR       FY76  / $  225000
EPA  OFFICER.. GJ D'ALESSIO              EPA/HDQTRS- OEMI
INVESTIGATOR.. RF PUESCHEL               US DOC
               PA ALLEE                  US DOC
               WE COBB                   US DOC
               FP PARUNGO                US DOC
               CC VANVALIN               US DOC
               DL WELLMAN                US DOC
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004132           SSIE-GMA  4650        EPA -D5-3693-EG       TASK-V625C-31
               AP  -625C             DU  -N140             LABT-EMI
ABSTRACT...... OBJECTIVES: DEVELOP CRITERIA BY WHICH TO ASSESS THE IMPACT OF POLLUTANTS FROM POWER GENERATION ON
                THE SOLAR AND TERRESTRIAL RADIATIVE FLUXES, AND TO DETERMINE THEIR CAPABILITY FOR ALTERING AMOUNT
                AND DISTRIBUTION OF PRECIPITATION THROUGH CHANGES IN THE NUMBERS OF CLOUD AND ICE NUCLEI. APPROACH:
                MEASURE IN SITU BY AIRCRAFT 1) NUMBER AND SIZE DISTRIBUTIONS OF PRIMARY (FLY ASH) AND SECONDARY
                (GAS-TO-PARTICLE CONVERTED) AEROSOLS. 2) GASES THAT LEAD TO PARTICLE FORMATION, 3) INFRARED
                TERRESTRIAL RADIATION, 4) ELECTRIC FIELDS AND CONDUCTIVITIES OF THE ATMOSPHERE, 5) AEROSOL LIGHT
                SCATTERING COEFFICIENTS. COLLECT ADDITIONAL AEROSOL SAMPLES FOR DELINEATING THE PARAMETERS THAT
                DETERMINE CLOUD NUCLEATING AND RADIATIVE EFFECTS, VIZ., PARTICLE SIZES, SHAPES AND ELEMENTAL
                COMPOSITIONS. INDEPENDENTLY DETERMINE THE CLOUD AND ICE NUCLEATING PORTION OF THE AEROSOL. CONDUCT
                SIMILAR MEASUREMENTS AND SAMPLE COLLECTIONS AT SELECTED SURFACE LOCATIONS. MEASURE VISIBILITIES
                PHOTOMETRICALLY AND BY LIGHT SCATTERING COEFFICIENT. USE MEASURED AEROSOL SIZE DISTRIBUTIONS AS
                INPUT INTO RADIOACTIVE TRANSFER MODELS. PROGRESS: 1. THE FOUR CORNERS, N.M. POWERPLANT DOES NOT
                YIELD ICE NUCLEI CONCENTRATIONS ABOVE BACKGROUND BECAUSE OF THE ADSORPTION ON FLY ASH AEROSOLS OF
                DEACTIVATING GASES SUCH AS SO2 AND NO2. HOWEVER, THEY CAN BECOME ACTIVE ICE NUCLEI IF THE GASES ARE
                EVAPORATED. IN THE PLUME OF THE COLSTRIP, MT., POWERPLANT, ICE NUCLEI CONCENTRATIONS OF ONE TO TWO
                ORDERS OF MAGNITUDE ABOVE BACKGROUND HAVE BEEN MEASURED. 2. HOMOGENEOUS AND HETEROGENEOUS
                NUCLEATION PROCESSES CONTRIBUTE TO CLOUD NUCLEI FORMATION AT RATES OF 10 TO THE L4TH POWER TO 10 TO
                THE 16TH POWER PER SECOND. 3. VARIABILITIES IN VISIBILITY OF 50 TO 250 KM HAVE BEEN OBSERVED IN
                EAST-CENTRAL UTAH OVER THE PERIOD OF ONE YEAR. CHANGING AEROSOL CHARACTERISTICS, AIR MASS HISTORIES
                AND THE EFFECTS OF CLOUDS ON CONTRAST HAVE BEEN SHOWN TO AFFECT THE VISIBILITY MEASUREMENTS. 4.
                INFRARED (8-14 MICRONS) PROPERTIES OF PLUME EFFLUENTS ARE TRANSMISSIVITY EQUALS 0.82 PLUS OR MINUS
                0.01; EXTINCTION COEFFICIENT EQUALS 0.99 PLUS OR MINUS 0.04 KM TO THE MINUS 1; COOLING RATE EQUALS
                0.64 PLUS OR MINUS 0.1 DEGREE CENTIGRADE PER HOUR.
```

**PROJECT: 04133-METEOROLOGICAL INTERPRETATION AND PREDICTION OF AIR QUALITY IN THE WESTERN U.S.

```
                    STARTING/ COMPLETION DATE . 07/75   07/80 :   FUNDING    ESTIMATED   FY77  / $  160000
                    TASK CODE=V625C-32      **EPA=D5-E693-EK  ** ( IAG )      PRIOR       FY76  / $  237000
EPA  OFFICER.. GJ D'ALESSIO              EPA/HDQTRS- OEMI
INVESTIGATOR.. A  BASS                   ENV RES & TECH INC
               J  NUBER                  ENV RES & TECH INC
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004133           SSIE-GMA  4663        EPA -D5-E693-EK       TASK-V625C-32
               AP  -625C             DU  -N140             LABT-EMI
ABSTRACT...... THE PURPOSE OF THE PROJECT IS TO SELECT AND APPLY A LONG DISTANCE DISPERSION MODEL TO ESTIMATE THE
                IMPACT OF ENERGY DEVELOPMENT IN THE FOUR CORNERS REGION OF UTAH, COLORADO, NEW MEXICO, AND ARIZONA
                ON THE REGIONAL AIR QUALITY AT A DISTANCE OF 100-1,000 KM FROM THE EMISSION SOURCES. A REVIEW OF
                EXISTING POTENTIALLY APPLICABLE MODELS WAS COMPLETED DURING FY77 AND SEVERAL MODELS WERE SELECTED
                FOR MODIFICATION AND EVALUATION IN FY78. THE FINALLY SELECTED MODEL OR MODELS WILL BE APPLIED TO A
                NUMBER OF ENERGY DEVELOPMENT SCENARIOS IN THE FOUR CORNERS REGION.
```

**PROJECT: 04134-ISOLATION AND IDENTIFICATION OF WATER-BORNE POLLUTANTS ASSOCIATED WITH THE POWER INDUSTRY

STARTING/ COMPLETION DATE : 05/75 05/80 : FUNDING ESTIMATED FY77 / $ 44000
TASK CODE=V625C-36 **EPA=D5-E721-DH ** (IAG) PRIOR FY76 / $ 105000

EPA OFFICER.. GD D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. LH HOWE US TVA
CW HOLLEY US TVA
MILESTONES.... 07/77 -DETERMINATION BY VOLTAMMETRY OF ZN, CD, PB, CU REPORT
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004134 SSIE-GMA 2911 1 EPA -D5-E721-DH TASK-V625C-36
AP -625C DU -N140 LABT-EMI
ABSTRACT..... LABORATORY STUDIES WILL BE MADE TO IMPROVE ANALYTICAL PROCEDURES AND PROVIDE ACCEPTABLE ALTERNATE ANALYTICAL METHODS FOR SEVERAL POLLUTANTS FROM ENERGY-CRITICAL AREAS IN THE OHIO AND TENNESSEE RIVER VALLEYS. SPECIFIC TASKS FOR WHICH IMPROVED METHODS ARE BEING DEVELOPED ARE: ACROLEIN BY VOLTAMMETRY; TOTAL ARSENIC BY VOLTAMMETRY, ATOMIC ABSORPTION AND COLORIMETRY; ZINC, CADMIUM, LEAD, AND COPPER BY VOLTAMMETRY; DIGESTION TECHNIQUES FOR SUSPENDED AND DISSOLVED METALS; CHROMIUM (III AND VI) BY VOLTAMMETRY; PROCEDURES FOR IDENTIFYING AND QUANTIFYING EXTRACTABLE ORGANIC POLLUTANTS IN SEDIMENTS; PROCEDURES FOR QUANTIFYING METALS IN FISH TISSUE. THESE REPORTS HAVE BEEN PUBLISHED: LYMAN H. HOWE, "VOLTAMMETRIC DETERMINATION OF ACROLEIN," EPA-600/7-76-005, JULY 1976 (EXCERPTS IN ANAL CHEM, 48(14), 2167, 1976); "TRACE ANALYSIS OF ARSENIC BY COLORIMETRY, ATOMIC ABSORPTION AND POLAROGRAPHY," EPA-600/7-77-036, APRIL 1977. CURRENT STATUS: DRAFT MILESTONE REPORT ON ZINC, CADMIUM, LEAD, AND COPPER BY VOLTAMMETRY WAS SUBMITTED TO EPA AUGUST 1977; LABORATORY WORK IS UNDERWAY ON DIGESTION TECHNIQUES FOR METALS AND ON CHROMIUM (III AND VI) BY VOLTAMMETRY.

**PROJECT: 04136-DEVELOPMENT AND EVALUATION OF AN INTEGRATED APPROACH TO THE OPTIMIZATION OF NUCLEAR POWER PLANT RADIOLOGICAL SURVEILLANCE PROGRAMS

STARTING/ COMPLETION DATE : 05/75 09/79 : FUNDING ESTIMATED FY77 / $ 127000
TASK CODE=V625C-37 **EPA=D7-E721-DI ** (IAG) PRIOR FY76 / $ 281000

EPA OFFICER.. GD D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. EA BELVIN US TVA
BB HOBBS US TVA
LG KANIPE US TVA
RP POWERS US TVA
MILESTONES.... 04/78 -REPORT ON ENVIRONMENTAL APPLICATIONS OF GERMANIUM DETECTOR
10/78 -PROJECT TERMINATES
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004136 SSIE-GMA 4681 EPA -D7-E721-DI TASK-V625C-37
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: 1. TO DEVELOP AND MAINTAIN QUALITY ASSURANCE PROGRAM FOR RADIOLOGICAL SURVEILLANCE. THE EMPHASIS IN THIS TASK WILL BE ON DEVELOPMENT OF A MULTIPLE-LABORATORY PROGRAM. 2. TO DEVELOP IMPROVED RADIOLOGICAL MONITORING TECHNIQUES. 3. TO DEVELOP PORTIONS OF AN OPTIMIZED ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM. APPROACH: 1. TO PRODUCE AN ANALYTICAL QUALITY CONTROL DOCUMENT WHICH CAN BE USED BY RADIOLOGICAL LABORATORIES FOR QUALITY CONTROL MONITORING OF PROCEDURES, COUNTING EQUIPMENT, AND DATA HANDLING. 2. TO DEVELOP A PROGRAM OF INTERLABORATORY STUDIES, STANDARDS, AND ANALYTICAL AND COUNTING PROCEDURES TO USE AS STANDARD METHODS IN MULTIPLE LABORATORIES. 3. TO PROVIDE GUIDELINES FOR GAMMA COUNTING AND DATA REDUCTION TECHNIQUES. 4. TO DEVELOP PORTIONS OF A COST-EFFECTIVE RADIOLOGICAL SURVEILLANCE PROGRAM THROUGH THE USE OF STATISTICAL METHODOLOGIES, PARAMETRIC STUDIES AND IMPROVED SAMPLING PROCEDURES. RESULTS/STATUS: 1. A "HANDBOOK FOR ANALTYICAL QUALITY CONTROL IN RADIOANALYTICAL LABORATORIES" IS IN PRESS. 2. AN INTERLABORATORY STANDARDS AND CROSSCHECK PROGRAM HAS BEEN ESTABLISHED. 3. A REPORT, "LEAST-SQUARES RESOLUTION OF GAMMA-RAY SPECTRA IN ENVIRONMENTAL MONITORING," IS IN PRESS AND RELATES TO ANALYSIS USING NAI(TL) SYSTEMS. 4. A REPORT ON APPLICATIONS OF GERMANIUM DETECTORS IN ENVIRONMENTAL ANALYSES HAS BEEN PRODUCED IN DRAFT FORM. (EXPECTED PUBLICATION -4/78). 5. EVALUATION OF AVAILABLE SURVEILLANCE DATA AND EXISTING SURVEILLANCE PROGRAMS IS UNDERWAY.

**PROJECT: 04137-REMOTE SENSING OF SO2 EFFECTS ON VEGETATION

STARTING/ COMPLETION DATE : 05/75 05/80 FUNDING ESTIMATED FY77 / $ 72000
TASK CODE=V625C-45 **EPA=D6-E721-DJ ** (IAG) PRIOR FY76 / $ 209000

EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. CD SAPP US TVA
HC JONES US TVA
MILESTONES.... 12/78 -MAJOR REPORT ON REMOTE MONITORING OF SO2 IMPACTS
PLAN ID.....: (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-004137 SSIE-GMA 2938 1 EPA -D6-E721-DJ TASK-V625C-45
AP -625C DU -N140 LABT-EMI
ABSTRACT..... THIS RESEARCH ACTIVITY INVOLVES TESTING, REFINEMENT, AND DEVELOPMENT OF REMOTE SENSING INSTRUMENTATION AND TECHNIQUES FOR MONITORING THE VISIBLE EFFECTS OF SO2 EMISSIONS FROM FOSSIL-FUELED ELECTRIC GENERATING STATIONS ON TERRESTRIAL VEGETATION. NASA IS COLLABORATING WITH TVA IN THE PROJECT. LOW- AND HIGH-ALTITUDE COLOR, COLOR INFRARED, MULTI-SPECTRAL SCANNING, AND OTHER TYPES OF IMAGERY AND GROUND-TRUTH DATA ARE BEING OBTAINED FOR EFFECTS ON SOYBEANS AND MIXED SOUTHERN PINE-DECIDUOUS HARDWOOD TIMBER STANDS IN THE VICINITIES OF THE SHAWNEE, WIDOWS CREEK, JOHNSONVILLE, AND COLBERT STEAM PLANTS FOR BOTH MANUAL AND AUTOMATED INTERPRETATIONS. MILESTONE REPORT DUE DECEMBER

**PROJECT: 04139-RADIOLOGICAL POLLUTANT QUALITY ASSURANCE

```
                    STARTING/ COMPLETION DATE : 03/75   03/80 :   FUNDING    ESTIMATED   FY77  / $   50000
                    TASK CODE=V625C-64      **EPA=D7-E684-CN  ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: CW HALL                    EPA/HDQTRS- OEMI
INVESTIGATOR.: R  HUTCHINSON              US DOC/NBS                          CTR FOR RADIATION RES
MILESTONES...: 00/00 -DEVELOP THE FOLLOWING STANDARDS:  RADIUM-226 IN SHALE PLUTONIUM-2      39
               12/77 -COMPLETE DEVELOPMENT OF MIXED GAMMA-RAY-EMITTING SOIL STANDARDS A      ND
               06/78 -DEVELOP SOLUTION STANDARD OF 234U, 235U AND 238U IN NATURAL ISOTO      PIC
               09/78 -DEVELOP 241PU SOLUTION STANDARD
               06/79 -DEVELOP 232TH SOLUTION STANDARD
               09/79 -DEVELOP SOLUTION STANDARD OF MIXED RADIONUCLIDES (3H, 90SR, 134CS
               09/80 -DEVELOP SOLUTION STANDARDS OF 210PB, 243CM, AND 244CM
               12/78 -DEVELOP FLY AS STANDARD CHARACTERIZED FOR 234U, 238U, 210PO, 218P      O,
PLAN ID......: (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004139            SSIE-GMA  4660        EPA -D7-E684-CN       TASK-V625C-64
               AP  -625C              DU  -N140             LABT-EMI
ABSTRACT.....: THE OVERALL GOAL OR PURPOSE: TO PROVIDE METHODS AND STANDARDS FOR FOR ENVIRONMENTAL RADIOACTIVITY
                MEASUREMENTS IN ORDER TO IMPROVE THE ACCURACY OF THESE MEASUREMENTS FOR THE PURPOSE OF EQUITABLY
                TESTING COMPLIANCE WITH REGULATIONS AND ASSESSING PROGRESS TOWARD NATIONAL ENVIRONMENTAL GOALS. KEY
                OBJECTIVES: TO DEVELOP STANDARD REFERENCE MATERIALS FOR THE TESTING, CALIBRATION AND EVALUATION OF
                ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS. TO PROVIDE REGULATORY AGENCIES (EPA, NRC AND APPROPRIATE
                STATE AGENCIES) WITH THE MEANS FOR RELATING ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS TO THE
                NATIONAL MEASUREMENT SYSTEM. PRIOR YEAR ACCOMPLISHMENTS: DEVELOPED THE FOLLOWING STANDARDS: 5 LINE
                MIXED GAMMA-RAY STANDARD, POLONIUM-210.
```

**PROJECT: 04141-ENERGY RELATED WATER POLLUTANT STANDARD REFERENCE MATERIALS (SRMS)

```
                    STARTING/ COMPLETION DATE : 03/75   03/80 :   FUNDING :  ESTIMATED   FY77  / $  150000
                    TASK CODE=V625C-65      **EPA=D7-E684-CN  ** ( IAG )      PRIOR       FY76  / $  360000
EPA  OFFICER.. GJ D'ALESSIO               EPA/HDQTRS- OEMI
INVESTIGATOR.: IL BARNES                  US DOC
MILESTONES...: 12/76 -RESOLUTION OF ANALYTICAL PROBLEMS FOR FRESH WATER SRM
               03/77 -DEVELOPMENT OF PRECONCENTRATION TECHNIQUES FOR TRACE ELEMENTS IN
               07/77 -DEVELOPMENT OF STERILIZATION METHOD FOR SEA AND FRESH WATER
               06/78 -ISSUE PROCEEDINGS OF OFF-SHORE OIL OPERATIONS, COAL CONVERSION
               07/77 -ISSUE PROCEEDINGS OF OIL SHALE PROCESSING WORKSHOP
               09/77 -ISSUE PROCEEDINGS OF GEOTHERMAL, URANIUM MINING AND ANINE DRAINAG      E
               09/77 -ISSUE FINAL SUMMARY REPORT
               08/77 -ISSUE SRM OF TRACE ELEMENTS IN WATER
               12/77 -DETERMINE FEASIBILITY PRECONCENTRATION, ION EXCHANGE FILTER
               03/78 -DETERMINE FEASIBILITY OF CERTIFYING ANION CONCENTRATIONS IN WATER
PLAN ID....... (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004141            SSIE-GMA  4693        EPA -D7-E684-CN       TASK-V625C-65
               AP  -625C              DU  -N140             LABT-EMI
ABSTRACT...... THE OVERALL GOAL OR PURPOSE: TO IMPROVE THE RELIABILITY OF MEASUREMENTS OF TRACE ELEMENTS IN WATERS,
                BOTH FRESH AND SEA, FOR APPLICATION TO THE CERTIFICATION OF STANDARD REFERENCE MATERIALS. KEY
                OBJECTIVES: TO DEVELOP INSTRUMENTAL METHODS FOR THE ANALYSIS OF NG/G OR LOWER LEVELS OF TRACE
                ELEMENTS IN NATURAL WATERS, BOTH FRESH WATER AND SEA WATER; TO DEVELOP PRE-CONCENTRATION METHODS
                FOR ELEMENTS THAT CANNOT BE DETERMINED DIRECTLY AND TO APPLY THE METHODS TO DEVELOPMENT OF
                PROCEDURES FOR THE CERTIFICATION OF STANDARD REFERENCE MATERIALS; TO INVESTIGATE METHODS FOR THE
                STERILIZATION OF FRESH AND SEA WATERS; AND TO INVESTIGATE METHODS FOR FREEZE-DRYING AND
                RECONSTITUTION OF SEA WATER. PRIOR YEAR ACCOMPLISHMENTS: ANALYTICAL METHODS FOR 18 TRACE ELEMENTS
                IN FRESH WATER WERE DEVELOPED AND EVALUATED. AT LEAST TWO METHODS FOR EACH ELEMENT WERE FOUND TO BE
                OF SUITABLE ACCURACY. THIS TECHNOLOGY IS BEING TRANSFERRED TO THE CERTIFICATION OF A TRACE ELEMENTS
                IN WATE
```

**PROJECT: 04143-ENERGY RELATED, AIR POLLUTION MONITORING STANDARD REFERENCE MATERIALS, INSTRUMENTATION AND METHODS

STARTING/ COMPLETION DATE : 03/75 03/80 : FUNDING : ESTIMATED FY77 / $ 70000
TASK CODE=V625C-66 **EPA=D7-E684 ** (IAG) PRIOR FY76 / $ 158000

EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.. J TAYLOR US DOC
MILESTONES.... 03/77 -COMPLETION OF EVALUATION OF ELECTROLYTIC GENERATION OF OZONE
06/77 -COMPLETION OF EVALUATION OF UV GENERATION OF OZONE
06/77 -COMPLETE INTERCOMPARISON OF OZONE REFERENCE METHODOLOGIES
09/77 -COMPLETE DEVELOPMENT OF METHODS FOR CHEMICAL CHARACTERIZATION OF
12/76 -COMPLETE EVALUATION STUDIES OF H2S PERMEATION TUBES
12/76 -COMPLETE METHODS FOR NO2
06/77 -COMPLETE STABILITY STUDY OF NO2, SO2
09/77 -COMPLETE STABILITY STUDY OF NO
09/77 -COMPLETE ACCURACY STUDY OF NO2, NO, SO2
01/78 -NO2 IN AIR GAS BLEND SRM'S AT CONCENTRATIONS OF 250 PPM, 500PPM
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004143 SSIE-GMA 4656 EPA -D7-E684 TASK-V625C-66
AP -625C DU -N140 LABT-EMI
ABSTRACT..... THE OVERALL GOAL OR PURPOSE: TO DEVELOP ACCURATE REFERENCE METHODS FOR MEASUREMENT OF AIR POLLUTANTS, AND FOR CERTIFICATION OF REFERENCE MATERIALS, TO PROVIDE MEANS FOR ADEQUATELY TESTING COMPLIANCE WITH AIR POLLUTION REGULATIONS AND FOR ASSESSING PROGRESS TOWARD AIR POLLUTION ABATEMENT GOALS. TO PROVIDE STANDARD REFERENCE MATERIALS FOR USE IN THE CONTROL OF COMBUSTION EQUIPMENT AND COMBUSTION PROCESSES AND IN INDUSTRIAL PROCESSES RELATED TO ENERGY PRODUCTION. KEY OBJECTIVES: STATE-OF-THE-ART ANALYTICAL METHODS WILL BE DEVELOPED, TO ENABLE CERTIFICATION OF REFERENCE MATERIALS FOR CRITICAL AIR POLLUTION MEASUREMENTS. SOURCES OF ERROR IN PRESENT METHODS WILL BE MINIMIZED AND IMPROVED METHODS WILL BE DEVELOPED AS APPROPRIATE. NEW APPROACHES TO PRODUCE REFERENCE MATERIALS WILL ALSO BE INVESTIGATED. TO DETERMINE THE FEASIBILITY OF PREPARING GASEOUS MIXTURES OF OXYGEN, CARBON DIOXIDE, SULFUR DIOXIDE, NITROGEN OXIDES AND HYDROGEN SULFIDE FOR USE AS STANDARD REFERENCE MATERIALS. TO EXPLORE ALTERNATE METHODS OF PREPARING GAS MIXTURES FOR CALIBRATION FOR SPECIES TOO REACTIVE TO BE PREPARED AS GAS MIXTURES. PRIOR YEAR ACCOMPLISHMENTS: PRELIMINARY EVALUATION OF ELECTROLYTIC METHOD FOR GENERATOR OF OZONE. EVALUATION OF METHODS FOR MEASURING OZONE. EVALUATION OF OZONE SOURCE UTILIZING UV FOR SEVERAL AMBIENT PARAMETERS. CALIBRATED OZONE GENERATORS USED BY STATE AND FEDERAL AGENCIES IN WIDE-AREA MEASUREMENT OF OZONE IN ORDER TO ASSURE INTERCOMPARABILITY OF MEASUREMENT. DEVELOPED METHODS FOR HOMOGENIZATION OF A LARGE QUANTITY OF URBAN PARTICULATE MATTER FOR USE AS A REFERENCE MATERIAL. COMPLETED SRM SO2 FOR STATIONARY SOURCE MONITORS. COMPLETED SRM OF CO IN AIR FOR SOURCE AND AMBIENT MONITORING. EVALUATED H2S PERMEATION TUBES IN INERT ATMOSPHERE. COMPLETED STUDY OF ONE ACCURATE METHOD FOR MEASUREMENT OF HIGH CONCENTRATIONS OF NO2.

**PROJECT: 04145-ENERGY RELATED AIR POLLUTION MONITORING STANDARD REFERENCE MATERIALS, INSTRUMENTATION AND METHODS

STARTING/ COMPLETION DATE : 03/75 03/80 FUNDING ESTIMATED FY77 / $ 110000
TASK CODE=V625C-67 **EPA=D7-E684 ** (IAG) PRIOR FY /

EPA OFFICER.. GJ D'ALESSIO EPA/HDQTRS- OEMI
INVESTIGATOR.: K HEINRICH US DOC
MILESTONES...: 03/77 -COMPLETION OF THIN FILMS OF GLASSES BY SECONDARY ION SPUTTERING
08/77 -COMPLETION OF COMPOSITION CHARACTERIZATION OF FILMS
08/77 -COMPLETION OF OPTICAL AND SCANNING ELECTRON MICROSCOPY STUDY OF
00/00 -DESIGN OF CENTRIFUGAL PARTICLE DOPPLER SHIFT SPECTROSCOPY (PDSS)
09/77 -COMPARISON TESTS OF SIZE DISTRIBUTION AND TEMPORAL STABILITY FOR
05/77 -COMPLETE MICROPROBE ANALYSIS OF THIN FILMS
07/77 -DEMONSTRATE UNIFORMITY OF SPUTTERED SAMPLES
06/78 -RESEARCH MATERIALS AVAILABLE
10/77 -DEVELOP METHOD FOR ADHERING PARTICLES TO FILTER MATERIAL AND
06/78 -RESEARCH MATERIALS AVAILABLE
PLAN ID..... (AP-625C)(DU-N140) ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES... RECN-004145 SSIE-GMA 4661 EPA -D7-E684 TASK-V625C-67
AP -625C DU -N140 LABT-EMI
ABSTRACT..... OVERALL GOAL OR PURPOSE: TO PROVIDE CALIBRATION STANDARDS AND BASIC MEASUREMENT METHODS FOR PARTICULATE MATTER IN THE ATMOSPHERE, TO OBTAIN THE ACCURACY REQUIRED TO EQUITABLY TEST COMPLIANCE WITH AIR POLLUTION REGULATIONS, AND TO ASSESS PROGRESS TOWARD NATIONAL AIR POLLUTION ABATEMENT GOALS. KEY OBJECTIVES: TO DEVELOP CALIBRATION STANDARDS OF PARTICULATE MATTER OF STABLE AND ACCURATELY CHARACTERIZED COMPOSITION (E.G., THIN FILM STANDARDS FOR X-RAY FLUORESCENCE ANALYSIS); TO DEVELOP MEASUREMENT TECHNIQUES FOR THE ACCURATE PHYSICAL AND CHEMICAL CHARACTERIZATION OF ATMOSPHERIC PARTICULATES TO STUDY ASBESTOS CHARACTERIZATION. PRIOR YEAR ACCOMPLISHMENTS: INITIAL PDSS SYSTEM WITH WIND TUNNEL CONSTRUCTED. REVISED PDSS SYSTEM WITH STATIC AIR PARTICLE CHAMBER CONSTRUCTED. MEASURED COMPOSITIONAL ACCURACY OF SELECTED COMMERICAL THIN FILM STANDARDS. INVESTIGATED POTENTIAL OF SECONDARY ION DEPOSITION FOR PREPARATION OF THIN FILMS OF KNOWN COMPOSITION.

**PROJECT: 04146-LIDAR TECHNIQUES FOR MEASURING PARTICULATE POLLUTANTS FROM ENERGY PRODUCTION AND THEIR TRANSPORT AND DISPERSION PROCESSES

```
                    STARTING/ COMPLETION DATE : 07/75   07/80 :   FUNDING    ESTIMATED   FY77  / $  190000
                    TASK CODE=V625C-70      **EPA=D5-E693-EB  ** ( IAG )     PRIOR       FY76  / $  389000
EPA  OFFICER.. GJ D'ALESSIO              EPA/HDQTRS- OEMI
INVESTIGATOR.: VE DERR                   US DOC/NOAA                          ENV RES LABS/WAVE PROP LAB
               RL SCHWIESOW              US DOC/NOAA                          ENV RES LABS/WAVE PROP LAB
               GT MCNICE                 US DOC/NOAA                          ENV RES LABS/WAVE PROP LAB
PLAN ID......: (AP-625C)(DU-N140)  ENERGY-RELATED POLLUTANT & EFFECTS MONITORING, METHODS & TECH.
ORDIS CODES..: RECN-004146            SSIE-GMA  3036 1       EPA -D5-E693-EB       TASK-V625C-70
               AP  -625C              DU  -N140              LABT-EMI
ABSTRACT.....: OBJECTIVES: 1. DEVELOP LIDAR TECHNIQUES FOR TRACING AND ANALYZING POLLUTANTS. 2. DEVELOP DOPPLER
                LIDAR TECHNIQUES FOR MEASUREMENT OF POLLUTANT TRANSPORT PROCESSES. APPROACH: 1. USE INDEPENDENT
                MULTI-WAVELENGTH LIDAR TRANSMISSIONS AND DEPOLARIZATION INFORMATION TO IDENTIFY AND DISTINGUISH
                NATURAL AEROSOLS AND THOSE RESULTING FROM MAN'S ACTIVITIES. STUDY USES OF DIFFERENTIAL ABSORPTION
                AND INELASTIC SCATTER FOR AEROSOL IDENTIFICATION. UTILIZE LIDAR IN FEASIBILITY STUDIES OF
                SMOKESTACK PLUME TRACINGS. 2. DEVELOP CO2 DOPPLER LIDAR TECHNIQUES FOR MEASURING WIND VELOCITY IN
                THE "CLEAR" AIR. MEASURE STACK VELOCITIES AND WIND AND TURBULENCE PROFILES. CURRENT PROGRESS· 1.
                LIDAR TECHNIQUES. THE POLARIZATION SENSITIVE LIDAR HAS DEMONSTRATED AN ABILITY TO DISTINGUISH
                COAL-FIRED STACK EMISSIONS FROM NEWLY RISEN STRIP MINE DUST AND TO FOLLOW THE PLUME AS IT MOVES
                UNDER THE INFLUENCE OF WINDS AND TERRAIN. THE TWO-WAVELENGTH LIDAR (.694 AND .347 MICRON) HAS BEEN
                USED TO DISTINGUISH BETWEEN STACK EMISSION, AMBIENT DRY AEROSOLS, AND COOLING POND CLOUDS. 2.
                DOPPLER LIDAR. WIND AND TURBULENCE PROFILES HAVE BEEN MEASURED UNDER A VARIETY OF TERRAIN AND
                ATMOSPHERIC CONDITIONS BY USING AN OPERATIONAL, FIELD-TESTED DOPPLER LIDAR. WE CONTINUE TO IMPROVE
                THE SCANNING AND DATA PROCESSING CAPABILITIES OF THE SYSTEM TO BETTER MEET POLLUTANT TRANSPORT
                MEASUREMENT NEEDS. A MAJOR MILESTONE IS 06/78, TO USE AN OFFSET LOCAL OSCILLATOR TO EXTRACT A SMALL
                MEAN VELOCITY COMPONENT FROM A LARGE-TURBULENCE STACK EFFLUENT SITUATION.
```

**PROJECT: 03165-IDENTIFY AND MEASURE CHEMICAL ELEMENTS AND VOLATILE ORGANICS IN ENERGY-RELATED WASTES

```
                    STARTING/ COMPLETION DATE : 09/76   04/78     FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=K625D-141     **EPA=68-03-2487  ** (CNTR.)     PRIOR       FY76  / $  122000
EPA  OFFICER.. AL ALFORD                 EPA/ERL   ATHENS
INVESTIGATOR.: JF RYAN                   GULF SOUTH RESEARCH INST
MILESTONES...: 06/77 -FIRST CONTRACTOR'S REPORT ON POLLUTANTS IN ENERGY-RELATED WASTES
               04/78 -SECOND CONTRACTOR'S REPORT ON POLLUTANTS IN ENERGY-RELATED WASTES
PLAN ID......  (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES... RECN-003165            SSIE-GMA  3503        EPA -68-03-2487       TASK-K625D-141
               AP  -625D              DU  -N140              LABT-ALW
ABSTRACT...... A CONTRACTOR WILL IDENTIFY AND MEASURE POLLUTANTS IN ENERGY-RELATED SOLID WASTES AND LIQUID
                EFFLUENTS. INFORMATION ABOUT DATA OBTAINED IN OTHER CURRENT INVESTIGATIONS OF ENERGY-RELATED
                POLLUTION WILL BE SUMMARIZED TO IDENTIFY INFORMATION GAPS AND TO SELECT SAMPLES THAT WILL PROVIDE
                MAXIMUM INFORMATION. TO PERMIT EFFICIENT USE OF SMALL DEDICATED COMPUTERS, A SYSTEM DESIGNED TO
                RAPIDLY SEARCH A DATA BANK OF 10,000 MASS SPECTRA WILL BE INSTALLED TO EVALUATE ITS POTENTIAL USE
                IN INDIVIDUAL EPA LABORATORIES.
```

**PROJECT: 04150-ENERGY-RELATED AIR POLLUTANT ANALYSIS INSTRUMENTATION

```
                    STARTING/ COMPLETION DATE : 03/75   03/80 :   FUNDING    ESTIMATED   FY77  / $   75000
                    TASK CODE=V625D-59      **EPA=D7-E684     ** ( IAG )     PRIOR       FY76  / $  169000
EPA  OFFICER.. GJ D'ALESSIO              EPA/HDQTRS- OEMI
INVESTIGATOR.. R  MCKENZIE               US DOC
MILESTONES.... 12/76 -FIELD TEST SULFATE AEROSOL MONITOR
               03/77 -FIELD TEST SULFATE AEROSOL MONITOR   STATIONARY SOURCES
               06/77 -TEST MONITOR WITH VARYING SULFATE SALTS
               06/77 -REPORT ON INSTRUMENTS FOR MEASURING PARTICULATE SULFUR
               06/78 -REPORT ON SPECIATION OF PARTICULATE SULFUR COMPOUNDS
PLAN ID....... (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES... RECN-004150            SSIE-GMA  4657        EPA -D7-E684          TASK-V625D-59
               AP  -625D              DU  -N140              LABT-EMI
ABSTRACT...... THE OVERALL GOAL OR PURPOSE: TO PROVIDE THE MEANS FOR IDENTIFYING AND QUANTIFYING SULFUR COMPOUNDS
                IN ATMOSPHERIC PARTICULATE MATTER IN ORDER TO PROVIDE A MEASUREMENT BASIS FOR STUDIES ON HEALTH
                EFFECTS WHICH WILL BE MANDATED IN PENDING LEGISLATION. KEY OBJECTIVES: TO DEVELOP AND CHARACTERIZE
                A CONTINUOUS PARTICULATE SULFUR ANALYZER SUITABLE FOR FIELD USE. TO DEVELOP AN INSTRUMENT CAPABLE
                OF IDENTIFYING INDIVIDUAL SULFUR COMPOUNDS IN ATMOSPHERIC AEROSOLS. PRIOR YEAR ACCOMPLISHMENTS: A
                SULFATE AEROSOL MONITOR CONSISTING OF A COUPLED FLAME PHOTOMETRIC DETECTOR AND PULSED ELECTROSTATIC
                PRECIPITATOR WAS CONSTRUCTED AND PRELIMINARY STUDIES INDICATE PROMISING MEASUREMENT CAPABILITIES.
                PRELIMINARY EXPERIMENTS ALSO SHOWED THE CAPABILITIES FOR CHEMICAL CHARACTERIZATION OF AEROSOLS BY
                MONITORING THE RATE OF GROWTH OF PARTICLES IN A CONTROLLED HUMIDITY.
```

**PROJECT: 04152-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION

```
                    STARTING/ COMPLETION DATE : 03/75   03/80 :   FUNDING    ESTIMATED   FY77  / $  110000
                    TASK CODE=V625D-60      **EPA=D7-E684      ** ( IAG )    PRIOR       FY76  / $  245000
EPA  OFFICER.. GJ D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.. H  HERTZ                    US DOC
MILESTONES.... 02/77 -EXAMINE STABILITY OF AN AQUEOUS SOLUTION OF POLYNUCLEAR AROMATIC
               05/77 -USE OF AN AQUEOUS SOLUTION OF C14-LABELED HYDROCARBONS TO STUDY
               09/77 -INVESTIGATE LONGER RANGE STABILITY OF AN AQUEOUS TRACE LEVEL
               06/77 -SEARCH FOR POSSIBLE ORGANIC "MARKER" COMPOUNDS IN WATER ASSOCIATE      D
               06/77 -DEVELOP CONCENTRATION TECHNIQUES FOR POLAR ORGANICS COMPOUNDS
               06/80 -DEVELOP LIQUID CHROMATOGRAPHY MASS SPECTROMETRY INSTRUMENTATION
               01/80 -DEVELOPMENT OF MARKER COMPOUNDS TO BE USED AS INTERNAL STANDARDS
               00/00 -DEVELOPMENT OF METHODS FOR COUPLING LIQUID-CHROMATOGRAPHY WITH MA      SS
               01/78 -REPORT ON FEASIBILITY OF ALTERNATIVE APPROACHES
               01/78 -DEVELOPMENT AND TESTING OF PRELIMINARY INTERFACE
PLAN ID...... (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES.. RECN-004152          SSIE-GMA  4658        EPA -D7-E684          TASK-V625D-60
               AP  -625D           DU  -N140             LABT-EMI
ABSTRACT..... KEY OBJECTIVE: TO RELEASE A SERIES OF SRM'S FOR TRACE PETROLEUM IN WATER ANALYSES. PRIOR YEAR
               ACCOMPLISHMENTS: THE SOLUBILITY OF PETROLEUM IN WATER WAS STUDIED IN ORDER TO EVALUATE THE
               FEASIBILITY OF A CRUDE OIL IN WATER SRM. A PRELIMINARY STABILITY STUDY OF PETROLEUM MARKER
               COMPOUNDS IN WATER WAS CARRIED OUT. A SERIES OF INTERNAL STANDARD COMPOUNDS HAVE BEEN STUDIED FOR
               USE IN QUANTITATING PETROLEUM HYDROCARBONS IN ENVIRONMENTAL SAMPLES. SEVERAL MARKER COMPOUNDS FOR
               IDENTIFICATION OF PETROLEUM POLLUTION HAVE BEEN IDENTIFIED. MASS SPECTROMETRIC INSTRUMENTATION FOR
               USE IN THE LC-MS EXPERIMENT HAS BEEN DESIGNED AND ORDERED. RESIN TECHNIQUES FOR EXTRACTING PHENOLS
               FROM ENVIRONMENTAL SAMPLES HAVE BEEN STUDIED.
```

**PROJECT: 04153-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION

```
                    STARTING/ COMPLETION DATE : 03/75   03/80     FUNDING    ESTIMATED   FY77  / $   45000
                    TASK CODE=V625D-61      **EPA=D7-E684      ** ( IAG )    PRIOR       FY    /
EPA  OFFICER.. G  D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.. R  DURST                    US DOC
MILESTONES.... 10/77 -DEVELOP METHOD FOR CYANIDE DETECTION
               06/80 -DEVELOP WATER SAMPLE SPECIATION TECHNIQUES
               06/78 -ANALYZE COUPLING LIQUID CHROMATOGRAPHY FOR ORGANOMETALS
PLAN ID....... (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES... RECN-004153         SSIE-GMA  4648        EPA -D7-E684          TASK-V625D-61
               AP  -625D           DU  -N140             LABT-EMI
ABSTRACT...... THE OVERALL GOAL OR PURPOSE: TO IMPROVE THE ACCURACY OF WATER POLLUTION ANALYSIS THROUGH THE
               DEVELOPMENT OF REFERENCE MATERIALS AND ANALYTICAL REFERENCE METHODOLOGY. KEY OBJECTIVES: TO
               INVESTIGATE SOURCES OF ERROR IN WATER POLLUTION METHODOLOGY, TO EVALUATE METHODS FOR RELIABLE WATER
               POLLUTION MONITORING, TO IMPROVE EXISTING METHODS OR DEVELOP NEW METHODS AS NEEDED TO PROVIDE
               RELIABLE POLLUTION MEASUREMENTS. TO MEASURE FUNDAMENTAL EQUILIBRIUM CONSTANTS NEEDED TO INTERPRET
               WATER POLLUTION DATA. TO DEVELOP REFERENCE MATERIALS NEEDED TO ELIMINATE ANALYTICAL BIAS. PRIOR
               YEAR ACCOMPLISHMENTS: COMPLETED DEVELOPMENT PHASE FOR A HEAVY-METAL-IN-WATER SRM.
```

**PROJECT: 04155-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION

```
                    STARTING/ COMPLETION DATE : 03/75   03/80     FUNDING    ESTIMATED   FY77  / $   45000
                    TASK CODE=V625D-62      **EPA=D7-E684      ** ( IAG )    PRIOR       FY    /
EPA  OFFICER.. GJ D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.. J  DEVOE                    US DOC
MILESTONES.... 05/77 -OPTIMIZATION OF EXPERIMENTAL METHOD
               09/77 -LIMITING NOISE SOURCE AND PRINCIPAL INTERFERENCE EFFECTS FOR ABOV      E
               06/77 -RANGE AND LIMIT FOR FIVE ELEMENTS--LASER-INDUCED OPTICAL
               06/78 -TEMPERATURE-PROGRAMMED PLASMA FLAME EMISSION DETECTOR ANALYSIS
PLAN ID....... (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES... RECN-004155         SSIE-GMA  4655        EPA -D7-E684          TASK-V625D-62
               AP  -625D           DU  -N140             LABT-EMI
ABSTRACT...... THE OVERALL GOAL OR PURPOSE: TO CHARACTERIZE A NEW TECHNIQUE FOR DETECTING LASER-INDUCED OPTICAL
               ABSORPTIONS, AND EVALUATE THE POTENTIAL CONTRIBUTION OF THE METHOD TO ANALYTICAL SPECTROSCOPY. KEY
               OBJECTIVES: IDENTIFY THE PRINCIPAL FACTORS CONTRIBUTING TO SENSITIVITY, NOISE, MATRIX INTERFERENCE;
               APPLY THE METHOD TO ALL ELEMENTS AMENABLE TO THE AVAILABLE LASER WAVELENGTH RANGE AND THE
               ANALYTICAL FLAME; CATALOG MATRIX INTERFERENCES; DEVELOP SAMPLE TREATMENTS AND/OR MEASUREMENT
               PROTOCOLS TO CIRCUMVENT OR MINIMIZE INTERFERENCES.
```

**PROJECT: 04156-ENERGY-RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION

```
                    STARTING/ COMPLETION DATE : 03/75   03/80     FUNDING    ESTIMATED   FY77  / $        0
                    TASK CODE=V625D-63      **EPA=D7-E684     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: GJ D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.: D  NEWBURY                  US DOC
MILESTONES...: 03/77 -COMPLETION OF STUDY OF TECHNIQUES FOR ION MICROPROBE DEPTH PROFIL      ING
               06/77 -COMPLETION OF STUDY OF GLASS RESEARCH MATERIALS AS POSSIBLE PARTI     CULATE
               09/77 -COMPLETION OF STUDY OF LAYERED PARTICLES FROM THE ENVIRONMENT
               06/77 -DEVELOP ION MICROPROBE TECHNIQUE FOR EXAMINING ELEMENTAL PROFILES
PLAN ID......: (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES..: RECN-004156            SSIE-GMA  4659        EPA -D7-E684          TASK-V625D-63
               AP  -625D              DU  -N140             LABT-EMI
ABSTRACT.....: THE OVERALL GOAL OF PURPOSE: THE GOAL OF THE STUDY IS TO DEVELOP ION MICROPROBE TECHNIQUES TO
                CHARACTERIZE THE DISTRIBUTION IN DEPTH OF ELEMENTS IN PARTICULATES IN SURFACE LAYERS UP TO 1
                MICROGRAM DEEP. KEY OBJECTIVES: TO PROVIDE IMPROVED ION MICROPROBE ANALYSIS TECHNIQUES FOR
                PARTICULATES. TO CHARACTERIZE LAYERED PARTICLES COLLECTED FROM VARIOUS SOURCES IN THE ENVIRONMENT.
                TO TEST GLASS RESEARCH MATERIALS (RM) FOR SUITABILITY AS POSSIBLE PARTICULATE STANDARDS. PRIOR YEAR
                ACCOMPLISHMENTS: DEVELOPMENT OF SATISFACTORY MOUNTING TECHNIQUES FOR STABLE, LONG-TERM ANALYSES OF
                INDIVIDUAL MICROMETER-SIZED PARTICLES UNDER ION BOMBARDMENT. DIRECT OBSERVATION OF INDIVIDUAL
                MICROMETER-SIZED PARTICLES BY HIGH-BRIGHTNESS POSITIVE ION BEAMS.
```

**PROJECT: 04157-ENERGY-RELATED REMOTE AND IN SITU SENSING INSTRUMENT DEVELOPMENT

```
                    STARTING/ COMPLETION DATE : 07/75   06/79 :   FUNDING    ESTIMATED   FY77  / $  155000
                    TASK CODE=V625D-68      **EPA=D6-E771-BEU ** ( IAG )      PRIOR       FY76  / $  183000
EPA  OFFICER.. GJ D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.. EV BROWELL                  US NASA
               F  ALLARIO                  US NASA
               GL GREGORY                  US NASA
PLAN ID......: (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES..: RECN-004157            SSIE-GMA  4649        EPA -D6-E771-BEU      TASK-V625D-68
               AP  -625D              DU  -N140             LABT-EMI
ABSTRACT..... OBJECTIVES: TO DEVELOP ADVANCED AND IMPROVED INSTRUMENT TECHNIQUES FOR MEASURING ENVIRONMENTAL
                PARAMETERS ASSOCIATED WITH THE GENERATION OF ELECTRICAL ENERGY AND OTHER POLLUTION SOURCES.
                APPROACH: TO MEET THESE OBJECTIVES, THE FOLLOWING TASKS WILL BE CONDUCTED: TASK 1   RAMAN LIDAR
                EVALUATE RAMAN LIDAR FOR REMOTE MEASUREMENT OF SO2 CONCENTRATION AT POWER-PLANT STACK EXIT. TASK 2
                -PLUME DISPERSION STUDIES: APPLY AEROSOL SCATTERING LIDAR TECHNIQUES TO THE STUDY OF PLUME
                DISPERSION UNDER VARIOUS ATMOSPHERIC CONDITIONS. TASK 3   IR DIAL   TO DEVELOP AND APPLY THE
                TUNABLE INFRARED (IR) DIFFERENTIAL ABSORPTION LIDAR (DIAL) TECHNIQUE TO THE REMOTE MEASUREMENT OF
                MOLECULAR PLUME EFFLUENTS. TASK 4   LASER HETERODYNE DETECTOR   TO EVALUATE THE USE OF THE LASER
                HETERODYNE DETECTOR TECHNIQUE AS A MEANS TO INCREASE THE SENSITIVITY OF LONG PATH CONTINUOUS WAVE
                ABSORPTION MEASUREMENTS USING DIFFUSE REFLECTORS. TASK 5   HCL MONITOR   TO DEVELOP AND DELIVER TO
                EPA AN IMPROVED IN SITU HCL CHEMILUMINESCENT MONITOR. TASK 6   UV DIAL   TO EVALUATE THE UV
                DIFFERENTIAL ABSORPTION LIDAR (DIAL) TECHNIQUE FOR REMOTE MEASUREMENTS OF THE CONCENTRATION OF SO2,
                O3, AND AEROSOLS AT A POWER-PLANT STACK EXIT AND WITHIN THE STACK PLUME. CURRENT PLANS AND/OR
                PROGRESS: NECESSARY MODIFICATIONS TO THE RAMAN LIDAR HAVE BEEN COMPLETED. A CONTRACT HAS BEEN LET
                FOR THE TUNABLE IR LASER (DELIVERY JANUARY, 1978) WHICH WILL BE INTEGRATED WITH THE IR TELESCOPE,
                DETECTOR, AND DATA PROCESSOR TO CONSTRUCT A MOBILE LIDAR SYSTEM. THE LASER HETERODYNE DETECTOR IN
                THE LONG PATH LASER MONITORING SYSTEM IS UNDER EVALUATION, WITH A TECHNICAL REPORT ON THE EFFECTS
                OF SPECKLE SCHEDULED FOR COMPLETION IN JANUARY, 1978. ALL LABORATORY AND FIELD EVALUATION OF THE
                HCL DETECTOR HAVE BEEN COMPLETED. THE UV DIAL SYSTEM WILL BE CALIBRATED AND FIELD TESTED JOINTLY
                WITH EPA DURING JANUARY 1978. OPERATIONAL FIELD TESTS ARE SCHEDULED FOR APRIL, 1978.
```

**PROJECT: 04159-OPTICAL ABSORPTION PROPERTIES OF SULFATE AEROSOL

```
                    STARTING/ COMPLETION DATE : 00/75   00/78 :   FUNDING :  ESTIMATED   FY77  / $   30000
                    TASK CODE=V625D-69      **EPA=D7-E681-CG  ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: GJ D'ALESSIO                EPA/HDQTRS- OEMI
INVESTIGATOR.: PT CUNNINGHAM               US DOE                              ARGONNE NATL LAB
               R  KUMAR                    US DOE                              ARGONNE NATL LAB
               SA JOHNSON                  US DOE                              ARGONNE NATL LAB
MILESTONES...: 04/78 -COMPLETE FIELD TESTING
               04/78 -INITIATE FIELD INSTRUMENT DESIGN
               09/78 -COMPLETE INSTRUMENT DESIGN
PLAN ID.......: (AP-625D)(DU-N140)  ENERGY-RELATED POLLUTANT MEASUREMENT AND INSTRUMENT DEVEL.
ORDIS CODES...: RECN-004159           SSIE-GMA  5363        EPA -D7-E681-CG       TASK-V625D-69
               AP  -625D              DU  -N140             LABT-EMI
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP TECHNIQUES AND PROCEDURES FOR THE MEASUREMENT OF SULFATE
                AND ACID SULFATE IN ATMOSPHERIC AEROSOL MATERIAL. THE APPROACH IS BASED ON THE DETERMINATION OF THE
                INFRARED ABSORPTION SPECTRA OR OTHER CHARACTERISTIC SPECTRA OF THE AEROSOL MATERIAL AND ITS
                DERIVATIVES. PROGRESS DURING THE PAST YEAR HAS INCLUDED DEVELOPMENT OF PROCEDURES THAT PRESERVE THE
                ACIDITY OF SAMPLES COLLECTED ON FILTERS DURING THE SAMPLES PREPARATION STEPS PRIOR TO OBTAINING THE
                SPECTRUM. THE INFRARED CHARACTERIZATION TECHNIQUE HAS BEEN COMPARED IN THE FIELD WITH OTHER METHODS
                FOR THE MEASUREMENT OF SULFATE AND ACIDIC SULFATE AEROSOL. CURRENT PLANS ARE TO CONTINUE TO DEVELOP
                NEW TECHNIQUES AND IMPROVED PROCEDURES FOR SULFATE AEROSOL CHARACTERIZATION.
```

Health Effects

**PROJECT: 01277-COMPARATIVE TOXICOLOGICAL EVALUATION OF EMISSIONS FROM POWER PLANTS USING EASTERN VS WESTERN COALS

STARTING/ COMPLETION DATE : 07/77 06/78 : FUNDING ESTIMATED FY77 / $ 160000
TASK CODE=D625F-011 **EPA=68-03-2601 ** (CNTR.) PRIOR FY /

EPA OFFICER.. R DANNER EPA/HERL CINC
INVESTIGATOR.. VN FINELLI UNIVERSITY OF CINCINNATI
HG PETERING UNIVERSITY OF CINCINNATI
TE CODY UNIVERSITY OF CINCINNATI
VJ ELIA UNIVERSITY OF CINCINNATI
E MENDEN UNIVERSITY OF CINCINNATI
R CHRISTIAN UNIVERSITY OF CINCINNATI
MILESTONES.... 10/77 -COLLECTION OF SAMPLES
02/78 -IN-VITRO STUDY
02/78 -IN-VIVO STUDY
06/78 -COMPLETION
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-001277 SSIE-GMA 4501 EPA -68-03-2601 TASK-D625F-011
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THIS PROPOSED WORK PROVIDES FOR AN EXPANDED BIOLOGICAL TESTING REGIMEN TO INCLUDE WHOLE-ANIMAL IN VIVO TESTING AND A COMPREHENSIVE IN VITRO TOXICITY TESTING REGIMEN COUPLED WITH THE PHYSICOCHEMICAL CHARACTERIZATION OF THE COALS AND COAL EMISSIONS CONDENSATE DATA TO ASSESS THE TOXICOLOGICAL EFFECTS OF STACK EMISSIONS (CONDENSATES) FROM EASTERN VS. WESTERN COAL. THE IN VIVO TESTING REGIMEN CONSISTING OF INTRATRACHEAL INTUBATION OF FRACTIONATED AND UNFRACTIONATED OF THE STACK EMISSIONS CONDENSATE INTO RATS. AT SPECIFIC TIME INTERVALS THE RATS WILL BE INTRAVENEOUSLY INJECTED WITH RADIO IODINATED ALBUMIN AND AFTER SIX HOURS THE ANIMALS WILL BE ANESTHETIZED AND THE LUNGS LAVAGED WITH SALINE. BLOOD AND TISSUES WILL BE COLLECTED AND SAVED FOR FUTURE ANALYSES. PULMONARY ALVEOLAR MACROPHAGES (PAM) IN THE LAVAGE FLUID WILL BE COUNTED AND OBSERVED UNDER MICROSCOPY FOR MORPHOLOGICAL ASSESSMENT. ALIQUOTS OF THE LAVAGE SOLUTION WILL BE ADDED TO SCINTILLATION COCKTAIL AND COUNTED FOR 131I RADIOACTIVITY. THE REMAINING LAVAGE FLUID WILL BE CENTRIFUGED AND THE SUPERNATANT ASSAYED FOR LYSOZYME ACTIVITY AND TOTAL PROTEIN CONTENT. BLOOD, LUNG AND OTHER TISSUES WILL BE ANALYZED FOR METALS BY ATOMIC ABSORPTION SPECTROSCOPY. THE METALS TO BE ANALYZED ARE SELECTED FROM THOSE WHICH HAVE BEEN FOUND TO BE PRESENT IN THE STACK EMISSION CONDENSATES. ON ALL EXPERIMENTAL AND CONTROL ANIMALS A COMPLETE AUTOPSY WILL BE DONE. ANY GROSS ABNORMALITIES WILL BE RECORDED IN BRIEF DESCRIPTIONS, FROM ALL ORGANS REPRESENTATIVE SEGMENTS WILL BE TAKEN FOR MICROSCOPIC EXAMINATION. THESE WILL BE STAINED WITH HEMATOXYLIN AND EOSIN. INCLUDED IN THIS PROPOSAL ARE PROGRAMS FOR MUTAGENICITY TESTING BY THE MAMMALIAN CELL MUTAGENESIS ASSAY AND THE SALMONELLA TYPHIMURIUM ASSAY ("AMES TEST"). THESE PROCEDURES WILL COMPLEMENT ONE ANOTHER IN EVALUATION OF MUTAGENIC POTENTIAL OF THE SAMPLES WHILE PERMITTING A COMPARISON OF THE RESPONSE OF THE TWO METHODS TO SAMPLES OF POWER PLANT EXHAUST CONDENSATES. THE EFFECTS OF THE FRACTIONATED SAMPLES ON THE ACTIVITY OF COMMERCIALLY AVAILABLE METALLOENZYMES, SUCH AS TYROSINASE, GALACTOSE OXIDASE, CATALASE, ALA-D, ETC., WILL BE TESTED.

**PROJECT: 01279-INVESTIGATION OF EFFECTS OF PROLONGED INHALATION OF NICKEL-ENRICHED FLY ASH IN SYRIAN GOLDEN HAMSTERS

STARTING/ COMPLETION DATE : 09/76 09/79 : FUNDING ESTIMATED FY77 / $ 325000
TASK CODE=D625F-112 **EPA=68-03-2457 ** (CNTR.) PRIOR FY /

EPA OFFICER.: W MOORE EPA/HERL CINC
INVESTIGATOR.: AP WEHNER BATTELLE MEMORIAL INST
OR MOSS BATTELLE MEMORIAL INST
GE DAGLE BATTELLE MEMORIAL INST
R BUSCHBOM BATTELLE MEMORIAL INST
RE BARRETT BATTELLE MEMORIAL INST
MILESTONES... 11/76 -INITIATE CONTRACT WORK
09/77 -GENERATE FLY ASH
12/77 -INITIATE ANIMAL EXPOSURE
09/78 -INITIATE PHASE II OF STUDY
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-001279 SSIE-GMA 3367 1 EPA -68-03-2457 TASK-D625F-112
AP -625F DU -N140 LABT-HEE
ABSTRACT..... OBJECTIVES: TO INVESTIGATE (A) DEVELOPMENT OF LESIONS INDUCED BY INHALATION OF NI-ENRICHED FLY ASH (NEFA) AS A FUNCTION OF EXPOSURE TIME AND AEROSOL CONCENTRATION, (B) MORTALITY AS A FUNCTION OF EXPOSURE, (C) REVERSIBILITY OF NEFA-INDUCED LESIONS AS A FUNCTION OF EXPOSURE AND AGE BY PERIODICALLY WITHDRAWING HAMSTERS FROM EXPOSURE AND MAINTAINING THEM FOR LIFE-SPAN OBSERVATIONS. APPROACH: PHASE I NEFA AND FLY ASH (FA) WILL BE PREPARED AND CHARACTERIZED. EXPOSURE FACILITIES AND EQUIPMENT WILL BE PREPARED AND TESTED. HAMSTERS WILL BE ORDERED AND QUARANTINED. ACUTE AND SUBACUTE TOXICITY TESTS WITH NEFA AND FA WILL BE CONDUCTED. PHASE II FOUR GROUPS OF MALE SYRIAN GOLD HAMSTERS WILL RECEIVE HIGH-LEVEL EXPOSURES TO NEFA, LOW-LEVEL EXPOSURES TO NEFA, HIGH-LEVEL EXPOSURES TO FA, AND SHAM EXPOSURES, RESPECTIVELY. EACH GROUP WILL CONSIST OF A SUBGROUP OF 50 ANIMALS TO RECEIVE LIFE-SPAN (15 MONTHS) EXPOSURES, A SUBGROUP OF 20 ANIMALS TO BE SACRIFICED QUARTERLY IN LOTS OF 5, AND ANOTHER SUBGROUP OF 20 ANIMALS TO BE WITHDRAWN FROM EXPOSURE QUARTERLY IN LOTS OF 5 FOR FURTHER OBSERVATION. DEAD ANIMALS WILL BE NECROPSIED. LUNGS AND GROSSLY OBSERVED LESIONS WILL BE HISTOPATHOLOGICALLY EXAMINED.

**PROJECT: 01281-HEALTH EFFECTS OF ENERGY BYPRODUCTS ON DRINKING WATER

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 101976
TASK CODE=D625F-113 **EPA=R805599-01 ** (GRANT) PRIOR FY /

EPA OFFICER. DG GREATHOUSE EPA/HERL CINC
INVESTIGATOR.. MA SHAPIRO UNIVERSITY OF PITTSBURGH
AA SOOKY UNIVERSITY OF PITTSBURGH
JL SYKORA UNIVERSITY OF PITTSBURGH
JB ANDELMAN UNIVERSITY OF PITTSBURGH
MILESTONES.... 10/78 -PROJECT COMPLETION
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-001281 SSIE-GMA 4372 EPA -R805599-01 TASK-D625F-113
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVES OF THIS STUDY ARE (A) EVALUATION OF SOURCES, PRODUCTION AND UTILIZATION OF COAL-ENERGY-RELATED BYPRODUCTS, (2) EVALUATION OF HEALTH EFFECTS OF COAL ENERGY BYPRODUCTS, (3) EVALUATION OF COAL ENERGY BYPRODUCTS INTRODUCED INTO DRINKING WATER SUPPLIES, (4) EVALUATION OF INFORMATION OBTAINED FROM 1, 2 AND 3 ABOVE TO DEFINE FUTURE RESEARCH NEEDS. THIS STUDY WILL BE BASED ON INFORMATION PUBLISHED IN PERIODICALS, BOOKS, REPORTS OR AVAILABLE RAW DATA. FIVE SEPARATE TASKS WILL COVER ALL THE ESSENTIAL ASPECTS OF SOURCES AND HEALTH EFFECTS OF CONTAMINANTS DERIVED FROM COAL ENERGY PRODUCTION AS WELL AS THE PATHWAYS THROUGH WHICH THEY ENTER DRINKING WATER SUPPLIES. THE CONCLUSIONS OF THE STUDY WILL ALLOW FORMULATION OF FUTURE RESEARCH AND DEVELOPMENT NEEDS IN THE AREA OF COAL ENERGY UTILIZATION AND PRODUCTION AS

**PROJECT: 01282-HEALTH IMPACTS OF ACID MINE DRAINAGE ON DRINKING WATER SUPPLIES IN WESTERN COALS

STARTING/ COMPLETION DATE . 06/77 UNK : FUNDING ESTIMATED FY77 / $ 157800
TASK CODE=D625F-114 **EPA=R805579-01 ** (GRANT) PRIOR FY /

EPA OFFICER. DG GREATHOUSE EPA/HERL CINC
INVESTIGATOR. BG WIXSON UNIVERSITY OF MISSOURI
BT KAGEY UNIVERSITY OF MISSOURI
NL GALE UNIVERSITY OF MISSOURI
MILESTONES... 09/78 -EVALUATION OF LITERATURE AND SAMPLING PLAN FORMULATED
10/79 -PROJECT COMPLETED
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-001282 SSIE-GMA 4371 EPA -R805579-01 TASK-D625F-114
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVES OF THIS PROJECT ARE. 1. IDENTIFY COAL MINING AREAS IN WESTERN STATES WHERE ACID MINE DRAINAGE MAY GET INTO DRINKING WATER SUPPLIES. 2. CARRY OUT A LITERATURE REVIEW TO IDENTIFY POSSIBLE COMPOUNDS AND LEVELS OF ORGANICS OR INORGANICS THAT MIGHT CAUSE DISEASE. 3. IDENTIFY HEALTH EFFECTS ASSOCIATED WITH THESE COMPOUNDS AND THEIR POSSIBLE INGESTION. 4. DETERMINE, WHERE POSSIBLE, THOSE COMPOUNDS THAT ARE REMOVED BY DRINKING WATER TREATMENT. 5. EVALUATE THE MORTALITY DATA IN RESPECT TO SPECIFIC DISEASE RELATIONSHIP IN THE WESTERN COAL STATES. 6. PROPOSE A REPRESENTATIVE AREA AND SPECIFY THE ANALYTICAL PROCEDURES, WATER CHARACTERISTICS AND TYPE OF EPIDEMIOLOGICAL STUDIES THAT WILL BE NECESSARY TO ESTABLISH VALID BASELINES, DEFINE PROBLEMS AND SEEK POSSIBLE CONTROL MEASURES. THE INFORMATION COLLECTED AND EVALUATED BY THIS PROJECT SHOULD PLAY A MAJOR ROLE IN DETERMINING THE APPROPRIATE AREA FOR CONCENTRATED STUDIES ON THE PROBLEMS OF ACID MINE DRAINAGE-WATER SUPPLIES AND HEALTH. THIS INFORMATION WILL BE CRITICAL TO THE FUTURE DEVELOPMENT OF WESTERN COALS AND ALLOW FOR THE MAXIMUM UTILIZATION OF FUNDS AND RESEARCH TO ANSWER POSSIBLE QUESTIONS OF HEALTH EFFECTS ASSOCIATED WITH ACID MINE DRAINAGE AND DRINKING WATER SUPPLIES.

**PROJECT: 01283-EFFECTS OF ENERGY CONSUMPTION RELATED POLLUTANTS ON PULMONARY FIBROSIS

STARTING/ COMPLETION DATE : 06/74 06/79 : FUNDING ESTIMATED FY77 / $ 105886
TASK CODE=D625F-115 **EPA=68-03-2005 ** (CNTR.) PRIOR FY76 / $ 55000

EPA OFFICER. SD LEE EPA/HERL CINC
INVESTIGATOR. RS BHATNAGAR UNIV OF CALIFORNIA SCH OF DENTISTRY/BIOCHEM DEPT
MILESTONES... 06/74 -INITIATE EXPERIMENTS
06/75 -REPORT ON TOXIC EFFECTS OF PD
06/76 -REPORT ON TOXIC EFFECTS OF CD AND PT
09/77 -REPORT ON LUNG ORGAN CULTURE AS A SCREENING SYSTEM (RU, NI, HG,
09/78 -EFFECTS ON OXIDANTS ON PULMONARY FIBROSIS
11/79 -FINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-001283 SSIE-GMA 4380 EPA -68-03-2005 TASK-D625F-115
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THERE IS MOUNTING CONCERN OVER THE INCREASE IN ATMOSPHERIC CONCENTRATIONS OF A VARIETY OF METALLIC POLLUTANTS ASSOCIATED WITH ENERGY CONSUMPTION AND CHANGING ENERGY SOURCES. WITH A FEW EXCEPTIONS, VERY LITTLE IS KNOWN ABOUT THE TOXICITY AND LONG RANGE HEALTH EFFECTS OF MANY OF THESE METALS. WE HAVE PREVIOUSLY DEVELOPED A HIGHLY REPRODUCIBLE & CONTROLLABLE LUNG ORGAN CULTURE SYSTEM FOR THE EVALUATION OF SEVERAL ENVIRONMENTAL TOXINS; OUR STUDIES PROVIDED USEFUL INFORMATION CONCERNING THE TOXICITY OF THESE SUBSTANCES AND ALSO YIELDED INFORMATION CONCERNING THE MOLECULAR MECHANISMS INVOLVED IN THESE TOXIC INTERACTIONS LEADING TO PULMONARY DISORDERS. IN OUR ORIGINAL CONTRACT WITH THE EPA, WE EXAMINED THE TOXICITY OF THE METALS PT, PD AND CD AND INITIATED INVESTIGATIONS ON THE EFFECTS OF HG ON PULMONARY TISSUES IN ORGAN CULTURE. BECAUSE OF THE SUITABILITY AND VERSATILITY OF THIS PROCEDURE, WE PROPOSE TO USE OUR LUNG ORGAN CULTURE SYSTEM FOR INVESTIGATING THE BIOCHEMICAL EFFECTS OF THE ENERGY CONSUMPTION-RELATED TRACE METALS, RU, NI, HG, CU AND ZN. WE PROPOSE TO (1) DETERMINE EFFECTS OF THESE TRACE METALS ON PULMONARY CONNECTIVE TISSUE BIOSYNTHESIS USING LUNG ORGAN CULTURES; (2) DETERMINE THE DOSE RESPONSE OF THESE COMPOUNDS; (3) DETERMINE QUALITATIVE AND QUANTITATIVE CHANGES IN COLLAGEN INDUCED BY ABOVE POLLUTANTS (SIMILAR STUDIES WILL BE INITIATED WITH ELASTIN); (4) CORRELATE OBSERVED BIOCHEMICAL CHANGES WITH MORPHOLOGICAL LESIONS; (5) PARAMETERS OF COLLAGEN SYNTHESIS WILL BE EXAMINED IN LUNGS OF RATS EXPOSED TO THE ABOVE POLLUTANTS, AT THE EPA, CINCINNATI. WE WILL ALSO INVESTIGATE THE EFFECT OF CADMIUM ON THE SYNTHESIS OF CONNECTIVE TISSUE MACROMOLECULES. FURTHER STUDIES IN RELATION TO THE METALLIC POLLUTANTS WILL INVOLVE EXAMINATION OF THE INTERACTIONS OF THE TOXINS WITH CRITICAL ENZYMES INVOLVED IN CONNECTIVE TISSUE MACROMOLECULAR SYNTHESIS TO DETERMINE THEIR SITES OF ACTION. STUDIES WILL ALSO BE CARRIED OUT TO DETERMINE THE EFFECT OF THE ABOVE POLLUTANTS ON INFORMATIONAL MACROMOLECULE SYNTHESIS IN LUNG ORGAN CULTURES. THE EFFECTS OF THESE TRACE METALS ON DNA AND RNA SYNTHESIS WILL BE INVESTIGATED.

**PROJECT: 01288-COMPARATIVE TOXICOLOGICAL EVALUATION OF EMISSION FROM POWER PLANTS USING EASTERN VS WESTERN COAL

STARTING/ COMPLETION DATE : 09/77 09/78 : FUNDING ESTIMATED FY77 / $ 160000
TASK CODE=D625F-118 **EPA=68-03-2601 ** (CNTR.) PRIOR FY /

EPA OFFICER.. RM DANNER EPA/HERL CINC
INVESTIGATOR.. VN FINELLI UNIVERSITY OF CINCINNATI
HG PETERING UNIVERSITY OF CINCINNATI
TE CODY UNIVERSITY OF CINCINNATI
VJ ELIA UNIVERSITY OF CINCINNATI
MILESTONES.... 10/77 -COLLECTION OF SAMPLES
02/78 -IN VITRO STUDY
02/78 -IN VIVO STUDY
06/78 -COMPLETION
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-001286 SSIE-GMA 4499 EPA -68-03-2601 TASK-D625F-118
AP -625F DU -N140 LABT-HEE

ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE INCREASED UTILIZATION OF COAL AS AN ENERGY SOURCE MAY SIGNIFICANTLY ALTER THE POLLUTANT PROFILE IN THE HUMAN ENVIRONMENT. RESERVES OF COAL FAR EXCEED THE KNOWN RESERVES OF ALL OTHER MINERAL FUELS. IN THE UNITED STATES FROM THE ATLANTIC TO THE PACIFIC COASTS THERE ARE GREAT RESERVES OF VARIOUS TYPES OF COAL GRADED FROM THE HIGHEST RANKED PENNSYLVANIA ANTHRACITE AND THE EASTERN AND MIDWESTERN BITUMINOUS TO THE LOW RANKED, SOFTER COALS, WESTER SUBBITUMINOUS AND LIGNITE. THE OBJECTIVES OF THIS RESEARCH ARE: A) TO DETERMINE THE PROFILES OF ORGANIC AND METAL CONSTITUENTS OF EMISSIONS FROM COAL-FIRED POWER PLANTS USING EASTERN OR WESTERN COALS AND TO ANALYZE THE RESULTS IN VIEW OF THE TYPE OF COAL USED AND IN AWARENESS OF THE DIVERSE PLANT DESIGNS AND EMISSION CONTROL DEVICES AT THE VARIOUS COLLECTION SITES; B) TO ASSESS THE TOXICOLOGIC EFFECTS OF COLLECTED EMISSION SAMPLES AND TO COMPARE THE BIOLOGICAL EFFECTS WITH THE CHEMICAL CHARACTERISTICS OF THE SAMPLES. COLLECTION OF EMISSION SAMPLES FROM THE POST-CONTROL-DEVICE COMBUSTION EFFLUENTS (FUGITIVE STACK EMISSION) WILL BE PERFORMED USING UP-TO-DATE SAMPLING METHODOLOGY. METAL ANALYSES, FRACTIONATION AND FINGERPRINTING OF ORGANIC CONSTITUENTS AND IN VIVO AND IN VITRO TOXICOLOGICAL EVALUATION OF UNFRACTIONATED SAMPLES AND THEIR FRACTIONS WILL PERMIT US TO ASSESS THE ROLE OF METALS AND ORGANIC CONSTITUENTS IN THE TOXICITY OF STACK EMISSIONS. THE BIOLOGICAL TESTS PROPOSED IN THIS STUDY INCLUDE BACTERIAL AND MAMMALIAN CELL MUTAGENESIS, CYTOTOXICITY AND LONG AND SHORT TERM EFFECTS OF INTRATRACHEALLY ADMINISTERED SAMPLES AS SEEN BY BIOCHEMICAL AND PATHOLOGICAL CHANGES IN THE LUNGS OF EXPOSED RATS.

**PROJECT: 01288-EFFECT OF POLLUTANTS FROM ENERGY CONSUMPTION AND ENVIRONMENTAL TRACE METALS ON LUNG METABOLISM

STARTING/ COMPLETION DATE : 06/75 06/78 : FUNDING ESTIMATED FY77 / $ 0
TASK CODE=D625F-130 **EPA=68-03-2221 ** (CNTR.) PRIOR FY76 /

EPA OFFICER.: SD LEE EPA/HERL CINC
INVESTIGATOR.: MG MUSTAFA UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
DF TIERNEY UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
AD HACKER UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
JJ OSPITAL UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
N ELSAYED UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
MILESTONES.... 07/75 -INITIATE EXPERIMENTS
07/76 -BIOCHEMICAL EFFECTS OF OX EXPOSURE
09/77 -BIOCHEMICAL METHODS OF ASSESSING POLLUTANT EFFECTS
12/77 -INFLUENCE OF AGE ON POLLUTANT EFFECTS
07/78 -FINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-001288 SSIE-GMA 4494 EPA -68-03-2221 TASK-D625F-130
AP -625F DU -N140 LABT-HEE

ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVE IS TO DETERMINE QUALITATIVE AND QUANTITATIVE BIOCHEMICAL CHANGES IN THE LUNGS OF ANIMALS EXPOSED TO POLLUTANTS RELATED TO ENERGY CONSUMPTION, VIZ., OZONE, NITROGEN OXIDES, SULFUR OXIDES, SULFURIC ACID, SULFATES AND ENVIRONMENTAL TRACE METALS. ANIMALS (RATS) ARE EXPOSED TO POLLUTANTS AND THE EFFECTS IN THE LUNG ARE DELINEATED USING SENSITIVE BIOCHEMICAL PARAMETERS. THE FINDINGS OF STUDIES TO DATE ARE SUMMARIZED AS FOLLOWS. ALTHOUGH ACUTE EXPOSURES TO OXIDANT POLLUTANTS GENERALLY CAUSE A DEPRESSION OF LUNG ENZYMATIC ACTIVITIES, EXPOSURES OF OZONE AT CONCENTRATIONS BELOW 1 PPM (SIMULATING AMBIENT CONDITIONS IN PHOTOCHEMICAL SMOG) AND TO NITROGEN DIOXIDE AT 5 PPM (THRESHOLD LIMIT VALUE) FOR A FEW DAYS OR LONGER RESULT IN A STIMULATION OF LUNG METABOLISM. AS JUDGED FROM ENZYMATIC ACTIVITIES, LUNG METABOLISM MAY EXHIBIT AN INITIAL DEPRESSION (WITHIN 24 HOURS) BUT A SUBSEQUENT ELEVATION WHICH ATTAINS THE PEAK BETWEEN 3 AND 4 DAYS OF EXPOSURE. FOR EXPOSURES INVOLVING 0.8 PPM OZONE, A 50-100% ELEVATION OF METABOLIC PARAMETERS HAS BEEN OBSERVED. FOR LOWER LEVELS OF OZONE (VIZ., 0.5 AND 0.2 PPM) THE METABOLIC CHANGES ARE SMALL, EXHIBITING PROLONGED EXPOSURES TO OZONE (VIZ., 0.8 PPM), AND SHOW THAT THE BIOCHEMICAL CHANGES IN THE LUNG REMAIN ELEVATED FOR AS LONG AS 50 DAYS OF EXPOSURE, BUT THEN DECLINE ALMOST TO CONTROL LEVEL AFTER 90 DAYS OF EXPOSURE. FOR LOWER LEVELS OF OZONE, THE CHANGES ARE FOUND TO REVERT TO CONTROL LEVEL WITHIN 20 DAYS OF EXPOSURE. IF THE EXPOSURE IS DISCONTINUED AFTER A FEW DAYS, THE BIOCHEMICAL CHANGES IN RECOVERING ANIMALS RETURN TO CONTROL LEVELS WITHIN A WEEK. IT MAY BE CONCLUDED THAT LOW-LEVEL OXIDANT EXPOSURES CAUSE BIOCHEMICAL CHANGES IN THE LUNG, AND THAT THE CHANGES ARE REVERSIBLE.

**PROJECT: 02688-ENZYMATIC CHARACTERIZATION OF METABOLIC ACTIVATION AND DNA BINDING OF PRESUMPTIVE CARCINOGENS IN SHORT-TERM ASSAY SYSTEMS (ABBREV)

STARTING/ COMPLETION DATE : 09/77 09/79 : FUNDING : ESTIMATED FY77 / $ 89954
TASK CODE=H625F-7140 **EPA=R805482-01 ** (GRANT) PRIOR FY /

EPA OFFICER. J HUISINGH EPA/HERL RTP
INVESTIGATOR. IB WEINSTEIN COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
D GRUNBERGER COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
AM JEFFREY COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
H YAMASAKI COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
RP SANTELLA COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-002688 SSIE-GMA 4832 EPA -R805482-01 TASK-H625F-7140
AP -625F DU -N140 LABT-HEE

ABSTRACT..... THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. IT IS NOW RECOGNIZED THAT ANIMAL BIOASSAYS ARE INADEQUATE FOR MONITORING THE THOUSANDS OF ENVIRONMENTAL AGENTS WHICH REQUIRE SCREENING AS POSSIBLE CARCINOGENS. SEVERAL SHORT-TERM IN VITRO TESTS FOR MUTAGENICITY AND CARCINOGENICITY ARE CURRENTLY BEING EVALUATED (BY GOVERNMENTAL AGENCIES, PRIVATE INDUSTRY AND VARIOUS RESEARCH GROUPS). SINCE MANY ENVIRONMENTAL MUTAGENS AND CARCINOGENS REQUIRE PRIOR METABOLISM OR WHOLE CELLS TO EXERT THEIR EFFECTS, SOME OF THESE SHORT-TERM ASSAYS USE A RAT LIVER MICROSOMAL FRACTION FOR ACTIVATION OF THE CHEMICAL BEING TESTED. THERE IS A PAUCITY OF INFORMATION, HOWEVER, ON WHETHER OR NOT THE ACTIVATION OF A KNOWN CARCINOGEN AND ITS COVALENT BINDING TO CELLULAR DNA IN THESE IN VITRO SYSTEMS IS QUANTITATIVELY AND QUALITATIVELY SIMILAR TO THAT WHICH OCCURS IN INTACT MAMMALIAN CELLS, OR IN THE WHOLE ANIMAL. THE OBJECTIVE OF THIS PROPOSAL IS TO EXAMINE THE MODIFIED DNA FROM CELLS USED IN THESE ASSAYS AFTER EXPOSURE TO THE UBIQUITOUS CARCINOGEN BENZO(A)PYRENE (BP). THE APPROACH WILL BE TO INCUBATE TRITIUM LABELED BP WITH MICROSOMES AND SALMONELLA TYPHIMURIUM TESTER STRAINS, OR WITH VARIOUS MAMMALIAN CELL LINES. CELLULAR DNA WILL THEN BE EXTRACTED, ANALYZED FOR RADIOACTIVITY AND FLUORESCENCE, AND THEN HYDROLYZED TO NUCLEOSIDES WHICH WILL BE ANALYZED BY HIGH PRESSURE LIQUID CHROMATOGRAPHY, UTILIZING APPROPRIATE BP-NUCLEOSIDE DERIVATIVES PREPARED CHEMICALLY AS MARKERS TO DETERMINE THE NATURE OF THE BP-NUCLEOSIDE ADDUCTS PRESENT. PARALLEL ASSAYS WILL BE DONE FOR MUTAGENICITY AND TRANSFORMATION AND OF ARYL HYDROCARBON HYDROXYLASE AND EPOXIDE HYDRATASE ACTIVITIES. THE DATA WILL BE CORRELATED WITH OUR RESULTS OBTAINED IN INTACT HUMAN TISSUES WHERE IT HAS BEEN POSSIBLE TO DETERMINE THE STRUCTURE OF THE MAJOR ADDUCT FORMED.

**PROJECT: 02689-IMPLEMENTATION OF SCREENING TESTS FOR POTENTIALLY HAZARDOUS AIRBORNE PARTICULATE MATERIALS USING THE ALVEOLAR MACROPHAGE TEST SYS

STARTING/ COMPLETION DATE : 10/76 09/78 : FUNDING ESTIMATED FY77 / $ 350000
TASK CODE=H625F-7150 **EPA=68-02-2566 ** (CNTR.) PRIOR FY /

EPA OFFICER.. MD WATERS EPA/HERL RTP
INVESTIGATOR.. JA CAMPBELL NORTHROP SERVICES INC
J HUISINGH US EPA
MD WATERS US EPA
MILESTONES.... 09/77 -EVALUATE ATP AS A BIO-INDICATOR OF TOXICITY IN EFFLUENTS
08/77 -TEST EFFLUENTS FROM FLUIDIZED BED COMBUSTION PILOT STUDY
10/77 -TEST EFFLUENT FROM COAL GASIFICATION PILOT STUDY
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002689 SSIE-GMA 4296 EPA -68-02-2566 TASK-H625F-7150
AP -625F DU -N140 LABT-HEE

ABSTRACT..... STUDIES IN THIS AND OTHER LABORATORIES HAVE DEFINED A CENTRAL ROLE FOR THE ALVEOLAR MACROPHAGE IN THE DEFENSE OF THE LUNG AGAINST INHALED PARTICULATE MATERIALS. WE HAVE IDENTIFIED A NUMBER OF METALLIC SUBSTANCES OF THE TYPE KNOWN TO BE PRESENT IN AIR EFFLUENTS WHICH ARE RELATIVELY TOXIC FOR THE ALVEOLAR MACROPHAGE (CD, V, NI, HG, ETC.). MANY SUBSTANCES SUCH AS SOME METALS AND CERTAIN ORGANICS ARE EMITTED IN THE VAPOR PHASE AND SUBSEQUENTLY PREFERENTIALLY CONDENSE ON THE SURFACE OF THE SMALLER RESPIRABLE PARTICULATE MATERIALS. WE NOW HAVE A NUMBER OF CHEMICAL ANALYTICAL TECHNIQUES AND BIOLOGICAL ENDPOINTS AVAILABLE TO STUDY THE NATURE OF THE SURFACES OF PARTICLES AND THE RESULTING EFFECTS OF THE IN VITRO EXPOSURE OF THESE PARTICLES TO ALVEOLAR MACROPHAGE. THE BIOLOGICAL ENDPOINTS FORM THE BASIS OF A VALUABLE SCREENING SYSTEM FOR POTENTIALLY HAZARDOUS AIRBORNE PARTICULATE MATERIALS. IN COLLABORATION WITN ANALYTICAL CHEMISTS WHO ARE ABLE TO DEFINE THE SURFACE CHEMICAL PROPERTIES OF PARTICULATE SAMPLES, WE WILL CARRY OUT A SYSTEMATIC SCREENING EFFORT TO DEFINE THE BIOLOGICAL RESPONSE OF THE ALVEOLAR MACROPHAGE TO PHAGOCYTIZED PARTICLES IN VITRO. WE WILL FOCUS ON THE PROPENSITY OF CRUDE PARTICLES TO PROMOTE CELL LYSIS, TO AFFECT PHAGOCYTIC ACTIVITY (AS DETERMINED BY DEPRESSION IN ADENOSINE TRIPHOSPHATE LEVELS), TO ALTER THE INTEGRITY OF THE LYSOSOMES AND TO INDUCE ENZYME SYSTEMS CAPABLE OF ACTIVATING POTENTIALLY CARCINOGENIC COMPOUNDS SUCH AS THE POLYNUCLEAR AROMATICS WHICH MAY BE ADSORBED TO PARTICULATE SURFACES. WE WILL STUDY THE INFLUENCE OF THE NATURE OF THE SURFACE OF STANDARD PARTICLES ON THE EXTENT OF ADSORPTION OF MATERIALS. FURTHERMORE, WE WILL STUDY THE INFLUENCE OF INTERNAL AND EXTERNAL SURFACE AREA ON THE TIME COURSE OF RELEASE OF ADSORBED COMPONENTS AND THE EFFECTS OF SURFACE CHEMICAL COMPONENTS ON THE BIOLOGIC

**PROJECT: 02691-IMPROVED SCORING OF CHEMICAL TRANSFORMATION OF C3H/10T1/2 CELLS

