GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: 6/28/79

Project Title: Energy Analysis & Diagnostic Center

Project No: B-532

Project Director: Mr. G. B. Curtis

Sponsor: University City Science Ctr., Philedelphia, PA 19104

Agreement Period: From 12/17/78 Until ~~12/31/79~~ aw 31-80

Type Agreement: Contract dated 5/2/79

Amount: $79,099

Reports Required: Audit Reports, Monthly Progress Reports

Sponsor Contact Person (s):

Technical Matters

F. William Kirsch, Ph.D.
University City Science Center
3625 Science Center
Philadelphia, Pennsylvania 19104

Contractual Matters
(thru OCA)

Mr. Robert S. Krutsick
University City Science Center
3625 Science Center
Philadelphia, Pennsylvania 19104
215/387-2255

NOTE: Continuation of B-527

Defense Priority Rating: N/A

Assigned to: Technology & Development (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director--EES
Accounting Office
Procurement Office
Security Coordinator (OCA)
Reports Coordinator (OCA) ✓
Library, Technical Reports Section
EES Information Office
EES Reports & Procedures
Project File (OCA)
Project Code (GTRI)
Other

CA-3 (3/76)

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: March 3, 1980

t Title: Energy Analysis and Diagnostic Center

t No: B-532

t Director: Mr. G. B. Curtis

or: University City Science Center; Philadelphia, Pa.

ve Termination Date: January 31, 1980

ice of Accounting Charges: January 31, 1980

Contract Closeout Actions Remaining: None

- _ Final Invoice and Closing Documents
- _ Final Fiscal Report
- _ Final Report of Inventions
- _ Govt. Property Inventory & Related Certificate
- _ Classified Material Certificate
- _ Other _____

to: TAL/ECD (School/Laboratory)

FROM:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director–EES
Accounting Office
Procurement Office
Security Coordinator (OCA)
Reports Coordinator (OCA)

Library, Technical Reports Section
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

CA-4 (1/79)

B-532

EES ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

June 11, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pennsylvania 19104

Subject: Energy Analysis and Diagnostic Center Program Monthly Progress Summary Report for EES/GIT Research Project B-532 for period 6 June 1979 through 15 June 1979

Dear Dr. Kirsch:

On behalf of Mr. Grant Curtis, Principal Investigator of the EADC Project at Georgia Tech, as well as the other members of this project team, I would like to take this opportunity to express our enthusiasm about our continued association with this program and with the University City Science Center.

This letter will serve as our first monthly report. A schedule for completion of this project within the revised, seven month period is enclosed.

Associated with this project, in addition to Grant Curtis, will be Mr. John B. Kirk and the writer. Biographical sketches for these two personnel are enclosed. An additional man will also be hired to assist in our efforts.

Current activities are centering upon planning for the required 35 audits in order to optimize the gathering of quantifiable information. During the next month, we anticipate conducting three (3) in-plant audits. Subsequent months will find an increase in our audit rate. From the next monthly report forward, monthly reporting will be carried out as per the format detailed in our current contract.

We are anticipating continued success with this project and look forward to our ongoing association.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Division Chief

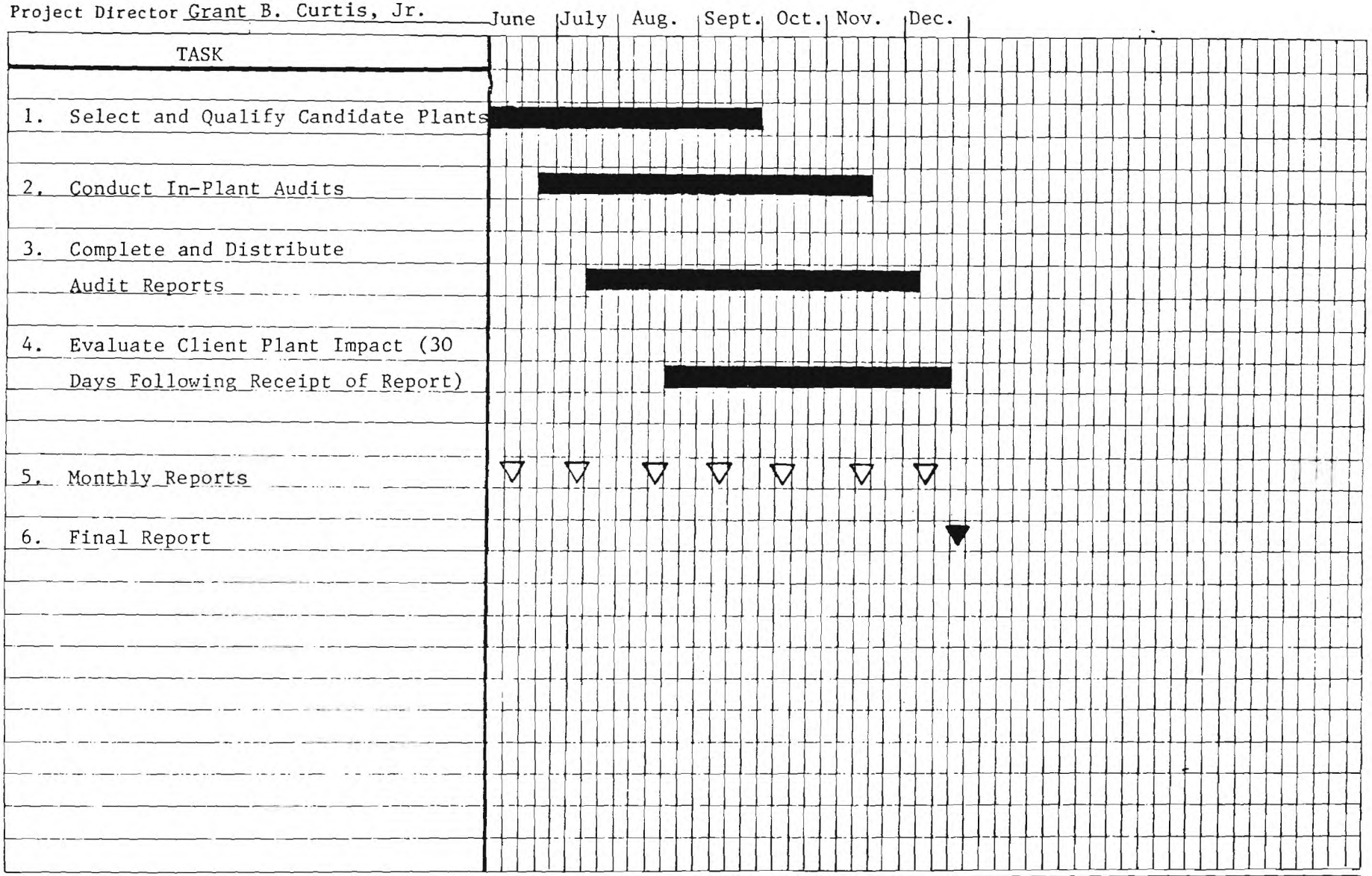
DJC/dlm

Enclosure

cc: Grant B Curtis, Jr.

Project Title Energy Analysis and Diagnostic Center

Project Director Grant B. Curtis, Jr.



Georgia Institute of Technology

BIOGRAPHICAL SKETCH

COUGHLIN, DENNIS J.--Assistant Research Engineer
Engineering Experiment Station

Education

B.I.E., Georgia Institute of Technology	1972
M.B.A., Georgia State University	In Progress

Employment History

Dekalb County Board of Education	
Secondary School Teacher	1973-1974
Westinghouse Electric Corporation, Steam Turbine Division	
Associate Quality Control Engineer	1974-1976
Westinghouse Electric Corporation, Nuclear Equipment Divisions	
Quality Assurance Engineer	1976-1978
Georgia Institute of Technology	
Assistant Research Engineer	1978-Present

Experience Summary: At Westinghouse Electric Corporation, Steam Turbine Division, engaged in the development and design of inspection apparatus and methods for large commercial steam turbine blades. Directed project to design, procure, and develop a computerized man-machine system for real time moment balancing of blade rows. Also participated in the qualification and surveillance of steel suppliers, the qualification of non-destructive test personnel, and the analysis of product deficiencies, both during manufacture and at assembly sites. At Westinghouse Electric Corporation, Nuclear Equipment Divisions, engaged in the verification of compliance in the design, machining, fabrication, and assembly of commercial nuclear reactor core internals with appropriate boiler and pressure vessel code sections and Federal requirements. Headed project to design and implement an information system for maintaining computerized material traceability in reactor internals construction. Other responsibilities included: review of intermediate and final product designs, design of product functional gaging, surveillance of reactor assembly at power generating sites, and liaison with third party inspection agencies, ASME survey teams, and customer witnesses. Received qualifying training in non-destructive testing by visual, liquid penetrant, ultrasonic, and radiographic inspection of steels and performed as-needed in supervisory capacity over hourly personnel. While at Georgia Tech, have provided technical support to manufacturing industry via the Georgia Industrial Energy Extension Service in the area of process and hardware analysis for energy conservation opportunities. Responsibilities include: plant energy surveys, hardware and process technical and economic analyses, report writing, and seminar presentations to industrial management groups. Currently Group Coordinator for General Industries sector of IEES.