```
                    STARTING/ COMPLETION DATE : 10/77   09/80     FUNDING    ESTIMATED   FY77  / $  270000
                    TASK CODE=H625F-7153   **EPA=R805208     ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. MD WATERS                EPA/HERL   RTP
INVESTIGATOR.. C  HEIDELBERGER          UNIV OF SO CALIF
               S  MONDAL                UNIV OF SO CALIF
               RF BAKER                 UNIV OF SO CALIF
MILESTONES...: 08/77 -PROJECT TO BE FUNDED
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002691          SSIE-GMA  4325        EPA -R805208          TASK-H625F-7153
               AP  -625F            DU  -N140             LABT-HEE
ABSTRACT...... WE PLAN TO IMPROVE THE QUANTITATIVE ONCOGENIC TRANSFORMATION BY CHEMICAL CARCINOGENS AND SCORE FOR
                TRANSFORMATION AT EARLIER TIMES SO THAT THE SYSTEM CAN BE USEFUL AS A RAPID PRE-SCREEN FOR
                ENVIRONMENTAL POLLUTION. INDIVIDUAL COMPOUNDS, AS WELL AS MIXTURES, WILL BE STUDIED. THE USE OF
                SINGLE CELLS IN INDIVIDUAL DISHES AS THE BASIC SYSTEM WILL BE IMPROVED, AND THE INHIBITORY
                INFLUENCE OF CELL DENSITY ON TRANSFORMATION FREQUENCY WILL BE ACCURATELY QUANTITATED. TRANSFORMED
                C3H/10T1/2 CELLS HAVE A DIFFERENT MORPHOLOGY IN THE SCANNING ELECTRON MICROSCOPE. THIS PROPERTY
                WILL BE USED TO DEVELOP AN ALTERNATIVE ASSAY FOR TRANSFORMATION AND TO DETERMINE AT WHAT TIME AFTER
                CARCINOGEN TREATMENT CELLS BECOME TRANSFORMED.
```

**PROJECT: 02692-WORKSHOP ON "SCREENING SYSTEMS FOR ALTERNATE ENERGY EFFLUENTS"

```
                    STARTING/ COMPLETION DATE : 11/77   01/78 :   FUNDING    ESTIMATED   FY77  / $   20000
                    TASK CODE=H625F-7154   **EPA=68-02-2435  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: MD WATERS                EPA/HERL   RTP
INVESTIGATOR.. MD WATERS                KAPPA SYSTEMS INC
               MD WATERS                US EPA
               W  MARTIN                KAPPA SYSTEMS INC
MILESTONES.... 11/77 -WORKSHOP TO BE HELD
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002692          SSIE-GMA  4484        EPA -68-02-2435       TASK-H625F-7154
               AP  -625F            DU  -N140             LABT-HEE
ABSTRACT..... THERE ARE PRESENTLY ONLY A LIMITED NUMBER OF INDIVIDUALS ACTUALLY INVOLVED IN THE BIOLOGICAL
                IDENTIFICATION (SCREENING) OF POTENTIALLY HAZARDOUS EFFLUENTS RESULTING FROM THE UTILIZATION OF
                ALTERNATE SOURCES OF ENERGY. IT WOULD BE HIGHLY ADVANTAGEOUS TO ASSEMBLE THOSE INDIVIDUALS INVOLVED
                IN THE DEVELOPMENT AND UTILIZATION OF BIOLOGICAL SCREENING METHODS FOR DETECTION OF MUTAGENS,
                CARCINOGENS AND CYTOTOXIC AGENTS DERIVED FROM ALTERNATE ENERGY SOURCES IN A WORKSHOP.
                REPRESENTATIVES OF "USER" GROUPS SHOULD BE PRESENT TO ESTABLISH THE FEASIBILITY OF AN
                INTERDISCIPLINARY EFFORT.
```

**PROJECT: 02693-DEVELOPMENT OF AUTOMATED BEHAVIORAL TESTING METHODOLOGIES FOR STUDY OF EFFECTS OF COAL CONVERSION AND UTILIZATION PRODUCTS

```
                    STARTING/ COMPLETION DATE : 10/76   09/78     FUNDING    ESTIMATED   FY77  / $  124000
                    TASK CODE=H625F-7155   **EPA=68-02-2288  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.  LW REITER                EPA/HERL   RTP
INVESTIGATOR.     UNKNOWN               IOWA STATE UNIV OF SCI & TECH        GRADUATE SCH
MILESTONES.... 05/77 -INSTALL COMPUTER SYSTEM
               04/78 -DEVELOP SOFTWARE FOR BEHAVIOR IDENTIFICATION
               05/78 -TEST SYSTEM WITH AGENTS
               09/78 -FINAL REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002693          SSIE-GMA  4492        EPA -68-02-2288       TASK-H625F-7155
               AP  -625F            DU  -N140             LABT-HEE
ABSTRACT...... THE HEALTH EFFECTS RESEARCH LABORATORY OF EPA WILL EVALUATE THE TOXICITY OF COAL CONVERSION AND
                UTILIZATION PRODUCTS. AS PART OF THIS EFFORT, THE ADVERSE BIOLOGICAL EFFECTS OF THESE PRODUCTS ON
                THE NERVOUS SYSTEM OF PRIMATES MUST BE STUDIED. USING BEHAVIOR AS AN INDEX, THE FUNCTIONAL
                INTEGRITY OF THE NERVOUS SYSTEM CAN BE MEASURED. THIS DATA WILL PROVIDE A DATA BASE IN SUPPORT OF
                THE AGENCY'S REGULATORY POLICY. THIS CONTRACT WITH IOWA STATE UNIVERSITY WILL PROVIDE FOR THE
                DEVELOPMENT OF TESTING PROCEDURE WHICH WILL PROVIDE RAPID, BUT SENSITIVE EVALUATION OF PRIMATE
                BEHAVIOR. THE MAIN OBJECTIVE OF THE STUDY IS TO DEVELOP AUTOMATED TESTING PROCEDURES UTILIZING A
                MINICOMPUTER, CLOSED-CIRCUIT TV EQUIPMENT AND APPROPRIATE HARDWARE INTERFACES TO COLLECT AND
                ANALYZE PRIMATE BEHAVIOR IN THE REAL-TIME LABORATORY ENVIRONMENT. TASK 1 (PATTERN RECOGNITION OF
                SPONTANEOUS BEHAVIOR IN MONKEYS) WILL DEFINE AND ANALYZE THE MOTOR ITEMS COMPRISING THE ANIMALS'
                SPONTANEOUS ACTIVITY. TASK 2 (LEARNING/MEMORY EVALUATION) WILL DEVELOP COMPUTER PROGRAM STIMULUS
                PRESENTATION, RESPONSE ACQUISITION AND DATA ANALYSI
```

**PROJECT: 02695-ENZYMATIC CHARACTERIZATION OF METABOLIC ACTIVATION AND DNA BINDING OF PRESUMPTIVE CARCINOGENS IN SHORT-TERM ASSAY SYSTEMS (ABBREV)

STARTING/ COMPLETION DATE : 09/77 09/80 : FUNDING ESTIMATED FY77 / $ 90000
TASK CODE=H625F-7156 **EPA=68-02-2231 ** (CNTR.) PRIOR FY /

EPA OFFICER.. JL HUISINGH EPA/HERL RTP
INVESTIGATOR.. IB WEINSTEIN COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
D GRUNBERGER COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
AM JEFFREY COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
JL HUISINGH US EPA
MILESTONES.... 09/77 -INITIATE PROJECT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002695 SSIE-GMA 4289 EPA -68-02-2231 TASK-H625F-7156
AP -625F DU -N140 LABT-HEE
ABSTRACT..... IT IS NOW RECOGNIZED THAT ANIMAL BIOASSAYS ARE INADEQUATE FOR MONITORING THE THOUSANDS OF ENVIRONMENTAL AGENTS WHICH REQUIRE SCREENING AS POSSIBLE CARCINOGENS. SEVERAL SHORT-TERM IN VITRO TESTS FOR MUTAGENICITY AND CARCINOGENICITY ARE CURRENTLY BEING EVALUATED (BY GOVERNMENTAL AGENCIES, PRIVATE INDUSTRY AND VARIOUS RESEARCH GROUPS). SINCE MANY ENVIRONMENTAL MUTAGENS AND CARGINOGENS REQUIRE PRIOR METABOLISM OR WHOLE CELLS TO EXERT THEIR EFFECTS, SOME OF THESE SHORT-TERM ASSAYS USE A RAT LIVER MICROSOMAL FRACTION FOR ACTIVATION OF THE CHEMICAL BEING TESTED. THERE IS A PAUCITY OF INFORMATION, HOWEVER, ON WHETHER OR NOT THE ACTIVATION OF A KNOWN CARCINOGEN AND ITS COVALENT BINDING TO CELLULAR DNA IN THESE IN VITRO SYSTEMS IS QUANTITATIVELY AND QUALITATIVELY SIMILAR TO THAT WHICH OCCURS IN INTACT MAMMALIAN CELLS, OR IN THE WHOLE ANIMAL. THE OBJECTIVE OF THIS PROPOSAL IS TO EXAMINE THE MODIFIED DNA FROM CELLS USED IN THESE ASSAYS AFTER EXPOSURE TO THE UBIQUITOUS CARCINOGEN BENZO(A)PYRENE (BP). THE APPROACH WILL BE TO INCUBATE TRITIUM LABELED BP WITH MICROSOMES AND SALMONELLA TYPHIMURIUM TESTER STRAINS, OR WITH VARIOUS MAMMALIAN CELL LINES. CELLULAR DNA WILL THEN BE EXTRACTED, ANALYZED FOR RADIOACTIVITY AND FLUORESCENCE, AND THEN HYDROLYZED TO NUCLEOSIDES WHICH WILL BE ANALYZED BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY, UTILIZING APPROPRIATE BP-NUCLEOSIDE DERIVATIVES PREPARED CHEMICALLY AS MARKERS TO DETERMINE THE NATURE OF THE BP-NUCLEOSIDE ADDUCTS PRESENT. PARALLEL ASSAYS WILL BE DONE FOR MUTAGENICITY AND TRANSFORMATION OF ARYL HYDROCARBON HYDROXYLASE AND EPOXIDE HYDRATASE ACTIVITIES. THE DATA WILL BE CORRELATED WITH OUR RESULTS OBTAINED IN INTACT HUMAN TISSUES WHERE IT HAS BEEN POSSIBLE TO DETERMINE THE STRUCTURE OF THE MAJOR ADDUCT FORMED. THIS APPLICATION DOES NOT INVOLVE RECOMBINANT DNA.

**PROJECT: 02696-STUDIES ON THE RELATIONSHIP BETWEEN CARCINOGEN METABOLISM IN THE ALVEOLAR MACROPHAGE AND THE INDUCTION OF LUNG CANCER

STARTING/ COMPLETION DATE : 12/76 11/80 : FUNDING ESTIMATED FY77 / $ 350000
TASK CODE=H625F-7157 **EPA=68-02-2566 ** (CNTR.) PRIOR FY /

EPA OFFICER.. MD WATERS EPA/HERL RTP
INVESTIGATOR. N GARRETT NORTHROP SERVICES INC
MILESTONES.... 07/77 -IMPLEMENT MICROBIAL MUTAGENESIS AS AN INDICATOR OF MACROPHAGE MET
09/77 -PROCURE MACROPHAGES FROM SEVERAL RODENT SPECIES FOR EVALUATION OF
11/77 -UTILIZATION OF MICROBIAL MUTAGENESIS IN SCREENING FOR CARCINOGENE SI
01/78 -EXPOSE MACROPHAGES IN CULTURE TO CARCINOGENS
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-002696 SSIE-GMA 4297 EPA -68-02-2566 TASK-H625F-7157
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE OF THIS TASK IS TO STUDY THE RELATIONSHIP BETWEEN CARCINOGEN METABOLISM IN THE ALVEOLAR MACROPHAGE AND THE INDUCTION OF LUNG CANCER. USING IN VITRO METHODS THE COURSE OF METABOLIC ACTIVATION/ DETOXIFICATION OF PROCARCINOGENS WILL BE INVESTIGATED IN ALVEOLAR MACROPHAGES OBTAINED FROM RATS AND HAMSTERS. BIOCHEMICAL METHODS WILL BE USED IN MONITORING INDUCTION OF METABOLIC ACTIVATION/DETOXIFICATION SYSTEMS. MICROBIAL MUTAGENESIS WILL BE USED TO MONITOR THE EXTENT OF METABOLIC ACTIVATION/DETOXIFICATION BY MACROPHAGES. ONCE THE CONDITIONS FOR MAXIMAL ACTIVATION/DETOXIFICATION OF CARCINOGENS HAVE BEEN ESTABLISHED USING IN VITRO METHODS, WHOLE ANIMAL STUDIES WILL BE INITIATED EMPLOYING INTRATRACHEAL INSTILLATION TECHNIQUES TO ADMINISTER PARTICULATES AND APPROPRIATE PROCARCINOGENS. THE METABOLIC ACTIVATION OF PROCARCINOGENS WILL BE MONITORED AS DESCRIBED ABOVE USING MACROPHAGES OBTAINED BY SALINE LAVAGE OF CARCINOGEN-EXPOSED ANIMALS. WHEN OPTIMAL CONDITIONS HAVE BEEN ESTABLISHED, EXPERIMENTS WILL BE PERFORMED TO DEMONSTRATE THE RELATIONSHIP BETWEEN ELICITATION OF MACROPHAGE INFLUX, METABOLIC ACTIVATION/DETOXIFICATION OF CARCINOGENS AND THE INDUCTION OF LUNG TUMORS IN ANIMALS. THIS IS A LONG-RANGE PROJECT THAT WILL BE APPROACHED SEQUENTIALLY WITH CONTINUATION FROM YEAR TO YEAR BEING DEPENDENT UPON DEMONSTRATED SUCCESS OF

**PROJECT: 02698-EFFECTS OF SULFURIC ACID AEROSOL UPON RESPIRATORY FUNCTION IN NORMAL HUMAN SUBJECTS

STARTING/ COMPLETION DATE : 11/76 12/79 : FUNDING ESTIMATED FY77 / $ 230000
TASK CODE=H625F-7160 **EPA=R804803 ** (GRANT) PRIOR FY /

EPA OFFICER.: ED HAAK EPA/HERL RTP
INVESTIGATOR.: HD KERR UNIV OF MARYLAND DEPT OF MED
ML MCILHANY UNIV OF MARYLAND DEPT OF MED
P SWIDERSKY UNIV OF MARYLAND DEPT OF MED
T KULLE JOHNS HOPKINS UNIV
D SWIFT JOHNS HOPKINS UNIV
MILESTONES.... 06/78 -1ST PHASE CLINICAL STUDIES REPORTED
06/79 -2ND PHASE CLINICAL STUDIES REPORTED
06/80 -3RD PHASE CLINICAL STUDIES REPORTED
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-002698 SSIE-GMA 3542 EPA -R804803 TASK-H625F-7160
AP -625F DU -N140 LABT-HEE
ABSTRACT..... OBJECTIVES: TO DETERMINE THE EFFECTS OF LOW CONCENTRATION (100 MICROGRAMS/CUBIC METER) H2SO4 AEROSOL OF SMALL PARTICLE SIZE (0.1-0.3 MICROGRAM) ON THE MECHANICAL FACTORS OF BREATHING IN NORMAL HUMAN SUBJECTS. APPROACH: A MODIFIED DOUBLE-BLIND STUDY IS PLANNED. SUBJECTS WILL BE STUDIED IN PAIRS AND WILL SPEND 6 HOURS DAILY IN A CLASS 100 ENVIRONMENTALLY CONTROLLED CHAMBER ON 3 SUCCESSIVE DAYS. THEY WILL NOT BE TOLD WHICH DAY THE 4-HOUR EXPOSURE TO H2SO4 AEROSOL WILL OCCUR NOR WHICH 2 DAYS THEY WILL SIMPLY BREATHE FILTERED CLEAN AIR. PULMONARY FUNCTION TESTS WILL BE DONE IMMEDIATELY BEFORE ENTERING THE CHAMBER AND EVERY 2 HOURS THEREAFTER. OUTPUT: SMOKERS AND NON-SMOKERS WILL BE STUDIED. PULMONARY FUNCTION TESTS WILL INCLUDE THE FOLLOWING: (A) SPIROMETRY, (B) PLETHYSMOGRAPHIC DETERMINATION OF SPECIFIC AIRWAY CONDUCTANCE AND FRC, (C) CLOSING VOLUME AND NITROGEN PLATEAU, AND (D) DYNAMIC COMPLIANCE.

**PROJECT: 02700-THE EFFECT OF LOW LEVELS OF SULFURIC ACID MIST EXPOSURE ON HUMAN PULMONARY FUNCTION

STARTING/ COMPLETION DATE : 01/76 12/79 : FUNDING ESTIMATED FY77 / $ 230000
TASK CODE=H625F-7161 **EPA=R804853 ** (GRANT) PRIOR FY /

EPA OFFICER ED HAAK EPA/HERL RTP
INVESTIGATOR. SM HORVATH UNIVERSITY OF CALIFORNIA
LJ FOLINSBEE UNIVERSITY OF CALIFORNIA
JF BEDI UNIVERSITY OF CALIFORNIA
MILESTONES.... 06/78 -1ST ANNUAL REPORT ON HUMAN STUDIES PLANNED FOR THAT YEAR
06/79 -2ND ANNUAL REPORT ON HUMAN STUDIES PLANNED FOR THAT YEAR
06/80 -3RD ANNUAL REPORT ON HUMAN STUDIES PLANNED FOR THAT YEAR
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002700 SSIE-GMA 4324 EPA -R804853 TASK-H625F-7161
AP -625F DU -N140 LABT-HEE
ABSTRACT..... OBJECTIVE: THE AIM OF THIS INVESTIGATION IS TO EXAMINE THE EFFECTS OF ACUTE EXPOSURE TO H2SO4 MIST IN HUMANS AND SOME OF THE FACTORS AFFECTING TOXICITY--TEMPERATURE, HUMIDITY, AND DURATION OF EXPOSURE. APPROACH: THE SUBJECTS WILL BE EXPOSED IN AN ENVIRONMENTAL CHAMBER TO EITHER FILTERED AIR .20 MG/CUBIC METER OR .40 MG/M CUBIC METER OF H2SO4 UNDER FOUR CONDITIONS OF TEMPERATURE AND HUMIDITY: 18 DEGREES C, 45% RH; 35 DEGREES C, 85% RH; 35 DEGREES C, 45%RH; AND 35 DEGREES C, 88% RH. SUBJECTS WILL EXERCISE INTERMITTENTLY AT 25% OF THEIR MAXIMUM CAPACITY DURING THE EXPOSURE PERIOD. PULMONARY FUNCTION TESTS WILL BE PERFORMED BEFORE, DURING, AND AFTER THE EXPOSURE. SOME ASPECTS OF CARDIOVASCULAR PERFORMANCE WILL BE ASSESSED DURING THE EXPOSURE EXERCISE PERIODS. OUTPUT: THE FINAL REPORT OF THIS STUDY WILL PROVIDE THE AGENCY WITH IMPORTANT INFORMATION ON THE EFFECTS OF ACID AEROSOL EXPOSURE IN

**PROJECT: 02702-EFFECT OF COAL GASIFICATION PRODUCTS ON THE PULMONARY DEFENSE SYSTEM AGAINST INFECTIOUS DISEASE (BACTERIAL)

STARTING/ COMPLETION DATE : 03/77 02/80 FUNDING : ESTIMATED FY77 / $ 150000
TASK CODE=H625F-7162 **EPA=R805317 ** (GRANT) PRIOR FY76 /

EPA OFFICER.: JA GRAHAM EPA/HERL RTP
INVESTIGATOR.: C ARANYI I I T RES INST
MILESTONES.... 08/77 -AWARD GRANT, PROVIDE 1ST TEST SAMPLE
08/78 -COMPLETE ACUTE EXPOSURES OF 1ST TEST SAMPLE
08/78 -SUBMIT ANNUAL REPORT
08/79 -COMPLETE ACUTE EXPOSURES OF SECOND TEST SAMPLE
10/79 -SUBMIT ANNUAL REPORT
08/80 -COMPLETE CHRONIC EXPOSURES
10/80 -SUBMIT FINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002702 SSIE-GMA 4326 EPA -R805317 TASK-H625F-7162
AP -625F DU -N140 LABT-HEE
ABSTRACT.....: THE IMPACT OF POLLUTANTS FROM ALTERNATE ENERGY SOURCES (PRIMARILY COAL GASSIFICATION) ON PULMONARY DEFENSE SYSTEMS AGAINST INFECTIOUS BACTERIAL DISEASE WILL BE INVESTIGATED. ANIMALS WILL BE EXPOSED TO RESPIRABLE-SIZED AEROSOLS OF THE POLLUTANT IN A MANNER TO ELUCIDATE DOSE RESPONSE RELATIONSHIPS. THE FOLLOWING PARAMETERS WILL BE USED IN THE INVESTIGATION: (1) MORTALITY AND MEAN SURVIVAL TIME FOLLOWING AEROSOLS OF PATHOGENIC BACTERIA; (2) PULMONARY BACTERICIDAL RESPONSES; (3) PULMONARY CELL POPULATIONS; AND (4) FUNCTIONING OF ALVEOLAR MACROPHAGES. IF ADVERSE EFFECTS ARE FOUND, THE INFLUENCE OF PARTICLE SIZE AND DURATION OF EXPOSURE WILL BE TESTED USING THE MOST SENSITIVE PARAMETERS. THE TIME REQUIRED FOR RECOVERY FROM ADVERSE EFFECTS WILL ALSO BE DETERMINED.

**PROJECT: 02704-TO DETERMINE EFFECTS OF POLLUTANTS FROM ALTERNATE ENERGY SOURCES ON PULMONARY ANTIVIRAL MECHANISMS

STARTING/ COMPLETION DATE : 02/77 01/80 FUNDING ESTIMATED FY77 / $ 270000
TASK CODE=H625F-7163 **EPA=R805049 ** (GRANT) PRIOR FY76 /

EPA OFFICER.. JA GRAHAM EPA/HERL RTP
INVESTIGATOR.. L SCHIFF I I T RES INST
MILESTONES.... 08/77 -COMPLETE H2SO4 AND CARBON EXPOSURE, WITH AND WITHOUT VIRUS
01/79 -COMPLETE STUDIES ON POLLUTANT SAMPLE
06/79 -COMPLETE STUDIES TO DETERMINE THE EFFECTS OF VIRUS
02/80 -COMPLETE STUDIES OF THE INTERACTION OF VIRUS AND POLLUTANT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-002704 SSIE-GMA 3547 EPA -R805049 TASK-H625F-7163
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE TOXICITY OF EFFLUENTS FROM ALTERNATE ENERGY SOURCES ON THE RESPIRATORY EPITHELIUM DURING AND AFTER EXPOSURE TO INFECTIOUS AGENTS (INFLUENZA VIRUS). WHOLE TRACHEAL ORGAN CULTURES FROM 2-4 DAY OLD AND 4 WEEK OLD HAMSTERS WILL BE EXPOSED IN VITRO TO THE APPROPRIATE POLLUTANTS, WITH AND WITHOUT INFLUENZA VIRUS. THE PARAMETERS TO BE MEASURED INCLUDE: (1) CILIARY ACTIVITY AS OBSERVED BY LIGHT MICROSCOPY; (2) VIRAL REPLICATION AND INTERFERON PRODUCTION; (3) CELLULAR SITES AND DISTRIBUTION OF VIRAL REPLICATION; AND (4) CYTOPATHOLOGIC CHANGES OF THE EPITHELIUM USING LIGHT, TRANSMISSION AND SCANNING ELECTRON MICROSCOPY. ONCE ADVERSE EFFECTS ARE FOUND, STUDIES WILL ELUCIDATE DOSE-RESPONSE RELATIONSH

**PROJECT: 02706-APPLICATION OF AUTOMATED BEHAVIORAL TESTING SYSTEM TO MONKEYS EXPOSED TO COAL CONVERSION POLLUTANTS

STARTING/ COMPLETION DATE . 00/77 UNK FUNDING ESTIMATED FY77 / $ 250000
TASK CODE=H625F-7165 **EPA=68-02-2288 ** (CNTR.) PRIOR FY /

EPA OFFICER.. LW REITER EPA/HERL RTP
INVESTIGATOR.. UNKNOWN IOWA STATE UNIV OF SCI & TECH GRADUATE SCH
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002706 SSIE-GMA 4700 EPA -68-02-2288 TASK-H625F-7165
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE HEALTH EFFECTS RESEARCH LABORATORY OF EPA WILL EVALUATE THE TOXICITY OF COAL CONVERSION AND UTILIZATION PRODUCTS. AS PART OF THIS EFFORT, THE ADVERSE BIOLOGICAL EFFECTS OF THESE PRODUCTS ON THE NERVOUS SYSTEM OF PRIMATES MUST BE STUDIED. USING BEHAVIOR AS AN INDEX, THE FUNCTIONAL INTEGRITY OF THE NERVOUS SYSTEM CAN BE MEASURED. THIS DATA WILL PROVIDE A DATA BASE IN SUPPORT OF THE AGENCY'S REGULATORY POLICY. THE PROPOSED CONTRACT WILL UTILIZE AUTOMATED BEHAVIORAL TESTING METHODS DEVELOPED IN THIS PROJECT (EPA PROJECT #625F-B03) UNDER CONTRACT WITH IOWA STATE UNIVERSITY TO TEST BEHAVIORAL TOXICITY OF CANDIDATE POLLUT

**PROJECT: 02707-AIR POLLUTION AND CARDIOPULMONARY FUNCTIONS

STARTING/ COMPLETION DATE : 10/76 10/78 : FUNDING : ESTIMATED FY77 / $ 154000
TASK CODE=H625F-7166 **EPA=R804256 ** (GRANT) PRIOR FY76 / $ 162000

EPA OFFICER. WB RIGGAN EPA/HERL RTP
INVESTIGATOR.. RA MOSTARDI UNIVERSITY OF AKRON
BL RICHARDSON UNIVERSITY OF AKRON
GA ATWOOD UNIVERSITY OF AKRON
MILESTONES.... 11/76 -GRANT AWARD
11/78 -PROGRESS REPORT
11/79 -FINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002707 SSIE-GMA 3582 EPA -R804256 TASK-H625F-7166
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE BASIC STRUCTURE OF THIS EXPERIMENTAL DESIGN IS TO EXAMINE THE EFFECTS OF AIR POLLUTION ON VARIOUS CARDIOPULMONARY PARAMETERS. THE DESIGN WILL INVOLVE BOTH LONGITUDINAL AND CROSS-SECTIONAL APPLICATIONS AND INCLUDE A NUMBER OF AGE GROUPS. THREE GEOGRAPHIC LOCATIONS WILL BE SELECTED AND INCLUDE: 1) AN AREA OF HEAVY POPULATION, 2) AN AREA OF INTERMEDIATE OR VARYING POPULATION, 3) A CLEAN AREA. IN EACH OF THE AREAS A MINIMUM OF 150 VOLUNTEERS WITHIN EACH AGE GROUP WILL BE TESTED. THE VARIOUS TESTS WHICH WILL BE CONDUCTED AND OTHER DATA COLLECTED INCLUDE: 1) VITAL DATA, 2) PULMONARY FUNCTION TESTING, 3) MAXIMAL EXPIRATORY FLOW VOLUME CURVES, 4) MULTIPLE-LOAD EXERCISE TEST, 5) ALPHA-1-ANTITRYPSIN, 6) METHEMOGLOBIN, 7) CARBOXYHEMOGLOBIN, 8) MERCURY AND CADMIUM IN BLOOD, 9) MERCURY AND ARSENIC IN URINE, 10) TRACE METALS IN HAIR, 11) QUESTIONNAIRE COMPLETION. AEROMETRIC MONITORING WILL BE CARRIED OUT AT MULTIPLE SITES WITHIN EACH OF THE THREE AREAS AND WILL INCLUDE: 1) TOTAL SUSPENDED PARTICULATE, 2) SO2, 3) NOX, 4) HYDROCARBONS, 5) OZONE, 6) TRACE METALS, 7) METEROLOGICAL DATA. THE DATA COLLECTED WILL BE ANALYZED AMONG AND BETWEEN THE AGE GROUPS USING MULTIPLE LINEAR REGRESSION AND ANALYSIS OF VARIANCE MODELS.

**PROJECT: 02709-PREPARATION AND CHARACTERIZATION OF FINELY PARTICULATE ENVIRONMENTAL CONTAMINANTS FOR BIOLOGICAL EXPERIMENTATION

STARTING/ COMPLETION DATE : 08/76 03/78 : FUNDING ESTIMATED FY77 / $ 24900
TASK CODE=H625F-7171 **EPA=68-02-2451 ** (CNTR.) PRIOR FY76 / $ 79300

EPA OFFICER.. M KIRTZ EPA/HERL RTP
INVESTIGATOR.. G YAMATE I I T RES INST
D WALIA I I T RES INST
J GRAFF I I T RES INST
E STEINAR I I T RES INST
MILESTONES... 07/77 -SHIP SAMPLES TO RTP
09/77 -COMPLETE SAMPLE ANALYSIS
12/77 -COMPLETE COMMINGTONITE ANALYSIS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002709 SSIE-GMA 3364 1 EPA -68-02-2451 TASK-H625F-7171
AP -625F DU -N140 LABT-HEE
ABSTRACT..... THE OBJECTIVE OF THIS PROGRAM IS TO PREPARE A VARITY OF PARTICULATE SUBSTANCES WHOSE SIZE DISTRIBUTION, PURITY, ETC. ARE RELIABLY AND CAREFULLY CHARACTERIZED FOR USE IN A VARIETY OF BIOLOGICAL EXPERIMENTS BY EPA PERSONNEL AND CONTRACTORS. METALLIC COMPOUNDS, BENZO (A) PYRENE, UICC AMOSITE FIBERS, AND OTHER COMPOUNDS WILL BE OBTAINED, CHARACTERIZED, AND SUPPLIED, EITHER ALONE OR COMBINED, IN THE SIZE RANGE OF INTEREST TO EPA OR ITS CONTRACTORS. IN ADDITION, AMPHIBOLE FIBERS WILL BE FROM THE PETER MITCHELL PIT OF THE RESERVE MINING COMPANY IN MINNESOTA AND WILL BE COMPARED TO THOSE FIBERS FOUND IN AMIBENT AIR SAMPLES FROM SILVER BAY AND BABBITT, MINNESOTA. APPROPRIATE FIBERS FROM THE PIT WILL BE CHARACTERIZED AND SUPPLIED, EITHER ALONE OR IN COMBINATION WITH OTHER COMPOUNDS, TO EPA OR ITS CONTRACTORS.

**PROJECT: 02710-BIOLOGICAL ASSESSMENT OF EXPOSURE TO SULFUR DIOXIDE AND ACID SULFATE

```
                    STARTING/ COMPLETION DATE : 06/77   12/80 :   FUNDING :  ESTIMATED   FY77  / $  105000
                    TASK CODE=H625F-7187   **EPA=R805622-01  ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. CG HAYES                  EPA/HERL   RTP
INVESTIGATOR.. KV RAJAGOPALAN            DUKE UNIV                            SCH OF ME/PHARM DEPT
MILESTONES.... 11/77 -AWARD GRANT
               11/78 -PROGRESS REPORT
               11/79 -PROGRESS REPORT   GRANT CONTINUATION APPLICATION
               11/80 -FINAL REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-002710           SSIE-GMA  4328        EPA -R805622-01       TASK-H625F-7187
               AP  -625F             DU  -N140             LABT-HEE
ABSTRACT.....: THE USE OF HIGH-SULFUR COAL AS A SOURCE OF ENERGY IS EXPECTED TO GENERATE HIGHER ATMOSPHERIC
                CONCENTRATIONS OF SULFUR DIOXIDE AND ACID SULFATE. IT IS GENERALLY BELIEVED THAT THESE COMPOUNDS
                COULD AFFECT THE HEALTH OF HUMAN POPULATIONS WHICH MAY BE EXPOSED TO THEM. BECAUSE OF THIS, IT IS
                OF ADVANTAGE TO HAVE AVAILABLE RELIABLE BIOLOGICAL INDICES FOR DETECTION OF EXPOSURE TO THESE
                CHEMICALS. THE RELEVANT TESTS SHOULD BE APPLICABLE TO BLOOD SAMPLES OBTAINED FROM SAMPLES OF HUMAN
                POPULATION. IN THE CASE OF SULFUR DIOXIDE, IT IS CONCEIVABLE THAT METABOLITES SUCH AS SULFITE,
                THIO-SULFATE AND S-SULFOCYSTEINE MAY BE PRESENT IN THE BLOOD OF EXPOSED INDIVIDUALS IN
                CONCENTRATIONS HIGHER THAN THOSE IN NORMAL POPULATIONS. USING THE RAT AS THE EXPERIMENTAL ANIMAL,
                THIS PROJECT WILL EXPLORE THE POSSIBILITY OF DEVELOPING SENSITIVE TESTS FOR THE PRESENCE OF THESE
                COMPOUNDS IN BLOOD OF ANIMALS EXPOSED TO VARIOUS LEVELS OF SO2. PROCEDURES FOR ASSESSING EXPOSURE
                TO ACID SULFATE MAY ALSO BE POSSIBLE TO DEVELOP. SINCE SULFITE OXIDASE IS AN ENZYME CAPABLE OF
                DETOXIFYING SO2, METHODS FOR EPIDEMIOLOGICAL TESTING OF SULFITE OXIDASE IN HUMAN POPULATIONS WILL
                ALSO BE INVESTIGATED.
```

**PROJECT: 02712-ENVIRONMENTAL MUTAGENS STUDIES UTILIZING A DROSOPHILA TEST SYSTEM

```
                    STARTING/ COMPLETION DATE : 09/77   09/80 :   FUNDING :  ESTIMATED   FY77  / $   64000
                    TASK CODE=H625F-7189   **EPA=R802030     ** (GRANT)      PRIOR       FY    /
EPA  OFFICER.. CG HAYES                  EPA/HERL   RTP
INVESTIGATOR.. JW BAUM                   BROOKHAVEN NATL LAB
               JW BAUM                   U.S. DEPT. OF ENERGY
MILESTONES.... 09/77 -INITIATE SERIES OF STUDIES
               09/78 -PROGRESS REPORT
               09/79 -PROGRESS REPORT
               09/80 -FINAL REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002712           SSIE-GMA  4319        EPA -R802030          TASK-H625F-7189
               AP  -625F             DU  -N140             LABT-HEE
ABSTRACT...... THE OBJECTIVE OF THIS INTERAGENCY AGREEMENT IS TO CONDUCT ENVIRONMENTAL MUTAGEN STUDIES OF AIR
                POLLUTANTS USING A DROSOPHILA TEST SYSTEM. THESE STUDIES WILL BE COORDINATED WITH AN ONGOING EFFORT
                TO DETERMINE THE PRESENCE OF MUTAGENIC AGENTS IN AMBIENT AIR IN WHICH THE NATIONAL INSTITUTE FOR
                ENVIRONMENTAL HEALTH SCIENCES, DHEW, BROOKHAVEN NATIONAL LABORATORIES, ERDA, AND THE HEALTH EFFECTS
                RESEARCH LABORATORY, EPA ARE COLLABORATING. THROUGH AN INTERAGENCY AGREEMENT WITH NIEHS, BROOKHAVEN
                NATIONAL LABORATORIES HAS DEVELOPED A MOBILE EXPOSURE FACILITY TO CONDUCT MUTAGENICITY TESTS USING
                THE TRADESCANTIA TEST SYSTEM UNDER ACTUAL, AS OPPOSED TO SIMULATED, AIR POLLUTION EXPOSURES. THE
                ENVIRONMENTAL PROTECTION AGENCY IS PROVIDING MOBILE AEROMETRIC SUPPORT CONCURRENTLY WITH THE
                STUDIES. IN ADDITION, EPA IS COLLECTING BOTH VAPOR PHASE AND PARTICULATE SAMPLES FOR CHEMICAL
                CHARACTERIZATION AND FOR ADDITIONAL MUTAGENICITY TESTS IN THE LABORATORY. THE DROSOPHILA STUDIES
                WILL COMPLEMENT THE BATTERY OF TESTS CURRENTLY IN USE.
```

**PROJECT: 02713-IN VITRO SCREENING OF SELECTED AIR POLLUTANTS FOR POTENTIAL CARCINOGENICITY

```
                    STARTING/ COMPLETION DATE : 11/75   11/77 :   FUNDING    ESTIMATED   FY77  / $   46500
                    TASK CODE=H625F-7190   **EPA=68-02-2271  ** (CNTR.)      PRIOR       FY    /
EPA  OFFICER.: MD WATERS                 EPA/HERL   RTP
INVESTIGATOR.: LM SCHECHTMAN             MICROBIOLOGICAL ASSOCIATES INC
               RE KOURI                  MICROBIOLOGICAL ASSOCIATES INC
MILESTONES.... 03/77 -PRELIMINARY REPORT ON METABOLIC ACTIVATION IN V-79 AND BALB/3T3 S
               08/77 -FINAL REPORT ON METABOLIC ACTIVATION IN V-79, BALB/3T3 AND 10T1/2
               10/77 -COMPLETION OF TESTING OF 10 SUBSTANCES WITH AND WITHOUT METABOLIC
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-002713           SSIE-GMA  2710 1      EPA -68-02-2271       TASK-H625F-7190
               AP  -625F             DU  -N140             LABT-HEE
ABSTRACT...... THE PURPOSE OF THIS CONTRACT IS TO PROVIDE THE CAPABILITY FOR IN VITRO SCREENING OF SELECTED
                ENVIRONMENTAL POLLUTANTS FOR POTENTIAL CARCINOGENICITY. THE CONTRACTOR SHALL EMPLOY THE ESTABLISHED
                BALB/C 3T3 AND 10T1/2 BIOASSAY SYSTEMS FOR DETERMINING MORPHOLOGIC CELLULAR TRANSFORMATION.
                METABOLIC ACTIVATION SYSTEMS SHALL BE IMPLEMENTED FOR EMPLOYMENT WITH THE BALB/C 3T3 CELLS
                INITIALLY AND EVENTUALLY ALSO WITH THE 10T1/2 CELLS. THESE ACTIVATION SYSTEMS SHALL BE ESTABLISHED
                BY USE OF AND CORRELATED WITH MUTAGENESIS OF MICROBIAL (SALMONELLA TYPHIMURIUM) AND MAMMALIAN (V79)
                CELL SYSTEMS. THE CONTRACTOR HAS IMPLEMENTED A NEW MOUSE FIBROBLAST STRAIN -BALB/3T3 CLONE A31-1
                FOR CELLULAR NEOPLASTIC TRANSFORMATION STUDIES WITH POTENTIALLY CARCINOGENIC ENVIRONMENTAL
                CHEMICALS. THIS SYSTEM WILL BE USED IN CONJUNCTION WITH THE C3H10T1/2 NEOPLASTIC TRANSFORMATION
                SYSTEM ON THOSE SAMPLES WHICH TEST POSITIVE IN THE AMES SALMONELLA TYPHIMURIUM MICROBIAL AND
                CHINESE HAMSTER LUNG (V79) MAMMALIAN CELL MUTAGENESIS TEST SYSTEMS. METABOLIC ACTIVATION METHODS
                ARE BEING DEVELOPED TO PERMIT USE OF THESE NEOPLASTIC TRANSFORMATION SYSTEMS WITH ENVIRONMENTAL
                CHEMICALS WHICH MUST BE METABOLIZED TO BRING ABOUT NEOPLASTIC TRANSFORMATION. SAMPLES WHICH HAVE
                BEEN COLLECTED FROM FLUIDIZED BED CONVERSION PROCESS PLANT WILL BE SCREENED DURING THE NEXT
                QUARTER.
```

**PROJECT: 04173-METABOLISM OF INHALED TRACE METAL EFFLUENTS FROM COMBUSTION PROCESSES

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 111000
TASK CODE=V625F-19 **EPA=D7-E681 ** (IAG) PRIOR FY76 / $ 249000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. RG CUDDIHY LOVELACE FOUND FOR MED ED & RES
SH WEISSMAN LOVELACE FOUND FOR MED ED & RES
RC PFLEGER LOVELACE FOUND FOR MED ED & RES
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004173 SSIE-GMA 4667 EPA -D7-E681 TASK-V625F-19
AP -625F DU -N140 LABT-EMI
ABSTRACT..... A VARIETY OF TRACE METALS ARE FOUND IN ATMOSPHERIC AEROSOLS WHICH ARE FORMED FROM NATURAL AND ANTHROPOGENIC PROCESSES. FURTHER STUDY OF THE BIOLOGICAL IMPORTANCE OF TRACE METALS IS NEEDED BECAUSE THEY MAY BE TOXIC IN THEMSELVES OR IN COMBINATION WITH OTHER ATMOSPHERIC COMPONENTS AND THEY MAY ALSO BE USEFUL AS EASILY MEASURED TRACERS TO DETERMINE MAN'S OVERALL ENVIRONMENTAL EXPOSURE. THIS STUDY CONCENTRATES ON TRACE METAL CHARACTERISTICS OF EFFLUENTS FROM ENERGY PRODUCTION, ESPECIALLY THOSE RELATED TO THE COMBUSTION OF FOSSIL FUELS. SELECTED METALS WHICH MERIT FURTHER STUDY IN THIS PROJECT INCLUDE CADMIUM, VANADIUM, ARSENIC AND SELENIUM. THESE ARE BEING INCORPORATED INTO CONDENSATION AEROSOLS OF THE METAL OXIDES AND INTO AEROSOLS CONTAINING OXY-SULFATE FORMS. THE OXY-SULFATE AEROSOLS ARE CHARACTERISTIC OF AEROSOLS OBTAINED WHEN METAL OXIDES INTERACT WITH SULFUR OXIDES OR SULFURIC ACID IN THE ATMOSPHERE. BEAGLE DOGS, SYRIAN HAMSTERS AND FISCHER RATS ARE BEING EXPOSED TO THE AEROSOLS BY INHALATION. DEPOSITION, RETENTION AND METABOLISM OF THE INHALED METALS ARE BEING STUDIED IN THE ANIMALS OVER SEVERAL HUNDREDS OF DAYS AFTER EXPOSURE. THEIR EFFECTS ON LUNG CELL MACROPHAGES AND TYPE II ALVEOLAR CELLS ARE ALSO BEING ASSESSED. THIS INCLUDES IN VITRO AND IN VIVO STUDIES OF CELL VIABILITY AND FUNCTION. THESE DATA WILL BE USED TO PROVIDE POPULATION DOSIMETRY MODELS USEFUL FOR INTERPRETING THE ENVIRONMENTAL AND HUMAN HEALT

**PROJECT: 04174-DEPOSITION, RETENTION AND DOSIMETRY OF INHALED REACTION PRODUCTS WHICH MAY RESULT FROM SO2-PARTICLE REACTIONS

STARTING/ COMPLETION DATE : 04/77 UNK FUNDING ESTIMATED FY77 / $ 115000
TASK CODE=V625F-20 **EPA=D7-E681 ** (IAG) PRIOR FY76 / $ 258000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. MB SNIPES LOVELACE FOUND FOR MED ED & RES
TL KIRCHGESSNER LOVELACE FOUND FOR MED ED & RES
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004174 SSIE-GMA 4664 EPA -D7-E681 TASK-V625F-20
AP -625F DU -N140 LABT-EMI
ABSTRACT..... SULFUR COMPOUNDS, ESPECIALLY OXIDES AND SULFATES, ARE IMPORTANT RELEASE OR REACTION PRODUCTS ASSOCIATED WITH THE CONVERSION OF FOSSIL FUELS TO ENERGY. CONDENSATION OF THESE COMPOUNDS AND/OR REACTION PRODUCTS RESULTS IN RESPIRABLE PARTICLES WHICH HAVE BEEN SHOWN TO PRODUCE MARKED ALTERATIONS IN RESPIRATORY PARAMETERS OF EXPERIMENTAL ANIMALS AND THESE CHANGES PRESUMABLY OCCUR IN HUMANS. CHANGE IN PULMONARY FUNCTION COULD INCLUDE ALTERATION OF CLEARANCE RATES FOR PARTICULATE MATTER AND CHANGES IN THE THICKNESS AND VISCOSITY OF MUCOUS LINING MAJOR AIRWAYS. IT IS IMPORTANT TO DEFINE DISTRIBUTION PATTERNS IN LUNG FOR THESE INHALED IRRITANTS AND DETERMINE THEIR MECHANISMS OF PHYSIOLOGICAL CHANGE TO BETTER UNDERSTAND THE MAGNITUDE OF RISK FOR HUMANS EXPOSED TO THESE MATERIALS. THIS RESEARCH PROJECT IS DESIGNED TO PROVIDE INFORMATION NECESSARY FOR RELATING DOSE TO EFFECT AFTER INHALATION OF THESE TOXICANTS BY ANIMALS, INCLUDING THE FISCHER-344 RAT AND BEAGLE DOG. SPECIFIC STUDIES HAVE BEEN DEVELOPED TO EXAMINE THE 3-DIMENSIONAL DISTRIBUTION OF INHALED TOXICANT AS A FUNCTION OF TIME AFTER EXPOSURE AND CHANGES IN DEPOSITION AND RETENTION OF TEST AEROSOLS DEPOSITED IN LUNG BEFORE, DURING OR AFTER INHALATION OF THE NON-NUCLEAR TOXICANTS. PROGRESS TO DATE RELATES PRIMARILY TO DEVELOPMENT OF EXPOSURE EQUIPMENT AND TEST AEROSOLS. TWO STUDIES WILL BE INITIATED IN THE NEAR FUTURE USING FISCHER-344 RATS TO (1) EXAMINE TOXICANT DISTRIBUTION IN THE LUNG AFTER INHALATION OF SULFURIC ACID MIST AND (2) DISTRIBUTION AND RETENTION OF INHALED MONODISPERSE INERT PARTICLES AFTER INHALATIO

**PROJECT: 04175-CYTOGENETIC STUDIES OF LUNG CELLS FOLLOWING INHALATION OF FLY ASH, CHEMICAL MUTAGENS AND EFFLUENTS FROM POWER-RELATED INDUSTRY

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 126000
TASK CODE=V625F-21 **EPA=D7-E681 ** (IAG) PRIOR FY76 / $ 284000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. AL BROOKS LOVELACE FOUND FOR MED ED & RES
RL CARPENTER LOVELACE FOUND FOR MED ED & RES
CN MITCHELL LOVELACE FOUND FOR MED ED & RES
DE BICE LOVELACE FOUND FOR MED ED & RES
NA HACKETT LOVELACE FOUND FOR MED ED & RES
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004175 SSIE-GMA 4668 EPA -D7-E681 TASK-V625F-21
AP -625F DU -N140 LABT-EMI
ABSTRACT..... EXPERIMENTS ARE BEING DIRECTED TOWARD UNDERSTANDING CHANGES AT THE CELLULAR LEVEL FOLLOWING INHALATION OF PARTICULATE MATTER (FLY ASH) AND POLYCYCLIC HYDROCARBONS RELEASED FROM COAL-POWERED ELECTRICAL PLANTS. AN EFFORT IS UNDER WAY TO CHARACTERIZE THE DEPOSITION AND RETENTION OF NEUTRON-ACTIVATED FLY ASH WHICH WILL BE USEFUL IN CALCULATING DOSE OF FLY ASH TO LUNGS FOLLOWING PROTRACTED EXPOSURES. ABOUT 10% OF THE INHALED FLY ASH IS RETAINED IN THE SYRIAN HAMSTER WITH AN 83-DAY HALF-LIFE. STUDIES ON THE INDUCTION OF AHH FOLLOWING INHALATION ARE IN PROGRESS. EARLY RESULTS INDICATE THAT THE ENZYME LEVEL IN THE LIVER OF THE CHINESE HAMSTER CAN BE INDUCED WITH BENZ(A)PYRENE. THE MAJOR EFFORT IS DIRECTED TOWARD DEVELOPMENT OF METHODS FOR EVALUATING CYTOGENETIC CHANGES IN LUNG CELL POPULATIONS FOLLOWING INHALATION OF POWER PLANT EFFLUENTS. CELL POPULATIONS BEING STUDIED ARE MACROPHAGES, TRACHEAL EPITHELIUM AND TYPE II EPITHELIAL CELLS. ADDITIONAL EFFORT IS BEING DIRECTED TOWARD OBTAINING A BETTER UNDERSTANDING OF PULMONARY CELL KINETICS. THESE STUDIES SHOW THAT FOR THE CHINESE HAMSTER THE LUNG CELLS DO NOT PROLIFERATE VERY RAPIDLY AFTER THE ANIMAL REACHES 6 DAYS OF AGE. LONG-TERM RETENTION OF LABEL IN LUNG CELLS WILL BE USEFUL IN DETERMINING THE NORMAL SLOW TURNOVER RATE IN ADULT ANIMALS. THE CYTOGENETIC CHANGES AND ENZYME ACTIVATION DATA WILL SERVE AS AN INDEX OF BIOLOGICAL AND MUTAGENIC ACTIVITY WHICH, COUPLED WITH RETENTION, DISTRIBUTION AND CELL TURNOVER DATA, MAY BE USEFUL IN EVALUATING HAZARDS AND PREDICTING LONG-TERM EFFECTS OF THESE MATERIALS IN HUMA

**PROJECT: 04176-THE USE OF MALE GERMINAL TISSUE IN THE DETECTION OF MUTATIONAL EVENTS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :   FUNDING    ESTIMATED   FY77  / $   16000
                    TASK CODE=V625F-22      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.: HV MALLING                  US HEW                              NATL INST OF HLTH /PHS
MILESTONES...: 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004176            SSIE-GMA  4776        EPA -D5-E772          TASK-V625F-22
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT......
```

THE AIM OF THIS PROJECT IS TO DEVELOP SYSTEMS FOR MEASURING THE FREQUENCY OF POINT MUTATIONS AND DNA CHANGE IN MALE GERMINAL TISSUE. THESE SYSTEMS WOULD HAVE THE ADVANTAGE OF TESTING THE HUMAN POPULATION BY MEANS OF READILY AVAILABLE SAMPLES, I.E., SPERMATOZOA. AT PRESENT ENZYME HISTOCHEMICAL METHODS ARE BEING DEVELOPED TO DETECT POINT MUTATIONS IN MALE MICE AND THREE ENZYMES AND THEIR INHIBITORS HAVE BEEN CHARACTERIZED. THESE ENZYMES ARE ALPHA-GLYCEROPHOSPHATE DEHYDROGENASE, LACTATE DEHYDROGENASE AND SUCCINATE DEHYDROGENASE. PRELIMINARY WORK HAS STARTED WITH THE AXIOMATE SCANNING MICROSCOPE TO DETERMINE ITS USEFULNESS IN MEASURING THE DISTRIBUTION OF DNA CONTENT IN A POPULATION OF SPERM. IT IS HOPED THAT THIS INSTRUMENT MAY PROVE USEFUL IN SHOWING CHANGES IN THE DISTRIBUTION PATTERN IN SPERM POPULATIONS DERIVED FROM MICE TREATED OR UNTREATED WITH KNOWN MUTAGENS.

**PROJECT: 04177-DEVELOPMENTAL TOXICITY INDICATORS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK       FUNDING    ESTIMATED   FY77  / $   70000
                    TASK CODE=V625F-23      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.: RL DIXON                    US HEW                              NATL INST OF HLTH /PHS
MILESTONES...: 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004177            SSIE-GMA  4742        EPA -D5-E772          TASK-V625F-23
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT......
```

OBJECTIVE: TO ASSESS THE POSTNATAL TOXIC EFFECTS OF GESTATIONAL CHEMICAL EXPOSURE. METHODS EMPLOYED: THE FISCHER RAT WILL BE THE TEST ANIMAL FOR ROUTINE STUDIES. OTHER SPECIES SUCH AS MICE, HAMSTERS, GUINEA PIGS, OR RABBITS MIGHT BE USED ALSO IN FUTURE ATTEMPTS TO DEFINE SPECIES VARIABILITY FEMALE RATS WILL BE EXPOSED TO THE TEST CHEMICAL FOR A DEFINED PERIOD EITHER PRIOR TO BREEDING OR FOLLOWING CONCEPTION. CHEMICAL EXPOSURE WILL CONTINUE DURING GESTATION AND WILL BE DISCONTINUED ONE DAY PRIOR TO EXPECTED PARTURITION. OFFSPRING WILL BE EXAMINED FOR SIGNS OF TOXICITY AT FIVE DEFINED POSTNATAL PERIODS. AT EACH TEST PERIOD, VARIOUS GROSS, CHEMICAL, HEMATOLOGICAL, AND FUNCTIONAL TESTS WILL BE PERFORMED. SPECIAL EMPHASIS SHOULD BE DIRECTED TO THE FOLLOWING SYSTEMS (OR FUNCTIONS): BONE MARROW AND BLOOD; MOTOR AND SENSORY FUNCTION OF THE NERVOUS SYSTEM (INCLUDING PAIN, TASTE, OLFACTION, AUDITION, AND VISION); BEHAVIOR AND "MEMORY"; CARDIOVASCULAR RESPONSES; RESPIRATION; RENAL FUNCTION AND BODY FLUID BALANCE; DIGESTIVE SYSTEM; METABOLISM (ENERGY EXCHANGE); ENDOCRINOLOGY; REPRODUCTION; IMMUNOLOGIC CAPACITY; AND PATHOLOGY. TESTS OF OVERALL HEMEOSTASIS, PHYSICAL ENDURANCE, AND ADAPTATION TO STRESS ARE ALSO DESIRED.

**PROJECT: 04179-CARCINOGENESIS OF FOSSIL FUEL-RELATED COMBUSTION PRODUCTS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :   FUNDING :  ESTIMATED   FY77  / $  100000
                    TASK CODE=V625F-24      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.: P  NETTESHEIM               US HEW                              NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004179            SSIE-GMA  4738        EPA -D5-E772          TASK-V625F-24
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT......
```

THE BYPRODUCTS OF FOSSIL FUEL COMBUSTION ARE A COMPLEX MIXTURE OF COMPOUNDS WHICH INCLUDE POLYCYCLIC AROMATIC HYDROCARBONS (PAH'S). MANY OF THESE PAH'S (FOR EXAMPLE BENZO(A)PYRENE) ARE KNOWN TO BE POTENT CARCINOGENS. WHEN COMPLEX MIXTURES OF PAH'S ARE ASSAYED FOR CARCINOGENIC ACTIVITY, THEY ARE HIGHLY ACTIVE. IN FACT, THE ACTIVITY OF THE MIXTURE OFTEN GREATLY EXCEEDS THE ACTIVITY OF EACH OF THE ISOLATED COMPONENTS. THIS SUGGESTS THAT CERTAIN NON-CARCINOGENIC OR WEAKLY CARCINOGENIC COMPOUNDS IN THE MIXTURE ACT TO ENHANCE OR TO PROMOTE THE ACTIVITY OF THE CARCINOGENIC AGENTS. IN AN EFFORT TO ASSESS THE HAZARD OF FOSSIL FUEL COMBUSTION PRODUCTS, ONE MUST THEREFORE CONSIDER NOT ONLY THE CARCINOGENIC FACTORS IN THE BYPRODUCTS, BUT ALSO THEIR INTERACTION WITH OTHER BYPRODUCTS. A THEORETICAL BASIS FOR THIS INTERACTION IS LACKING AND A BETTER UNDERSTANDING OF THE BASIC MECHANISMS OF CARCINOGENESIS IS REQUIRED. OUR STUDIES ON THIS PROBLEM ARE CENTERED ON TWO LEVELS. THE FIRST LEVEL IS THE INITIATION OF CARCINOGENESIS, WHILE THE SECOND LEVEL IS HOW THE INITIATED CELL DEVELOPS INTO A MALIGNANT CANCER AND WHAT FACTORS MODULATE THIS DEVELOPMENT. AN UNDERSTANDING OF THIS ENTIRE PROCESS WILL ALLOW A BETTER ASSESSMENT OF HOW TO ELIMINATE FACTORS WHICH INDUCE CANCER. OUR APPROACH TO THESE PROBLEMS HAS BEEN TO STUDY THE EFFECT OF CARCINOGENS AND PROMOTERS OF CARCINOGENESIS ON CELLS GROWN IN CULTURE. BY STUDYING THE INTERACTION OF CHEMICALS AND CELLS IN CULTURE RATHER THAN IN ANIMALS, WE TEMPORARILY IGNORE THE IN VIVO FACTORS INFLUENCING CARCINOGENESIS AND FOCUS ON THE PROBLEM AS A CELLULAR EVENT. THIS ENABLES US TO UNDERSTAND THE MOLECULAR AND CELLULAR MECHANISMS INVOLVED. SPECIFICALLY, WE ARE INTERESTED IN (1) HOW CHEMICALS SUCH AS BENZO(A)PYRENE INITIATE CARCINOGENESIS AND WHETHER THIS INITIATION IS ANALOGOUS TO OTHER BIOLOGICAL RESPONSES SUCH AS MUTATION; (2) HOW INITIATED CELLS DEVELOP AS MALIGNANT CELLS AND (3) HOW NORMAL CELL

**PROJECT: 04180-MUTAGENESIS IN CULTURED LYMPHOCYTES

STARTING/ COMPLETION DATE : 00/77 UNK FUNDING ESTIMATED FY77 / $ 218002
TASK CODE=V625F-25 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. AD BLOOM COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
HS ROSENKRANZ COLUMBIA UNIV COL OF PHYS & SURGEONS/PEDIATRICS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004180 SSIE-GMA 4746 EPA -D5-E772 TASK-V625F-25
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THIS PROJECT INVOLVES THE DEVELOPMENT OF MAMMALIAN LYMPHOID CULTURE SYSTEMS TO TEST FOR THE MUTAGENICITY OF ENVIRONMENTAL AGENTS. COMPOUNDS WHICH ARE KNOWN MUTAGENS (SUCH AS ALKYLATING AGENTS, AND FRAMESHIFT MUTAGENS) WILL BE TESTED IN HUMAN AND LYMPHOID CELL LINES FOR THE INDUCTION OF MUTATIONS AT THE HYPOXANTHINE-GUANINE PHOSPHORIBOSYL TRANSFERASE AND THE ARGININOSUCCINIC ACID SYNTHETASE LOCI, AND IN MURINE LYMPHOID CELLS FOR THE INDUCTION OF ALTERED IMMUNOGLOBULIN. THE INDUCTION OF CHROMOSOMAL BREAKAGE IN THESE CELL LINES WILL BE STUDIED USING THE G AND H BANDING TECHNIQUES. IN ADDITION, THE RESEARCH WILL UTILIZE BACTERIAL TEST SYSTEMS TO DETERMINE THE RELATIONSHIP BETWEEN MUTAGENICITY IN SIMPLER ORGANISMS AND IN MORE COMPLEX, DIFFERENTIATED

**PROJECT: 04181-MULTIPLE LOCI SCREEN FOR MUTATIONS IN MAMMALIAN CELLS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 97322
TASK CODE=V625F-26 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. MJ SICILIANO UNIVERSITY OF TEXAS
RM HUMPHREY UNIVERSITY OF TEXAS
TC HSU UNIVERSITY OF TEXAS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004181 SSIE-GMA 4757 EPA -D5-E772 TASK-V625F-26
AP -625F DU -N140 LABT-EMI
ABSTRACT..... IT IS OUR INTENTION TO DEVELOP A NEW SYSTEM FOR TESTING THE MUTAGENIC POTENTIAL OF VARIOUS ENVIRONMENTAL AGENTS ON MAMMALIAN SOMATIC CELLS. THE BASIS OF THE PROCEDURE IS TO EXPOSE CELLS TO MUTAGEN AND PLATE OUT SINGLE CELL CLONES. CLONAL ISOLATES, AFTER BEING GROWN UP TO 40 X 10 TO THE 6TH POWER CELLS, ARE THEN SCREENED FOR ELECTROPHORETIC VARIATION OF THE PRODUCTS OF OVER 40 GENETIC LOCI. WHERE A CLONAL VARIANT IS DETECTED, IT IS ISOLATED AND ITS HERITABILITY DETERMINED BY SUBCLONING AND SUBSEQUENT ELECTROPHORESIS. THE PROCEDURE AVOIDS MANY OF THE PROBLEMS ASSOCIATED WITH THE DETECTION ON SELECTIVE SYSTEMS OF RECESSIVE MUTATIONS (AUXOTROPHIC, DRUG RESISTANT, AND TEMPERATURE SENSITIVE) IN DIPLOID MAMMALIAN CELLS SINCE ELECTROPHORETIC MUTATIONS ARE CO-DOMINANT. LACK OF ENRICHMENT FOR MUTANTS BY SELECTION IS ALSO COMPENSATED FOR BY THE INCREASED PROBABILITY OF OBTAINING AN ELECTROPHORETIC SHIFT IN A PROTEIN AS THE RESULT OF A SINGLE NUCLEOTIDE SUBSTITUTION IN ITS GENE AS OPPOSED TO THE COMPLETE LOSS OF FUNCTION BY SUCH AN EVENT AND, THE STUDY OF THE PRODUCTS OF A LARGE NUMBER OF LOCI. ADDITIONAL ATTRIBUTES OF THE PROCEDURE ARE THAT: EACH VARIANT MAY BE ASSOCIATED WITH A SPECIFIC GENETIC LOCUS, MUTATIONS IN A WIDE RANGE OF GENETIC LOCI MAY BE STUDIED, THE SYSTEM REQUIRES NO CHANGE IN THE MEDIUM LIMITING THE CAUSE OF ANY OBSERVED VARIATION TO INTRACELLULAR EVENTS, AND MUTATIONS IN BOTH STRUCTURAL GENES AS WELL AS THOSE AFFECTING GENE EXPRESSION CAN BE SPECIFICALLY DETECTED. OUR PRELIMINARY STUDIES USING CHINESE HAMSTER OVARY CELLS (CHO) HAVE REVEALED THAT WE CAN ELECTROPHORETICALLY CHARACTERIZE THE PRODUCTS OF 51 STRUCTURAL ENZYME LOCI AND DETECT VARIANTS AT BOTH STRUCTURAL AND CONTROL LOCI. WE WISH TO CONTINUE THESE STUDIES IN ORDER TO OPTIMIZE VARIOUS PARAMETERS OF THE PROCEDURE -- DOSAGE OF MUTAGEN, TIME OF CLONING AND STAGE OF THE CELL CYCLE FOR MUTAGEN TREATMENT -- AND TO USE THE SYSTEM TO STUDY MUTATION FREQUE

**PROJECT: 04182-DEVELOPMENT OF DNA REPAIR FOR MONITORING HUMAN HEALTH

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 87632
TASK CODE=V625F-27 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. AD MITCHELL S R I INTERNATIONAL
K STEFOS S R I INTERNATIONAL
MV MCMACKEN S R I INTERNATIONAL
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004182 SSIE-GMA 4758 EPA -D5-E772 TASK-V625F-27
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THE NATION'S RESPONSE TO THE NEEDS FOR ENERGY SELF-SUFFICIENCY COULD INCREASE THE NUMBER OF HAZARDOUS AGENTS THAT ARE RELEASED INTO MAN'S DAILY ENVIRONMENT. EFFICIENT AND ECONOMICAL SYSTEMS ARE NEEDED TO PREDICT HUMAN SUSCEPTIBILITY TO HAZARDOUS AGENTS AND TO MONITOR POPULATIONS FOR ADVERSE GENETIC EFFECTS WHICH MAY BE CAUSED BY UNFORSEEN MUTAGENS. THERE IS A HIGH PROBABILITY THAT THESE NEEDS COULD BE MET BY FURTHER DEVELOPMENT OF DNA REPAIR SYNTHESIS. THE UTILITY OF THE PRESENT IN VITRO DNA REPAIR SYNTHESIS TESTS CAN BE ENHANCED BY DEVELOPING IN VIVO DNA REPAIR SYNTHESIS TO MEASURE ORGAN AND TISSUE SPECIFICITIES OF RESPONSES TO HAZARDOUS AGENTS AND BY USING THESE SAME TISSUES AS THE SOURCES OF METABOLIC ACTIVATION ENZYMES FOR IN VITRO DNA REPAIR SYNTHESIS ASSAYS. THE SIGNIFICANCE OF DNA REPAIR SYNTHESIS WILL BE FURTHER ENHANCED BY EXAMINATIONS OF DNA REPAIR IN PREMATURELY CONDENSED CHROMOSOMES AND BY CORRELATIONS OF THE EXTENT OF DNA REPAIR WITH MEASUREMENTS OF CYTOGENETIC ABERRATIONS, WITH MUTAGENESIS OF MAMMALIAN CELLS, AND WITH CARCINOGENESIS AS MEASURED BY CELL TRANSFORMATION.

**PROJECT: 04183-HEPATIC AND EXTRAHEPATIC CONJUGATION AND OXIDATION METABOLIC PATHWAYS FOR XENOBIOTICS IN MAMMALS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 20000
TASK CODE=V625F-28 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.: G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.: JR BEND US HEW NATL INST OF HLTH /PHS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004183 SSIE-GMA 4756 EPA -D5-E772 TASK-V625F-28
AP -625F DU -N140 LABT-EMI

ABSTRACT..... SEVERAL ARENE OXIDES AND ALKENE OXIDES ARE KNOWN TO REACT COVALENTLY WITH MACROMOLECULES, INCLUDING NUCLEIC ACIDS, AND TO TRANSFORM CELLS IN VITRO, SUGGESTING THEIR ROLE AS ULTIMATE CARCINOGENS, MUTAGENS, AND CYTOTOXINS. WE ARE STUDYING THE MIXED-FUNCTION OXIDASES, WHICH CONVERT UNSATURATED HYDROCARBONS TO EPOXIDES, AND THE FURTHER METABOLISM OF ARENE AND ALKENE OXIDES BY SOLUBLE FRACTION GLUTATHIONE S-TRANSFERASES AND MICROSOMAL EPOXI`E HYDRASE IN HEPATIC AND EXTRAHEPATIC TISSUES (INCLUDING TESTIS, OVARY, AND ADRENAL). THE RELATIVE QUANTITATIVE IMPORTANCE OF THE TWO PATHWAYS FOR EPOXIDE METABOLISM IS BEING STUDIED IN VITRO AND IN ISOLATED PERFUSED RAT LIVER AND RABBIT LUNG PREPARATIONS, WHICH HAVE INTACT CELLULAR STRUCTURE.

**PROJECT: 04184-ENVIRONMENTAL TERATOLOGY INFORMATION CENTER (ETIC)

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=V625F-29 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. JS WASSOM U.S. DEPT. OF ENERGY
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004184 SSIE-GMA 4750 EPA -D5-E772 TASK-V625F-29
AP -625F DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVE: TO ESTABLISH A TERATOLOGY INFORMATION CENTER THAT WILL MEET AS MANY OF THE NEEDS OF THE BIOMEDICAL COMMUNITY AS IS FEASIBLE. METHODS EMPLOYED: 1. TO COLLECT REPRINTS OF ALL PUBLICATIONS THAT CONTAIN DATA PERTINENT TO DETERMINATION OF THE TERATOGENIC POTENTIAL OF ENVIRONMENTAL AGENTS OR CONDITIONS TO WHICH MAN IS EXPOSED; 2. TO PREPARE EXTRACTS FROM THE RELEVANT REFERENCES AND TO MAKE THE EXTRACTED INFORMATION AVAILABLE TO THE BIOMEDICAL COMMUNITY; AND 3. TO ENCOURAGE SCIENTIFIC EVALUATION OF THE ADEQUACY OF AVAILABLE DATA ON HIGH PRIORITY AGENTS FOR DETERMINATION OF TERATOGENIC POTENTIAL. PROGRESS DURING THIS PERIOD: THE NUMBER OF PERTINENT REFERENCES AND REPRINTS COLLECTED IN THE ETIC FILE WAS INCREASED BY 2,100 TO GIVE A CURRENT TOTAL ABOVE 10,000. ON JULY 25, 1977, 8,880 REFERENCES FROM THE TERATOLOGY FILE WERE MADE AVAILABLE TO USERS "ON-LINE" THROUGH THE ADDITION OF ETIC TO THE NATIONAL LIBRARY OF MEDICINE'S TOXLINE. THE "ON-LINE" ETIC FILE CONTAINS INFORMATION ON MORE THAN 2,200 AGENTS.

**PROJECT: 04185-REGULATION OF NEURAL DISTRIBUTION OF LEAD

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 67064
TASK CODE=V625F-30 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. LA OTUAMA UNIV OF NORTH CAROLINA SCH OF MED/PATH DEPT
JT GATZY UNIV OF NORTH CAROLINA SCH OF MED/PATH DEPT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004185 SSIE-GMA 4751 EPA -D5-E772 TASK-V625F-30
AP -625F DU -N140 LABT-EMI

ABSTRACT.....: FACTORS REGULATING THE ENTRY AND DISTRIBUTION OF INORGANIC LEAD IN THE NERVOUS SYSTEM WILL BE STUDIED UNDER CONTROL AND SELECTED ABNORMAL CONDITIONS. IN THE GUINEA PIG, IN VIVO CSF PERFUSION WILL QUANTITATE THE DISAPPEARANCE RATE OF 210PB AND 45CA ACROSS THE BLOOD-CSF BARRIER. THE UPTAKE OF 210PB AND 45CA ACROSS THE BLOOD-BRAIN BARRIER WILL BE MEASURED BY AN INDICATOR DILUTION TECHNIQUE. THESE MEASUREMENTS WILL BE CORRELATED WITH LEVELS OF LEAD AND CALCIUM IN THE ABSENCE OF AN INTACT BARRIER WILL BE ASSESSED BY MEASURING IN VITRO UPTAKE AND RELEASE OF 210PB AND CA. THIS WILL BE DETERMINED UNDER CONTROL CONDITIONS; AFTER INHIBITION OF GENERAL, OXIDATIVE AND GLYCOLYTIC METABOLISM; AFTER CHANGES IN MEDIUM ELECTROLYTE COMPOSITION AND AFTER EXPOSURE TO REAGENTS THAT ACT AS LIGANDS. AN EFFORT WILL BE MADE TO DISTINGUISH SOLUTE ACCUMULATION DUE TO BINDING WITHIN NEURAL TISSUE FROM THAT DUE TO MOVEMENT ACROSS THE TISSUE USING EXCISED BULLFROG CHOROID PLEXUS AND MENINGES WHICH CAN BE MOUNTED AS "POLAR" MEMBRANES, ALLOWING DIRECT MEASUREMENT OF TRANSEPITHELIAL FLUX. THIS PARAMETER WILL BE STUDIED IN CONTROL AND ACUTELY POISONED FROGS AND CONTRASTED WITH THE RESULTS OF IN VITRO UPTAKE AND RELEASE EXPERIMENTS IN THE SAME SPECIES. THE BEHAVIOR OF 109CD, A NON-NEUROTOXIC METAL, WILL ALSO BE OBSERVED IN SEVERAL OF THE ABOVE EXPERIMENTAL SITUATIONS, SO AS TO SUGGEST PATTERNS OF UPTAKE AND DISTRIBUTION THAT ARE NOT CORRELATED WITH NEUROTOXICITY. THESE STUDIES WILL A) ESTABLISH HOW THE DISORDERED FLOW OF LEAD ACROSS NEURAL BARRIERS THAT WE HAVE NOTED IN LEAD ENCEPHALOPATHY CONTRIBUTES TO ITS PATHOGENESIS; B) ALLOW DEVELOPMENT OF PREDICTIVE TESTS FOR NEURAL TOXICITY OF POTENTIAL TOXINS AND POLLUTANTS BY TESTING THEIR EFFECTS ON BARRIER

**PROJECT: 04186-FUNCTION OF METALLOTHIONEIN IN HEAVY METAL METABOLISM

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 36474
TASK CODE=V625F-31 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. FO BRADY UNIV OF SOUTH DAKOTA SCH OF ARTS & SCI
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004186 SSIE-GMA 4755 EPA -D5-E772 TASK-V625F-31
AP -625F DU -N140 LABT-EMI

ABSTRACT..... THE LOW MOLECULAR WEIGHT, CYSTEINE-RICH PROTEIN METALLOTHIONEIN WILL BE STUDIED UNDER A VARIETY OF CONDITIONS IN ORDER TO ELUCIDATE ITS FUNCTION IN HEAVY METAL METABOLISM. ITS INVOLVEMENT IN THE MECHANISMS OF INCORPORATION, METABOLISM, DEPOSITION AND TURNOVER OF HAZARDOUS TOXIC METALS, WHICH ARE BECOMING INCREASINGLY PREVALENT IN THE ENVIRONMENT AS BYPRODUCTS ASSOCIATED WITH VARIOUS ENERGY RELATED TECHNOLOGIES, WILL BE ELUCIDATED. SPECIFICIALLY, THE FOCUS OF THESE STUDIES WILL BE ON THE MECHANISMS OF ACTION AND SITES OF LOCALIZATION AND TRANSFER OF HEAVY METALS IN PERFUSED RAT LUNGS, AND POSSIBLY LIVERS AND KIDNEYS, (BOTH IN VIVO AND EX VIVO) AND IN RATS (BOTH ADULTS AND NEONATES). THE HEAVY METALS OF INTEREST IN THIS STUDY ARE ZINC, COPPER, CADMIUM, MERCURY, NICKEL, AND THALLIUM. INITIALLY, THESE WILL BE STUDIED INDIVIDUALLY AS A PRELIMINARY TO MORE IMPORTANT EXPERIMENTS WHICH WILL INVOLVE THE STUDY OF INTERACTIONS OF TWO OR MORE OF THESE METALS, E.G., A SITUATION WHICH IS MORE LIKELY TO OCCUR UNDER ENVIRONMENTAL CONDITIONS. THE GOAL OF THESE STUDIES IS TO ESTABLISH WHETHER METALLOTHIONEIN IS FUNCTIONING IN DETOXICATION OF TOXIC HEAVY METALS, THE PRESENCE OF TOXIC HEAVY METALS SERVING TO INTERFERE WITH THESE NORMAL PROCESSES.