Current Fields of Interest

Industrial energy conservation through alternative energy applications and state of the art technology; energy conservation in new home construction; man-machine and information systems for industry.

Membership - Professional Organizations

Member of American Society of Mechanical Engineers
Member of American Society of Quality Control Engineers

Major Reports and Publications

1. "Industrial Energy Conservation," Manual for Industrial Energy Extension Service Project A-2099, 1978, co-author.
2. "Building and Marketing the Energy Conserving Home in Georgia 1978-1979," Manual for Home Builders Energy Workshop Project A-2227, 1979, co-author.
3. "Solid Fuels Technology," Manual for Industrial Energy Extension Service Project A-2362, 1979, contributor.

Georgia Institute of Technology

BIOGRAPHICAL SKETCH

KIRK, JOHN B.--Research Engineer Level I

Education

B.S., Chemical Engineering, Tulane University	1978
M.B.A., Tulane University	In Progress

Employment History

Shell Oil Company, Engineer	1977
City of New Orleans, Laboratory Technician	1978

Experience Summary: Shell Oil; during summer employment, studied saltwater treating facilities to determine how much dispersed oil and suspended sand was being removed. Conducted field tests and wrote a report describing the operating efficiency of two plants. City of New Orleans; performed non-destructive flow rate tests on sand filter and calibrated orifice meters and automatic controls in water treating plant.

Current Fields of Interest

Solar power and aquiculture. Energy conservation in automobile and truck refrigeration systems. Energy conservation in small industry.

B-532

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

July 10, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, PA 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for 1 June 1979
Through 30 June 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of June.

Activities of June

1. Monthly activity highlights:

   - Reference is made to the attached EADC Monthly Progress Report form which gives a breakdown of specific activities for the month.

   - Work was begun on the preparation of a brochure to be used in promotion of the EADC Program. This brochure will be completed during July and distributed by mail to small and medium sized manufacturing industries in order to publicize our program and prompt inquiries from interested manufacturers. Primary focus will be on SIC categories 24, 25 and 26 in this promotion.

2. Comparison to project plan: All tasks are on schedule.

3. Reason for schedule slippage: N/A

4. Problems encountered: None

Plans for July

1. Conduct 6 new audits. (Refer to attached EADC Monthly Progress Report Form for details of July Audit plants).

2. Develop audit reports as scheduled (ie, within 3 weeks of audit).

3. Distribute program brochure to small and medium sized manufacturers in SIC categories 24, 25 and 26.

4. Conduct evaluation of level of implementation of audited plants as scheduled (ie, 30 days following manufacturer's receipt of audit report).

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Division Chief

DJC:ah
Attachment
cc: Grant B Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Grant B. Curtis

Date: July 10, 1979

Report period: June, 1979

o Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C 2601/31	26	6/14/79	6/29/79
C 2501/32	25	6/21/79	In progress
C 2401/33	24	6/27/79	In progress

o Have any follow-up visits been made during this report period? ____ yes __X__ no

If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted
N/A			

o How many inquiries have you received from interested manufacturers during this report period? 1

o Have any implementation data been received by the EADC during this report period? ____ yes __x__ no. If yes, has a copy been sent to the Science Center? N/A yes ___ n

o Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit
C2402	24	7/5/79
C2403	24	7/12/79
C2602	26	7/25/79

3 additional audits in SIC categories 24,25,or 26 for a total of 6 for the month of July.

o Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

August 6, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pa. 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for July 1, 1979 through July 31, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of July, 1979.

Activities of July

1. Monthly activity highlights:
   - Reference is made to the attached EADC Monthly Progress Report form which gives a breakdown of specific activities for the month.
   - Work was completed on development, production, and mailing of a brochure to be used in promotion of the EADC program. This brochure and a cover letter were mailed to approximately 200 small and medium sized manufacturing industries in order to publicize our program and prompt inquiries from interested manufacturers. Focus was on SIC categories 24, 25 and 26 in the mailing; three requests for audits were received during this month as a result of this mailing. (Please see attachment A, program brochure).
   - In addition to existing project personnel, two Research Engineers (Messr's D. T. Reed and W. G. Moran) performed audits. Please see attachments B and C giving biographical sketches.
2. Comparison to project plan: All tasks are on schedule.
3. Reason for schedule slippage: N/A
4. Problems encountered: None

Plans for August

1. Conduct seven new audits. (Refer to attached EADC Monthly Progress Report Form for details of August audit plants).

2. Develop audit reports as scheduled (i.e., within three weeks of audit).

3. Continue to distribute program brochures to small and medium sized manufacturers in SIC categories 24, 25, and 26.

4. Host University City Science Center personnel during proposed evaluation visit to Georgia Tech.

5. Conduct evaluation of level of implementation of audited plants.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran
Professional Engineer
Division Chief

Attachments

cc: Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Georgia Tech, Engineering Experiment Station, Grant B. Curtis

Date: August 6, 1979

Report period: July, 1979

o Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C 2402/34	24	7/5/79	7/23/79
C 2403/35	24	7/12/79	7/31/79
C 2404/36	24	7/18/79	In Progress
C 2502/37	25	7/19/79	In Progress
C 2406/38	24	7/20/79	In Progress
C 2407/39	24	7/20/79	In Progress
C 2602/40	26	7/25/79	In Progress
C 2405/41	24	7/27/79	In Progress
Update on Status of Firms Audited in June			
C 2501/32	25	6/21/79	*7/11/79
C 2401/33	24	6/27/79	*7/16/79

*Change in status

o Have any follow-up visits been made during this report period? ____ yes __X__ no

If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted

N/A

o How many inquiries have you received from interested manufacturers during this report period? ____3____ Three firms requested EADC audits during this period. Two were by written request and one by telephone. See comments below

o Have any implementation data been received by the EADC during this report period? ____ yes __X__ no. If yes, has a copy been sent to the Science Center? ___ yes ___ n

o Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit
C 2605	26	8/6/79
C 2603	26	8/8/79
C 2604	26	8/8/79

4 additional audits in SIC categories 24, 25, or 26, for a total of 7 for the month of August.

o Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

SEE BACK OF THIS FORM FOR COMMENTS

Attachment "A"

Energy Conservation Opportunities

via

The Energy Analysis and Diagnostic Center Program

A joint service of
the University City Science Center
and Georgia Tech's
Engineering Experiment Station

Energy Conservation Opportunities

Objectives

The Energy Analysis and Diagnostic Center (EADC) program is an ongoing extension service for manufacturing industries which provides assistance to plant management at selected plants in conducting energy surveys. The EADC has as its objective the development of economically attractive energy conservation opportunities through in-plant surveys within small and medium sized industrial firms.

Sponsor

The EADC program is sponsored by the University City Science Center in Philadelphia, Pennsylvania, a non-profit organization, through authorization of the Department of Energy. The University City Science Center has overall management responsibility for this national program under which three EADC's have been designated, each in a different state, to administer operation of the program.

Administrator

Georgia Tech's Engineering Experiment Station has been chosen as one of three EADC's. This selection was based on the station's proven record of performance in energy conservation outreach projects, its established resources and experienced staff, and its ability to work closely with industrial firms in the area of applied energy conservation techniques.

Program Operation

EADC teams from Georgia Tech will assist plant management at selected plants by conducting in-plant energy surveys. These surveys will analyze energy conservation opportunities in process or plant operations and will research energy consumption and efficiency for individual plants. An energy conservation report detailing energy conservation opportunities will be written for each surveyed plant giving practical instances of current energy conservation technology as they relate to that plant. Emphasis will be on low cost, short payback recommendations which the plant can implement within short periods of time. Some measures may require detailed design or equipment sizing which is beyond the scope of this program; however, private engineering firms would be able to take the preliminary recommendations produced by EADC teams and follow them through the design steps. Savings areas may vary from simple reductions in usage time to equipment or process modification.

Availability

This free, voluntary service is available to any small or medium sized industrial manufacturing firm. In order to successfully carry out the in-plant survey and develop the energy conservation recommendations, the surveyed plants will be asked to provide records of their energy consumption for a recent one year period. These records and all areas of the in-plant survey will be kept confidential, and proprietary information will remain proprietary. A plant's participation in this program will also be kept confidential.

For More Information

For more information, call or write:

Dennis Coughlin
Engineering Experiment Station
Georgia Tech
Atlanta, GA 30332
(404) 894-3412

Attachment"B"

Georgia Institute of Technology

BIOGRAPHICAL SKETCH

REED, DANNY T.--Research Engineer

Education

B., Mechanical Engineering, Georgia Institute of Technology	1975
M.S., Mechanical Engineering, Georgia Institute of Technology	1978

Employment History

Marshall Space Flight Center (NASA), Student Trainee	1971-1972
Delta Air Lines, Cooperative Student	1972-1975
Stauffer Chemical Company, Process Engineer	1976-1977
Georgia Institute of Technology, Research Engineer	1978-Present

Experience Summary: NASA: computer check-out procedures (soft ware) and electrical ground support equipment for Apollo Telescope Mount (ATM) experiments on Skylab projects. Delta: developed fuel consumption data; maintained weight and balance records; acted as liaison engineer for Landing Gear Shop, performing stress analyses of landing gear parts. Stauffer: pollution control and prevention, designed containment walls for chemical storage tanks; fire protection, designed and supervised the installation of automatic sprinkler system; plant maintenance, specified and supervised repairs of chemically damaged concrete structure, analyzed, specified, and supervised replacement of stress-cracked expansion bellows; energy conservation, specified and purchased automatic oxygen analyzers, supervised installation of replacement deaerator for plant steam system; engineering computer coordinator. Georgia Tech Engineering Experiment Station: currently working with the Industrial Energy Extension Service. Initial assignment was with Food and Stone, Clay and Glass Industries. Primary responsibilities: conduct in-plant energy conservation surveys, provide consulting and technical assistance to industries in the area of energy conservation, conduct industrial energy seminars, evaluate innovative energy conservation techniques, prepare and disseminate technical information on energy conservation. Presently Food and Kindred products sector group coordinator.

Current Fields of Interest

Industrial and commercial energy conservation, plant engineering, computer applications.

Major Reports and Publications

1. "Radiation and Electrical Conductivity of Argon Plasma at 1 to 100 Atm", AIAA 11th Thermophysics Conference, San Diego, California, July 1976, AIAA Paper No. 76-465, with A. V. Larson, J. R. Williams, and M. C. Wynn.

2. Industrial Energy Conservation, Seminar Manual for Industrial Energy Extension Service, 1978, with others.

Attachment "C"

Georgia Institute of Technology

BIOGRAPHICAL SKETCH

MORAN, William G.--Research Engineer
Engineering Experiment Station

Education

B.S., Mechanical Engineering, University of Massachusetts	1973
M.S., Mechanical Engineering, Rensselaer Polytechnic Institute	1976
M.B.A., Georgia State University	In Progress

Registration

Professional Engineer, Georgia No. 11732

Employment History

United Technologies Corp., Pratt & Whitney Aircraft	
Senior Mechanical Engineer	1973-1977
Georgia Institute of Technology	
Research Engineer	1977-Present
Head, Energy Conservation Branch	
Technology & Development Laboratory, EES	1979-Present

Experience Summary: Pratt & Whitney. Research, design and development of advanced manufacturing processes and equipment. Project engineer for design and fabrication of: automatic ultrasonic inspection systems for turbine disks, heat dissipation devices for large hot isostatic presses. Assisted in the development of a completely automated casting facility for directionally solidified turbine blades. Research and design experience in vacuum and pressure vessels, robots and process automation and powdered metals handling and forming. Project responsibilities included: mechanical design, economic and feasibility studies, quality assurance, and program coordination with outside vendors and research institutes. Work at Georgia Tech consists primarily of technical assistance to industry in the field of energy conservation. Responsibilities include: plant energy surveys, engineering and economic analysis, consulting and technical assistance, seminars and information dissemination. Currently, Head, Energy Conservation Branch with responsibility for managing the Industrial Energy Extension Program for the state of Georgia.

Current Fields of Interest

Industrial and commercial energy conservation; alternate energy sources; research and development.

Membership - Professional Organizations

Member of American Society of Mechanical Engineers
Member of Georgia Society of Professional Engineers

Publications and Reports

1. "Optimization of Metal Spraying Techniques," Final Report, Pratt and Whitney Aircraft, Equipment Development Group, December 1973
2. "Analysis of Closed Loop Servo Motor Control for Fellows Gear Shapers," Final Report, Pratt and Whitney Aircraft, Equipment Development Group, June 1974
3. "The Effect of New Manufacturing Techniques on the Structural Properties of Turbine Disks and Directionally Solidified Turbine Blades," Masters Thesis - Rensselaer Polytechnic Institute, 1975
4. "Industrial Energy Conservation," Manual for Industrial Energy Extension Service Project A-2099, 1978, Co-author
5. "Improving Steam Boiler Operating Efficiency," Manual for Industrial Energy Extension Service Project A-2099, 1978, Co-author
6. "Solid Fuels Technology," Manual for Industrial Energy Extension Service, Project A-2362, 1979, Co-author

B-532

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

September 7, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pa. 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for August 1, 1979 through
August 31, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of August, 1979.

Activities of August

1. Monthly Activity Highlights:
   - Reference is made to the attached EADC Monthly Progress Report form, which gives a breakdown of specific activities for the month.
   - One Research Engineer (Mr. Doug M. Moore, P.E.) has been added to existing project personnel. Please see attachment A, giving a biographical sketch.
2. Comparison to project plan: All tasks are on schedule.
3. Reason for schedule slippage: N/A.
4. Problems encountered: None.

Plans for September

1. Conduct eight new audits. (Refer to attached EADC Monthly Progress Report form for details of September Audit Plants).
2. Develop audit reports as scheduled (ie, within three weeks of audit).
3. Continue to distribute program brochures to small and medium sized manufacturers in SIC categories 24, 25, and 26.

4. Conduct evaluation of level of implementation of audited plants.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Chief, Energy Conservation Division

Attachments

cc: Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Georgia Tech, Engineering Experiment Station, Grant B. Curtis

Date: September 7, 1979

Report period: August, 1979

o Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C2604/40	26	8/8/79	8/20/79
C2608/41	26	8/9/79	8/21/79
C2603/43	26	8/8/79	8/28/79
C2609/44	26	8/22/79	In Progress
C2503/45	25	8/27/79	In Progress
C2607/46	26	8/28/79	In Progress
C2408/47	24	8/28/79	In Progress
C2605/N/A	26	N/A - See Comments	See Comments - No Report
Update on Status of Firms Audited in July			
C2404/36	24	7/18/79	*8/7/79
C2602/37	26	7/25/79	*8/9/79
C2405/38	24	7/27/79	*8/10/79
C2502/39	25	7/19/79	*8/20/79
C2406/42	24	7/20/79	*8/22/79
C2407/N/A	24	7/20/79	*See Comments - No Report *Change in Status

o Have any follow-up visits been made during this report period? ____ yes __x__ no

If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted
N/A			

o How many inquiries have you received from interested manufacturers during this report period? 3

o Have any implementation data been received by the EADC during this report period? ____ yes __x__ no. If yes, has a copy been sent to the Science Center? ___ yes ___ n

o Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit
C2409	24	9/4/79
C2606	26	9/5/79
C2612	26	9/11/79
C2610	26	9/11/79
C2611	26	9/18/79

(3 additional audits in SIC categories 24, 25, or 26, for a total of 8 for the month of Sept.)

o Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

SEE BACK OF THIS FORM FOR COMMENTS

Comments re August, 1979 EADC Monthly Report:

During this reporting period, two plants were originally contacted for audits but subsequently could not comply with the requirements for providing one year energy consumption history and/or yearly production/ sales volume, due to management policy. Subject plants were numbers:

- o C2407 - scheduled for audit 7/20/79.
- o C2605 - scheduled for audit 8/6/79.