**PROJECT: 04187-BIOLOGICAL EFFECTS OF 60 HERTZ ELECTRIC FIELDS

STARTING/ COMPLETION DATE : 00/77 UNK FUNDING ESTIMATED FY77 / $ 31000
TASK CODE=V625F-32 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.: G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.: AA MARINO STATE UNIVERSITY OF NEW YORK
RO BECKER STATE UNIVERSITY OF NEW YORK
JA SPADARO STATE UNIVERSITY OF NEW YORK
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004187 SSIE-GMA 4752 EPA -D5-E772 TASK-V625F-32
AP -625F DU -N140 LABT-EMI

ABSTRACT..... 60 HERTZ ELECTRIC FIELDS ARISING FROM ELECTRIC POWER TRANSMISSION LINES ARE UBIQUITOUSLY PRESENT IN THE ENVIRONMENT. THE STRENGTH OF SUCH FIELDS VARIES DIRECTLY WITH THE OPERATION VOLTAGE OF THE TRANSMISSION LINE AND INVERSELY WITH DISTANCE FROM THE LINE. BIOLOGICAL EFFECTS ATTRIBUTABLE TO LOW FREQUENCY ELECTRIC FIELD EXPOSURE HAVE RECENTLY BEEN DESCRIBED, NOTWITHSTANDING EARLIER WORK MINIMIZING THE BIOLOGICAL SIGNIFICANCE OF SUCH FIELDS. PRELIMINARY RESULTS OBTAINED IN OUR LABORATORY SHOW THAT A 60 HERTZ ELECTRIC FIELD OF 150 VOLTS/CM IS A BIOLOGICAL STRESSOR. THAT IS, FIELD EXPOSURE ALTERS NORMAL GROWTH IN RATS AND MICE AND PRODUCES CHANGES IN THE LEVELS OF SERUM HYDROXYCORTICOSTERONE AND SERUM PROTEINS. THIS PROJECT INVOLVES THE SYSTEMATIC STUDY OF THESE PHENOMENA IN GREATER DETAIL. PRESENTLY, THE HUMAN HEALTH HAZARD ASSOCIATED WITH EXPOSURE TO 60 HERTZ ELECTRIC FIELDS IS UNKNOWN. THERE HAVE BEEN NO SYSTEMATIC STUDIES OF SUCH EFFECTS AND CONSEQUENTLY THERE ARE NO FEDERAL OR STATE STANDARDS FOR PERMISSIBLE NON-OCCUPATIONALLY RELATED EXPOSURE. CONTINUING OUR INITIAL WORK, WE PROPOSE THE FOLLOWING EXPERIMENTS TO EVALUATE THE BIOLOGICAL EFFECTS OF 60 HERTZ ELECTRIC FIELDS AT 150 VOLTS/CM: 1. THE EFFECT IN RATS ON SERUM HYDROXYCORTICOSTERONE, TRIGLYCERIDES, TOTAL PROTEINS AND THE EFFECT ON GROWTH, TISSUE STRUCTURE AND FOOD AND WATER CONSUMPTION. 2. THE EFFECT ON REPRODUCTION IN MICE. 3. THE EFFECT IN RABBITS OF ACUTE AND CHRONIC EXPOSURE. THE EXPERIMENTS WILL BE REPEATED AS A FUNCTION STRENGTH AND FREQUENCY.

**PROJECT: 04188-FACTORS AFFECTING IRRITANT POTENCY OF GASES AND AEROSOLS

STARTING/ COMPLETION DATE : 00/77 UNK FUNDING : ESTIMATED FY77 / $ 82000
TASK CODE=V625F-33 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. MO AMDUR HARVARD UNIV PUBLIC HEALTH/PHYS DEPT
DW UNDERHILL HARVARD UNIV PUBLIC HEALTH/PHYS DEPT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004188 SSIE-GMA 4747 EPA -D5-E772 TASK-V625F-33
AP -625F DU -N140 LABT-EMI

ABSTRACT..... WE PROPOSE TO EXAMINE THE JOINT TOXIC ACTION OF SULFUR DIOXIDE AND OZONE. CONCENTRATIONS USED WILL BE IN THE RANGE OF 0.2-0.8 PPM OF EACH GAS. THEY WILL BE COMBINED IN EQUAL CONCENTRATIONS AS WELL AS IN VARYING RATIOS. THE CRITERIA OF IRRITANT RESPONSE WILL BE ALTERATIONS IN THE RESPIRATORY MECHANICS OF GUINEA PIGS. THE RESPONSE TO THE COMBINATION WILL BE COMPARED TO PREVIOUSLY OBSERVED CHANGES PRODUCED BY SULFURIC ACID. WE ALSO PLAN TO STUDY THE UPTAKE OF SULFUR DIOXIDE BY WETTED WALL TUBES WITH AND WITHOUT THE ADDITION OF AEROSOLS. WE PLAN TO STUDY THE SOLUBILITY AND REACTIVITY OF SULFUR DIOXIDE IN SOLUTIONS OF VARIOUS SALTS WHICH HAVE BEEN SHOWN TO POTENTIATE THE BIOLOGICAL RESPONSE

**PROJECT: 04189-RESPIRATORY TRACT DEPOSITION OF INHALED AEROSOLS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK       FUNDING    ESTIMATED   FY77  / $   52000
                    TASK CODE=V625F-34      **EPA=D5-E772     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: G  RAUSA                   EPA/HDQTRS- OEMI
INVESTIGATOR.: CP YU                      STATE UNIVERSITY OF NEW YORK
               DB TAULBEE                 STATE UNIVERSITY OF NEW YORK
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004189            SSIE-GMA  4749        EPA -D5-E772          TASK-V625F-34
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... MATHEMATICAL MODELS ARE TO BE DEVELOPED FOR THEORETICAL PREDICTION OF PARTICLE DEPOSITION AND
                DISTRIBUTION ALONG THE RESPIRATORY TRACT SYSTEM. SPECIFICALLY, THE FOLLOWING TASKS ARE TO BE
                UNDERTAKEN DURING THE PERIOD OF REQUESTED SUPPORT: 1. DEVELOP A MATHEMATICAL MODEL FOR DEPOSITION
                IN MAN AT NOSE-BREATHING. 2. RECOMMEND FIGURES FOR THE REGIONAL DEPOSITION IN THE HUMAN LUNG AT
                NOSE AND MOUTH-BREATHING UNDER VARIOUS WORKING CONDITIONS. EMPHASIS WILL BE GIVEN TO FINE PARTICLES
                WHICH ARE DIFFICULT TO BE REMOVED FROM POWER PLANT EMISSIONS. 3. DEVELOP A MATHEMATICAL MODEL FOR
                DEPOSITION IN SMOKERS AND PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE. 4. DEVELOP A
                MATHEMATICAL MODEL FOR DEPOSITION IN EXPERIMENTAL ANIMALS. THE BASIC METHOD TO BE USED IS THE ONE
                PREVIOUSLY DEVELOPED BY THE PRINCIPAL INVESTIGATOR AND HIS FACU
```

**PROJECT: 04190-TRACE ELEMENT DEPOSITION IN AMBIENT AEROSOL INHALATION

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :  FUNDING    ESTIMATED   FY77  / $   57104
                    TASK CODE=V625F-35      **EPA=D5-E772     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                   EPA/HDQTRS- OEMI
INVESTIGATOR.. JW WINCHESTER              FLORIDA STATE UNIV                 DEPT OF OCEANOGRAPHY
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004190            SSIE-GMA  4748        EPA -D5-E772          TASK-V625F-35
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... THE RESPONSE TO INHALATION OF AMBIENT AEROSOL PARTICLES FROM INDOOR AND SELECTED OUTDOOR
                ENVIRONMENTS WILL BE INVESTIGATED USING HIGH SENSITIVITY ELEMENTAL ANALYSIS BY PROTON INDUCED X-RAY
                EMISSION, PIXE. THE RESPONSE MAY INCLUDE BOTH DEPOSITION OF PARTICLES IN THE RESPIRATORY TRACT AND
                GROWTH IN PARTICLE SIZE DUE TO EXPOSURE TO HIGH RELATIVE HUMIDITY DURING BREATHING. BOTH RESPONSES
                MAY DEPEND ON PARTICLE SIZE AND ON CHEMICAL COMPOSITION OF THE PARTICLES AND MAY BE DIFFERENT FOR
                DIFFERENT COMPONENT PARTICLES IN A MIXED AEROSOL. THE DIFFERENT COMPONENTS MAY BE DISTINGUISHED BY
                THEIR DIFFERENT ELEMENTAL COMPOSITION, AND THE RESPIRATORY RESPONSE OF EACH MAY BE DETERMINED IN A
                SINGLE EXPERIMENT. SAMPLES WILL BE TAKEN BY 5 STAGE CASCADE IMPACTOR WITH FINE PARTICLE FILTER AND
                WILL PROVIDE RESOLUTION OF PARTICLES FROM LESS THAN 0.25 TO GREATER THAN 4 MICRONS EQUIVALENT
                AERODYNAMIC DIAMETER. EACH SIZE RANGE IS ANALYZED FOR ITS ELEMENTAL CONSTITUENTS BY PIXE, INCLUDING
                S, CL, K, CA, TI, V, CR, MN, FE, NI, CU, ZN, BR, PB, ZR, CD, AND ADDITIONAL HEAVY METALS IF PRESENT
                IN THE AEROSOL. THE NANOGRAM SENSITIVITY OF THE PIXE TECHNIQUE PERMITS FINE PARTICLE SIZE
                RESOLUTION AT A SAMPLING RATE OF 1 LITER/MINUTE AND REQUIRES OF HUMAN SUBJECTS ONLY 10 MINUTES OR
                LESS OF BREATHING TIME PER SAMPLE. EXPERIMENTS ARE CARRIED OUT USING AMBIENT AEROSOL FROM DIFFERENT
                ACTUAL ENVIRONMENTS AND DO NOT REQUIRE THE USE OF SPECIAL TRACER MATERIALS. A MAJOR OBJECTIVE OF
                THE RESEARCH WILL BE TO STANDARDIZE EXPERIMENTAL CONDITIONS AND DEVELOP A COMPACT AND PORTABLE
                SAMPLING UNIT WHICH CAN BE USED IN MORE SPECIALIZED MEDICAL TESTS OF INHALATION RESPONSE POLLUTION
                AEROSOL PARTICLES.
```

**PROJECT: 04192-REGIONAL DEPOSITION OF INHALED PARTICLES IN MAN

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :  FUNDING    ESTIMATED   FY77  / $   74777
                    TASK CODE=V625F-36      **EPA=D5-E772     ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                   EPA/HDQTRS- OEMI
INVESTIGATOR.. M  LIPPMANN                NEW YORK UNIV
               RE ALBERT                  NEW YORK UNIV
               RB SCHLESINGER             NEW YORK UNIV
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004192            SSIE-GMA  4753        EPA -D5-E772          TASK-V625F-36
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... THE OBJECTIVE OF THIS RESEARCH PROGRAM IS TO DEVELOP AND REFINE REALISTIC PREDICTIVE MODELS FOR
                PARTICLE DEPOSITION EFFICIENCIES AND PATTERNS IN THE HUMAN TRACHEOBRONCHIAL TREE. THE MODELS WILL
                COVER RESPIRABLE PARTICLES OF ALL SIZES, A WIDE RANGE OF CONSTANT AND CYCLIC RESPIRATORY FLOWS, AND
                BE APPLICALBE TO POPULATION SUBGROUPS AS WELL AS AVERAGES. THEY WILL BE BASED UPON AVAILABLE DATA
                FROM STUDIES ON HUMANS IN VIVO, AND AVAILABLE DATA AND NEW DATA ON THE DISTRIBUTION OF DEPOSITION
                IN HOLLOW BRONCHIAL CASTS. THE NEW STUDIES WILL BE PERFORMED USING GAMMA-TAGGED MONODISPERSE
                AEROSOLS, TWELVE NEW BRONCHIAL CASTS WHICH EXTEND TO 2 MM AIRWAYS, NEW REPLICATE LARGE AIRWAY
                CASTS, NEW MULTIPLE LOBULE CASTS OF AIRWAYS LESS THAN OR EQUAL TO 2 MM, AND APPROPRIATE COLLIMATED
                SCINTILLATION DETECTORS. A VARIABLE ORIFICE LARYNX MODEL WILL BE CONSTRUCTED FOR THE DEPOSITION
                STUDIES WITH CYCLIC FLOWS. HIGH RESOLUTION SURFACE DENSITY MEASUREMENTS WILL BE MADE BY COUNTING
                THE NUMBERS OF PARTICLES ON BIFURCATIONS AND OTHER SELECTED CAST SURFACES WITH A SCANNING ELECTRON
                MICROSCOPE. THESE MEASUREMENTS WILL ESTABLISH CONCENTRATIONS FACTORS AND IDENTIFY LOCATIONS FOR THE
                CELLS WITH THE HIGHEST EXPOSURES TO INHALED PARTICLES; THEREBY PROVIDING A BASIS FOR THE DEPOSITION
                COMPONENTS OF AN AIRWAY SURFACE DOSIMETRY MODEL RELATED TO HUMAN BR
```

**PROJECT: 04194-EFFECTS OF ENVIRONMENTAL AGENTS ON MALE AND FEMALE REPRODUCTIVE TRACT FUNCTION

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=V625F-37 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.: G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.: J DAVIS ENDOCRINE LABS OF MADISON INC
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004194 SSIE-GMA 4754 EPA -D5-E772 TASK-V625F-37
AP -625F DU -N140 LABT-EMI
ABSTRACT..... A SERIES OF EXPERIMENTS ARE DESCRIBED WHICH WILL PROVIDE INFORMATION ON THE EFFECTS OF 24 SELECTED XENOBIOTICS (6 PER ANNUM) ON THE FERTILITY OF MICE (MALE AND FEMALE) FOLLOWING PRENATAL OR POSTNATAL EXPOSURE, AND, DETERMINE IF LEVELS OF REPRODUCTIVE HORMONES HAVE DEVIATED FROM THE NORM OR IF A PATHOLOGIC CONDITION EXISTS IN MICE WHOSE REPRODUCTIVE CAPACITY HAS BEEN ALTERED. INFORMATION WILL BE OBTAINED ON THE POSSIBLE DEVELOPMENTAL TOXICITY OF THESE CHEMICALS, FOCUSING ON TRANSPLACENTAL CARCINOGENESIS.

**PROJECT: 04195-EFFECTS OF 60 HZ FIELDS ON THE MAMMALIAN CENTRAL NERVOUS SYSTEM

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 60000
TASK CODE=V625F-38 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. WR ADEY UNIV OF CALIFORNIA SCH OF MED/ANATOMY DEPT
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004195 SSIE-GMA 4744 EPA -D5-E772 TASK-V625F-38
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: THE OBJECTIVES OF THIS RESEARCH ARE TO DETERMINE THE EFFECTS OF 60 H FIELDS FROM HIGH VOLTAGE TRANSMISSION LINES ON THE CENTRAL NERVOUS SYSTEM OF MAMMALS. METHODS EMPLOYED: ENVIRONMENTAL FIELD CONDITIONS SIMILAR TO THOSE FOUND IN THE VICINITY OF HIGH VOLTAGE TRANSMISSION LINES WILL BE SIMULATED. THESE FIELD GRADIENTS WILL RANGE FROM 1 TO 2000 VOLTS/METER. THE EFFECTS OF THESE FIELDS ON THE BIOLOGICAL RHYTHMS IN RATS WILL BE EVALUATED. THE EFFECTS ON THE NEUROENDOCRINE MECHANISM IN RATS WILL BE EXAMINED BY USING 17-HYDROXYSTEROIDS, CALCIUM, PHOSPHORUS, VANILAMANDELIC ACID AND OTHER URINARY INDICATORS OF BIORHYTHMICITY. CHANGES IN THE NEUROCHEMISTRY OF BRAIN TISSUE OF CATS WILL BE STUDIED. THESE STUDIES WILL INCLUDE THE MEASUREMENT OF BOTH CA 2 ION AMINO ACID EFFLUXES FROM THE CEREBRAL CORTEX OF THE CAT. MAJOR FINDINGS: EXPOSURE OF RATS TO ELECTRIC FIELDS OF 50 VOLTS/METER, AND 500 VOLTS/METER HAVE BEEN COMPLETED. ACTIVITY MEASUREMENTS AT 50 VOLTS/METER SHOWED NO DIFFERENCES AS COMPARED TO THE CONTROLS. AT 500 VOLTS/METER AN INCREASE IN ACTIVITY OF THE EXPOSED OVER THE CONTROLS WERE MEASURED. AT BOTH 50 VOLTS/METER AND 500 VOLTS METER AN INCREASE IN URINE OUTPUT WAS MEASURED WITH NO INCREASE IN WATER INTAKE. AT 500 VOLTS/METER NO CHANGE IN GROWTH RATE WAS OBSERVED, HOWEVER, AT 500 VOLTS/METER A SLOWER WEIGHT GAIN WAS MEASURED. THYROID AND ADRENAL TISSUE WEIGHTS WERE TAKEN AT THE END OF EXPOSURE. AVERAGE WEIGHTS OF WET ADRENAL TISSUE WAS HIGHER (56.8 MG) FOR THE 500 VOLTS/METER SERIES THAN IN THE CONTROL GROUP (43.1 MG). HOWEVER, NO DIFFERENCES WERE DETECTED IN AVERAGED WET THYROID TISSUE WEIGHTS (19.0 VERSUS 18.5 MG).

**PROJECT: 04196-ASSESSMENT OF NEUROBEHAVIORAL CONSEQUENCES OF ENERGY RELATED ENVIRONMENTAL FACTORS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 125000
TASK CODE=V625F-39 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.: G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.: CL MITCHELL US HEW NATL INST OF HLTH /PHS
HA TILSON US HEW NATL INST OF HLTH /PHS
PA CABE US HEW NATL INST OF HLTH /PHS
RE SQUIBB US HEW NATL INST OF HLTH /PHS
MILESTONES... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004196 SSIE-GMA 4739 EPA -D5-E772 TASK-V625F-39
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THERE IS CONSIDERABLE CONCERN ABOUT THE POSSIBILITY FOR SUBTLE NEUROBEHAVIORAL CHANGES RESULTING FROM LOW-LEVEL CHRONIC EXPOSURE TO ENERGY RELATED POLLUTANTS. UNFORTUNATELY, THERE IS ONLY LIMITED AGREEMENT AS TO THE SENSITIVITY AND UTILITY OF MANY COMMONLY USED NEUROBEHAVIORAL TESTS IN ANIMALS FOR THE EXTRAPOLATION OF RISKS TO HUMANS. THEREFORE, THE CURRENT WORK SEEKS TO PROVIDE A STRATEGY AIMED AT RESOLVING THIS IMPORTANT PROBLEM. TEST VALIDATION WILL BE ACCOMPLISHED BY EVALUATING KNOWN NEUROTOXINS IN A BATTERY OF TESTS CHOSEN TO ASSESS IN ANIMAL MODELS A WIDE RANGE OF EFFECTS BASED ON REPORTED HUMAN TOXICOSIS SYMPTOMATOLOGY. PHENOMENA TO BE MEASURED ARE ONGOING HOME CAGE MOTOR ACTIVITY, FOOD CONSUMPTION, WATER CONSUMPTION (AND THE DIURNAL CYCLING OF THESE), NEUROLOGICAL/PHYSIOLOGICAL INDICES (REFLEXES, AUTONOMIC SIGNS, EQUILIBRIUM/GAIT, BALANCE, TREMOR REACTIVITY, AND MUSCULAR STRENGTH), AND ASPECTS OF COGNITIVE AND ASSOCIATIVE BEHAVIOR INVOLVING BOTH ENDOGENOUS AND EXOGENOUS (SENSORY) CONTROL OF RESPONDING. AN INTEGRATED TIME SCHEME COVERING 90 DAYS OF CHEMICAL TREATMENT AND 30 DAYS OF POST-DOSING RECOVERY WILL BE USED. BY COMPARING THE OBSERVED RESULTS OF THE NEUROTOXINS IN THE ANIMAL MODELS WITH THE PREDICTED EFFECTS BASED ON REPORTED HUMAN SYMPTOMATOLOGY, SOME DECISION CONCERNING THE VALIDIT

**PROJECT: 04197-CHEMICALLY INDUCED MUTATIONS AT BIOCHEMICAL LOCI IN MICE

STARTING/ COMPLETION DATE : 00/77 UNK FUNDING ESTIMATED FY77 / $ 246400
TASK CODE=V625F-40 **EPA=D5-E772 ** (IAG) PRIOR FY /
EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. F JOHNSON US HEW NATL INST OF HLTH /PHS
MILESTONES... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004197 SSIE-GMA 4745 EPA -D5-E772 TASK-V625F-40
AP -625F DU -N140 LABT-EMI
ABSTRACT.....: ALTHOUGH IN THEORY ALKYLATING AGENTS SUCH AS TEM SHOULD BE CAPABLE OF INDUCING GENE MUTATIONS IN MAMMALS, ONLY A RELATIVELY SMALL AMOUNT OF DATA ARE AVAILABLE SUPPORTING THIS HYPOTHESIS. THE OBJECTIVE OF THIS STUDY WAS TO TEST THE EFFECTIVENESS OF A CHEMICAL MUTAGEN IN INDUCING MUTATIONS AT A NUMBER OF DIFFERENT ENZYME LOCI IN THE MOUSE. STRAIN DBA/2J MALES WERE EXPOSED TO TRIETHYLENEMELIMINE (TEM) BY I.P. INJECTION. CONTROL MALES WERE INJECTED WITH THE CARRIER (HBSS). MALES WERE MATED TO C57BL/6J FEMALES. KIDNEYS AND BLOOD WERE OBTAINED FROM ALL F1 OFFSPRING AND SAID TISSUES WERE ANALYZED BY STARCH GEL ELECTROPHORESIS FOR THE OCCURRENCE OF MUTATIONS AT THE VARIOUS ENZYME LOCI. A NUMBER OF PUTATIVE MUTANTS HAVE BEEN IDENTIFIED IN THIS EXPERIMENT AND PROGENY TESTING IS UNDERWAY TO CONFIRM THESE MUTATIONS.

**PROJECT: 04198-LEAD TOXICITY AND ENERGY METABOLISM IN IMMATURE BRAIN

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 70527
TASK CODE=V625F-41 **EPA=D5-E772 ** (IAG) PRIOR FY /
EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. SD HOLTZMAN STANFORD UNIV SCH OF MED
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004198 SSIE-GMA 4740 EPA -D5-E772 TASK-V625F-41
AP -625F DU -N140 LABT-EMI
ABSTRACT..... LEAD IS A UBIQUITOUS TOXIC POLLUTANT. THE MOST SERIOUS MANIFESTATION OF PEDIATRIC LEAD POISONING IS AN ACUTE ENCEPHALOPATHY. IN ADDITION, THE RISING BURDEN OF ENVIRONMENTAL LEAD MAY BE PRODUCING SIGNIFICANT BRAIN DAMAGE, WITHOUT OVERT ENCEPHALOPATHY, IN YOUNG CHILDREN, IN THE UNBORN FETUS, AND THE NEONATE. PATHOLOGIC STUDIES SUGGEST THAT LEAD PRODUCES EDEMA AND CAPILLARY CHANGES AT A "CRITICAL" TIME IN THE IMMATURE BRAIN OF THE HUMAN AND IN A RAT MODEL OF LEAD ENCEPHALOPATHY. THIS "CRITICAL" PERIOD IN THE RAT CONTAINS MANY AGE-DEPENDENT CHANGES IN ENERGY METABOLISM INCLUDING ACTIVITIES OF THE ELECTRON TRANSPORT CHAIN (ETC) AS DESCRIBED BY THIS INVESTIGATOR AND OTHERS. LEAD DOES ACT ON THE ETC IN OTHER TISSUES. HOWEVER, THERE ARE NO STUDIES IN IMMATURE BRAIN OF LEAD EFFECTS ON THE ETC, A PROBABLE BASIC STEP IN THE PATHOGENESIS OF LEAD ENCEPHALOPATHY. PRELIMINARY RESULTS ARE PRESENTED ON EFFECTS OF LEAD ON OXIDATIVE PHOSPHORYLATION IN IMMATURE RAT BRAIN MITOCHONDRIA. WITHIN 2 DAYS OF FEEDING LEAD TO 2 WEEK OLD ANIMALS, RESPIRATION WITH NAD-LINKED SUBSTRATES IS UNCOUPLED, REFLECTING AN INCREASED STATE 4 RATE. DURING THE SUBSEQUENT 2 WEEK PRE-ENCEPHALITIC PERIOD OF LEAD FEEDINGS, BOTH STATE 3 AND 4 RATES BECOME INCREASINGLY DEPRESSED. CYTOCHROME OXIDASE ACTIVITY SHOWS THE SAME CHANGES. THESE EFFECTS ARE MORE SIGNIFICANT IN CEREBELLAR THAN IN CEREBRAL HEMISPHERE MITOCHONDRIA. IMPORTANTLY, THESE EFFECTS OF LEAD OCCUR EARLIER THAN PREVIOUSLY REPORTED CHANGES IN BRAIN FLUID, ELECTROLYTES, AND MORPHOLOGY. CONSIDERING THE PRELIMINARY RESULTS AND OBSERVATIONS OUTLINED ABOVE, INVESTIGATIONS ARE PROPOSED BASED ON THESE HYPOTHESES: A) THE PRIMARY EFFECT OF LEAD IN DEVELOPING BRAIN IS ON ENERGY METABOLISM; SPECIFICALLY ON SITES IN THE ETC; AND B) THIS EFFECT IS BASIC TO THE TOXIC EFFECTS OF LEAD. EXPERIMENTS ARE DESIGNED TO DELINEATE THE SITES AND MECHANISMS OF ACTION OF LEAD TO LEARN MORE OF THE PROPERTIES OF THE ETC IN IMMATURE BRAIN AND OF THE PATHOGENESIS OF LEAD ENCEPHALOPATHY. YOUNGER ANIMALS WILL BE STUDIED TO DELINEATE POTENTIAL EFFECTS OF LEAD ON THE BRAIN OF THE HUMAN FETUS AND NEONATE.

**PROJECT: 04199-ENVIRONMENTAL MUTAGEN INFORMATION CENTER

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 31000
TASK CODE=V625F-42 **EPA=D5-E772 ** (IAG) PRIOR FY /
EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. US WASSOM US DOE.OAK RIDGE LAB INFORMATION CTR COMPLEX
MILESTONES... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004199 SSIE-GMA 4737 EPA -D5-E772 TASK-V625F-42
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: THE MISSION OF THE ENVIRONMENTAL MUTAGEN INFORMATION CENTER (EMIC) IS TO COLLECT, ORGANIZE, AND DISSEMINATE CHEMICAL MUTAGENESIS INFORMATION. MAJOR FINDINGS AND PROPOSED COURSE: EMIC'S DATA FILE AT THE END OF MARCH 1977 CONTAINED 19,000 BIBLIOGRAPHIC ENTRIES. OF THESE, APPROXIMATELY 18,000 HAVE BEEN INDEXED WITH RESPECT TO AGENT(S), ORGANISM(S), AND CHEMICAL ABSTRACT SERVICE REGISTRY NUMBER(S). THE CENTER PROCESSES REQUESTS FOR INFORMATION AT A RATE OF 2-3 PER DAY. THESE REQUESTS COME PRIMARILY FROM GOVERNMENTAL AGENCIES IN THE UNITED STATES OR GOVERNMENT SUPPORTED RESEARCH IN UNIVERSITIES. SEVERAL REQUESTS FROM OTHER COUNTRIES ARE ALSO RECEIVED. THE EMIC DATA BANK CAN NOW BE SCREENED BY TOXLINE. EMIC WILL CONTINUE TO MONITOR THE WORLD SCIENTIFIC LITERATURE FOR REPORTS ON CHEMICAL MUTAGENESIS. IT WILL ISSUE ITS ANNUAL LITERATURE SURVEY IN THE MIDDLE OF THE FISCAL YEAR. THIS REPORT WILL INCLUDE AN INDEX TO TEST ORGANISMS OR TEST OBJECTIVES AS WELL AS INDEXES FOR AGENTS AND SELECTED TITLE KEYWORDS. AS GREAT A PORTION AS POSSIBLE OF EMIC'S TOTAL BIBLIOGRAPHIC ENTRIES WILL BE KEYWORDED WITH RESPECT TO AGENT, TEST ORGANISM, AND TEST OBJECT. EMIC WILL CONTINUE TO ANSWER SELECTED REQUESTS FOR SPECIAL INFORMATION FROM THE SCIENTIFIC, EDUCATION, AND INDUSTRIAL COMMUNITIES. TABULAR EXTRACTS OF THE DATA FROM LITERATURE WILL BE ADDED TO THE DATA FILE AS THEY ARE PREPARED IN CONJUNCTION WITH THE TIMELY STATE-OF-ART REPORTS ON SUBJECTS OF CURRENT SCIENTIFIC INTEREST.

**PROJECT: 04201-CHEMICAL AND ENVIRONMENTAL MUTAGEN STUDIES UTILIZING THE TRADESCANTIA TEST SYSTEM

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING : ESTIMATED FY77 / $ 150000
TASK CODE=V625F-43 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. J VANTHOF BROOKHAVEN NATL LAB
RL DIVON US HEW NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004201 SSIE-GMA 4741 EPA -D5-E772 TASK-V625F-43
AP -625F DU -N140 LABT-EMI
ABSTRACT..... WE HAVE DEMONSTRATED THAT METHODS DEVELOPED FOR STUDYING THE EFFECTS OF PHYSICAL MUTAGENS UTILIZING THE TRADESCANTIA GENETIC TEST SYSTEM CAN BE APPLIED WITH VERY LITTLE MODIFICATION TO CHEMICAL MUTAGEN INVESTIGATIONS. ALSO, DOSE RESPONSE DATA FROM PHYSICAL MUTAGEN TREATMENTS CAN BE USED FOR BASELINE COMPARISONS WITH DATA FROM CHEMICAL MUTAGEN EXPERIMENTS. PRESENT DATA INDICATE THAT THE SYSTEM IS SENSITIVE ENOUGH TO DETECT A SIGNIFICANT INCREASE IN MUTATION FREQUENCIES AT LEVELS WELL BELOW 1 PPM FOR SOME GASEOUS MUTAGENS. RESEARCH WILL CONTINUE USING VARIOUS CHEMICALS AND AIR POLLUTANTS SUSPECTED OR KNOWN TO BE MUTAGENIC. GREATER EFFICIENCY OF THE TEST SYSTEM WILL BE SOUGHT, THROUGH BASIC GENETIC STUDIES AND A BREEDING PROGRAM AIMED AT OBTAINING MORE SENSITIVE CLONES, DEVISING MORE EFFECTIVE CHEMICAL MUTAGEN EXPOSURE METHO

**PROJECT: 04202-MONITORING MUTAGENS (CLASTOGENS) WITH MAMMALIAN CHROMOSOMES

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 116863
TASK CODE=V625F-44 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. TC HSU UNIVERSITY OF TEXAS
FE ARRIGHI UNIVERSITY OF TEXAS
MILESTONES... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004202 SSIE-GMA 4759 EPA -D5-E772 TASK-V625F-44
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THERE IS AN URGENT NEED FOR DEVISING AND STANDARDIZING PROCEDURES FOR MONITORING THE EFFECTS OF ENVIRONMENTAL MUTAGENS ON THE GENETIC SYSTEMS OF HIGHER ANIMALS. FOR PRACTICAL PURPOSES, THESE PROCEDURES SHOULD BE RELATIVELY INEXPENSIVE, NOT LABORIOUS, EASILY QUANTITATED, AND THE TEST OBJECTS SHOULD BE RELATED TO THE GENETIC SYSTEM OF MAN AND OTHER MAMMALS. CHROMOSOMES OF CELLS IN CULTURE FULFILL ALL THESE CRITERIA AND SHOULD BE ONE OF THE MOST SUITABLE TESTING MATERIALS. SINCE MOST MUTAGENS INDUCE CHROMOSOME DAMAGE (HENCE THEY ARE ALSO CLASTOGENS), CHROMOSOME DAMAGE SHOULD SERVE AS A CONSERVATIVE INDICATOR OF GENE DAMAGE. HOWEVER, INVESTIGATORS IN THE PAST USED VARIOUS TEST OBJECTS (MANY WERE POOR MATERIALS) AND TEST SYSTEMS (MANY HAPHAZARDLY DESIGNED), SO THEIR DATA ARE INCOMPLETE AND ARE NOT STRICTLY COMPARABLE. THIS PROJECT IS DESIGNED TO SYSTEMATICALLY TEST SEVERAL CYTOLOGICALLY ADVANTAGEOUS MATERIALS AND TO DETERMINE THE MOST EFFICIENT, ECONOMICAL AND INFORMATION-YIELDING PROTOCOL FOR FUTURE SCREENING OF ENVIRONMENTAL MUTAGENS. OUR TEST MATERIALS INCLUDE, IN ADDITION TO DIPLOID HUMAN FIBROBLASTS, CELLS OF THE CHINESE HAMSTER (FOR ITS FAST GROWTH RATE AND GOOD CHROMOSOMES), THE INDIAN MUNTJAC (FOR ITS VERY LOW DIPLOID NUMBER, 2N EQUALS 6), TWO SPECIES OF THE DEER MICE (DIFFERING DRASTICALLY IN THE AMOUNT OF CONSTITUTIVE HETEROCHROMATIN AND REPETITIVE DNA CONTENT), THE LABORATORY MOUSE, AND SEVERAL OTHER SPECIES. TEST COMPOUNDS WILL INCLUDE WELL-KNOWN CLASTOGENS, PROBABLE CLASTOGENS AND UNTESTED CHEMICALS. THE DRUG EXPERIMENTS WILL CONSIST OF CONTINUOUS TREATMENTS (TO DETERMINE INHIBITION OF MITOSIS, STICKINESS, CHROMOSOME ORIENTATION, BREAKS AND SUBSEQUENT ABERRATIONS), ABERRATIONS IN THE RECOVERY POPULATIONS AFTER PULSE TREATMENTS, FREQUENCY OF SISTER CHROMATID EXCHANGES WHEN THE CELLS ARE TREATED WITH 5-BROMODEOXYURIDINE IN CONJUNCTION WITH TEST COMPOUNDS, AND OTHER CYTOGENETIC CHARACTERISTICS. ALSO, WE PLAN TO USE CHICK EMBRYOS IN VIVO TO TEST THE POSSIBILITY OF USING DEVELOPING

**PROJECT: 04204-RISK ASSESSMENT FOR ENVIRONMENTAL CARCINOGENS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 5000
TASK CODE=V625F-45 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. DG HOEL US HEW NATL INST OF HLTH /PHS
HA GUESS US HEW NATL INST OF HLTH /PHS
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004204 SSIE-GMA 4760 EPA -D5-E772 TASK-V625F-45
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THE PURPOSE OF THIS PROJECT IS TO DEVELOP IMPROVED STATISTICAL TECHNIQUES FOR USING DATA FROM ANIMAL CARCINOGENICITY TESTS CONDUCTED AT HIGH DOSE LEVELS TO ESTIMATE LONG TERM RISK FROM CHEMICAL CARCINOGENS AT VERY LOW DOSE LEVELS. EXISTING TECHNIQUES ARE EVALUATED AND NEW TECHNIQUES ARE STUDIED, WITH PARTICULAR EMPHASIS ON THOSE WHICH ATTEMPT TO RELATE MECHANISTICALLY TO THE CARCINOGENIC PROCESS.

**PROJECT: 04205-STATISTICAL DEVELOPMENT OF MULTISTAGE CARCINOGENESIS MODELS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :   FUNDING    ESTIMATED   FY77  / $  100000
                    TASK CODE=V625F-46      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.: G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. DG HOEL                     US HEW                                NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004205            SSIE-GMA  4767        EPA -D5-E772          TASK-V625F-46
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT.....: OBJECTIVE: TO IMPROVE METHODS FOR ESTIMATING HUMAN CANCER RISKS FROM ENVIRONMENTAL CONTAMINANTS.
                THESE RISK ESTIMATES ARE TO BE BASED UPON LABORATORY DATA TYPICALLY FROM CHRONIC FEEDING STUDIES IN
                RODENTS. APPROACH: THE MULTISTAGE MODEL FOR CARCINOGENESIS IS USED TO REPRESENT THE DOSE RESPONSE
                CURVE FOR EXTRAPOLATION OF HIGH DOSE EFFECTS TO LOW DOSE EFFECTS. PRODUCT/RESULTS EXPECTED. THE
                FOLLOWING RESULTS ARE EXPECTED: A) EFFECTS OF COMPETING RISKS ARE TO BE INVESTIGATED; B)
                DEVELOPMENT OF STATISTICAL DESIGNS OF EXPERIMENTS FOR LOW DOSE ESTIMATION; C) GOODNESS-OF-FIT
                COMPARISONS OF SEVERAL MODELS.
```

**PROJECT: 04207-LOW DOSE TOXICOLOGICAL ESTIMATION

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :   FUNDING    ESTIMATED   FY77  / $   12500
                    TASK CODE=V625F-47      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. DG HOEL                     US HEW                                NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004207            SSIE-GMA  4761        EPA -D5-E772          TASK-V625F-47
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... OBJECTIVE: TO DEVELOP STATISTICAL METHODS FOR ESTMATING LOW-DOSE TOXIC EFFECTS BASED UPON HIGH-DOSE
                EXPERIMENTAL DATA. APPROACH: 1) EXAMINE EXISTING METHODS OF OBTAINING ADI VALUES. 2) STUDY VARIOUS
                STATISTICAL DOSE-RESPONSE MODELS FOR TOXICOLOGICAL EXTRAPOLATION. 3) DEVELOP STATISTICAL LOW-DOSE
                ESTIMATION AND APPLY THEM TO SAMPLE DATA. PRODUCT/RESULTS EXPECTED: NEW METHODOLOGIES FOR
                ESTIMATING LOW-DOSE TOXIC EFFECTS OF ENVIRONMENTAL AGENTS.
```

**PROJECT: 04208-STATISTICAL STUDIES OF PROBLEMS OF HEALTH AND BIOLOGY