BIOGRAPHICAL SKETCH

Moore, Douglas M. -- Research Engineer
Engineering Experiment Station

Education

B.S., Mechanical Engineering, Georgia Institute of Technology, 1971

Registration

Professional Engineer, Georgia No. 10240-D
S. C. No. 7628

Employment History

Georgia Power Co.	
Co-operative Student	1967-1971
James M. Lazenby & Assoc.	
Design Engineer	1971-1975
Asst. HVAC Dept. Head & Asst. Vice Pres.	1975-1978
Moore Engineering	
(Self-employed as consulting engineer)	1978-1979
W. L. Thompson Consulting Engineers	
Design Engineer	1979
Georgia Institute of Technology	
Research Engineer	1979-Present

Experience Summary:

Georgia Power Co.: Assisted in design and layout of yard facilities for coal-fired electric generating plants, including ash pond design, railroad design, and site grading and drainage. James M. Lazenby & Assoc., Moore Engineering, and W. L. Thompson Consulting Engineers: Design and layout of all types of commercial HVAC systems, specification writing, economic analysis, and project management. Assisted in design of energy conservation modifications to existing HVAC systems. Work at Georgia Tech consists primarily of technical assistance to industry in the field of energy conservation. Responsibilities include plant energy surveys, engineering and economic analysis, consulting and technical assistance, and seminars and information dissemination.

Current Fields of Interest

Industrial and commercial energy conservation, solar energy utilization.

Membership-Professional Organizations

Member of American Society of Heating, Refrigeration, and Air Conditioning Engineers.
Member of Georgia Society of Professional Engineers.

B-532

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

October 8, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pa. 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for September 1, 1979
through September 30, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of September, 1979.

Activities of September

1. Monthly Activity Highlights:
   - Reference is made to the attached EADC Monthly Progress Report form, which gives a breakdown of specific activities for the month.
   - Reference is also made to the attached list of plants who have received audit reports to date.
2. Comparison to project plan: All tasks are on schedule.
3. Reason for schedule slippage: N/A
4. Problems encountered: None.

Plans for October

1. Conduct seven new audits. (Refer to attached EADC Monthly Progress Report form for details of October Audit Plants).
2. Develop audit reports as scheduled, ie, within three weeks of audit .
3. Continue to distribute program brochures to small and medium sized manufacturers in SIC categories 24, 25, and 26.

4. Conduct evaluation of level of implementation of audited plants.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Chief, Energy Conservation Division

Attachments

cc; Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Georgia Tech, Engineering Experiment Station, Grant B. Curtis

Date: October 8, 1979

Report period: September 1979

o Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C2606/47	26	9/05/79	9/21/79
C2409/48	24	9/04/79	9/25/79
C2610/49	26	9/11/79	9/28/79
C2612/50	26	9/11/79	10/02/79
C2611/52	26	9/18/79	In Progress
C2411/53	24	9/18/79	In Progress
C2801/54	28	9/19/79	In Progress

Update on Status of Firms Audited in August

C2609/44	26	8/22/79	*9/10/79
C2503/45	25	8/27/79	*9/12/79
C2408/46	24	8/28/79	*9/14/79
C2607/51	26	8/28/79 *9/12/79	*10/08/79

* Change In Status

o Have any follow-up visits been made during this report period? X yes ____ no
If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted
C2410/6	24	9/24/79	In Progress

o How many inquiries have you received from interested manufacturers during this report period? 2

o Have any implementation data been received by the EADC during this report period? ____ yes __x__ no. If yes, has a copy been sent to the Science Center? ___ yes ___

o Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit
C2504	25	10/02/79
C2613	26	10/02/79
C2614	26	10/11/79
C2615	26	10/26/79

(3 Additional Audits in SIC Categories 24,25 or 26 for a total of 7 for October.)

o Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

Comments for September 1979 EADC Monthly Report

1. During this reporting period, one plant originally contacted on 2-22-77 and for whom an EADC report was written at that time (Report #6) was recontacted at the plant's request. A follow-up visit was conducted on 9-24-79 and a follow-up report, based on the plant's revised operations and facilities, is in the process of being developed.

2. A point of clarification is in order with regard to the plant and report numbering system. The plant code is established at the time of initial contact and is a constant identifier. The report number is an indicator of the chronological order that a plant's report was issued. Therefore, while a plant's report is in progress, its report number is temporarily assigned and when the report is completed and issued, the report number becomes permanent; the temporary and permanent report numbers for a given plant may not be the same, depending on changes between expected and actual chronological orders of issuance.

The attached list of plants/reports represents the plants Audited during this funding period who have received EADC reports.

ENERGY ANALYSIS AND DIAGNOSTIC CENTER

Georgia Institute of Technology

Company 31 -C2601
Market: International

Wet Waxed Meat Paper	264124
Dry Waxed Paper	264124
Printed Ham Wraps	264111
Interfold Wax Paper	264124

Employment 70 T
Plant Trip: June 14, 1979
Report Sent: June 29, 1979

Company 32 -C2501
Market: International

Chrom & Glass Tables	251411
Wood & Metal Tables	251124

Employment 40 T
Plant Trip: June 21, 1979
Report Sent: July 11, 1979

Company 33 -C2401
Market: Regional

Wood Window Units	243113
Wood Door Units	243143

Employment 34 T
Plant Trip: June 27, 1979
Report Sent: July 16, 1979

Company 34 -C2402
Market: District

Hardwood Lumber	242117
Pine Lumber	242121
Wood Chips	242157

Employment 41 T
Plant Trip: July 5, 1979
Report Sent: July 23, 1979

Company 35 -C2403
Market: Regional

Hardwood Rough Lumber	242116
Hardwood Dressed Lumber	242117
Softwood	242122

Employment 42 T
Plant Visit: July 1 , 1979
Report Sent: July 31, 1979

Company 36 -C2404
Market: Regional

Pressure Treated Lumber	242117
Pressure Treated Plywood	253620

Employment 15 T
Plant Visit: July 18, 1979
Report Sent: August 7, 1979

Company 37 -C2602

Market: Regional

Envelopes	264202
Water Cups	265423

Employment 116 T
Plant Trip: July 25, 1979
Report Sent: August 9, 1979

Company 38 -C2405
Market: National

Pine Lumber	242121
Mixed Hardwood	242116
Hardwood Flooring	242611
Pallets	244806

Employment 81 T
Plant Trip: July 27, 1979
Report Sent: August 22, 1979

Company 39 -C2502
Market: District

Mattresses	251511
Boxsprings	251531
Upholstered Sofas	251201
Upholstered Chairs	251203

Employment 108 T
Plant Trip: July 19, 1979
Report Sent: August 20, 1979

Company 40 -C2604
Market: State
Corrugated Boxes 265301
Corrugated Pads 265306
Paper Tape 264131
Employment 11 T
Plant Trip: August 9, 1979
Report Sent: August 21, 1979

Company 41 -C2608
Market: Regional
Paper Tubes & Cores 265523
Employment 55 T
Plant Trip: August 9, 1979
Report Sent: August 21, 1979

Company 42 -C2406
Market: District
Wood Mouldings 243176
Employment: 135
Plant Trip: July 20, 1979
Report Sent: August 22, 1979

Company 43 -C2603
Market: International
Poly Bags 264323
Set - Up Boxes 265209
Plastic Containers 307940
Folding Cartons 263114
Employment: 32 T
Plant Trip: August 8, 1979
Report Sent: August 28, 1969

Company 44 -C2609
Market: Local
Polyethylene Bags 264323
Employment 10 T
Plant Trip: August 22, 1979
Report Sent: September 10, 1979

Company 45 -C2503
Market: Regional
Wooden Store Fixtures 254133
Wooden Store Cabinets 254134
Construction Plastics 307960
Plastics 307960
Employment 31 T
Plant Trip: August 27, 1979
Report Sent: September 12, 1979

Company 46 -C2408
Market: District
Prehung Wood Door Unit 243131
Mouldings 243161
Millwork 243183
Prehung Window Unit 243121
Employment 50 T
Plant Trip: August 28, 1979
Report Sent: September 14, 1979

Company 47 -C2606
Market: International
Envelopes 264202
Business Paper 264811
Filing Suppleis 264959
Employment 76 T
Plant Trip: September 5, 1979
Report Sent: September 21, 1979

Company 48 -C2409
Market: National
Door Light Inserts 243187
Louvers 243158
Wood Mouldings 243161
Employment 35 T
Plant Trip: September 4, 1979
Report Sent: September 25, 1979

Company 49 -C2610
Market: Regional
Paper Milk Containers 265411
Employment 80 T
Plant Trip: September 11, 1979
Report Sent: September 28, 1979

Company 50-C2612
Market: Regional
Paperboard 263118
Employment: 43T
Plant Trip: September 11, 1979
Report Sent: October 2, 1979

Company 51-C2607
Market: District
Corrugated Containers 265301
Employment: 171T
Plant Trip: August 28 and September 12
Report Sent: October 8, 1979

B-532

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

November 9, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pennsylvania 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for October 1, 1979
through October 31, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of October, 1979.