```
                    STARTING/ COMPLETION DATE : 00/77   UNK        FUNDING    ESTIMATED   FY77  / $   81391
                    TASK CODE=V625F-48      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. J  NEYMAN                   UNIVERSITY OF CALIFORNIA
               L  LECAM                    UNIVERSITY OF CALIFORNIA
               EL SCOTT                    UNIVERSITY OF CALIFORNIA
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004208            SSIE-GMA  4768        EPA -D5-E772          TASK-V625F-48
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT.....  IT IS INTENDED TO WORK ON THE DEVELOPMENT OF STATISTICAL AND PROBABILISTIC SUBDISCIPLINES
                PARTICULARLY IMPORTANT IN THE STUDIES OF BIOLOGY AND HEALTH PROBLEMS. WHENEVER POSSIBLE, SUCH
                STUDIES WILL BE CONDUCTED IN CONJUNCTION WITH SUBSTANTIVE BIOLOGICAL STUDIES. TO FACILITATE THE
                ESTABLISHMENT OF THE RELEVANT CONTACTS, SEMINAR MEETINGS WITH SUBSTANTIVE SPEAKERS WILL BE USED,
                ONCE A WEEK DURING THE ACADEMIC YEAR AND MORE FREQUENTLY DURING SUMMER. MANY PROBLEMS CONTEMPLATED
                FOR THE IMMEDIATE FUTURE ARE SUGGESTED BY THE CURRENT ENERGY CRISIS. THE BROAD, SAY  ULTIMATE
                STATISTICAL PROBLEM CONNECTED WITH THIS CRISIS CAN BE STATED AS FOLLOWS: GIVEN THAT IN A LOCALITY A
                NEW ENERGY PRODUCING PLANT IS TO BE CONSTRUCTED, WITH A SPECIFIED ADDITIONAL ENVIRONMENTAL
                POLLUTION, TO ESTIMATE THE CONSEQUENT CHANGES IN THE SELECTED PARAMETERS OF PUBLIC HEALTH. IT IS
                PROPOSED TO STUDY A NUMBER OF SUBPROBLEMS OF THIS "ULTIMATE" PROBLEM. THESE INCLUDE: (1) THE USE OF
                MARKOV CHAINS TO STUDY "COMPETING RISKS", (2) METHODOLOGY OF TREATING FACTORIAL EXPERIMENTS, (3)
                CONSTRUCTION OF STOCHASTIC MODELS OF BIOLOGICAL PHENOMENA LIKE CARCINOGENESIS AND MUTAGENESIS. SOME
                RELEVANT MATHEMATICAL P
```

**PROJECT: 04209-THE INTERACTION OF CHEMICAL AGENTS PRESENT IN OIL SHALE WITH BIOLOGICAL SYSTEMS

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 50957
TASK CODE=V625F-49 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER . G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. CF CHIGNELL US HEW NATL INST OF HLTH /PHS
MILESTONES.... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004209 SSIE-GMA 4762 EPA -D5-E772 TASK-V625F-49
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: THE OBJECTIVES OF THIS PROJECT ARE TO: (1) STUDY THE ROLE OF FREE RADICAL INTERMEDIATES FORMED DURING THE METABOLISM OF POLY NUCLEAR HYDROCARBONS IN THE TOXICITY OF THESE AGENTS, (2) TO STUDY THE MECHANISMS BY WHICH LIGHT (UV AND VISIBLE) SYNERGIZES THE TUMORIGENICITY OF POLYNUCLEAR HYDROCARBONS ON SKIN, AND (3) STUDY THE BINDING OF HEAVY METAL IONS TO PLASMA AND TISSUE PROTEINS ON THE BODY DISTRIBUTION OF THE METAL IONS. APPROACH: THE FORMATION AND CHARACTERIZATION OF FREE RADICAL INTERMEDIATES WILL BE DONE USING ELECTRON SPIN RESONANCE (ESR) SPECTROSCOPY. ESR SPECTROSCOPY CAN DETECT UNPAIRED ELECTRONS PRESENT BOTH IN FREE RADICALS (ORGANIC OR INORGANIC) AND IN PARAMAGNETIC METALS. IN SOME CASES, SPIN TRAPPING TECHNIQUES WILL BE USED TO TRANSFORM REACTIVE FREE RADICAL INTERMEDIATES TO FORM STABLE RADICALS WHICH CAN THEN BE IDENTIFIED. PRODUCT/RESULTS EXPECTED: (1) THE PROJECT WILL ATTEMPT TO DETECT AND QUANTIFY FREE RADICAL INTERMEDIATES OF POLYNUCLEAR HYDROCARBON METABOLISM, AND HOPEFULLY, PROVIDE INFORMATION ON THE MECHANISMS INVOLVED. (2) STUDIES ON THE BINDING OF METALS TO PROTEIN SHOULD PROVIDE INFORMATION ON THE NATURE OF THE FUNCTIONAL GROUPS TO WHICH THE METAL IS COORDINATED, AS WELL AS THE BINDING PARAMETERS FOR THE METAL-PROTEIN INTERACTIONS.

**PROJECT: 04210-THE EFFECT OF NOX AIR POLLUTANTS ON MEMBRANES

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING : ESTIMATED FY77 / $ 50000
TASK CODE=V625F-51 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. CF CHIGNELL US HEW NATL INST OF HLTH /PHS
MILESTONES... 07/78 -SEMIANNUAL PROGRESS REPORT
01/79 -ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004210 SSIE-GMA 4763 EPA -D5-E772 TASK-V625F-51
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVE: THE OBJECTIVE OF THIS PROJECT IS TO EXAMINE THE EFFECTS OF NO2 ON MODEL MEMBRANES, E.G., LIPOSOMES, LECITHIN MULTILAYERS; BIOLOGICAL MEMBRANES, E.G., THOSE FROM ALVEOLAR MACROPHAGES OR ERYTHROCYTES; AND THE LUNG SURFACTANT LIPOPROTEIN. APPROACH: THE ELECTRON SPIN RESONANCE (ESR) SPECTROMETER WILL BE USED TO DETECT FREE RADICAL INTERMEDIATES FORMED AS A RESULT OF REACTIONS WITH NO2. IF SUCH INTERMEDIATES ARE NOT DETECTED, THE EFFECT OF NO2 ON MEMBRANE STRUCTURE WOULD BE ASCERTAINED WITH THE AID OF SPIN-LABELED ANALOGS OF STEROIDS, FATTY ACIDS AND PHOSPHOLIPIDS. PRODUCT/RESULTS EXPECTED: SEVERAL OF THE BIOCHEMICAL CHANGES FOUND IN LUNG FOLLOWING EXPOSURE TO NO2 MAY RESULT FROM LIPID PEROXIDATION. SINCE NO2 ITSELF IS PARAMAGNETIC AND HAS BEEN SHOWN TO PRODUCE FREE RADICAL INTERMEDIATES WHEN REACTED WITH UNSATURATED LIPIDS, WE WOULD EXPECT ESR SPECTROSCOPY SHOULD CONFIRM THIS EFFECT IN BIOLOGICAL MEMBRANES AND PROVIDE INFORMATION AS TO THE MECHANISM OF TOXICITY.

**PROJECT: 04212-CAN VITAMIN E OR LIPID ALTER NO2 OR O3 TOXICITY IN LUNG

STARTING/ COMPLETION DATE : 00/77 UNK : FUNDING ESTIMATED FY77 / $ 59883
TASK CODE=V625F-52 **EPA=D5-E772 ** (IAG) PRIOR FY /

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. DB MENZEL DUKE UNIV SCH OF ME/PHARM DEPT
HO JAUREQUI DUKE UNIV SCH OF ME/PHARM DEPT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004212 SSIE-GMA 4771 EPA -D5-E772 TASK-V625F-52
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OZONE AND NITROGEN DIOXIDE MAY EXERT THEIR TOXIC EFFECTS BY PEROXIDATION OF THE UNSATURATED FATTY ACIDS OF THE LUNG AND OTHER TISSUES. TO TEST THIS HYPOTHESIS, MICE WILL BE FED CHEMICALLY DEFINED DIETS KNOWN TO PRODUCE LUNG LIPIDS HAVING DIFFERING DEGREES OF SUSCEPTIBILITY TO LIPID PEROXIDATION. DIETS WILL BE DEFICIENT OR SUFFICIENT IN VITAMIN E OR CONTAIN -TOCOPHERYL QUINONE OR PHENOLIC ANTIOXIDANTS. ANIMALS WILL BE EXPOSED TO OZONE AND NITROGEN DIOXIDE AND THE DOSE-RESPONSE RELATIONSHIP BETWEEN THE TOXICITY OF THESE AIR POLLUTANTS AND THE PEROXIDIZABILITY OF THE LUNG LIPIDS WILL BE DETERMINED. THE PROTECTIVE EFFECT OF VITAMIN E AND OTHER PHENOLIC ANTIOXIDANTS WILL BE DETERMINED. THE EFFECTS OF AIR POLLUTANT EXPOSURE WILL ALSO BE MEASURED BY CHANGES IN GROWTH AND IN LUNG LIPID COMPOSITION AND ENZYME CONTENT. POTENTIAL DEFENSE MECHANISMS OF PEROXIDASES WILL BE INVESTIGATED IN BOTH LUNG AND LIVER. THE TOXIC EFFECTS OF OZONE AND NITROGEN DIOXIDE WILL BE COMPARED WITH PUTATIVE CHEMICAL INTERMEDIARIES OF TOXICITY. THESE STUDIES ARE DESIGNED TO TEST THE FREE RADICAL THEORY OF ACTION OF THESE AIR POLLUTANTS, AND TO DETERMINE THE DIETARY LEVELS OF ANTIOXIDANTS NECESSARY TO PREVENT LUNG DAMAGE AT CURRENT CONCENTRATIONS OF AIR POLLUTION.

**PROJECT: 04213-PULMONARY EFFECTS OF ENVIRONMENTAL OXIDANT POLLUTANTS

```
                    STARTING/ COMPLETION DATE : 00/77   UNK        FUNDING    ESTIMATED   FY77  / $  315170
                    TASK CODE=V625F-53      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. DL DUNGWORTH                UNIVERSITY OF CALIFORNIA
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004213            SSIE-GMA  4764        EPA -D5-E772          TASK-V625F-53
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... RATS AND MONKEYS WILL BE CHRONICALLY EXPOSED TO OXIDANT AIR POLLUTANTS, PRIMARILY OZONE, AT
                CONCENTRATIONS APPROXIMATING HIGH AMBIENT LEVELS (0.2-0.5 PPM). A MULTIDISCIPLINARY GROUP WILL MAKE
                INTEGRATED BIOCHEMICAL, MICROBIOLOGICAL, PHYSIOLOGICAL AND MORPHOLOGICAL EVALUATIONS OF EFFECTS.
                THE FINDINGS WILL HAVE RELEVANCE TO THE SPECIFIC PROBLEM OF AIR POLLUTION AND TO A GENERAL
                UNDERSTANDING OF PULMONARY PATHOBIOLOGY. BY PLOTTING THE RELATIVE LEVELS OF SENSITIVITY OF THE
                VARIOUS PARAMETERS STUDIED AND THE EFFECTS OBSERVED, A BASIS WILL BE PROVIDED FOR MAKING
                PREDICTIONS OF POSSIBLE LONG-TERM CONSEQUENCES OF PHOTOCHEMICAL SMOG ON MAN. COMPARISON OF EFFECTS
                IN RATS AND MONKEYS SHOULD PROVIDE FOR MORE CONFIDENT EXTRAPOLATION TO MAN AND HENCE ENABLE THE
                SETTING OF RATIONAL AIR QUALITY CRITERIA. A PRIMARY GOAL IS TO TEST CRITICAL HYPOTHESES CONCERNING
                BIOCHEMICAL, IMMUNOLOGICAL AND CELLULAR MECHANISMS RESPONSIBLE FOR THE DELETERIOUS EFFECTS OF THE
                POLLUTANTS. MAJOR PATHOGENETIC AND MODIFYING FACTORS OF INTEREST ARE: THE ROLE OF LIPID
                PEROXIDATION IN INITIATING DAMAGE; THE INDUCTION OF ANTIOXIDANT DEFENSE MECHANISMS BY CONTINUED
                EXPOSURE AND THE GENERAL PHENOMENON OF ADAPTATION; THE SITES OF IMPAIRMENT IN PULMONARY ALVEOLAR
                MACROPHAGES AND COMPONENTS OF THE IMMUNE SYSTEM IN THE LUNG; THE SEQUENCE AND NATURE OF LESIONS
                RESULTING IN THE DEVELOPMENT OF CHRONIC OBSTRUCTIVE LUNG DISEASE (BRONCHITIS/EMPHYSEMA) AND
                INTERSTITIAL FIBROSIS. AN ADDITIONAL GOAL IS TO EXPLORE FURTHER THE POTENTIAL PROPHYLACTIC VALUE
                FOR HUMAN POPULATIONS OF DIETARY ANTIOXIDANTS SUCH AS V
```

**PROJECT: 04214-ENVIRONMENTAL CELLULAR TOXICOLOGY PROGRAM

```
                    STARTING/ COMPLETION DATE : 00/77   UNK    :   FUNDING    ESTIMATED   FY77  / $   48000
                    TASK CODE=V625F-54      **EPA=D5-E772      ** ( IAG )      PRIOR       FY    /
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. DG WENZEL                   UNIVERSITY OF KANSAS
               CK ERICKSON                 UNIVERSITY OF KANSAS
               H  RYTTING                  UNIVERSITY OF KANSAS
MILESTONES...: 07/78 -SEMIANNUAL PROGRESS REPORT
               01/79 -ANNUAL PROGRESS REPORT
PLAN ID......: (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004214            SSIE-GMA  4770        EPA -D5-E772          TASK-V625F-54
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... THIS IS A REQUEST FOR AN ENVIRONMENTAL CELLULAR TOXICOLOGY PROGRAM AT THE UNIVERSITY OF KANSAS. THE
                MISSION OF THE UNIT WILL BE TO INITIATE, COORDINATE AND TO FACILITATE RESEARCH OF INVESTIGATORS IN
                THE AREA OF THE TOXICOLOGY OF ENVIRONMENTAL TOXICANTS AT THE CELLULAR LEVEL. THE EMPHASIS IS TO BE
                ON THE MEASUREMENT OF A VARIETY OF TOXICANT-INDUCED ALTERATIONS OF CULTURED OR ISOLATED CELLS AS
                EARLY INDICES OF INJURY. THE THRUST OF THIS APPROACH WILL BE TO ESTABLISH QUANTITATIVE
                METHODOLOGIES THAT RELATE TO MECHANISMS OF TOXICITY. CELL MODELS ARE TO INCLUDE: BLOOD PLATELETS,
                CULTURED NERVE, HEART MUSCLE AND ENDOTHELIAL CELLS, AND LUNG FIBROBLASTS AND MACROPHAGES. METHODS
                OF EVALUATION ARE TO INCLUDE, BUT NOT BE LIMITED TO, CHANGES IN: VIABILITY, MORPHOLOGY, PLASMA AND
                ORGANELLE MEMBRANE CHARACTERISTICS, LOCOMOTION, AND BIOCHEMICAL CONSTITUENTS, ESPECIALLY
                NEUROTRANSMITTERS. THE PROGRAM WILL BE HOUSED PRIMARILY IN THE DEPARTMENT OF PHARMACOLOGY AND
                TOXOCIOLOGY BUT IT IS TO INCLUDE INDIVIDUAL INVESTIGATORS (PRESENT AND FUTURE) FROM OTHER
                DEPARTMENTS. TO BE COORDINATED WITH THE PROGRAM IS A TRAINING FUNCTION DIRECTED TOWARD GRADUATE
                EDUCATION OF STUDENTS IN THE DISCIPLINE OF CELLULAR TOXICOLOGY. BECAUSE OF THE DEPARTMENT OF
                PHARMACOLOGY AND TOXICOLOGY IS INTEGRATED WITH THE DEPARTMENTS OF MEDICINAL CHEMISTRY AND
                PHARMACEUTICAL CHEMISTRY IN THE SCHOOL OF PHARMACY, AND SHARES THE USE OF MAJOR EQUIPMENT WITH THE
                CHEMISTRY DEPARTMENT AND OTHERS, THE RESOURCES OF THESE OTHER DEPARTMENTS ARE ALSO AVAILABLE TO
                SOLVE PROBLEMS RELATED TO THE RESEARCH PROGRAM AS SET FORTH AND TO GRADUATE STUDENT EDUCATION IN
                CELLULAR TOXICOLOGY.
```

**PROJECT: 04216-PRENATAL DOSIMETRY POLLUTANT METALS

```
                    STARTING/ COMPLETION DATE : 06/75   05/78 :   FUNDING    ESTIMATED   FY77  / $   80000
                    TASK CODE=V625F-55      **EPA=D6-E681-AQ   ** ( IAG )      PRIOR       FY76  / $  180000
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. PL HACKETT                  BATTELLE MEMORIAL INST
               MR SIKOV                    BATTELLE MEMORIAL INST
               DD MAHLUM                   BATTELLE MEMORIAL INST
MILESTONES.... 07/78 -SEMI-ANNUAL PROGRESS REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004216            SSIE-GMA  5361        EPA -D6-E681-AQ       TASK-V625F-55
               AP  -625F              DU  -N140             LABT-EMI
ABSTRACT...... THIS PROJECT IS CONCERNED WITH CERTAIN HEAVY METALS ASSOCIATED WITH ENERGY PRODUCTION, FOR WHICH
                THERE IS DIRECT OR INFERENTIAL EVIDENCE FOR DELETERIOUS EFFECTS ON PRENATAL DEVELOPMENT. IT WILL
                DEFINE THE SPECIFIC INFLUENCES OF FACTORS WHICH AFFECT THE QUALITATIVE AND QUANTITATIVE ASPECTS OF
                THE CROSS-PLACENTAL TRANSFER AND DISTRIBUTION OF THESE METALS IN THE FETOPLACENTAL UNIT.
                INTRAVENOUS, ORAL AND INHALATION ROUTES OF ADMINISTRATION WILL PROVIDE DIFFERENCES IN THE RATE AND
                POSSIBLY, THE CHEMICAL FORM IN WHICH THE METALS ARE PRESENTED TO THE PLACENTA. THE INITIAL STUDIES
                INVOLVING LEAD EXPOSURES AT REPRESENTATIVE GESTATIONAL AGES HAVE DETERMINED MASS EFFECTS ON
                METABOLISM USING TRACER 210PB ADMINISTERED CONCOMITANTLY WITH VARIOUS LEVELS OF STABLE PB (NO3)2. A
                RAPID UPTAKE INTO THE FETOPLACENTAL UNIT WAS OBSERVED FOLLOWING INTRAVENOUS ADMINISTRATION OF 0, 5
                AND 25 MG PB (NO3)2/KG TO RATS; THE HIGHEST DOSE WAS EMBRYOTOXIC AND TERATOGENIC. THE PERCENTAGES
                OF THE LEAD DOSE ABSORBED BY THE DAM FOLLOWING INHALATION OR ORAL EXPOSURES WERE DOSE DEPENDENT BUT
                THE KINETICS WERE SIMILAR TO THOSE FOLLOWING INTRAVENOUS ADMINISTRATION. CURRENT STUDIES ARE
                INVESTIGATING TRANSFER AND DISTRIBUTION OF ARSENIC, CADMIUM AND SELENIUM WHICH HAVE BEEN SHOWN TO
                BE EMBRYOCIDAL AND/OR TERATOGENIC, AS WELL AS NICKEL, WHICH HAS YIELDED EQUIVOCAL RESULTS, AND
                VANADIUM, WHICH APPARENTLY HAS NOT BEEN EVALUATED.
```

**PROJECT: 04218-GENETIC EFFECTS FROM ELECTRIC FIELDS AT THE CHROMOSOMAL LEVEL OF DROSOPHILA

STARTING/ COMPLETION DATE : 06/75 05/78 : FUNDING ESTIMATED FY77 / $ 90000
TASK CODE=V625F-56 **EPA=D8-E681-AN ** (IAG) PRIOR FY76 / $ 157000

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. FP HUNGATE BATTELLE MEMORIAL INST
RL RICHARDSON BATTELLE MEMORIAL INST
MILESTONES...: 02/78 -FINAL REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004218 SSIE-GMA 5362 EPA -D8-E681-AN TASK-V625F-56
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OBJECTIVES: THIS WORK SEEKS TO IDENTIFY THE POTENTIAL FOR CHANGE IN THE GENETIC MATERIAL FOLLOWING EXPOSURE TO LARGE DC AND AC ELECTRIC FIELDS.APPROACH: SMALL ORGANISMS OR CELL SYSTEMS ARE EXPOSED TO UNIFORM AND WELL CHARACTERIZED ELECTRIC FIELDS AND SUBSEQUENTLY ANALYZED FOR THE PRESENCE OF GENETIC CHANGE. PROGRESS BACTERIAL CULTURES WERE EXPOSED ABOUT 18 HOURS TO DC FIELDS OF 200 TO 800 KV/M AND THE FREQUENCY OF MUTANTS EVALUATED BY PLATING ON MEDIA RESTRICTING GROWTH OF NON-MUTATED CELLS. PRELIMINARY DATA INDICATES A SIGNIFICANT INCREASE IN THE FREQUENCY OF MUTANTS IN SALMONELLA (AMES STRAIN TA-100). A SIMILARLY SIGNIFICANT INCREASE IS ALSO OBSERVED IN PHOTOBACTERIUM FISHERI EXPOSED TO THESE HIGH FIELDS. NO SIGNIFICANT EFFECT ON MUTATION FREQUENCY WAS OBSERVED IN THE AMES STRAIN TA-98. INITIAL DATA FROM DROSOPHILA EXPOSED AS PUPAE FOR 3 DAYS TO A 185 KV/M DC FIELD SUGGESTS AN INCREASE IN FREQUENCY OF SEX LINKED LETHALS, SHOWN BY THE MULLER-5 TEST, IN PROGENY OF EXPOSED MALES. ANALYSES OF OZONE IN THE EXPOSURE CHAMBER AIR INDICATE THAT THIS IS NOT RESPONSIBLE FOR THE OBSERVED INCREASED MUTATION FREQUENCY.

**PROJECT: 04219-USE OF MOUSE SPECIFIC-LOCUS METHOD TO QUANTIFY THE GENE MUTATION HAZARD

STARTING/ COMPLETION DATE : 01/76 01/81 : FUNDING ESTIMATED FY77 / $ 175000
TASK CODE=V625F-57 **EPA=D5-E681-AQ ** (IAG) PRIOR FY76 / $ 394000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. LB RUSSELL U.S. DEPT. OF ENERGY
WL RUSSELL U.S. DEPT. OF ENERGY
MILESTONES.... 07/77 -SEMI-ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES..: RECN-004219 SSIE-GMA 5351 EPA -D5-E681-AQ TASK-V625F-57
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THERE ARE TWO IMPORTANT ASPECTS TO QUANTIFICATION OF MUTAGENESIS IN MAMMALIAN SYSTEMS THAT SCORE TRANSMITTED MUTATIONS. FIRST, FOR COMPOUNDS THAT ARE CLEARLY MUTAGENIC IT IS IMPORTANT TO BE ABLE TO EVALUATE WHAT THE MUTATION FREQUENCY WOULD BE AT EXPOSURE LEVELS LIKELY TO BE EXPERIENCED BY THE HUMAN POPULATION. SOME CHEMICALS HAVE ALREADY SHOWN A DOSE-RESPONSE CURVE MUCH STEEPER THAN LINEAR, AND THE POSSIBILITY OF A THRESHOLD DOSE LEVEL EXISTS. SECOND, FOR CHEMICALS THAT SHOW NO MUTAGENICITY IN THE SAMPLE OF ANIMALS EXAMINED IN A MAMMALIAN TEST SYSTEM, IT IS IMPORTANT TO HAVE THE SAMPLE SIZE ADEQUATE TO JUSTIFY A QUANTIFIED STATEMENT THAT THE OBSERVED ZERO MUTATION RATE EXCLUDES, WITH HIGH CONFIDENCE, THE POSSIBILITY THAT ANY MUTAGENICITY OF THE COMPOUND COULD BE HIGHER THAN A CERTAIN LOW, ACCEPTABLE LEVEL. WE ARE USING THE SPECIFIC-LOCUS METHOD IN MICE THE ONLY RELIABLE AND DEFINITIVE TEST FOR TRANSMITTED GENE MUTATIONS CURRENTLY AVAILABLE IN MAMMALS, TO QUANTIFY THE EFFECTS OF COAL-TECHNOLOGY-RELATED COMPOUNDS. PROBABLY POSITIVE SUBSTANCES ARE IDENTIFIED FOR THIS PURPOSE IN A SEPARATE SCREENING PROJECT, OR ARE SELECTED BECAUSE OF THE POTENTIAL WIDESPREAD EXPOSURE OF HUMAN POPULATIONS. EXTENSIVE TESTS WITH THE SO2 METABOLITE SODIUM BISULFITE PROVED NEGATIVE. WE ARE NOW ENGAGED IN THE TESTING OF BENZO(A)PYRENE (BP). TO DATE, TWO MUTATIONS WERE FOUND IN ABOUT 26,000 OFFSPRING FROM TREATED SPERMATOGONIA NOT SIGNIFICANTLY ABOVE CONTROL VALUE. IT APPEARS THAT BP, FOR WHICH WE HAVE SHOWN POSITIVE EFFECTS IN CHROMOSOME-DAMAGE TESTS, IS NOT A POINT MUTATION INDUCER IN MALE GERM CELLS. TESTS ARE UNDERWAY NOW IN FEMALES.

**PROJECT: 04221-SCREENING FOR THE MUTAGENICITY AND CARCINOGENICITY OF ENERGY RELATED POLLUTANTS

STARTING/ COMPLETION DATE : 01/76 01/81 : FUNDING ESTIMATED FY77 / $ 80000
TASK CODE=V625F-58 **EPA=D5-E681-AO ** (IAG) PRIOR FY76 / $ 180000

EPA OFFICER.: G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.: AW HSIE U.S. DEPT. OF ENERGY
DB COUCH U.S. DEPT. OF ENERGY
PA BRIMER U.S. DEPT. OF ENERGY
MILESTONES.... 07/78 -SEMI-ANNUAL PROGRESS REPORT
PLAN ID.....: (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004221 SSIE-GMA 5355 EPA -D5-E681-AO TASK-V625F-58
AP -625F DU -N140 LABT-EMI
ABSTRACT..... OUR GOAL IS TO EMPLOY MAMMALIAN CELL CULTURE SYSTEMS TO STUDY THE GENETIC TOXICITY OF ENVIRONMENTAL AGENTS RELATED TO FOSSIL FUEL ENERGY TECHNOLOGIES. WE HAVE EMPLOYED THE CHINESE HAMSTER OVARY CELLS/HYPOXANTHINE-GUANINE PHOSPHORIBOSYL TRANSFERASE (CHO/HGPRT) SYSTEM COUPLED WITH MICROSOME ACTIVATION TO STUDY THE CYTOTOXICITY AND MUTAGENICITY OF ENVIRONMENTAL POLLUTANTS IDENTIFIABLE CHEMICALLY OR FUEL SUBFRACTIONS SEPARATED ANALYTICALLY. WE FOUND THAT MNCL2, FESO4 AND COCL2 ARE MUTAGENIC; NICL2, BESO4 AND CDCL2 ARE WEAKLY MUTAGENIC. THE EFFECTS OF MNCL2 WERE ABOLISHED BY THE EXCESS OF MGCL2. THE UNUSUAL ENVIRONMENT REQUIRED FOR DEMONSTRATION OF MUTAGENICITY OF MNCL2 MAY ACCOUNT IN PART FOR THE VARYING RESULTS OBTAINED WITH PB (CH3COO)2, RBCL, H2SEO3 AND TICL4. POLYCYCLIC HYDROCARBONS BENZO(A)PYRENE (B(A)) BENZ(A)ANTHRACENE (BA) AND 7,12-DIMETHYL BA ARE MUTAGENIC; WEAK CARCINOGEN BENZO (E) PYRENE IS LESS MUTAGENIC THAN B (A) P; AND NON-CARCINOGENS PYRENE AND ANTHRACENE ARE NONMUTAGENIC. MOST PHENOLS ARE CYTOTOXIC, BUT NOT MUTAGENIC. B(A)P-4,5-EPOXIDE AND B(A)P-7,8-DIOL,9-10-EPOXIDE(SYN) APPEAR TO BE THE ULTIMATE MUTAGENS OF B(A)P. QUINOLINE IS MUTAGENIC. FOUR-NITROQUINOLINE-1-OXIDE, IS HIGHLY MUTAGENIC; ITS MUTAGENICITY DECREASES WHEN ASSAYED WITH THE ACTIVATION SYSTEM. EIGHT-HYDROXY-, 8-AMINO-, 8-NITRO-QUINOLINE EXHIBIT VARIABLY WEAK MUTAGENICITY. THE ACETONE EFFLUENT (WHICH CONTAINS HETEROCYCLIC NITROGEN COMPOUNDS) DERIVED FROM THE BASIC FRACTION OF A CRUDE SYNTHETIC FUEL IS MOST MUTAGENIC. THUS, THE CHO/HGPRT ASSAY IS APPLICABLE FOR THE SCREENING OF THE GENETIC TOXICITY OF BOTH INDIVIDUAL CHEMICALS AND ORGANIC MIXTURES. WE EXPECT TO COMPLETE PRELIMINARY STUDIES SUCH AS THOSE ON METALLIC COMPOUNDS AND SUBFRACTIONED SYNTHETIC FUELS, AND THEN TO EXTEND THE STUDY TO OTHER MAJOR ENVIRONMENTAL CHEMICAL GROUPS. WITH SOME EXPANSION OF SUPPORT, WE PROPOSE TO EXPAND THE CHO/HGPRT ASSAY TO ADDITIONAL STUDIES ON CHROMOSOME ABERRATIONS AND SISTER CHROMATID EXCHANGES. OUR PRELIMINARY STUDIES SHOW THAT IT IS FEASIBLE TO DETERMINE S

**PROJECT: 04223-TERATOGENIC AND MUTAGENIC EFFECTS OF TRACE METALS AND CARCINOGENIC HYDROCARBONS ON CULTURED MAMMALIAN CELLS

STARTING/ COMPLETION DATE : 07/75 09/80 : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=V625F-59 **EPA=D5-E681-A0 ** (IAG) PRIOR FY76 / $ 225000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. J DEVELLIS UNIVERSITY OF CALIFORNIA
L GERSCHENSON UNIVERSITY OF CALIFORNIA
I HARARY UNIVERSITY OF CALIFORNIA
K MCCARTHY UNIVERSITY OF CALIFORNIA
H HERSCHMAN UNIVERSITY OF CALIFORNIA
MILESTONES... 07/78 -SEMI-ANNUAL PROGRESS REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004223 SSIE-GMA 5352 EPA -D5-E681-A0 TASK-V625F-59
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THE AIM OF THIS PROJECT IS TO VALIDATE THE USE OF CELL CULTURES FROM NERVOUS TISSUE, LIVER AND MUSCLE AS FAST, EASY, QUANTITATIVE AND RELIABLE TEST SYSTEMS TO EVALUATE THE POTENTIAL TERATOGENIC AND METAGENIC EFFECTS OF TRACE HEAVY METALS AND CARCINOGENIC HYDROCARBONS RELEASED DURING THE COMBUSTION OF FOSSIL FUELS. WE ARE SPECIFICALLY STUDYING: A) THE EFFECT OF LEAD AND CADMIUM ON GENERAL GROWTH PARAMETERS OF SEVERAL CELL TYPES. B) THE EFFECT OF LEAD AND CADMIUM ON THE DEVELOPMENTAL EXPRESSION OF DIFFERENTIATED FUNCTIONS IN LIVER, BRAIN AND MUSCLE CELL CULTURES. C) THE INDUCTION OF CADMIUM BINDING PROTEIN (METALLOTHIONEIN) IN CULTURED LIVER CELLS. D) THE ESTABLISHMENT OF LEAD AND CADMIUM RESISTANT CELL LINES AND THE MECHANISM FOR THIS RESISTANCE. A THREE-YEAR REPORT (1975-1978) WILL BE SUBMITTED TO EPA IN JUNE 1978. THE EXPRESSION OF REGULATED TISSUE-SPECIFIC FUNCTIONS WAS DIFFERENTIALLY AFFECTED BY LEAD IN VARIOUS CELL TYPES. FOR SEVERAL FUNCTIONS, THE EFFECT OF LEAD WAS STUDIED IN THE ANIMAL, AND THE RESULTS OBTAINED WERE COMPARED TO THE DATA DERIVED FROM CELL CULTURES. THERE WAS CLOSE AGREEMENT BETWEEN THE ANIMAL AND CELL CULTURE DATA, THUS VALIDATING THE USE OF CELL CULTURE AS TEST SYSTEMS. LEAD-RESISTANT CELL LINES WERE DEVELOPED FROM LIVER AND BRAIN CELL LINES. THE RESISTANCE TO LEAD WAS FOUND TO BE HEREDITARY AND STABLE. THERE WAS NO CROSS RESISTANCE IN THE LEAD RESISTANT CELL LINES FOR CADMIUM OR COBALT. WE HAVE DEFINED A CLONAL CELL SYSTEM WHICH ACCUMULATES METALLOTHIONEIN (MT) IN CULTURE IN RESPONSE TO CADMIUM OR ZINC EXPOSURE. THE INCORPORATION OF LABELLED AMINO ACIDS INTO MT WAS STUDIED IN RESPONSE TO ACUTE EXPOSURE TO A HEAVY METAL. MT IN CELL CULTURES APPEARS IDENTICAL TO MT ISOLATED FROM

**PROJECT: 04226-DEVELOPMENT AND USE OF DIFFERENTIATED CELL CULTURES FOR TOXICOLOGY STUDIES

STARTING/ COMPLETION DATE : 07/75 09/78 : FUNDING ESTIMATED FY77 / $ 100000
TASK CODE=V625F-61 **EPA=D5-E-681-A0 ** (IAG) PRIOR FY76 / $ 225000

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. LE GERSCHENSON UNIVERSITY OF CALIFORNIA
J DEVELLIS UNIVERSITY OF CALIFORNIA
I HARARY UNIVERSITY OF CALIFORNIA
H HERSCHMAN UNIVERSITY OF CALIFORNIA
MILESTONES.... 07/78 -FINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004226 SSIE-GMA 5357 EPA -D5-E-681-A0 TASK-V625F-61
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THE OVERALL OBJECTIVE OF THIS PROJECT IS TO STUDY THE POSSIBLE HORMONAL REGULATION OF THE EFFECT OF CHEMICAL CARCINOGENS ON CULTURED ENDOMETRIAL CELLS. THIS MODEL HAS BEEN SHOWN TO BE RESPONSIVE TO THE "IN VITRO" ADDITION OF ESTROGENS AND PROGESTINS. SINCE ESTROGENS HAVE BEEN FOUND TO HAVE A "PROMOTING" ROLE FOR ENDOMETRIAL ADENOCARCINOMA, WHILE PROGESTERONE IS USED FOR ITS TREATMENT, IT APPEARED REASONABLE TO EXPLORE THIS AVENUE OF RESEARCH. WE HAVE FOUND BEFORE THAT PROGESTERONE HAD A PROTECTIVE EFFECT UPON THE CYTOTOXICITY DISPLAYED BY THE CHEMICAL CARCINOGEN DMBA WHEN BOTH AGENTS ARE ADDED TOGETHER. HOWEVER, WHEN THE CELLS WERE PRE-INCUBATED FOR 24 HRS. WITH THE STEROID HORMONE, BEFORE THE ADDITION OF DMBA, THE CYTOTOXIC EFFECT WAS HIGHER. OUR INTERPRETATION OF THIS STATE IS THAT PROGESTERONE HAS A DUAL EFFECT; IT CAN COMPETE WITH DMBA WHEN ADDED SIMULTANEOUSLY, HOWEVER, WHEN ADDED ALONE IT ACTS AS AN INDUCER, INCREASING THE AMOUNT OF DMBA-ACTIVATING ENZYMES. TO TEST THESE ASSUMPTIONS, WE ARE GOING TO MEASURE THE EFFECT OF PROGESTERONE ON ARYL-HYDROCARBON HYDROXYLASE (9/78 PUBLISH ANNUAL REPORT).

**PROJECT: 04228-IN VIVO SCREENING FOR GENE MUTATIONS IN MOUSE GERM AND SOMATIC CELLS

STARTING/ COMPLETION DATE : 01/76 01/81 : FUNDING ESTIMATED FY77 / $ 175000
TASK CODE=V625F-62 **EPA=D5-E681-AN ** (IAG) PRIOR FY76 / $ 394000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. LB RUSSELL U.S. DEPT. OF ENERGY
WL RUSSELL U.S. DEPT. OF ENERGY
MILESTONES.... 02/78 -SEMI-ANNUAL PROGRESS REPORTS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004228 SSIE-GMA 5350 EPA -D5-E681-AN TASK-V625F-62
AP -625F DU -N140 LABT-EMI
ABSTRACT..... SINCE THERE IS INCREASING EVIDENCE THAT TESTS WITH LOWER ORGANISMS ARE NOT NECESSARILY PREDICTIVE OF MUTAGENICITY OF CHEMICALS IN THE WHOLE MAMMAL, WE ARE USING IN VIVO MOUSE SYSTEMS TO SCREEN FOR POSSIBLE MUTAGENIC EFFECTS OF COMPOUNDS AND MIXTURES ASSOCIATED WITH COAL TECHNOLOGIES. A SOMATIC MUTATION SYSTEM ("SPOT TEST") WAS DEVELOPED BY US, AND, IN A TEST WITH SEVERAL CHEMICALS, HAS BEEN VALIDATED AS A USEFUL PRESCREEN FOR INDUCED GERMLINE MUTATIONS. THIS METHOD USES RELATIVELY SMALL NUMBERS OF ANIMALS, AND A TEST CAN BE COMPLETED IN FIVE WEEKS. HOWEVER, SINCE THE METHOD DETECTS VARIOUS CHROMOSOMAL CHANGES, IN ADDITION TO POINT MUTATIONS, IT IS NOT, BY ITSELF, A DEFINITIVE TEST FOR THE LATTER. WE THEREFORE ALSO USE THE SPECIFIC-LOCUS METHOD, THE ONLY RELIABLE AND DEFINITIVE TEST FOR TRANSMITTED GENE MUTATIONS AND SMALL DEFICIENCIES CURRENTLY AVAILABLE IN MAMMALS. THIS METHOD HAS BEEN EXTENSIVELY EMPLOYED BY US IN RADIATION WORK AND HAS ALREADY PROVED ITS USEFULNESS IN CHEMICAL MUTAGENESIS STUDIES. TO MAKE THE METHOD ECONOMICALLY EFFICIENT FOR SCREENING PURPOSES, IT IS BEING USED IN THIS PROJECT FOR WHOLE MIXTURES AS WELL AS MODEL COMPOUNDS THE "SPOT TEST" HAS GIVEN POSITIVE RESULTS FOR BENZO(A)PYRENE. EARLY RESULTS FROM THE COAL-CONVERSION PRODUCT SYNTHOIL CRUDE HAVE BEEN WEAKLY POSITIVE. IN THE SPECIFIC-LOCUS SCREENING, TESTING IS CURRENTLY UNDERWAY WITH THE SYNTHOIL CRUDE MIXTURE, APPLIED IN SINGLE OR REPEATED DOSES TO DATE, NO MUTATIONS HAVE BEEN OBSERVED IN OVER 12,000 OFFSPRING OF TREATED MALES.

**PROJECT: 04232-"IN-VITRO" CHEMICAL CARCINOGENESIS OF HORMONE-RESPONSIVE CULTURED ENDOMETRIAL CELLS

STARTING/ COMPLETION DATE : 07/75 09/78 FUNDING ESTIMATED FY77 / $ 30000
TASK CODE=V625F-65 **EPA=D5-E681-AN ** (IAG) PRIOR FY76 / $ 67000

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR. LE GERSCHENSON UNIVERSITY OF CALIFORNIA
MILESTONES... 07/78 -TERMINAL REPORT
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004232 SSIE-GMA 5358 EPA -D5-E681-AN TASK-V625F-65
AP -625F DU -N140 LABT-EMI
ABSTRACT..... THE AIM OF THIS PROJECT IS TO STUDY THE MOLECULAR MECHANISM(S) OF HEAVY METALS TOXICITY IN DIFFERENTIATED LIVER, MUSCLE AND BRAIN PERMANENT CELL LINES. FOR THIS PURPOSE THE EFFECT OF LEAD UPON THE HEME PATHWAY AND THE ORGAN-SPECIFIC FUNCTION OF THE CELL LINES IS UNDER INVESTIGATION. WE PROPOSE TO VALIDATE THESE "IN VITRO" MODELS AS RAPID, SIMPLE AND RELIABLE SYSTEMS TO SCREEN FOR ENERGY-RELATED POLLUTANTS. WE HAVE STUDIED THE EFFECT OF LEAD ON CULTURED CELL PROLIFERATION, HEME SYNTHESIS AND DIFFERENTIATED FUNCTIONS OF CULTURED LIVER, GLIAL, NEURONAL AND MUSCLE CELLS. WE HAVE ALSO ISOLATED SEVERAL LEAD-RESISTANT CELL LINES. WE WILL NOW STUDY THE DIFFERENTIATED FUNCTIONS OF LEAD-RESISTANT VS. LEAD-SENSITIVE CELL LINES AS WELL AS THE EFFECTS OF THE HEAVY METAL ON THE DEVELOPMENT OF MUSCLE DEVELOPMENT (9/78 PUBLISH ANNUAL REPORT).

**PROJECT: 04234-CHEMICAL INDUCTION OF CHROMOSOMAL ABERRATIONS IN MOUSE GERM CELLS

STARTING/ COMPLETION DATE : 07/76 07/81 : FUNDING ESTIMATED FY77 / $ 53000
TASK CODE=V625F-66 **EPA=D8-E681-AN ** (IAG) PRIOR FY76 / $ 91000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. WM GENEROSO U.S. DEPT. OF ENERGY
MILESTONES.... 02/78 -SEMI ANNUAL PROGRESS REPORTS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004234 SSIE-GMA 5353 EPA -D8-E681-AN TASK-V625F-66
AP -625F DU -N140 LABT-EMI
ABSTRACT..... A STUDY ON THE EFFECTIVENESS OF SYNTHOIL PRODUCT OIL (SYNCRUDE) AND ITS COMPONENTS (BASIC, ACID, AND NEUTRAL FRACTIONS) TO INDUCE CHROMOSOMAL ABERRATION AND CYTOTOXIC EFFECTS IN MICE GERM CELLS HAS BEEN UNDERWAY. THREE TEST SYSTEMS ARE CURRENTLY USED DOMINANT LETHAL, HERITABLE TRANSLOCATION, AND TOTAL REPRODUCTIVE CAPACITY TESTS. RESULTS TO DATE INDICATE THAT SYNCRUDE INDUCED LOW LEVELS OF DOMINANT-LETHAL MUTATIONS IN SPERMATOZOA. WE HAVE STARTED AN EXPERIMENT TO SEE IF THE CHROMOSOME DAMAGE THAT LED TO DOMINANT LETHALITY IS ASSOCIATED WITH THE PRODUCTION OF HERITABLE TRANSLOCATIONS. A STUDY TO FIND OUT WHICH OF THE THREE FRACTIONS CONTAIN DOMINANT-LETHAL ACTIVITY IS ALSO UNDERWAY.

**PROJECT: 04236-MUTAGENICITY ASSAY OF FRACTIONATED COAL-CONVERSION PRODUCTS

STARTING/ COMPLETION DATE : 01/76 01/81 FUNDING ESTIMATED FY77 / $ 125000
TASK CODE=V625F-67 **EPA=D5-E681-AN ** (IAG) PRIOR FY76 / $ 281000

EPA OFFICER.. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. JL EPLER U.S. DEPT. OF ENERGY
MILESTONES.... 02/78 -SEMI-ANNUAL PROGRESS REPORTS
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES.. RECN-004236 SSIE-GMA 5356 EPA -D5-E681-AN TASK-V625F-67
AP -625F DU -N140 LABT-EMI
ABSTRACT..... SHORT-TERM MUTAGENICITY TESTS, INCLUDING BACTERIAL, FUNGAL, INSECT, AND MAMMALIAN CELL SYSTEMS, HAVE BEEN APPLIED IN A COMPARATIVE SENSE TO EXEMPLARY TEST MATERIALS FROM SYNTHETIC FUEL TECHNOLOGIES. THE SALMONELLA HISTIDINE REVERSION ASSAY (AMES' TEST) HAS BEEN SHOWN TO BE GENERALLY APPLICABLE ESPECIALLY WHEN UTILIZED WITH CHEMICALLY FRACTIONATED MATERIALS. LIQUID-LIQUID EXTRACTION AND COLUMN CHROMATOGRAPHY ARE USED TO SEPARATE CRUDE TEST MATERIALS INTO DEFINED FRACTIONS FOR BIOASSAY PARALLELED BY CHEMICAL ANALYSES. TEST MATERIALS HAVE INCLUDED VARIOUS CRUDE OILS AND PRODUCT WATERS ALONG WITH EXTRACTS FROM RAW SHALE AND PROCESSED SHALE. MUTAGENIC MATERIALS HAVE BEEN OBSERVED IN THE BASIC AND NEUTRAL (POLYCYCLIC AROMATIC HYDROCARBON) FRACTIONS. EXTRAPOLATIONS TO SPECIFIC COMPOUNDS AND TO THE OVERALL BIO-HAZARD OF THE TEST MATERIALS ARE IN PROGRESS. COMPARATIVE STUDIES WITH SAMPLES FROM EXISTING PETROLEUM TECHNOLOGIES AND FOSSIL FUEL PROCESSES ARE BEING CARRIED OUT. MAJOR MILESTONE: IDENTIFICATION OF SPECIFIC CLASSES OF COMPOUNDS INVOLVED IN MUTAGENIC POTENTIAL OF COMPLEX MATERIALS.

**PROJECT: 04238-PULMONARY CARCINOGENESIS TEST SYSTEM

```
                    STARTING/ COMPLETION DATE : 01/76   07/78     FUNDING    ESTIMATED   FY77  / $   83000
                    TASK CODE=V625F-68      **EPA=D5-E681-AO  ** ( IAG )      PRIOR       FY76  / $  187000
EPA  OFFICER.. G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. RJ FRY                      US DOE                             DIV OF BIOL & MED RES
               WE KISIELESKI               US DOE                             DIV OF BIOL & MED RES
MILESTONES.... 07/78 -TERMINAL REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004238            SSIE-GMA  5354        EPA -D5-E681-AO       TASK-V625F-68
               AP  -625F              DU  -N140             LABT-EMI
```

ABSTRACT..... A NUMBER OF BIOLOGICAL ACTIVE POLLUTANTS, IN PARTICULAR POLYCYCLIC HYDROCARBONS, ARE DIFFICULT TO ELIMINATE FROM THE EFFLUENTS OF THE VARIOUS TYPES OF PROCESSING PLANTS WHICH ARE EITHER NOW IN USE OR ARE PROPOSED. SOME OF THE POLYCYCLIC HYDROCARBONS ARE KNOWN PULMONARY CARCINOGENS BUT NEITHER THE PRECISE NATURE OF THE EFFLUENT CONTENT NOR THE CARCINOGENICITY OF ALL OF THE IDENTIFIED COMPOUNDS ARE KNOWN. THEREFORE THERE IS A NEED FOR APPROPRIATE, RAPID AND ECONOMIC METHODS OF ASSAY OF THE EFFLUENT CONTENT NOR THE CARCINOGENICITY OF ALL OF THE IDENTIFIED COMPOUNDS ARE KNOWN. THEREFORE THERE IS A NEED FOR APPROPRIATE, RAPID AND ECONOMIC METHODS OF ASSAY OF THE ONCOGENIC POTENTIAL OF COMPOUNDS AND FOR THE STUDY OF PULMONARY TUMORIGENESIS. THE OBJECTIVES ARE TO: (1) ESTABLISH APPROPRIATE TEST SYSTEMS FOR THE ASSESSMENT OF TUMORIGENIC POTENTIAL OF COMPOUNDS. (2) CARRY OUT THE EXPERIMENTS IN SUCH A WAY THAT INFORMATION ABOUT THE MECHANISMS OF SUSCEPTIBILITY INCLUDING THE RELATIONSHIP OF PROLIFERATION IS OBTAINED. (3) DETERMINE WHETHER PULMONARY CARCINOGENS ACT ADDITIVELY OR MULTIPLICATIVELY IN THE MOUSE. THE AIMS OF THE CURRENT WORK ARE: (1) TO ESTABLISH THE SPONTANEOUS PREVALENCE AND AGE-SPECIFIC MORTALITY RATES OF LUNG TUMORS IN BALB/C AND C57B1/6 MICE; (2) TO COMPARE THE TUMORIGENIC EFFECTS OF IN VITRO AND IN VIVO EXPOSURE TO BENZO(A)PYRENE; (3) TO TEST THE USE OF NUDE ATHYMIC MICE FOR TRANSPLANTS OF LUNG TISSUE FROM DIFFERENT SPECIES IN ORDER TO COMPARE SPECIES SUSCEPTIBILITY FOR TUMORIGENESIS. WE HAVE ESTABLISHED THE PREVALENCE AND MORTALITY RATES FOR LUNG TUMORS IN MALE AND FEMALE B6CF1 AND ARE CURRENTLY COMPLETING THE STUDY OF PREVALENCE IN THE PARENT STRAINS C57B1/6 AND BALB/C. IT SHOULD NOW BE POSSIBLE TO DISTINGUISH INDUCTION AND ADVANCEMENT OF TIME OF APPEARANCE OF TUMORS AND WHETHER CARCINOGENS ACT ADDITIVELY.

**PROJECT: 04240-DEVELOPMENT OF PERMANENT EPITHELIAL CELL LINES

```
                    STARTING/ COMPLETION DATE : 01/76   01/81     FUNDING    ESTIMATED   FY77  / $   60000
                    TASK CODE=V625F-69      **EPA=DR-E681-AO  ** ( IAG )      PRIOR       FY76  / $  135000
EPA  OFFICER.: G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.: JK SELKIRK                  U.S. DEPT. OF ENERGY
MILESTONES...: 07/78 -SEMI-ANNUAL PROGRESS REPORTS
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004240            SSIE-GMA  5348        EPA -DR-E681-AO       TASK-V625F-69
               AP  -625F              DU  -N140             LABT-EMI
```

ABSTRACT..... OBJECTIVES: (1) TO STUDY, DEVELOP AND UTILIZE IN VITRO CELL CULTURE TECHNIQUES WITH EPITHELIAL CELLS WHICH ARE MAJOR TARGET TISSUE FOR THE STUDY OF THE CARCINOGENIC AND TOXIC ACTIVITY OF CHEMICALS KNOWN TO BE ASSOCIATED AS BY-PRODUCTS OF NON-NUCLEAR ENERGY PRODUCTION SUCH AS THOSE PRODUCED DURING THE FORMATION OF SYNTHETIC FUELS AND OIL SHALE EXTRACTION. (2) TO DISCERN BY METABOLIC ACTIVATION STUDIES THOSE CARCINOGENS WHICH CELL CULTURES ARE MOST CLOSELY RELATED TO HUMAN METABOLISM FOR EXTRAPOLATION FROM LABORATORY RESULTS TO THE HUMAN POPULATION. APPROACH: THIS RESEARCH GROUP UTILIZES SEVERAL TYPES OF CHEMICAL CARCINOGENS TO STUDY THEIR METABOLIC ACTIVATION, DETOXIFICATION AND INTERACTION WITH CELLULAR GENETIC MATERIAL. THE MAJOR DIRECTION IS TO STUDY SALIENT DIFFERENCES BETWEEN SUSCEPTIBLE AND RESISTANT SPECIES AND TO UTILIZE THE KNOWN TISSUE PREFERENCES OF SEVERAL CHEMICAL CARCINOGENS TO UNCOVER CRITICAL DIVERGENCE IN THE METABOLIC ACTIVATION PATHWAYS. MILESTONE: WE HAVE DETERMINED MAJOR VARIANCE IN THE ENZYMATIC ATTACK ON BENZO(A)PYRENE BY NORMAL AND CHEMICALLY TRANSFORMED LIVER EPITHELIAL CELLS AND ATTRIBUTE THIS DIFFERENCE TO ALTERATION IN TRANSLATION OF THE DRUG METABOLIZING COMPLEX.

**PROJECT: 04242-INFLUENCE OF DIET ON THE GASTROINTESTINAL ABSORPTION OF CADMIUM