Activities of October

1. Monthly Activity Highlights:
   - Reference is made to the attached EADC Monthly Progress Report form, which gives a breakdown of specific activities for the month.
   - Reference is also made to the attached list of plants who have received audit reports to date.
   - Project Director's meeting was attended by Messrs. D. J. Coughlin, G. B. Curtis, and W. G. Moran at the Science Center.
2. Comparison to project plan: All tasks are on schedule.
3. Reason for schedule slippage: N/A
4. Problems encountered: None.

Plans for November

1. Conduct three audits. (Refer to attached EADC Monthly Progress Report form for details of November Audit Plants).
2. Develop audit reports as scheduled, i.e., within three weeks of audit.
3. Continue to distribute program brochures to small and medium sized manufacturers in SIC categories 24, 25, and 26.

4. Conduct evaluation of level of implementation of audited plants.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Chief, Energy Conservation Division

Attachments

cc: Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Georgia Tech, Engineering Experiment Station, Dennis J. Coughlin

Date: November 9, 1979

Report period: October, 1979

- Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C2613/55	26	10/2/79	10/26/79
C2614/56	26	10/11/79	11/1/79
C2504/57	25	10/2/79 and 10/16/79	11/5/79
C2412/58	24	10/19/79	In Progress
C2616/59	26	10/22/79	In Progress
C2505/60	25	10/23/79	In Progress
C2615/61	26	10/26/79	In Progress
C2414/62	24	10/30/79	In Progress
Update On Status Of Firms Audited In September			
C2801/52	28	9/19/79	*10/12/79
C2611/53	26	9/18/79	*10/12/79
C2411/54	24	9/18/79	*10/16/79
C2410/6 - Follow Up	24	9/24/79	*10/16/79

*Change in Status

- Have any follow-up visits been made during this report period? __yes x no

- How many inquiries have you received from interested manufacturers during this report period? 1

- Have any implementation data been received by the EADC during this report period? __yes _x no. If yes, has a copy been sent to the Science Center? N/A

- Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit
C2617	26	11/6/79
C2506	25	11/13/79
C2413	24	11/13/79

(These three plant audits will make the total number of audits conducted during this contract period equal 35)

- Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

(see back of this form for comments)

COMMENTS FOR OCTOBER 1979 EADC MONTHLY REPORT

1. The attached, updated list of plants/reports represents the plants audited during this funding period who have received audit reports as of the writing of this status report.

2. Attached are EADC audit review forms received from the Science Center during the October 25, 1979 Project Director's meeting. Additions or corrections have been made on the review forms where requested. However, review forms were not received for plant/report numbers:

   - C2403/35
   - C2405/38
   - C2502/39
   - C2406/42

   In the event that any of these reports have not been received by the Science Center, please advise and copies will be forwarded.

ENERGY ANALYSIS AND DIAGNOSTIC CENTER

Georgia Institute of Technology

Company 31 -C2601
Market: International
Wet Waxed Meat Paper 264124
Dry Waxed Paper 264124
Printed Ham Wraps 264111
Interfold Wax Paper 264124
Employment 70 T
Plant Trip: June 14, 1979
Report Sent: June 29, 1979

Company 32 -C2501
Market: International
Chrom & Glass Tables 251411
Wood & Metal Tables 251124
Employment 40 T
Plant Trip: June 21, 1979
Report Sent: July 11, 1979

Company 33 -C2401
Market: Regional
Wood Window Units 243113
Wood Door Units 243143
Employment 34 T
Plant Trip: June 27, 1979
Report Sent: July 16, 1979

Company 34 -C2402
Market: District
Hardwood Lumber 242117
Pine Lumber 242121
Wood Chips 242157
Employment 41 T
Plant Trip: July 5, 1979
Report Sent: July 23, 1979

Company 35 -C2403
Market: Regional
Hardwood Rough Lumber 242116
Hardwood Dressed Lumber 242117
Softwood 242122
Employment 42 T
Plant Visit: July 1 , 1979
Report Sent: July 31, 1979

Company 36 -C2404
Market: Regional
Pressure Treated Lumber 242117
Pressure Treated Plywood 253620
Employment 15 T
Plant Visit: July 18, 1979
Report Sent: August 7, 1979

Company 37 -C2602

Market: Regional
Envelopes 264202
Water Cups 265423
Employment 116 T
Plant Trip: July 25, 1979
Report Sent: August 9, 1979

Company 38 -C2405
Market: National

Pine Lumber 242121
Mixed Hardwood 242116
Hardwood Flooring 242611
Pallets 244806
Employment 81 T
Plant Trip: July 27, 1979
Report Sent: August 22, 1979

Company 39 -C2502
Market: District
Mattresses 251511
Boxsprings 251531
Upholstered Sofas 251201
Upholstered Chairs 251203
Employment 108 T
Plant Trip: July 19, 1979
Report Sent: August 20, 1979

Company 40 -C2604
Market: State
Corrugated Boxes 265301
Corrugated Pads 265306
Paper Tape 264131
Employment 11 T
Plant Trip: August 9, 1979
Report Sent: August 21, 1979

Company 41 -C2608
Market: Regional
Paper Tubes & Cores 265523
Employment 55 T
Plant Trip: August 9, 1979
Report Sent: August 21, 1979

Company 42 -C2406
Market: District
Wood Mouldings 243176
Employment: 135
Plant Trip: July 20, 1979
Report Sent: August 22, 1979

Company 43 -C2603
Market: International
Poly Bags 264323
Set - Up Boxes 265209
Plastic Containers 307940
Folding Cartons 263114
Employment: 32 T
Plant Trip: August 8, 1979
Report Sent: August 28, 1969

Company 44 -C2609
Market: Local
Polyethylene Bags 264323
Employment 10 T
Plant Trip: August 22, 1979
Report Sent: September 10, 1979

Company 45 -C2503
Market: Regional
Wooden Store Fixtures 254133
Wooden Store Cabinets 254134
Construction Plastics 307960
Plastics 307960
Employment 31 T
Plant Trip: August 27, 1979
Report Sent: September 12, 1979

Company 46 -C2408
Market: District
Prehung Wood Door Unit 243131
Mouldings 243161
Millwork 243183
Prehung Window Unit 243121
Employment 50 T
Plant Trip: August 28, 1979
Report Sent: September 14, 1979

Company 47 -C2606
Market: International
Envelopes 264202
Business Paper 264811
Filing Suppleis 264959
Employment 76 T
Plant Trip: September 5, 1979
Report Sent: September 21, 1979

Company 48 -C2409
Market: National
Door Light Inserts 243187
Louvers 243158
Wood Mouldings 243161
Employment 35 T
Plant Trip: September 4, 1979
Report Sent: September 25, 1979

Company 49 -C2610
Market: Regional
Paper Milk Containers 265411
Employment 80 T
Plant Trip: September 11, 1979
Report Sent: September 28, 1979

Company 50-C2612
Market: Regional
Paperboard 263118
Employment: 43T
Plant Trip: September 11, 1979
Report Sent: October 2, 1979

Company 51-C2607
Market: District
Corrugated Containers 265301
Employment: 171T
Plant Trip: August 28 and September 12
Report Sent: October 8, 1979

Company 52-C2801
Market: Regional
Printing Ink 289311
Adhesives 289137
Employment: 31T
Plant Trip: September 19, 1979
Report Sent: October 12, 1979

Company 53-C2611
Market: National
Molded Pulp Products 264623
Employment: 170T
Plant Trip: September 18, 1979
Report Sent: October 12, 1979

Company 54-C2411
Market: Regional
Softwood Lumber, dressed - 242122
Wood Chips 242157
Shavings 242189
Employment: 70T
Plant Trip: September 18, 1979
Report Sent: October 16, 1979

Company 55-C2613
Market: International
Asphalt Containers 265109
Converted Kraft Linerboard 263141
Mead Mobile Board 264959
Slit Ken Kraft 265529
Employment: 65T
Plant Trip: October 2, 1979
Report Sent: October 26, 1979

Company 56-C2614
Market: Regional
Corrugated Boxes 265301
Corrugated Sheets 265306
Employment: 126T
Plant Trip: October 11, 1979
Report Sent: November 1, 1979

Company 57-C2504
Market: International
Bedroom Furniture 251151
Employment: 385
Plant Trips: Oct. 2 &
Oct. 16, 1979
Report Sent: November 5, 1979

B-532

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

December 7, 1979

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pennsylvania 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for November 1, 1979
through November 30, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of November, 1979.

Activities of November

1. Monthly Activity Highlights:

   - Reference is made to the attached EADC Monthly Progress Report form, which gives a breakdown of specific activities for the month.

   - Reference is also made to the attached list of plants who have received audit reports to date. Completion of audit number 65 represents the final audit during this contract period.

2. Comparison to project plan: All tasks are on schedule.

3. Reason for schedule slippage: N/A

4. Problems encountered: None.

Plans for December

1. Develop audit reports as scheduled, i.e., within three weeks of audit.

2. Host Science Center Staff visitors during week of 12/10/79.

3. Conduct evaluation of level of implementation of audited plants.

4. Develop final project report for this contract period.

Respectfully submitted,

Dennis J. Coughlin
Research Engineer I

William G. Moran, P.E.
Chief, Energy Conservation Division

Attachments

cc: Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

Submitted by: Georgia Tech, Engineering Experiment Station, Dennis J. Coughlin

Date: December 7, 1979

Report period: November, 1979

- Firms audited during report period:

Firm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
C2617/63	26	11/6/79	11/29/79
C2413/64	24	11/13/79	12/3/79
C2506/65	25	11/13/79	In Progress
	Update On Status Of Firms Audited In October		
C2412/58	24	10/19/79	11/12/79
C2414/59	24	10/30/79	11/13/79
C2615/60	26	10/26/79	11/21/79
C2616/61	26	10/22/79	11/27/79
C2505/62	25	10/23/79 and 10/30/79	11/29/79

- Have any follow-up visits been made during this report period? ____ yes __x__ no

If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted
N/A			

- How many inquiries have you received from interested manufacturers during this report period? ___1___

- Have any implementation data been received by the EADC during this report period? ____ yes __x__ no. If yes, has a copy been sent to the Science Center? N/A yes ___

- Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit

Activities during December will focus on implementation evaluations and development of a final report for this contract period.

- Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

Company 52-C2801
Market: Regional
Printing Ink 289311
Adhesives 289137
Employment: 31T
Plant Trip: September 19, 1979
Report Sent: October 12, 1979

Company 53-C2611
Market: National
Molded Pulp Products 264623
Employment: 170T
Plant Trip: September 18, 1979
Report Sent: October 12, 1979

Company 54-C2411
Market: Regional
Softwood Lumber, dressed - 242122
Wood Chips 242157
Shavings 242189
Employment: 70T
Plant Trip: September 18, 1979
Report Sent: October 16, 1979

Company 55-C2613
Market: International
Asphalt Containers 265109
Converted Kraft Linerboard 263141
Mead Mobile Board 264959
Slit Ken Kraft 265529
Employment: 65T
Plant Trip: October 2, 1979
Report Sent: October 26, 1979

Company 56-C2614
Market: Regional
Corrugated Boxes 265301
Corrugated Sheets 265306
Employment: 126T
Plant Trip: October 11, 1979
Report Sent: November 1, 1979

Company 57-C2504
Market: International
Bedroom Furniture 251151
Employment: 385
Plant Trips: Oct. 2 & Oct. 16, 1979
Report Sent: November 5, 1979

Company 58-C2412
Market: National
Unfinished Hardwood Plywood 243510
Prefinished Hardwood Plywood 243520
Exterior Cypress Plywood 243532
Polyester Overlay Plywood 243541
Employment: 93T
Plant Trip: October 19, 1979
Report Sent: November 12, 1979

Company 59-C2414
Market: Regional
Dressed Softwood Lumber 242122
Treated Poles & Piling 249111
Crossarms 242113
Pulpwood Chips 242157
Employment: 85T
Plant Trip: October 30, 1979
Report Sent: November 13, 1979

Company 60-C2615
Market: National
Paper Cones & Tubes 265527
Paperboard 265529
Employment: 169
Plant Trip: October 26, 1979
Report Sent: November 21, 1979

Company 61-C2616
Market: National
Container Board 263111
Employment: 780
Plant Trip: October 22, 1979
Report Sent: November 27, 1979

Company 62-C2505
Market: National
Tables 251124
Consoles, Credenza's 251129
Employment: 435
Plant Trip: 10/23/79 & 10/30/79
Report Sent: November 29, 1979

Company 63-C2617
Market: International
Milk Containers 265411
Sanitary Food Containers 265434
Employment: 181
Plant Trip: November 6, 1979
Report Sent: November 29, 1979

Company 64-C2413
Market: Regional
Mobile Homes 245111
Employment: 225
Plant Trip: November 13, 1979
Report Sent: December 3, 1979

Company 65-C2506
Market: International
Metal Coset Doors, Bi-fold 344211
Metal Closet Shelves 254223
Employment: 150
Plant Trip: November 13, 1979
Report Sent: December 11, 1979

B-532

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

January 7, 1980

Dr. F. William Kirsch
Director, EADC
University City Science Center
3624 Science Center
Philadelphia, Pennsylvania 19104

Subject: Energy Analysis and Diagnostic Center Program
Monthly Progress Summary Report for EES/GIT
Research Project B-532 for December 1, 1979
through December 30, 1979

Dear Dr. Kirsch:

This report summarizes activities on Research Project B-532 for the month of December, 1979.

Activities of December

1. Monthly Activity Highlights:

   - Reference is made to the attached EADC Monthly Progress Report form, which gives a breakdown of specific activities for the month. Completion of audit report number 65 represents the final audit report during this contract period.

   - Implementation analysis surveys have been completed for 31 of the 35 plants audited during this contract period. Copies of the survey forms are being sent to the Science Center under separate cover. The remainder of the analyses will be forwarded as they are completed.

2. Comparison to project plan: All tasks are on schedule.

3. Reason for schedule slippage: N/A

4. Problems encountered: None

Plans for January

1. Complete evaluation of level of implementation of audited plants.

2. Develop final project report for this contract period.

Respectfully submitted,

Douglas M. Moore, P.E.
Research Engineer II

William G. Moran, P.E.
Chief, Energy Conservation Division

Attachments

DMM/mro

cc: Grant B. Curtis, Jr.

EADC MONTHLY PROGRESS REPORT FORM

ubmitted by: Georgia Tech, Engineering Experiment Station, Douglas M. Moore

ate: January 7, 1980

eport period: December, 1979

Firms audited during report period:

irm/Report #	SIC Code	Date of Audit	Date Audit Report Was Submitted
(Audits completed in November)			
Update on Status of Firms Audited in November			
C2617/63	26	11/6/79	11/29/79
C2413/64	24	11/13/79	12/3/79
C2506/65	25	11/13/79	12/11/79

- Have any follow-up visits been made during this report period? x yes ____ no

If yes, please indicate:

Firm/Report #	SIC Code	Date Of Follow-up Visit	Date Follow-up Report Was Submitted
C2506/65	25	12/11/79	Purpose of visit was to review report with plant management

- How many inquiries have you received from interested manufacturers during this report period? None

- Have any implementation data been received by the EADC during this report period? x yes ____ no. If yes, has a copy been sent to the Science Center? x yes ___

- Please indicate your audit schedule for the current month:

Firm/Report #	SIC Code	Scheduled Date of Audit

Activities during January will focus on implementation evaluations and development of a final report for this contract period.

- Comments: (Please list on the back of this form any additional information which you feel would help Science Center staff to determine the status of your EADC's activities.)

ENERGY ANALYSIS AND DIAGNOSTIC CENTER PROGRAM

YEAR-END REPORT - 1979

GEORGIA INSTITUTE OF TECHNOLOGY

Submitted To:

University City Science Center
Philadelphia, Pennsylvania

Prepared By:

Douglas M. Moore
John B. Kirk

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

January 31, 1980

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

Since the latter part of 1976, the Engineering Experiment Station of the Georgia Institute of Technology has participated in a program of energy conservation assistance to small and medium-sized industries in Georgia, sponsored by the U.S. Department of Energy and conducted by the University City Science Center. In its role as an Energy Analysis and Diagnostic Center, Georgia Tech has conducted a total of 65 in-plant surveys and provided a written report outlining potential energy conservation opportunities to each surveyed plant since the project's inception.

During the 1979 project year, 35 plant surveys were performed. A total of 159 energy conservation recommendations were reported, representing a potential energy savings of 647 billion BTU's, at an equivalent cost savings of $1,437,000 annually. This savings is equal to 8 percent of the total energy consumption of the 35 plants. Of these 159, it is estimated that 74 recommendations have been or will be implemented by the end of 1980, representing an achieved savings of 111 billion BTU's and $349,900 per year. Based on a total EADC contract amount of approximately $80,000, this results in a program benefit/cost ratio of about 4.3.

II. INTRODUCTION

This report summarizes the activities of Georgia Tech in connection with the Energy Analysis and Diagnostic Center program during the contract period of September 16, 1978 to January 31, 1980. During this period, 35 plant audits were conducted and audit reports prepared, and one follow-up visit and report were completed. The results of these audits are discussed in the following sections of the report.