```
                    STARTING/ COMPLETION DATE : 07/76   09/81     FUNDING    ESTIMATED   FY77  / $   90000
                    TASK CODE=V625F-70      **EPA=D5681-AP    ** ( IAG )      PRIOR       FY76  / $  202000
EPA  OFFICER.  G  RAUSA                    EPA/HDQTRS- OEMI
INVESTIGATOR.. HE WALBURG                  UNIVERSITY OF TENNESSEE
               RJ CHERTOK                  UNIVERSITY OF TENNESSEE
               LB SASSER                   UNIVERSITY OF TENNESSEE
MILESTONES.... 07/78 -SEMI-ANNUAL PROGRESS REPORT
PLAN ID....... (AP-625F)(DU-N140)  AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004242            SSIE-GMA  5349        EPA -D5681-AP         TASK-V625F-70
               AP  -625F              DU  -N140             LABT-EMI
```

ABSTRACT..... WE HAVE PREVIOUSLY DEMONSTRATED THAT A RELATIONSHIP EXISTS BETWEEN LOW DIETARY CA AND THE UPTAKE OF ORALLY ADMINISTERED DOSES OF CD WHICH MAY BE FURTHER COMPLICATED BY ADVERSE CA:P RATIOS IN THE DIET. THE OBJECTIVE OF THIS STUDY WAS TO DETERMINE THE EFFECTS OF CD ON THE INTESTINAL ABSORPTION OF CA. MATURE RATS WERE ORALLY DOSED WITH 0, 50, 500, OR 5000 MICROGRAMS OF CD DAILY FOR 3 WEEKS. EVERTED GUT SACS FROM THESE RATS WERE PLACED IN MEDIA CONTAINING 4 X 10 TO THE MINUS 5TH POWER M CA, AND TISSUE UPTAKE AND TRANSPORT INTO THE SEROSAL FLUID OF THE SACS WERE MEASURED. TISSUE CONTENT OF CA AFTER 1 HOUR INCUBATION WAS EQUAL FOR THE 3 LOWER DOSES BUT WAS APPROXIMATELY 1.5 TIMES THE CONTROL VALUE FOR THE 5000 MICRON CD DOSE. SEROSAL FLUID CONTENT OF CA WAS DECREASED BY THE 500 AND 5000 MICROGRAM CD/DAY DOSES TO APPROXIMATELY 85 AND 80 PERCENT OF CONTROL. IN OTHER EXPERIMENTS, GUT SACS FROM CONTROL ANIMALS WERE INCUBATED FOR 1 HOUR IN BATHING MEDIA CONTAINING 4 X 10 TO THE MINUS 5TH POWER TO 1 X 10 TO THE MINUS 2ND POWER M CD. TISSUE AND SEROSAL FLUID UPTAKE OF CA DECREASED AS CD CONCENTRATION IN THE BATHING MEDIA WAS INCREASED. TO DETERMINE THE EFFECTS OF CD ON THE ACTIVE TRANSPORT OF CA, GUT SACS FROM 3-4 WEEK OLD RATS WERE FILLED WITH BATHING MEDIA CONTAINING 4 X 10 TO THE MINUS 5TH POWER M CA AND PLACED IN THE BATHING MEDIA WITH ADDED CD (1 X 10 TO THE MINUS 6TH POWER TO 1 X 10 TO THE MINUS 2ND POWER M). ACTIVE TRANSPORT OF CA WAS ABOLISHED BY 1.5 X 10 TO THE MINUS 4TH POWER M CD WHILE A CD CONCENTRATION OF 1 X 10 TO THE MINUS 6TH POWER M DECREASED THE TRANSPORT OF CA TO 1/3 THE CONTROL VALUE AFTER 2 HOURS INCUBATION. TO SUMMARIZE, INTESTINAL UPTAKE OF CA CAN BE INHIBITED BY CHRONIC INGESTION OF CD AS WELL AS BY ACUTE EXPOSURE OF

**PROJECT: 04244-TOXIC EFFECTS OF METALS ON DNA SYNTHESIS

STARTING/ COMPLETION DATE : 07/75 07/78 FUNDING ESTIMATED FY77 / $ 0
TASK CODE=V625F-71 **EPA=D5-E-681-AT ** (IAG) PRIOR FY76 / $ 50000

EPA OFFICER. G RAUSA EPA/HDQTRS- OEMI
INVESTIGATOR.. EF KORMAN UNIVERSITY OF CALIFORNIA
JF WARD UNIVERSITY OF CALIFORNIA
LS MYERS UNIVERSITY OF CALIFORNIA
PLAN ID..... (AP-625F)(DU-N140) AIR, WATER AND MULTI-ROUTE EXPOSURE & THEIR EFFECTS (HEALTH)
ORDIS CODES... RECN-004244 SSIE-GMA 5347 EPA -D5-E-681-AT TASK-V625F-71
AP -625F DU -N140 LABT-EMI

ABSTRACT..... OBJECTIVE: TO STUDY THE EFFECTS OF METALS IN FOSSIL FUELS ON THE SYNTHESIS AND/OR REPAIR OF DNA. APPROACH: EXPOSURE OF AN IN VITRO ENZYMATIC DNA SYNTHESIZING SYSTEM TO DIVALENT IONS OF THE METALS, MEASURING THEIR EFFECTS UPON: (1) THE RATE AT WHICH NEW DNA IS FORMED, AND (2) THE FIDELITY OF DNA SYNTHESIS, I.E., UPON THE INCORPORATION OF ERRORS INTO NEWLY FORMED DNA. PROGRESS: DIVALENT BARIUM, CALCIUM, COPPER, COBALT, NICKEL, CADMIUM, MERCURY, LEAD, AND ZINC HAVE BEEN SHOWN TO INCREASINGLY INHIBIT DNA SYNTHESIS IN THE ORDER LISTED IN THE IN VITRO SYSTEM. INHIBITION CAN BE COMPLETELY OVERCOME BY NON-ENZYMATIC PROTEIN AT 200 MICROGRAMS/ML. DNA PRIMER-TEMPLATE, ESSENTIAL IN THE ENZYMATIC SYSTEM, CAN ALSO OVERCOME THE INHIBITION WHEN PRESENT AT SUFFICIENTLY HIGH CONCENTRATIONS. DEOXYRIBONCLEOSIDE TRIPHOSPHATES, ALSO ESSENTIAL IN THE ENZYMATIC SYSTEM, MODULATE THE INHIBITORY EFFECTS OF THE METAL IONS, GIVING A "MULTIPHASIC" PATTERN AT SUFFICIENTLY HIGH CONCENTRATIONS. CURRENT STUDIES: THE ABILITY OF METAL IONS TO INDUCE MISINCORPORATIONS OF BASE ERRORS INTO NEWLY FORMED DNA IS CURRENTLY BEING STUDIED IN THE IN VITRO SYSTEM. A PAPER REPORTING THIS WORK WILL BE PUBLISHED IN 1978.

PROJECT TITLE INDEX

CONTROL TECHNOLOGY

FUEL PROCESSING, PREPARATION AND ADVANCED COMBUSTION

	Page #
00307-CONTROL TECHNOLOGY SURVEY OF PARAHO RETORT	15
00308-ENVIRONMENTAL ASSESSMENT OF OIL SHALE PROCESSES	15
00309-OIL SHALE - SAMPLING AND ANALYSIS REVIEW	15
00310-MACROECONOMIC STUDY - BIOMASS VS. COAL	16
00312-PREPARATION OF PLANS & SPECIFICATIONS FOR MERL/IERL T&E FACILITY	16
00313-ENVIRONMENTAL PROBLEM-SOLVING FOR COMMERCIAL DEVELOPMENT OF OIL SHALE	16
00314-MONITORING OF TRACE COMPONENTS FROM THE HANNA IV IN SITU COAL GASIFICATION TEST	16
01411-MINIPLANT STUDIES IN SUPPORT OF THE FLUIDIZED-BED COMBUSTION PROGRAM	17
01412-DEVELOPMENT OF THE CAFB GASIFIER FOR GENERATION OF CLEAN FUEL GAS FOR USE IN AN EXISTING OR NEW COMBUSTOR	17
01413-ENGINEERING SUPPORT OF THE CAFB DEMONSTRATION PLANT PROGRAM	18
01414-CAFB DEMONSTRATION	18
01415-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS AND PROGRAM SUPPORT FOR FLUIDIZED-BED COMBUSTION	18
01416-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS AND PROGRAM SUPPORT FOR FLUIDIZED-BED COMBUSTION	19
01420-NOX EMISSIONS FROM FLUIDIZED COMBUSTION	19
01422-PRELIMINARY ENVIRONMENTAL ASSESSMENT OF CAFB - LIGNITE AND COAL	20

Page #

01425-ENVIRONMENTAL ASSESSMENT/SYSTEMS ANALYSIS UTILIZING RESIDUAL OIL 20

01426-HAZARDOUS SUBSTANCES IN RESIDUAL OIL 21

01428-DESIGN AND CONSTRUCTION OF A FLUIDIZED-BED COAL COMBUSTION SAMPLING AND ANALYTICAL TEST RIG 21

01429-CATALYTIC DESULFURIZATION AND DENITROGENATION 22

01431-DEMETALLIZATION OF RESIDUAL OILS (PHASE V - DENITROGENATION CATALYST EVALUATION) 22

01430-INTERIM SUPPORT FOR HOMER CITY COAL CLEANING DEMONSTRATION 22

01435-CONTROL TECHNOLOGY DEVELOPMENT FOR THE PRODUCTS AND BY-PRODUCTS OF FUEL CONVERSION/FUEL UTILIZATION SYSTEMS 23

01436-BENCH SCALE STUDY OF THE MEYERS PROCESS FOR COAL DESULFURIZATION 23

01437-REACTOR TEST PROJECT FOR CHEMICAL REMOVAL OF PYRITIC SULFUR FROM COAL 23

01438-DEVELOPMENT PROGRAM FOR TREATMENT OF COAL TO PRODUCE LOW-SULFUR, SOLID FOSSIL FUEL 24

01439-COAL DESULFURIZATION BY MICROWAVE ENERGY 24

01440-PROGRAM SUPPORT IN FOSSIL FUEL PROCESSING AND SYNTHETIC FUELS 24

01442-POLLUTANTS FROM SYNTHETIC FUELS PROCESSES 25

01443-IN SITU FINE PARTICULATE MEASUREMENT 25

01445-MEASUREMENT OF HIGH TEMPERATURE, HIGH PRESSURE PROCESSES 25

01448-STUDIES RELATED TO THE ORGANIC CHEMICAL ANALYSIS OF INDUSTRIAL SAMPLES 26

01449-DEVELOPMENT OF HIGH-TEMPERATURE/HIGH-PRESSURE ELECTROSTATIC PRECIPITATOR 26

01450-REVIEW OF CONTROL TECHNOLOGIES FOR OPEN SOURCES OF PARTICULATE EMISSIONS 26

Page #

01453-THE EFFECTS OF HIGH TEMPERATURE AND PRESSURE ON PARTICLE COLLECTION MECHANISMS 27

01457-NEW CONCEPT FOR FINE PARTICLE CONTROL AT HIGH TEMPERATURE AND PRESSURE 27

01458-FINE PARTICLE CONTROL BY HOT FILTRATION 27

01461-THE USE OF ELECTROSTATICALLY CHARGED FOG FOR CONTROL OF DUST FROM OPEN SOURCES 28

01463-PHOTOCHEMICAL STUDY OF NOX REMOVAL FROM STACK GASES 28

01464-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 28

01468-METHODOLOGIES FOR UTILIZATION OF ENVIRONMENTAL-IMPACT-ASSESSMENT DATA 29

01469-ENVIRONMENTAL STUDIES OF COAL CLEANING PROCESSES 29

01471-ASSESSMENT AND CONTROL OF WASTEWATER CONTAMINANTS ORIGINATING FROM THE PRODUCTION OF SYNTHETIC FUELS FROM COAL 29

03997-REDUCE ADVERSE ENVIRONMENTAL EFFECTS FROM URANIUM MILL WASTES 30

01472-FIELD TESTING - APPLICATION OF COMBUSTION MODIFICATION TECHNIQUES TO CONTROL POLLUTANT EMISSIONS FROM INDUSTRIAL BOILERS 30

01476-DEVELOPMENT OF CRITERIA FOR EXTENSION OF APPLICABILITY OF LOW-EMISSION, HIGH-EFFICIENCY COAL BURNERS IN PROGRESS 30

01488-ORGANIZATION OF CLEAN COAL COMBUSTION CONFERENCE 31

FUEL EXTRACTION

00330-FUGITIVE DUST FROM OIL SHALE EXTRACTION 35

00332-REMOVAL OF TOXIC MATERIAL FROM MINE DRAINAGE 35

00334-EFFECTIVENESS OF SURFACE MINE SEDIMENTATION PONDS 35

00335-COAL AND THE ENVIRONMENT -ABSTRACT BIBLIOGRAPHIES 36

Page #

00338-POLLUTION CONTROL GUIDELINES FOR COAL REFUSE PILES AND SLURRY PONDS 36

00339-EVALUATION OF GROUNDWATER POLLUTION FROM EASTERN UNDERGROUND COAL MINES 36

00341-DEMONSTRATION OF CONNECTOR WELLS 37

00344-EFFECTS OF SURFACE CONFIGURATION IN WATER POLLUTION CONTROL ON SEMI-ARID MINED LANDS 37

00345-POTENTIAL IMPACTS TO GROUND-WATER & SURFACE-WATER QUALITY & QUANTITY FROM PROPOSED ENERGY DEVELOPMENT ON THE NORTHERN CHEYENNE RE 38

00346-EVALUATE SURFACE AND GROUNDWATER AT POTENTIAL STRIP MINES SITES 38

00347-VEGETATIVE STABILIZATION OF SPENT OIL SHALE 39

00349-VEGETATIVE STABILIZATION OF PARAHO SPENT OIL SHALE 39

00351-ENVIRONMENTAL MONITORING & ASSESSMENT OF COAL STRIP MINING & RECLAMATION IN THE FOUR CORNER AREA 39

00353-WATER-QUALITY HYDROLOGY OF SURFACE-MINED WATERSHEDS 40

00354-COREHOLE SPACING MODELS DEFINING POTENTIAL TOXIC ROCK BODIES IN COAL SURFACE MINING 40

00356-AUDIOVISUAL PROGRAM FOR SURFACE COAL MINING AND THE ENVIRONMENT 40

00358-DESIGN AND PERFORMANCE OF HEAD-OF-HOLLOW FILLS--A SURFACE MINING & RECLAMATION METHOD 41

00359-USE OF A VEGETATIVE FILTER ZONE TO CONTROL FINE-GRAINED SEDIMENTS FROM SURFACE MINES 41

00360-DETERMINE THE EFFECTIVENESS OF REGULATIONS AND PRACTICES FOR HANDLING TOXIC STRIP MINE SPOILS TO PREVENT ACID MINE DRAINAGE 41

00362-USER DESIGN MANUAL FOR TREATMENT OF ACID MINE DRAINAGES 42

00363-ROTATING DISC BIOLOGICAL TREATMENT OF AMD 42

Page #

00364-THE IMPORTANCE AND FUNCTIONS OF ALLUVIAL VALLEY FLOORS 42

00366-TRACE AND POTENTIALLY TOXIC ELEMENTS ASSOCIATED WITH URANIUM DEPOSITS IN SOUTH TEXAS 43

00367-TRANSPORT WATER CONTAMINATION IN COAL-SLURRY PIPELINES 43

00368-EVALUATION OF 3 PERMEABLE LIMESTONE SEALS VIA CONSTRUCTION OF 3 EARTHEN DAMS 43

00369-PREDICTING ACID POLLUTION POTENTIAL FROM COAL STRIP MINES 44

00371-ACTIVITIES ASSOCIATED WITH ENERGY RESOURCE EXTRACTION 44

00372-GEOCHEMISTRY OF CADMIUM AND OTHER SELECTED HEAVY METALS AS RELATED TO COAL STRIP MINING 45

00374-PREDICTING RESPONSE OF A NATURAL SYSTEM TO URANIUM EXTRACTION, OAKVILLE AQUIFER SYSTEM, TEXAS 45

03998-TECHNOLOGIES FOR CONTROLLING ADVERSE EFFECTS OF MINING ON FOREST, RANGE, AND RELATED FRESHWATER ECOSYSTEMS 45

03999-REVEGETATION AND RECLAMATION OF LAND AREAS DISTURBED BY MAN - CONTROLLED TECHNOLOGY 46

00387-OPERATE OHMSETT 46

00388-OHMSETT SUPPORT - NAVAL WEAPONS STATION EARLE 46

00390-PERFORMANCE TESTING OFFSHORE EQUIPMENT 47

00391-OIL SPILL AND OIL POLLUTION REPORTS II 47

00392-REVIEW AND ANALYSIS OF OIL/WATER SEPARATION LITERATURE 47

00393-MOP OIL SPILL DISPERSANTS 48

00395-METHODS MANUAL FOR OIL SPILL SOURCE IDENTIFICATION 48

00396-METHOD OF QUANTITATION FOR PETROLEUM OILS IN WATER 48

00399-PROTECTION AND RESTORATION OF SHORELINES FROM OIL SPILLS 49

00400-PETROLEUM PIPELINE LEAK DETECTION 49

Page #

00401-ENVIRONMENTAL GUIDELINES FOR ONSHORE IMPACT OF OFFSHORE PETROLEUM DEVELOPMENT 49

00421-NEW AMINE CARBAMATE GELATION TECHNIQUES FOR USE IN OIL SPILL RECOVERY OPERATIONS 50

00423-MULTIAGENCY PROJECT FOR OIL SPILL EQUIPMENT EVALUATION, PHASE I 50

00424-OPTIMIZATION OF LAND CULTIVATION PARAMETERS 50

ENVIRONMENTAL IMPACT OF CONVENTIONAL AND ADVANCED ENERGY SYSTEMS

00431-UNIVERSITY OF ILLINOIS CORE TEAM PARTICIPATION IN OHIO RIVER BASIN ENERGY STUDY, PHASE II 53

02942-ADVANCED WASTE HEAT CONTROL-WASTE UTILIZATION PROGRAM 53

03583-CONFERENCE - INTERGOVERNMENTAL ENERGY AND ENVIRONMENTAL COOPERATION THE OHIO VALLEY 53

04000-OHIO RIVER BASIN ENERGY STUDY 54

04001-OHIO RIVER BASIN ENERGY STUDY 54

04002-OHIO RIVER BASIN ENERGY STUDY PROJECT, PHASE II, UNIVERSITY OF KENTUCKY 54

04003-PHASE II, OHIO RIVER BASIN ENERGY STUDY 55

04004-EXPERIMENTAL MANAGEMENT PLAN FOR OHIO RIVER BASIN ENERGY STUDY - IMPACT ASSESSMENT OF EFFECT OF ENERGY CONVERSION FACILITIES (ABBREV) 55

04005-OHIO RIVER BASIN ENERGY STUDY (ORBES) 56

04006-IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN - PHASE II 56

04007-COST/BENEFIT OF FUEL REPROCESSING 56

04008-SOCIOECONOMIC & ENVIRONMENTAL IMPACTS OF A PROPOSED INCREASED CONCENTRATION OF ENERGY CONVERSION FACILITIES 56

04009-OHIO RIVER BASIN ENERGY STUDY, PHASE II 57

Page #

01473-PREPARATION OF GUIDELINE FOR ADJUSTMENT OF ATMOSPHERIC GAS BURNERS FOR RESIDENTIAL AND COMMERICAL HEATING 57

01480-APPLICATION OF ADVANCED COMBUSTION MODIFICATION TECHNIQUES TO SELECTED INDUSTRIAL PROCESS EQUIPMENT 57

01481-FIELD TESTING - APPLICATION OF COMBUSTION MODIFICATION TECHNOLOGY TO INDUSTRIAL COMBUSTION EQUIPMENT 58

01482-FIELD TESTING - APPLICATION OF COMBUSTION MODIFICATION TO CONTROL POLLUTANT EMISSIONS FROM POWER GENERATION COMBUSTION SYSTEMS 58

01486-ENVIRONMENTAL AND ENERGY ASSESSMENT OF AFTERBURNER COMBUSTION SYSTEMS 59

01494-INVESTIGATION OF AERODYNAMIC PHENOMENA IN POLLUTION CONTROL 59

01497-PILOT SCALE EVALUATION OF ADVANCED COMBUSTION CONTROL TECHNIQUES FOR FOSSIL & WASTE FUELS 59

01499-EVALUATION OF POLLUTION EMISSIONS FROM INDUSTRIAL BURNERS USING LOW-MEDIUM BTU GASES FROM COAL 60

01500-SYSTEMS EVALUATION OF THE USE OF LOW SULFUR WESTERN COAL IN EXISTING SMALL AND INTERMEDIATE SIZE BOILERS 60

01501-DESIGN OPTIMIZATION AND FIELD VERIFICATION OF AN INTEGRATED RESIDENTIAL FURNACE 61

01504-DEVELOPMENT OF CATALYST AND SYSTEM DESIGN CRITERIA FOR CATALYTIC COMBUSTORS WITH APPLICATION TO STATIONARY SOURCES 61

01506-EVALUATION OF FUNDAMENTAL COMBUSTION PHENOMENA 62

01509-DIRECT MEASUREMENT OF COMBUSTION FACTOR EFFECTS ON SECONDARY PARTICULATE FORMATION 62

01510-CHARACTERIZATION OF EMISSION AND COMBUSTION PERFORMANCE OF ALTERNATE FUELS 62

01512-CHARACTERIZATION AND DESIGN EVALUATION FOR COMMERCIAL COMBUSTION SYSTEMS 63

Page #

01518-POTENTIAL BENEFICIAL USE OF INDUSTRIAL WASTE HEAT FOR GREENHOUSE PRODUCTION OF BEDDING PLANTS, CUT FLOWERS AND FOLIAGE PLANTS 63

01519-WET/DRY COOLING TOWER STUDY 64

01520-DISPOSAL OF BYPRODUCTS FROM NONREGENERABLE FLUE GAS DESULFURIZATION SYSTEMS 64

01522-AN ASSESSMENT OF THE TECHNOLOGY OF DISPOSAL AND UTILIZATION OF FLUE GAS CLEANING BYPRODUCTS 64

01523-WET/DRY COOLING TOWER TEST MODULE PROGRAM 65

01524-LIME/LIMESTONE SCRUBBING WASTE CONVERSION PILOT STUDY 65

01529-DEWATERING PRINCIPLES AND EQUIPMENT DESIGN STUDIES 65

01530-DISPOSAL OF HIGH ALKALINE FLY ASH SLUDGE IN A DECOALED MINE SEAM 66

01531-DEVELOPMENT OF ENVIRONMENTAL ASSESSMENT AND CONTROL TECHNOLOGY QUALITY ASSURANCE PROGRAMS 66

01536-STANDARDIZATION OF OPERATING PERFORMANCE OF A DROPLET MEASURING DEVICE 66

01537-THE DEVELOPMENT OF FUGITIVE EMISSIONS SAMPLING TECHNIQUES 67

01539-SAMPLING AND ANALYSIS OF REDUCED AND OXIDIZED SPECIES IN PROCESS STREAMS 67

01540-EMISSIONS ASSESSMENT OF CONVENTIONAL COMBUSTION SYSTEMS 68

01561-PROJECT DEFINITION PHASE STUDY FOR AN INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGY 68

01562-AN INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGIES - PROJECT DEFINITION PHASE 69

01563-INTEGRATED ASSESSMENT OF COAL BASED ENERGY TECHNOLOGY--PROJECT DEFINITION PHASE 69

01564-A SURVEY OF THE USE AND EMISSION OF SELECTED CARCINOGENS IN NEW JERSEY 69

01566-QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 70

Page #

01567-ENGINEERING SERVICES IN SUPPORT OF ENVIRONMENTAL PROTECTION AGENCY SPECIFIC WORK ASSIGNMENTS 70

01568-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 70

01569-NONPERSONAL QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 71

01570-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 71

01571-NONPERSONAL, QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 71

01572-QUICK RESPONSE NONPERSONAL TECHNICAL AND ENGINEERING SERVICES 72

01573-QUICK REACTION ENGINEERING AND TECHNICAL SERVICES 72

01574-NONPERSONAL, QUICK REACTION ENGINEER AND TECHNICAL SERVICES (MOSC) 72

01576-MEASUREMENT AND EVALUATION PROCEDURES FOR ENVIRONMENTAL R AND D 73

01577-WASTE HEAT UTILIZATION 73

01582-ADVANCED WASTE HEAT CONTROL 74

01583-CHARACTERIZATION OF EFFLUENTS FROM COAL-FIRED UTILITY BOILERS 74

01584-FLY ASH CHARACTERIZATION AND DISPOSAL AND STUDYING WATER REUSE OR RECYCLING 75

01588-AIR POLLUTION EMISSION CONTROL DEVELOPMENT FOR STATIONARY INTERNAL COMBUSTION ENGINES 75

01617-INTEGRATED ASSESSMENT OF COAL-BASED ENERGY TECHNOLOGIES, PHASE II 76

04012-PROCESSING SLUDGES FROM LIME/LIMESTONE WET SCRUBBING PROCESSES FOR DISPOSAL OR RECYCLE (ABBREV) 76

00432-IERL-CI TECHNICAL SUPPORT CONTRACT 77

Page #

00437-PROCESS EVALUATION - MULTI-WASTE GASIFICATION 77

00440-PROCESS EVALUATION - MULTI-WASTE CO-FIRING IN UTILITY BOILERS 77

00450-REFUSE DERIVED FUEL SOURCES AND UTILIZATION 77

00453-SYSTEM CONCEPT EVALUATION - DENSIFIED REFUSE - DERIVED FUELS 78

00454-PROCESS EVALUATION - CHINA LAKE PYROLYSIS SYSTEM 78

00455-ENVIRONMENTAL ASSESSMENT OF ENERGY CONSERVATION TECHNOLOGY 78

00456-FULL-SCALE DEMONSTRATION OF HYPERFILTRATION FOR CLOSED-CYCLE OPERATION IN TEXTILE 79

00458-ENVIRONMENTAL ASSESSMENT OF ADVANCED ENERGY CONVERSION TECHNOLOGIES 79

00460-SURVEY OF GEOTHERMAL ENVIRONMENTAL REGULATIONS AND CONTROL TECHNOLOGY 80

00461-PRELIMINARY ENVIRONMENTAL ASSESSMENT OF SOLAR ENERGY SYSTEMS 80

00462-EIS FOR A SOLAR POWER STATION 80

00463-ENVIRONMENTAL ASSESSMENT OF GEOPRESSURED WATERS AND THEIR PROJECTED USES 81

00464-ENERGY CONSUMPTION FROM PRESENT POLLUTION CONTROL TECHNOLOGY 81

00465-ENVIRONMENTAL ASSESSMENT OF WASTE-TO-ENERGY (388) 81

00466-EVALUATION OF WASTE-TO-ENERGY PROCESSES 82

00467-ST. LOUIS WASTE CO-FIRING WITH COAL PROJECT - EQUIPMENT, FACILITIES AND ENVIRONMENTAL EVALUATION OF MERAMAC POWER PLANT 82

00468-EVALUATION OF AMES' WASTE PROCESS - AN ENERGY RECOVERY SYSTEM 82

00470-ENVIRONMENTAL EFFECT OF UTILIZING SOLID WASTE AS A SUPPLEMENTARY POWER-PLANT FUEL 83

Page #

00471-EFFECTS OF BURNING DENSIFIED FORMS OF MUNICIPAL SOLID WASTE DERIVED FUELS IN INDUSTRIAL UTILITY, AND INSTITUTIONAL STOKER BOILER 83

00473-PILOT SCALE PYROLYTIC CONVERSION OF MIXED WASTE TO FUEL 83

00475-CHEMICAL RECLAMATION OF SCRAP RUBBER 84

00477-CONVERSION OF SOLID WASTE TO POLYMER GASOLINE 84

00480-PROGRAM BRIEFINGS ON ENERGY CONSERVING INDUSTRIAL PROCESS CHANGES 84

00481-WASTE HEAT RECOVERY POTENTIAL FOR ENVIRONMENTAL BENEFITS IN SELECTED INDUSTRIES 85

00483-ENVIRONMENTAL, ECONOMIC, AND CONSERVATION ASPECTS OF INTEGRATED ENERGY USE APPLICATIONS 85

00484-DEVELOPMENT OF SAMPLING PLAN FOR GEOTHERMAL MANIFESTATIONS 85

00485-MONITORING SOLAR WASTEWATER TREATMENT 86

00487-ASSESSMENT OF LARGE-SCALE PHOTOVOLTAIC MATERIALS PRODUCTION 86

00488-PYROLYSIS OF AGRICULTURAL RESIDES AND FEEDLOT WASTES IN A REACTIVE STEAM ATMOSPHERE 86

00490-ASSESSMENT OF COMBUSTION OF RDF FUELS 87

00494-ENVIRONMENTAL AND TECHNOLOGICAL ANALYSIS OF THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL 87

00499-CHEMISTRY OF HIGH TEMPERATURE GEOTHERMAL BRINES 87

00500-CONSTRUCTION OF THE MERL/IERL T & E FACILITY 88

00502-WORKSHOP ON WASTE-TO-ENERGY TECHNOLOGY 88

00503-CO-FIRING OF SOLID WASTE WITH COAL IN A CEMENT KILN 88

02945-GEOTHERMAL SYSTEMS/ENVIRONMENTAL ASSESSMENT OF EXTRACTION, CONVERSION AND WASTE DISPOSAL 89

Page #

02946-GEOTHERMAL ENVIRONMENTAL IMPACT ASSESSMENT - FAUNA 89

02947-GEOTHERMAL ENVIRONMENTAL IMPACT ASSESSMENT - PLANTS AND SOILS 90

02948-MONITORING GUIDES FOR H2S AND NON-CONDENSIBLE HAZARDOUS GASEOUS EMISSIONS/GEOTHERMAL SYSTEMS 90

00520-TECHNOLOGY ASSESSMENT OF ENERGY DEVELOPMENT IN APPALACHIA 91

04013-TECHNOLOGY ASSESSMENT OF WESTERN ENERGY RESOURCE DEVELOPMENT 91

04031-DEVELOP ECONOMIC PROJECTION MODELING CAPABILITY NECESSARY TO DERIVE MODULAR ENERGY & ENVIRONMENTAL PLANNING MODELS AT A MULTICOU 92

04033-ENVIRONMENTAL RESIDUALS OUTPUT MODEL FOR OPERATION AND EXPANSION OF AN ELECTRIC POWER SYSTEM 92

04035-DEMONSTRATE THE APPLICATION OF COMPUTER GRAPHICS TO SITE-SPECIFIC AND REGIONAL INTEGRATED ENVIRONMENTAL ASSESSMENT OF ENERGY SYSTEM 92

FLUE GAS SULFUR OXIDE CONTROL

01514-WELLMAN-LORD/ALLIED FGD DEMONSTRATION TEST PROGRAM 95

01525-PROTOTYPE STUDY OF LIME/LIMESTONE SCRUBBERS FOR SO_2 AND DUST REMOVAL ADVANCED TESTING AND DATA EVALUATION 95

01527-SULFUR DIOXIDE OXIDATION IN SCRUBBER SYSTEMS 96

01547-DEMONSTRATION OF HIGH-EFFICIENCY/HIGH-THROUGHPUT BAGHOUSE 96

01579-DEVELOP COMPARATIVE ECONOMICS OF SO_2 EMISSION CONTROL PROCESSES 97

01580-ENERGY REQUIREMENT OPTIMIZATION STUDY OF SELECTED PROCESSES FOR REMOVING SO_2 FROM POWER PLANT STACK GASES 97

01585-LIME/LIMESTONE AND ADVANCED CONCEPTS--TVA'S 1-MW PILOT PLANT (COLBERT) 98

Page #

01581-DEVELOPMENT OF FLUE GAS DESULFURIZATION TECHNOLOGY--SHAWNEE LIME & LIMESTONE SCRUBBING PROGRAM 98

01586-ADVANCED CONCEPTS SO_2 REMOVAL PROCESS IMPROVEMENTS - BENCH-SCALE STUDIES 98

01587-UTILITY BOILER DESIGN/COST COMPARISON - FLUIDIZED-BED COMBUSTION VERSUS FLUE GAS DESULFURIZATION 99

NITROGEN OXIDE CONTROL

01474-REDUCTION OF POLLUTANT FORMATION IN COAL PARTICLE AND LIQUID FUEL SPRAY FLAMES 103

01475-FUEL DECOMPOSITION AND FLAME REACTIONS IN CONVERSION OF FUEL NITROGEN TO NOX 103

01478-ENVIRONMENTAL ASSESSMENT OF STATIONARY SOURCE NOX CONTROL TECHNOLOGIES 104

01487-COMBUSTOR DESIGN CONCEPTS FOR NOX CONTROL - ADVANCED LBG FIRED SYSTEMS 104

01490-INVESTIGATION OF NOX NITRATE AND SULFATE PRODUCTION IN LABORATORY FLAMES 105

01492-ADVANCED COMBUSTION SYSTEMS FOR STATIONARY GAS TURBINE ENGINES 105

01495-STAGED COMBUSTION FOR NOX CONTROL AND ENHANCED SO_3 EMISSIONS 105

01496-ASSESSMENT AND APPLICATION OF COMBUSTION ADDITIVE PROCESS FOR NOX CONTROL 106

01502-EFFECTS OF FUEL PROPERTIES AND ATOMIZATION PARAMETERS ON NOX CONTROL FOR HEAVY LIQUID FUEL-FIRED PACKAGE BOILERS 106

01508-EMISSIONS CONTROL TECHNOLOGY FOR HIGH PRESSURE COMBUSTION SYSTEMS 106

FLUE GAS PARTICULATE CONTROL

01484-EVALUATION OF EMISSIONS AND CONTROL TECHNOLOGY FOR INDUSTRIAL STOKER BOILERS 109

Page #

01485-COMBUSTION RESEARCH ON COAL NITROGEN AND PARTICULATE ORGANIC MATTER 109

01533-SAMPLING AND ANALYSIS METHODS FOR POM AND OTHER ORGANIC POLLUTANTS 110

01534-PARTICULATE SAMPLING AND SUPPORT 110

01542-OPERATION OF PILOT SCALE ESP VERSATILE FABRIC FILTER, AND BAGHOUSES (IN-HOUSE) 111

01543-FABRIC FILTRATION RESEARCH - EPA IN-HOUSE 111

01544-BAGHOUSE STUDY AS AN EMISSION CONTROL ON A SOLID WASTE INCINERATOR BOILER 111

01548-STUDIES OF DUST CAKE FORMATION AND STRUCTURE IN FABRIC FILTRATION 112

01549-HIGH-VELOCITY FABRIC FILTRATION 112

01545-DEMONSTRATION OF BAGHOUSE FOR COLLECTION OF FLY ASH FROM LOW SULFUR COAL 112

01550-FINE PARTICLE CONTROL WITH UNIVERSITY OF WASHINGTON ELECTROSTATIC SCRUBBER 113

01551-DEMONSTRATION OF SODIUM CONDITIONING 113

01554-STUDY OPERATING CHARACTERISTICS OF HOT-SIDE PRECIPITATORS 113

01555-RESIDENCE TIME DISTRIBUTIONS, DISPERSION AND REENTRAINMENT IN A PILOT-SCALE ELECTROSTATIC PRECIPITATOR 114

01556-PILOT-SCALE DEMONSTRATION OF FINE PARTICLE RESISTIVITY/ HIGH-RESISTIVITY ELECTROSTATIC PRECIPITATORS 114

01557-FINE PARTICULATE CONTROL BY HIGH GRADIENT MAGNETIC SEPARATION (HGMS) 114

01558-TECHNOLOGY TRANSFER FOR SCRUBBERS 115

01559-DESIGN AND CONSTRUCTION OF A VERSATILE FABRIC FILTER TEST UNIT 115

Page #

01560-DESIGN, FABRICATE, AND INSTALL A PILOT-SCALE ELECTROSTATIC PRECIPITATOR 116

01575-OPERATION OF IERL-RTP TEST FACILITIES 116

01615-DEMONSTRATION OF NOVEL FINE PARTICULATE COLLECTION SYSTEM 116

01616-EVALUATION AND ASSESSMENT OF METHODS FOR COLLECTING FLY ASH FROM COMBUSTION OF LOW-SULFUR COALS 117

HEALTH AND ENVIRONMENTAL EFFECTS

ECOLOGICAL EFFECTS

Page #

03584-ALASKAN OIL SEEPS - THEIR CHEMICAL AND BIOLOGICAL EFFECTS ON THE ENVIRONMENT 125

03585-ASSESSMENT OF THE EFFECTS OF BOTTOM DISTURBANCE ON THE ENVIRONMENT OF A CLEAR SUBARCTIC STREAM 125

03587-EFFECTS OF NON-GASEOUS AIRBORNE POLLUTANTS FROM COAL-FIRED POWER PLANTS ON PLANT GROWTH AND METABOLISM 125

03588-EFFECTS OF CHRONIC SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCERS AND INVERTEBRATE CONSUMERS IN A MIXED PRAIRIE ECOSYSTEM 125

03590-USE OF LICHENS AS PREDICTORS AND INDICATORS OF AIR POLLUTION FROM A COAL-FIRED POWER PLANT 126

03592-INVESTIGATION OF THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON TISSUE STRUCTURE OF SELECTED BIRD SPECIES BIRDS AS INDICAT 126

03594-MONITORING PLANT COMMUNITY CHANGES DUE TO FOSSIL FUEL POWER PLANTS IN SOUTHEASTERN MONTANA 126

03596-RESPONSE OF BIRDS TO ENVIRONMENTAL STRESS 127

03598-OIL SPILLS - EFFECT ON ARCTIC LAKE SYSTEMS 127

Page #

03599-SEASONAL CYCLES IN BODY COMPOSITION, ORGAN SYSTEM FUNCTION, AND ENERGETICS OF GRASSLAND BIRDS NEAR COLSTRIP, MONTANA 127

03601-POSSIBLE SUBLETHAL EFFECT OF PETROLEUM HYDROCARBONS ON THE PHYSIOLOGY OF TEMPERATURE ACCLIMATION IN MARINE FISHES (ABBREV) 128

03602-SUPPORT SERVICES AT FORT HOWES RANGER STATION 128

03603-AEROSOL CHARACTERIZATION RESEARCH -- COLSTRIP, MONTANA 128

03605-OIL MOVEMENT ON SOIL ACTIVE LAYER 128

03606-CHARACTERIZING THE AIR QUALITY IN THE COLSTRIP, MONTANA AREA 129

03608-MONTANA COAL-FIRED POWER PLANT BIOENVIRONMENTAL STUDY 129

03610-LABORATORY SUPPORT SERVICES FOR C.E.R.L. 129

03611-MULTIDISCIPLINARY RESEARCH ON SUBSYSTEMS OF COMPLEX FOREST ECOSYSTEMS 129

03612-MODIFICATION OF THE OPTIMIZED EPRF MULTILAYER HYDRODYNAMICAL-NUMERICAL MODEL 130

03757-CONTINUOUS FLOW BIOASSAYS USING NATURAL PERIPHYTON COMMUNITIES WITH EMPHASIS ON THE EFFECTS OF COAL LEACHATE 130

03758-ORGANIC LEACHING AND PARTICULATE DISPERSION FROM COAL 130

03761-THE IMPACT OF COAL-FIRED POWER PLANTS ON THE ENVIRONMENT 131

03839-EFFECTS OF THERMAL ADDITIONS ON THE DYNAMICS OF FOULING COMMUNITIES AT BEAUFORT, NC 131

03841-A FACILITY FOR THE EXPERIMENTAL ANALYSIS OF COASTAL MARINE ECOSYSTEMS 131

03863-ISOLATION AND STUDY OF CHLORO-ORGANICS RESULTING FROM CHLORINATION OF SEAWATER 132

03864-ADP TECHNICAL SUPPORT SERVICES 132

Page #

03866-SUBLETHAL EFFECTS OF CHLORINE ON VASCULAR PLANTS AND DECAPOD CRUSTACEANS 132

03867-DETERMINE THE DYNAMICS OF DISPERSION AND DISSIPATION IN MARINE AND ESTUARINE WATERS AND THE EFFECTS ON MARINE AND ESTURAINE ORG 132

03869-EFFECTS OF COMPOUNDS PRODUCED FROM PETROLEUM UTILIZATION ON MARINE INVERTEBRATES WITH EMPHASIS ON NEOPLASIA AND CARCINOGENSIS 133

03870-FOOD WEBS, POPULATIONS, AND PRODUCTIVITY IN A SOUTH-EAST COASTAL MARINE MARSH 133

03871-AN INVESTIGATION OF THE ECOLOGICAL EFFECTS OF RESIDUAL OZONE TO SELECTED ESTUARINE SPECIES 133

03872-DESIGN OF EXPERIMENTS, STATISTICAL ANALYSES, AND EVALUATION OF AQUATIC RESEARCH DATA 134

03878-ENVIRONMENTAL EFFECTS OF OFFSHORE DRILLING AND OIL ON THE MARINE ENVIRONMENT 134

03879-TOXICITY TO MARINE ORGANISMS OF PETROCHEMICALS & ENERGY RELATED ORGANIC SOLVENTS DERIVED FROM OFF-SHORE ACTIVITIES & OCEAN DUMPING 134

04038-ASSESSMENT OF IMPACTS OF MINING AND AIRBORNE POLLUTANTS ON FOREST, RANGE, AND RELATED FRESHWATER ECOSYSTEMS 134

04039-REVEGETATION AND RECLAMATION OF LAND AREAS DISTURBED BY MAN (ENVIRONMENTAL AND HEALTH) 135

04040-ESTABLISHMENT OF SEVERAL CROP ROTATIONS ON RESTORED SOILS AT A COAL SURFACE MINE 135

04041-IDENTIFYING AND PREVENTING SULFUR-RELATED PROBLEMS IN SOILS CREATED IN COAL MINING OPERATIONS 135

04042-SOIL PROFILE CHARACTERISTICS OF RESTORED SOILS AT A COAL SURFACE MINE 706-15-13 136

04043-DEEP TILLAGE STUDIES ON RECLAIMED LOESS AND GLACIAL TILL 706-15-11 136

04045-ENVIRONMENTAL ASSESSMENT OF NORTHERN PUGET SOUND & THE STRAIT OF JUAN DE FUCA 136

Page #

04047-ENVIRONMENTAL ASSESSMENT OF AN ACTIVE OIL FIELD IN THE NORTHWESTERN GULF OF MEXICO 137

04048-FIELD AND FILT/UNFILT FIELD EXPOSURE CHAMBER STUDIES OF THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON CROP AND FOREST SPECIES 137

04050-EFFECTS OF EMISSIONS FROM COAL-FIRED POWER PLANTS ON SOYBEANS AND OTHER CROPS OF ECOMONIC IMPORTANCE TO SOUTHEAST US (ABBREV) 137

04052-TRANSFER, FATE, AND EFFECTS OF SOX, NOX, AND ACID PRECIPITATION ON A TERRESTRIAL ECOSYSTEM REPRESENTATIVE OF THE TENNESSEE VALLEY 138

04054-BENEFICIAL EFFECTS OF SO2 EMISSIONS FROM COAL-FIRED POWER PLANTS ON CROP AND FOREST SPECIES 138

04056-FATE AND EFFECTS OF ATMOSPHERIC EMISSIONS FROM COOLING SYSTEMS ON TERRESTRIAL HABITATS 138

04058-ECOLOGICAL RECOVERY AFTER RECLAMATION OF TOXIC SPOILS LEFT BY COAL SURFACE MINING 139

04060-INFORMATION SYSTEMS DEVELOPMENT 139

04061-ACUTE THERMAL EFFECTS - AQUATIC INSECTS 139

04063-BIOCHEMICAL METHODOLOGY, AQUATIC THERMAL IMPACTS 140

04065-BIOMONITORING, MOLLUSKS, AND OTHERS 140

04067-EVALUATE WATER INTAKE, ZOOPLANKTON ENTRAINMENT 140

04069-STRIP MINE DRAINAGE WATER QUALITY WITH EMPHASIS ON TOXIC SUBSTANCES 141

04070-PRODUCTION OF ARTHROPOD PESTS AND VECTORS IN COAL STRIP MINE POOLS 141

04072-IMPROVING ESTIMATES OF SODIUM HAZARD OF COAL SURFACE-MINED OVERBURDEN 706-15-14 141

04073-MINE SOIL RESOURCES IN THE POWDER RIVER BASIN - CHARACTERIZATION, EVALUATION AND POTENTIALS 706-15-18 142

Page #

04074-ESTABLISHMENT, COMPOSITION AND PRODUCTIVITY OF SPECIES ADAPTED TO AREAS DISTURBED BY STRIP MINING 706-15-15 142

04075-FLEXIBLE CULTURAL PRACTICES FOR ESTABLISHMENT OF PERENNIAL AND ANNUAL VEGETATION ON TOPSOILED STRIPMINES 142

04076-WATER HARVESTING PARAMETERS ON SALINE MEDIA UNDER ARID CONDITIONS 706-15-17 143

04077-CHARACTERISTICS OF MINE LAND OVERBURDEN DUE TO SHORT-TERM WEATHERING 706-15-8 143

04078-DIRECT SEEDING OF COMMERCIAL FOREST TREES ON SURFACE MINE SOIL 706-15-7 143

04080-METHODOLOGY DEVELOPMENT AND APPLICATION FOR DETERMINING INSTREAM FLOW NEEDS 144

04079-EFFECTS OF COOLING TOWERS ON WEATHER 144

04082-DETERMINE WATER QUANTITY NEEDS OF FISH IN WESTERN STATES AFFECTED BY ENERGY DEVELOPMENT 144

04084-ECOLOGICAL METHODS FOR RAPIDLY ASSESSING COAL DEVELOPMENT IMPACTS TO WILDLIFE HABITAT 145

04086-MAJOR COASTAL ECOSYSTEM CHARACTERIZATION AND METHODOLOGY WITH EMPHASIS ON FISH AND WILDLIFE AS RELATED TO OIL AND GAS DEVELOPMENT 145

04088-ECOLOGICAL AND PHYSIOLOGICAL/TOXICOLOGICAL EFFECTS OF OIL ON BIRDS 145

04090-INTERACTIONS OF HARDWOOD TREE SEEDLINGS AND HERBACEOUS COVER ON SURFACE MINED LAND 146

04091-UTILIZATION OF LEGUMES IN REVEGETATION OF ENVIRONMENTALLY STRESSED ARID MINE SPOILS 146

04092-ALDER FOR MINELAND RESTORATION IN COLD-DOMINATED CLIMATES 146

04093-THE EFFECTS OF TOPSOIL DEPTH OVER SALINE-SODIC SPOILS ON THE PRODUCTIVITY OF NATIVE RANGE SPECIES 147

04094-EFFECT OF METALS IN MARINE ORGANISMS 147

Page #

04096-IN VITRO METABOLISM OF XENOBIOTICS BY SELECTED MARINE SPECIES 147

04098-CARCINOGENIC EFFECTS OF PETROLEUM HYDROCARBONS ON SELECTED MARINE AND ESTUARINE ORGANISMS 148

04100-DEFINING AND DIAGNOSING ORPHAN LANDS FOR RECLAMATION AND LAND USE POTENTIAL 148

04102-DETERMINING AND INTERPRETING MINESOIL PROPERTY VARIATIONS WITHIN MAPPABLE CLASSES 148

TRANSPORT AND FATE

01922-AMBIENT HYDROCARBON AND OZONE MEASUREMENTS NEAR A REFINERY 151

01926-KINETIC STUDY OF SIMULATED SO_2, NOX, RH-POLLUTED ATMOSPHERES 151

01927-DEVELOPMENT OF A MODEL OF SO_2 OXIDATION IN SMOG 151

01928-TRANSFORMATION AND TRANSPORT OF AIR POLLUTANTS 152

01929-SULFUR BUDGET IN LARGE PLUMES 152

01930-AIRCRAFT MEASUREMENTS IN SUPPORT OF PROJECT MISTT, MID-WEST INTERSTATE SULFUR TRANSFORMATION AND TRANSPORT 152

01931-FORMATION OF ATMOSPHERIC AEROSOLS 153

01934-A STUDY OF THE IDENTITY AND SOURCES OF DENVER'S AEROSOLS 153

01935-INTERPRETATION OF DATA FROM BIOGENIC SULFUR FIELD STUDIES/MISTT TECHNICAL SUPPORT 153

01936-MESOSCALE SULFUR BALANCE STUDIES 154

01938-OPTICAL EFFECTS OF ATMOSPHERIC AEROSOL 154

01939-HALOCARBON ANALYSES IN THE ST. LOUIS, MISSOURI METROPOLITAN AREA 154

01940-DEVELOPMENT & APPLICATION OF MULTIPLE TRACER TECHNIQUES FOR THE STUDY OF POLLUTANT TRANSPORT AND DISPERSION IN THE ATMOSPHERE 154

Page #

01942-INTERNATIONAL SYMPOSIUM ON SULFUR IN THE ATMOSPHERE, DUBROVNIK, YUGOSLAVIA 155

01943-DETERMINE THE CHARACTER AND ORIGIN OF AEROSOLS AND DEVELOPMENT OF FINE PARTICLE METHODOLOGIES 155

01945-STRUCTURE AND REACTIVITY OF ADSORBED OXIDES OF SULFUR 155

01946-REACTIONS OF SULFUR DIOXIDE IN AEROSOLS 155

01947-AEROSOL DEPOSITION RATES 156

01949-AEROMETRIC FIELD STUDY IN VICINITY OF A LARGE POWER PLANT IN COMPLEX TERRAIN 156

01951-INDEPENDENT AUDIT OF CLINCH RIVER FIELD STUDY 156

01952-NORTHROP SUPPORT SERVICES 156

01953-NORTHROP SUPPORT SERVICES 157

01954-ANALYSIS OF LIDAR DATA 157

01956-NOAA SUPPORT SERVICES TO EPA 157

01959-AEROSOL FORMATION AND DEPOSITION IN A FOREST CANOPY 157

01961-AIRCRAFT MEASUREMENTS IN SUPPORT OF AEROSOL RESEARCH STUDIES OF SULFUR INFORMATION AND TRANSPORTS 157

01963-PHOTOCHEMICAL MODEL DEVELOPMENT 158

01974-IDENTIFICATION AND MEASUREMENT OF INORGANIC COMPOUND EMISSIONS 158

01976-THEORETICAL DATA BASE FOR QUANTITATIVE ANALYSIS OF EMPIRICAL DATA ON MOLECULAR COMPOSITION OF PARTICLES BY RAMAN SCATTERING 158

01977-FABRICATE ADVANCED SOFTWARE PROGRAMS FOR THE EVALUATION OF GC/MS DATA 158

01978-COLLECTION AND ANALYSIS OF CARCINOGENIC VAPORS 159

01979-TECHNIQUES FOR THE MEASUREMENT OF AEROSOL SIZE DISTRIBUTION AND CARBON AND SULFUR CONTENT 159

Page #

01981-INTERCOMPARISON OF METHODS TO COLLECT AND ANALYZE AEROSOLS 159

01983-NORTHROP SUPPORT SERVICES 159

01984-TASK ORDER TECHNICAL SUPPORT 160

01985-NORTHROP SUPPORT SERVICES 160

01986-NORTHROP SUPPORT SERVICES 160

03160-INPUT, DEPOSITION, AND POST DEPOSITIONAL CONVERSION OF ARSENIC 160

03162-SORPTION PROPERTIES OF SOILS AND ENERGY-RELATED POLLUTANTS 161

03401-MINERALOGY OF OVERBURDEN AS RELATED TO GROUNDWATER DEGRADATION IN THE STRIP MINING OF COAL 161

04105-FATE AND EFFECTS OF PETROLEUM HYDROCARBONS AND SELECTED TOXIC METALS IN SELECTED MARINE ECOSYSTEMS AND ORGANISMS 161

04106-ATMOSPHERIC INTERACTION STUDIES 162

04108-REGIONAL ATMOSPHERIC TRANSPORT OF COAL-FIRED POWER PLANT EMISSIONS 162

04110-EVALUATION AND IMPROVEMENT OF MODELS USED FOR RADIOLOGICAL IMPACT ASSESSMENT OF GASEOUS RELEASES FROM NUCLEAR POWER PLANTS 162

04113-SIMULATION OF THERMAL DISPERSION AND FLUID MECHANICS AT CRITICAL LOCATIONS IN STREAMS & RESERVOIRS 163

04115-EFFECTS OF ENTRAINMENT IN COOLING SYSTEMS ON FISH EGGS AND LARVAE 163

04118-LONG-TERM EFFECTS OF OIL ON MARINE COMMUNITIES AND ASSOCIATED ORGANISMS 163

MEASUREMENT SYSTEMS AND INSTRUMENTATON

00107-CONTINUOUS MONITORING OF TOTAL DISSOLVED GAS PRESSURE 167

Page #

00110-ION EXCHANGE MEMBRANES APPLIED TO NEW METHODS OF SAMPLING, ENRICHMENT AND SPECIATION IN WATER ANALYSIS 167

00112-A COMPARATIVE SELECTIVITY STUDY OF THE NITROGEN OXIDE ELECTRODE AND THE SOLID STATE NITRATE ELECTRODE FOR DETERMINATION OF NITRATE 167

00114-EVALUATION OF THE DIONEX ION EXCHANGE CHROMATOGRAPH FOR NATURAL WATER SAMPLES ANALYSIS 167

00115-PROVIDE QUANTITATIVE ANALYTICAL SERVICES TO THE QA BRANCH 168

01346-QUALITY ASSURANCE IN SUPPORT OF ENERGY-RELATED MONITORING ACTIVITIES IN THE WESTERN USA 168

02953-MONITORING THE IMPACT OF WESTERN COAL STRIP MINING AND OIL SHALE EXTRACTION ON GROUNDWATER QUALITY 168

02955-ENERGY-RELATED RADIOLOGICAL POLLUTANT MONITORING AND TECHNIQUES DEVELOPMENT 169

02957-COLLABORATIVELY TEST METHODS FOR MEASURING URANIUM IN ENVIRONMENTAL SAMPLES 169

02959-ENERGY-RELATED RADIOLOGICAL MONITORING QUALITY ASSURANCE 169

02961-DEVELOPMENT OF BACKGROUND EVALUATIONS FOR VALIDATIONS OF GROUNDWATER QUALITY MONITORING METHODOLOGY 170

02963-ACQUIRE FROM NASA AND PUT INTO USE, THE DATA ANALYSIS SYSTEM (DAS) FOR MULTISPECTRAL INFORMATION 170

02964-ENERGY-RELATED OVERHEAD MONITORING AND TECHNIQUES DEVELOPMENT 171

02966-DEVELOPMENT OF TECHNIQUES FOR REMOTE MONITORING OF ORGANIC POLLUTION IN SURFACE WATERS 171

02967-ENERGY RELATED WATER MONITORING DATA INTEGRATION 172

02969-FOUR CORNERS AMBIENT AIR MONITORING NETWORK 172

02971-ENERGY-RELATED AMBIENT AIR QUALITY MONITORING IN THE WESTERN ENERGY DEVELOPMENT AREA 172

Page #

04121-OCEAN OIL SPILL CONCENTRATION AND TRAJECTORY FORECAST 173

04123-STANDARDIZATION AND INTERCALIBRATION TECHNIQUES FOR MARINE MONITORING 173

04125-BYPRODUCT MARKETING 173

04126-DEVELOP A SOFTWARE MODULE WHICH REMOVES GEOMETRIC DISTORTIONS FROM AIRCRAFT MULTISPECTRAL CLASSIFIED DATA 174

04127-DEVELOP A DATA BASE CLASSIFICATION SYSTEM FOR DETERMINING THE REHABILITATION POTENTIALS OF SURFACE MINED LANDS 174

04129-UTILIZATION OF AIRCRAFT-ACQUIRED MULTISPECTRAL DATA TO MONITOR CHANGE ON SURFACE MINED LANDS 174

04130-SHIPBOARD ENVIRONMENTAL DATA ACQUISITION SYSTEM (SEAS) 175

04132-ENVIRONMENTAL EFFECTS OF POLLUTANTS FROM ENERGY PRODUCTION 175

04133-METEOROLOGICAL INTERPRETATION AND PREDICTION OF AIR QUALITY IN THE WESTERN U.S. 175

04134-ISOLATION AND IDENTIFICATION OF WATER-BORNE POLLUTANTS ASSOCIATED WITH THE POWER INDUSTRY 176

04136-DEVELOPMENT AND EVALUATION OF AN INTEGRATED APPROACH TO THE OPTIMIZATION OF NUCLEAR POWER PLANT RADIOLOGICAL SURVEILLANCE PROGRAMS 176

04137-REMOTE SENSING OF SO_2 EFFECTS ON VEGETATION 176

04139-RADIOLOGICAL POLLUTANT QUALITY ASSURANCE 177

04141-ENERGY RELATED WATER POLLUTANT STANDARD REFERENCE MATERIALS (SRMS) 177

04143-ENERGY RELATED, AIR POLLUTION MONITORING STANDARD REFERENCE MATERIALS, INSTRUMENTATION AND METHODS 178

04145-ENERGY RELATED AIR POLLUTION MONITORING STANDARD REFERENCE MATERIALS, INSTRUMENTATION AND METHODS 178

04146-LIDAR TECHNIQUES FOR MEASURING PARTICULATE POLLUTANTS FROM ENERGY PRODUCTION AND THEIR TRANSPORT AND DISPERSION PROCESSES 179

Page #

03165-IDENTIFY AND MEASURE CHEMICAL ELEMENTS AND VOLATILE ORGANICS IN ENERGY-RELATED WASTES 179

04150-ENERGY-RELATED AIR POLLUTANT ANALYSIS INSTRUMENTATION 179

04152-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION 180

04153-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION 180

04155-ENERGY RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION 180

04156-ENERGY-RELATED WATER POLLUTANT ANALYSES INSTRUMENTATION 181

04157-ENERGY-RELATED REMOTE AND IN SITU INSTRUMENT DEVELOPMENT 181

04159-OPTICAL ABSORPTION PROPERTIES OF SULFATE AEROSOL 181

HEALTH EFFECTS

01277-COMPARATIVE TOXICOLOGICAL EVALUATION OF EMISSIONS FROM POWER PLANTS USING EASTERN VS WESTERN COALS 185

01279-INVESTIGATION OF EFFECTS OF PROLONGED INHALATION OF NICKEL-ENRICHED FLY ASH IN SYRIAN GOLDEN HAMSTERS 185

01281-HEALTH EFFECTS OF ENERGY BYPRODUCTS ON DRINKING WATER 186

01282-HEALTH IMPACTS OF ACID MINE DRAINAGE ON DRINKING WATER SUPPLIES IN WESTERN COALS 186

01283-EFFECTS OF ENERGY CONSUMPTION RELATED POLLUTANTS ON PULMONARY FIBROSIS 186

01286-COMPARATIVE TOXICOLOGICAL EVALUATION OF EMISSION FROM POWER PLANTS USING EASTERN VS WESTERN COAL 187

01288-EFFECT OF POLLUTANTS FROM ENERGY CONSUMPTION AND ENVIRONMENTAL TRACE METALS ON LUNG METABOLISM 187

02688-ENZYMATIC CHARACTERIZATION OF METABOLIC ACTIVATION AND DNA BINDING OF PRESUMPTIVE CARCINOGENS IN SHORT-TERM ASSAY SYSTEMS (ABBREV) 188

02689-IMPLEMENTATION OF SCREENING TESTS FOR POTENTIALLY HAZARDOUS AIRBORNE PARTICULATE MATERIALS USING THE ALVEOLAR MACROPHAGE TEST SYS 188

Page #

02691-IMPROVED SCORING OF CHEMICAL TRANSFORMATION OF C3H/10T1/2 CELLS 189

02692-WORKSHOP ON "SCREENING SYSTEMS FOR ALTERNATE ENERGY EFFLUENTS" 189

02693-DEVELOPMENT OF AUTOMATED BEHAVIORAL TESTING METHODOLOGIES FOR STUDY OF EFFECTS OF COAL CONVERSION AND UTILIZATION PRODUCTS 189

02695-ENZYMATIC CHARACTERIZATION OF METABOLIC ACTIVATION AND DNA BINDING OF PRESUMPTIVE CARCINOGENS IN SHORT-TERM ASSAY SYSTEMS (ABBREV) 190

02696-STUDIES ON THE RELATIONSHIP BETWEEN CARCINOGEN METABOLISM IN THE ALVEOLAR MACROPHAGE AND THE INDUCTION OF LUNG CANCER 190

02698-EFFECTS OF SULFURIC ACID AEROSOL UPON RESPIRATORY FUNCTION IN NORMAL HUMAN SUBJECTS 190

02700-THE EFFECT OF LOW LEVELS OF SULFURIC ACID MIST EXPOSURE ON HUMAN PULMONARY FUNCTION 191

02702-EFFECT OF COAL GASIFICATION PRODUCTS ON THE PULMONARY DEFENSE SYSTEM AGAINST INFECTIOUS DISEASE (BACTERIAL) 191

02704-TO DETERMINE EFFECTS OF POLLUTANTS FROM ALTERNATE ENERGY SOURCES ON PULMONARY ANTIVIRAL MECHANISMS 191

02706-APPLICATION OF AUTOMATED BEHAVIORAL TESTING SYSTEM TO MONKEYS EXPOSED TO COAL CONVERSION POLLUTANTS 192

02707-AIR POLLUTION AND CARDIOPULMONARY FUNCTIONS 192

02709-PREPARATION AND CHARACTERIZATION OF FINELY PARTICULATE ENVIRONMENTAL CONTAMINANTS FOR BIOLOGICAL EXPERIMENTATION 192

02710-BIOLOGICAL ASSESSMENT OF EXPOSURE TO SULFUR DIOXIDE AND ACID SULFATE 193

02712-ENVIRONMENTAL MUTAGENS STUDIES UTILIZING A DROSOPHILA TEST SYSTEM 193

02713-IN VITRO SCREENING OF SELECTED AIR POLLUTANTS FOR POTENTIAL CARCINOGENICITY 193

Page #

04173-METABOLISM OF INHALED TRACE METAL EFFLUENTS FROM COMBUSTION PROCESSES 194

04174-DEPOSITION, RETENTION AND DOSIMETRY OF INHALED REACTION PRODUCTS WHICH MAY RESULT FROM SO_2-PARTICAL REACTIONS 194

04175-CYTOGENTIC STUDIES OF LONG CELLS FOLLOWING INHALATION OF FLY ASH, CHEMICAL MUTAGENS AND EFFLUENTS FROM POWER-RELATED INDUSTRY 194

04176-THE USE OF MALE GERMINAL TISSUE IN THE DETECTION OF MUTATIONAL EVENTS 195

04177-DEVELOPMENTAL TOXICITY INDICATORS 195

04179-CARCINOGENESIS OF FOSSIL FUEL-RELATED COMBUSTION PRODUCTS 195

04180-MUTAGENESIS IN CULTURED LYMPHOCYTES 196

04181-MULTIPLE LOCI SCREEN FOR MUTATIONS IN MAMMALIAN CELLS 196

04182-DEVELOPMENT OF DNA REPAIR FOR MONITORING HUMAN HEALTH 196

04183-HEPATIC AND EXTRAHEPATIC CONJUGATION AND OXIDATION METABOLIC PATHWAYS FOR XENOBIOTICS IN MAMMALS 197

04184-ENVIRONMENTAL TERATOLOGY INFORMATION CENTER (ETIC) 197

04185-REGULATION OF NEURAL DISTRIBUTION OF LEAD 197

04186-FUNCTION OF METALLOTHIONEIN IN HEAVY METAL METABOLISM 198

04187-BIOLOGICAL EFFECTS OF 60 HERTZ ELECTRIC FIELDS 198

04188-FACTORS AFFECTING IRRITANT POTENCY OF GASES AND AEROSOLS 198

04189-RESPIRATORY TRACT DEPOSITION OF INHALED AEROSOLS 199

04190-TRACE ELEMENT DEPOSITION IN AMBIENT AEROSOL INHALATION 199

04192-REGIONAL DEPOSITION OF INHALED PARTICLES IN MAN 199

04194-EFFECTS OF ENVIRONMENTAL AGENTS ON MALE AND FEMALE REPRODUCTIVE TRACT FUNCTION 200

Page #

04195-EFFECTS OF 60 HZ FIELDS ON THE MAMMALIAN CENTRAL NERVOUS SYSTEM 200

04196-ASSESSMENT OF NEUROBEHAVIORAL CONSEQUENCES OF ENERGY RELATED ENVIRONMENTAL FACTORS 200

04197-CHEMICALLY INDUCED MUTATIONS AT BIOCHEMICAL LOCI IN MICE 201

04198-LEAD TOXICITY AND ENERGY METABOLISM IN IMMATURE BRAIN 201

04199-ENVIRONMENTAL MUTAGEN INFORMATION CENTER 201

04201-CHEMICAL AND ENVIRONMENTAL MUTAGEN STUDIES UTILIZING THE TRADESCANTIA TEST SYSTEM 202

04202-MONITORING MUTAGENS (CLASTOGENS) WITH MAMMALIAN CHROMOSOMES 202

04204-RISK ASSESSMENT FOR ENVIRONMENTAL CARCINOGENS 202

04205-STATISTICAL DEVELOPMENT OF MULTISTAGE CARCINOGENESIS MODELS 203

04207-LOW DOSE TOXICOLOGICAL ESTIMATION 203

04208-STATISTICAL STUDIES OF PROBLEMS OF HEALTH AND BIOLOGY 203

04209-THE INTERACTION OF CHEMICAL AGENTS PRESENT IN OIL SHALE WITH BIOLOGICAL SYSTEMS 204

04210-THE EFFECT OF NOX AIR POLLUTANTS ON MEMBRANES 204

04212-CAN VITAMIN E OR LIPID ALTER NO2 OR O3 TOXICITY IN LUNG 204

04213-PULMONARY EFFECTS OF ENVIRONMENTAL OXIDANT POLLUTANTS 205

04214-ENVIRONMENTAL CELLULAR TOXICOLOGY PROGRAM 205

04216-PRENATAL DOSIMETRY POLLUTANT METALS 205

04218-GENETIC EFFECTS FROM ELECTRIC FIELDS AT THE CHROMOSOMAL LEVEL OF DROSOPHILA 206

04219-USE OF MOUSE SPECIFIC-LOCUS METHOD TO QUANTIFY THE GENE MUTATION HAZARD 206

Page #

04221-SCREENING FOR THE MUTAGENICITY AND CARCINOGENICITY OF ENERGY RELATED POLLUTANTS 206

04223-TERATOGENIC AND MUTAGENIC EFFECTS OF TRACE METALS AND CARCINOGENIC HYDROCARBONS ON CULTURED MAMMALIAN CELLS 207

04226-DEVELOPMENT AND USE OF DIFFERENTIATED CELL CULTURES FOR TOXICOLOGY STUDIES 207

04228-IN VIVO SCREENING FOR GENE MUTATIONS IN MOUSE GERM AND SOMATIC CELLS 207

04232-"IN-VITRO" CHEMICAL CARCINOGENESIS OF HORMONE-RESPONSIVE CULTURED ENDOMETRIAL CELLS 208

04234-CHEMICAL INDUCTION OF CHROMOSOMAL ABERRATIONS IN MOUSE GERM CELLS 208

04236-MUTAGENICITY ASSAY OF FRACTIONATED COAL-CONVERSION PRODUCTS 208

04238-PULMONARY CARCINOGENESIS TEST SYSTEM 209

04240-DEVELOPMENT OF PERMANENT EPITHELIAL CELL LINES 209

04242-INFLUENCE OF DIET ON THE GASTROINTESTINAL ABSORPTION OF CADMIUM 209

04244-TOXIC EFFECTS OF METALS ON DNA SYNTHESIS 210

☆ U. S. GOVERNMENT PRINTING OFFICE : 1980 620-228/4071