The basic purpose of the program is to assist small and medium-sized manufacturers in implementing energy management programs and in reducing costs through specific energy conservation measures. These conservation measures, referred to herein as energy conservation opportunities or simply as "ECO's", are developed for each plant from an in-plant study of energy use and from historic energy consumption data. To analyze the effectiveness of the program, the audited plants are later contacted and polled to determine the level of implementation of the ECO's, actual energy savings, and any other comments or suggestions regarding the program.

The achieved energy savings tabulated in Section V of this report are based on results obtained from only 32 of the 35 audited plants. Even so, 74 of the total of 159 ECO's are considered as implemented, for an implementation rate of 46.5% and an average annual savings of approximately $4700 per recommendation. In addition to these achievements, however, the EADC program has helped to foster an awareness of the importance of energy management and energy conservation. This awareness will hopefully provide incentive to the small and medium-sized industries to continue to explore possible energy conservation measures in the future.

III. DESCRIPTION OF AUDITED PLANTS

The majority of the audited plants were selected from SIC categories 24, 25, and 26, which include lumber and wood products, furniture and fixtures, and paper and allied products. Greatest emphasis was placed on the paper and allied products group, as this is the most energy intensive. Audited plants range in size from twelve to seven hundred eighty employees, with an average size of one hundred twenty-five employees. Table III-1 below lists the number of audited plants according to product type. Table III-2 provides a summary of general plant data.

Energy usage by the thirty-five audited plants is summarized in Table III-3. Electricity and natural gas are the most commonly utilized energy sources, due to their high availability and relatively low cost in Georgia. Although coal is utilized by only one of the thirty-five plants, the usage by that plant alone is equal to more than the total of all other energy sources for all of the plants combined, in terms of BTU's.

TABLE III-1

PROFILE OF AUDITED COMPANIES

Product Type	SIC Group	No. of Companies
Lumber & Wood Products	24	7
Paper & Paper Products	26	14
Furniture	25	5
Building Materials	24, 25, 34	5
Chemicals	28	1
Packaging (Plastic)	26, 30	2
Miscellaneous	24	1

TABLE III-2

GENERAL DATA SUMMARY TABLE

Characteristic	Average	Range Min.	Range Max.	Total
No. of Employees	125	12	780	4366
Annual Sales Volume	$12,171,000	$750,000	$140,000,000	$413,816,000
Hours Operation per Year	3,726	1960	8400	130,428
Annual Energy Use per Employee - BTU x 10^6	1,838	24	8449	-
Energy Cost as Percent of Sales	3.94	.11	13.44	-

TABLE III-3

ENERGY USAGE BY SUPPLY SOURCE

Utilities	Average Usage Per Plant		Total Usage		Unit Cost	% of Total Energy Usage	
	Millions of BTU's	Dollars	Millions of BTU's	Dollars	Dollars Per Million BTU's	Energy Basis	Cost Basis
Electricity	16,542	132,042	578,987	4,621,418	7.98	7.2	28.4
Natural Gas	56,178	110,867	1,966.237	3,880,359	1.97	24.5	23.8
Sub-Total (Avg.)	72,720	242,909	2,545,224	8,501,777	(3.34)	31.7	52.2
Other Sources							
Propane (LPG)	200	785	7,009	27,505	3.92	0.1	0.2
Fuel Oil	22,835	51,808	799,222	1,813,293	2.27	10.0	11.1
Coal	133,428	169,813	4,670,000	5,943,453	1.27	58.2	36.5
Sub-Total (Avg.)	156,463	222,406	5,476,231	7,784,251	(1.42)	68.3	47.8
Total (Avg.)	229,183	465,315	8,021,455	16,286,028	(2.03)	100.0	100.0

IV. ENERGY CONSERVATION OPPORTUNITIES

Table IV-1 shows the potential energy savings reported according to type of energy saved. The total potential savings found by all the energy diagnostic centers during project year 1978 was 556,800 million BTU's per year and $1,362,500 per year.[1] Georgia Tech's performance alone during 1979 exceeds these levels by a respectable margin as the totals in Table IV-1 show. These totals represent 8.1% of the total energy consumption and 8.8% of the energy cost for the 35 plants analyzed.

There were 78 ECO's dealing with natural gas and 22 of these saved both natural gas and fuel oil. Each category was credited with one-half an ECO in the 22 instances of combined savings. This procedure inflates the fuel oil category and makes fuel oil appear relatively inexpensive. For example, the largest combined ECO saved 143,000 million BTU's per year, but only 18% of this was fuel oil. This alone would raise the total natural gas to 339,500 million BTU's per year and reduce the total fuel oil savings to 109,600 million BTU's per year. The percentage BTU savings would become 52% and 17% for natural gas and fuel oil, respectively.

Table IV-2 divides the potential energy savings into categories as defined by type of service. Most of the energy saved was in Production and Services. This was mainly due to insulating, using heat exchanges to recycle waste heat, and improving boiler or furnace efficiency. The HVAC category has the largest number of ECO's and most of these are insulation, preventing air infiltration, and lighting changes. In the Housekeeping category turning back thermostats is the most common ECO. The definitions for these areas are:

Production - energy consumed directly in manufacturing a product.

Services - energy used to supply heat or power in an auxiliary manner to the process or product.

HVAC - energy used for personnel comfort or regulating environmental conditions for operating equipment.

Housekeeping - energy to be conserved by normal routine operations and maintenance.

[1] Table 4, page 14, Energy Analysis and Diagnostic Centers, May, 1979.

Table IV-3 shows the potential energy conservation opportunities broken down into nine categories. These categories are defined to show areas that are repeatedly mentioned throughout the 35 energy surveys. The different types are defined as follows:

1. Lighting: includes energy efficient bulbs, removing unnecessary lights, cleaning sky lights.
2. Compressed Air Systems: includes repairing air leaks, reducing system air pressure, relocating air intakes.
3. Steam Systems: includes repairing steam leaks, faulty steam traps, insulating steam pipes, boiler efficiency, boiler economizers.
4. Heat Conservation and Recovery: includes insulating equipment, use of heat exchangers and heat pumps to recover heat.
5. HVAC: anything that makes space heating or cooling more energy efficient. (Examples: dock door seals, night and weekend thermostat setback, building insulation)
6. Waste and Wood Energy: anything that directly or indirectly substitutes the energy in wood or waste for conventional sources. (Examples: space heating with wood, cogeneration, using steam turbine drives, process heat from paper waste)
7. Shut Down Idling or Unused Equipment: (Examples: shut off pilot lights in auxiliary boilers)
8. Energy Efficient Equipment: any recommendation to use equipment that is more efficient by design. (Example: energy efficient electric motors). Does not include energy efficient lighting.
9. Miscellaneous: any recommendation not in the preceding categories.

TABLE IV-1

ENERGY CONSERVATION POTENTIAL BY ENERGY SOURCE

Energy Source	Conservation Potential BTU/Year x 10^6	$	Percentage of Total BTU Basis	$ Basis	No. of ECO's	Average Savings/ECO BTU/Year x 10^6	$
Electricity	14,944	136,869	2.3	9.5	74	202	1,850
Natural Gas	293,918	631,806	45.4	44.0	67	4,387	9,430
Fuel Oil	155,212	375,750	24.0	26.2	15	10,347	25,050
L.P.G.	416	1,603	.1	.1	2	208	801
Coal	183,000	290,970	28.2	20.2	1	-	-
Totals	647,500	1,437,000	100	100	159	-	-

TABLE IV-2

ENERGY CONSERVATION POTENTIAL BY SERVICE TYPE

Service Type	Conservation Potential BTU/Year x 10^6	$	Percentage of Total BTU Basis	$ Basis	No. of ECO's	Averages BTU/Year x 10^6	$
Production	512,402	1,051,205	79.1	73.2	30	17,080	35,040
Services	72,470	208,979	11.2	14.5	50	1,449	4,180
HVAC	33,913	115,533	5.2	8	70	484	1,650
Housekeeping	29,010	61,210	4.5	4.3	9	3,223	6,801
Totals	647,500	1,437,000	100	100	159	-	-

TABLE IV-3

COMMON TYPES OF POTENTIAL ENERGY CONSERVATION OPPORTUNITIES

Type	No. of ECO's	Conservation Potential BTU's x 10^6	$	Percentage of Total BTU Basis	Percentage of Total $ Basis	Averages BTU/Yr x 10^6	Averages $
1	27	4,750	42,561	.7	3.0	176	1,580
2	27.5	1,989	12,422	.3	.9	72	452
3	17.5	43,505	102,305	6.7	7.1	2,490	5,850
4	22	493,322	982,675	76.2	68.4	22,400	44,700
5	37	15,440	42,562	2.4	3.0	513	1,380
6	14	81,332	221,521	12.6	15.4	5,810	15,800
7	4	1,116	3,948	.2	.3	279	987
8	9	2,046	18,959	.3	1.2	227	2,100
9	1	4,040	9,973	.6	.7	-	-
Totals	159	647,500	1,437,000	100	100	-	-

V. IMPLEMENTATION LEVEL OF ENERGY CONSERVATION OPPORTUNITIES

Table V-1 shows the implemented recommendations divided into categories by the type of energy saved. The fourteen combined natural gas and fuel oil recommendations are tabulated as in the preceding section. The total implemented savings, 111,070 million BTU's and $349,900 per year, are 17.2% and 24.3% of the total potential energy and dollar savings respectively. The 73 recommendations implemented represent a 46.5% implementation of the 159 potential conservation opportunities.

Reports 52/C2801, 64/C2413, 65/C2606 are not included in this analysis because these plants did not have enough time to evaluate their reports. The last participants are often relunctant to state that any recommendation is implemented though they may have scheduled implementation work. A recommendation is considered implemented only if a definite commitment has been made, such as materials or equipment on order. Some unimplemented recommendations will be implemented after the management has had more time to consider them. For example, report 53 contained a recommendation to install heat exchangers that could save 143,000 million BTU's and $323,00 each year in natural gas energy. This recommendation is not counted as implemented because the work is not definitely scheduled. The plant's management stated that their engineering staff are still studying the project and they are enthusiatic about it. Thus the implementation percentages calculated above are probably very conservative.

Table V-2 indicates the implemented energy conservation efforts by service type. Production and Services are still the two largest contributors, though their contribution is not as large as it is in potential savings.

Table V-3 shows the implemented recommendations broken down into nine categories. The results follow the same pattern as the potential energy savings. Category four is the largest contributor, though its dominance is not as great as it was in the potential savings breakdown.

TABLE V-1

IMPLEMENTED CONSERVATION OPPORTUNITIES BY ENERGY SOURCE

Energy Source	Conservation Potential BTU/Year x 10^6	$	Percent. of Total BTU Basis	$ Basis	No. of ECO's	Averages BTU/Yr x 10^6	$
Electricity	7,964	79,052	7.2	22.6	38	209	2,080
Natural Gas	76,747	198,427	69.1	56.7	28	2,741	7,087
Fuel Oil	26,352	72,373	23.7	20.7	8	3,294	9,047
L.P.G.	0	0	0	0	0	-	-
Coal	0	0	0	0	0	-	-
Totals	111,070	349,900	100	100	74	-	-

TABLE V-2

IMPLEMENTED CONSERVATION OPPORTUNITIES BY SERVICE TYPE

Energy Source	Conservation Potential BTU/Year x 10^6	$	Percent. of Total BTU Basis	$ Basis	No. of ECO's	Averages BTU/Yr x 10^6	$
Production	49,083	136,870	44.2	39.1	10	4,908	13,687
Services	31,131	117,291	28.0	33.5	28	1,112	4,189
HVAC	8,352	48,418	7.5	13.8	31	269	1,562
Housekeeping	22,498	47,273	20.3	13.6	5	4,499	9,454
Totals	111,070	349,900	100	100	74	-	-

TABLE V-3

COMMON TYPES OF IMPLEMENTED CONSERVATION OPPORTUNITIES

Type	No. of ECO's	Conservation Potential BTU's/Year x 10^6	$	Percent. of Total BTU Basis	$ Basis	Averages BTU/Yr x 10^6	$
1	17	3,490	33,226	3.1	9.5	205	1,955
2.	13	1,082	5,323	1	1.5	83	410
3	15	40,772	95,131	36.7	27.2	2,720	6,340
4	10	49,407	135,410	44.5	38.7	4,940	13,500
5	14	4,861	15,192	4.4	4.3	347	1,090
6	2	10,440	60,720	9.4	17.4	5,220	30,400
7	1	87	200	.1	.1	-	-
8	2	924	4,650	.8	1.3	462	2,325
9	0	0	0	0	0	-	-
Totals	74	111,070	349,900	100	100		

VI. PROGRAM COST VERSUS BENEFIT

Table VI-1 on the following page provides some interesting data regarding program cost and benefit on a plant by plant basis. This table compares the total cost per plant (including program costs and implementation costs of the recommendations) with the annual dollar savings expected, for both potential and implemented ECO's. Included in the program costs are the EADC grant, at $2285 per plant, and the cost incurred by the plant in performing the energy audit. The latter is based on estimates by the audited companies. Where estimates where given in man-hours, an average manpower cost of $25 per hour was assumed.

The overall savings/cost ratio for all ECO's is shown in the table to be 0.96. This means that the potential costs savings would equal the program costs, including the cost of implementation of the ECO's, in only twelve and one-half months. The savings/cost ratio for the implemented ECO's, at 0.69, is equivalent to a payback period of seventeen months. A comparison of savings with direct program costs only indicates that the program will pay for itself in just under 3 months.

The most common technique for analyzing investments for energy conservation was found to be the simple payback method. Maximum paybacks of from one to ten years were reported, although the majority of the plants indicated a range of two to five years maximum. Several plants indicated that investment decisions were based on "seat of the pants" techniques.

PLANT BENEFIT / COST RELATIONSHIPS

	Program Costs		Implementation Costs		Total Dollar Costs		Annual Dollar Savings		Savings/Cost Ratio	
Plant Code	EADC Cost	Plant Cost	Potential	Implemented	Potential	Implemented	Potential	Implemented	Potential	Implemented
2601/31	2285	100	94241	94241	96626	96626	33673	33511	.35	.35
2501/32	2285	125	1926	1926	4336	4336	3620	2835	.835	.654
2401/33	2285	75	1101	1101	3461	3461	1724	317	.50	.092
2402/34	2285	100	297	0	2682	2385	193	0	.072	0
2403/35	2285	400	154360	0	157045	2685	88112	780	.561	.291
2404/36	2285	100	10575	635	12960	3020	4590	692	.354	.229
2602/37	2285	200	16581	16578	19063	19063	10146	4188	.532	.220
2405/38	2285	400	7884	7884	10569	10569	51530	47350	5.07	4.66
2502/39	2285	0	1146	0	3431	2285	1033	0	.301	0
2604/40	2285	125	1390	95	3800	2505	1571	640	.413	.255
2608/41	2285	1000	1852	214	5137	3499	3028	2179	.589	.623
2406/42	2285	50	1318	1318	3653	3653	211	211	.058	.058
2603/43	2285	100	4690	700	7075	3085	2208	851	.317	.285
2609/44	2285	150	3330	2980	5765	5415	3453	3133	.599	.579
2503/45	2285	200	7000	0	9485	2485	2662	0	.281	0
2408/46	2285	50	8055	63	10390	2398	5670	320	.546	.134
2606/47	2285	125	6548	4341	8958	6751	4001	2963	.447	.439
2409/48	2285	50	21531	0	23866	2335	3546	0	.149	0
2610/49	2285	100	19549	0	21934	2385	19879	0	.906	0
2612/50	2285	100	60073	7413	62458	9798	44758	17695	.717	1.81
2607/51	2285	10	25921	6190	28206	8475	44928	20718	1.59	2.44
2801/52	2285	--	1130	--	--	--	1616	--	.473	--
2611/53	2285	750	142316	0	145351	3035	381494	874	2.62	.288
2411/54	2285	100	26329	0	28714	2385	14121	71	.492	.03
2613/55	2285	200	1956	206	4441	2691	4184	2035	.942	.756
2614/56	2285	100	2826	2186	5211	4571	6499	4360	1.25	.954
2504/57	2285	100	57605	51605	59990	53990	2174	1907	.036	.035
2412/58	2285	200	19612	19612	22097	22097	114787	114787	5.19	5.19
2414/59	2285	50	184679	183319	184729	183369	31938	30720	.171	.167
2615/60	2285	100	1397	1397	3782	3782	7760	7606	2.05	2.01
2616/61	2285	100	506250	3750	508635	6135	441638	1852	.868	.302
2505/62	2285	500	11694	2202	14479	4987	7610	2666	.526	.535
2617/63	2285	75	20160	20160	22520	22520	23112	23112	1.03	1.03
2413/64	2285	--	8755	--	--	--	10854	--	.983	--
2506/65	2285	--	7944	--	--	--	24858	--	2.43	--
Totals (Overall avg.)	79975	5835	1424191	493526	1500852	506776	1437000	349900	(.96)	(.69)