3161 Giles

April 1951

MEMORANDUM OF UNDERSTANDING

Between

DEPARTMENT OF AGRONOMY AND AGRICULTURAL ENGINEERING OF THE N. C. AGRICULTURAL EXPERIMENT STATION, NORTH CAROLINA STATE COLLEGE, THE N. C. DEPARTMENT OF AGRICULTURE, RALEIGH, N. C.

And

Anthracite Institute	Wilkes-Barre, Pennsylvania
(Cooperator)	(P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Objectives:

   (a) To develop a satisfactory closed flue system for converting farmer-owned open flue anthracite burners.

   (b) To investigate factors affecting the quality of tobacco cured in gases from the combustion of anthracite as a basis for the development of an open flue anthracite curing system.

3. Reasons for Undertaking for Study:

   (a) At the end of the 1949 curing season there were about 1500 anthracite curing units in the bright leaf area. These units liberated the products of combustion from anthracite coal into the curing barn and are called open systems. About 1300 of these units were new anthracite stokers with metal combustion chambers centrally located within the barn and with 6" radial pipes for heat distribution. The remaining 200 units were bituminous stokers converted to anthracite burners with the same type of heat distribution system. Most of these 1500 units are in North Carolina in the areas around Lumberton, Whiteville, Dunn, Lillington, Goldsboro, Kinston, Wilson, and Nashville. The new open systems were sold to the farmers for about $350 each and the farmers were allowed from 2 to 3 years in which to complete payments. About 90 per cent of the open systems were converted in 1950 to some kind of a closed flue system with stacks. However, most of the converted systems are inefficient, having an estimated efficiency of 30%. The efficiency of the present heat distribution systems for bituminous coal is about 44%. In addition, the converted systems are hazardous in that the flue temperatures operate at about 700° F whereas safe flue temperatures are at 500° F or less. The farmers who purchased anthracite burners cannot afford to throw this equipment away ($500,000). This phase of the research is to develop a satisfactory system of converting these units to a closed system at nominal cost.

   (b) Furnaces for burning anthracite fuel and releasing the products of combustion into the barn has promise of supplying one of the cheaper sources of heat for curing. The results of experiments at the Oxford Station in 1950 showed a fuel saving of as much as $12.60 in favor of curing with an open flue system as compared with a closed flue system. No estimate can be made at this time of the increase of quality value as a result of better heat distribution, etc.

In addition to fuel economy, the open system is cheaper to install and maintain. The present flue system has an average life of about 2 years when used with coal.

These savings can be made available to the farmer provided the injury to the tobacco leaf as a result of the gases can be prevented or eliminated.

4. Procedure: The program will be divided into two parts according to the two objectives.

(a) The Anthracite Institute, working with materials that are available in the bright leaf area, will develop in its laboratory an anthracite closed flue system for curing bright leaf tobacco. This work will include furnace design, flue systems (shape, size and arrangement), heat liberation, and any measurements and tests that may be conducted in a barn without tobacco. When the Institute has completed its laboratory tests, the equipment developed by them, providing it is promising, will be set up at the Oxford Tobacco Branch Station and installed in Barn No. 3 for further testing during the tobacco curing season. A controlled experiment for 1951 is not anticipated.

(b) The Anthracite Institute is continuing the study of the composition of stoker combustion gases with particular reference to possible effect on the tobacco leaf. The Institute will collaborate with the state and federal agencies in studying the influence of gases upon tobacco. If the results of any of the investigations are promising, by mutual agreement, experiments will be conducted on a full size barn at the Oxford Station.

Each group will furnish equipment for making any studies which it instigates.

5. Personnel:

The individuals assigned to the project by the Head of the Department of Agronomy and the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the Subcommittee on Tobacco Curing of the Anthracite Institute assigned to the project by the Technical Advisory Committee, will be directly responsible for planning and executing this project.

The Subcommittee on Tobacco Curing for the Anthracite Institute comprises the following:

P. A. Mulcey	Director, Anthracite Institute
A. A. Norrman	Special Consultant, D.L. & W. Coal Co.
W. N. Sims	Fuel Engineer, Phila. & Reading Coal & Iron Co.

The following individuals are at present associated with the project. Subject to the exigencies of the overall research program of the respective agencies, it is anticipated that these and/or other individuals will participate as required:

P. F. White	Anthracite Institute
J. W. Eckerd	Anthracite Institute

6. Support:

Each party agrees to place at the disposal of the personnel carrying out the project such material and equipment as may be agreed upon. While it is not intended to set a minimum or a limit upon such contributions, it is planned that the following will be made available at the start:

(a) By the Anthracite Institute

(1) Two anthracite stokers
(2) Materials for construction of two or more furnaces, including "solite" and cement blocks, fire brick refractory lining material, flues and sheet metal.
(3) One sheet metal furnace
(4) Apparatus and instruments (for use in Wilkes-Barre) for testing of various furnaces, including optical pyrometers, surface pyrometers, recording potentiometers, thermocouples and equipment for measuring velocities and drafts.

(b) By the Department of Agricultural Engineering and Agronomy

(1) Such instruments as pyrometers, hygrometers, and potentiometers, etc., needed at Oxford Station for barn testing.
(2) Test cabinets and equipment for study of effect of gases upon tobacco.

(c) By the North Carolina Department of Agriculture

(1) Tobacco produced on the farm as required for use in the study.
(2) Test barns No. 3 and 10 for preliminary runs provided developments are promising. Additional barns may be provided for controlled experiments.
(3) Farm labor for handling tobacco or for other related jobs.

All equipment furnished by both parties will remain the property of each respective organization.

7. Reports:

The research workers assigned to this project will maintain full exchange of information and data on the project as the work progresses. Each worker on the project will be free to supply information to his superior officers in his respective organization on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the cooperator a written report on the investigations covered by this agreement each year. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party except that no formal release will be made without the permission of the North Carolina Agricultural Experiment Station nor will formal release of the data be made without consultation with the cooperator. In publications containing the results of this cooperative work, the cooperation will be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

8. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff or the name of the North Carolina Department of Agriculture or any of its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

9. Neither party to this agreement assumes any responsibility for bodily injuries to the employees of the other party or its cooperators while working on the project nor for damage to the property of other parties working on the project.

10. It is the policy of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is safeguarded.

If items of commercial value are developed as a result of this cooperative project, the North Carolina Agricultural Experiment Station has the right of initiating patent or copyright action within eight months from the time that the existence of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party is engaged, that party shall retain its full rights thereto.

Upon recommendation of the Anthracite Institute, the rights under this section will be extended to the several members of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate.

11. This memorandum of understanding shall continue in effect to December 31, 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

12. RECOMMENDED:

April 6, 1951 — Date
G. H. Hicks — Head, Dept. of Agricultural Engineering

April 10, 1951 — Date
W. E. Colwell — Head, Department of Agronomy and In Charge, Tobacco Investigation, N. C. Agricultural Experiment Station

April 13, 1951 — Date
J. M. Carr — Asst. Director in Charge of Tobacco Experiment Station, Oxford, N. C.

Date

APPROVED:

5-25-51 — Date
Anthracite Institute

7/18/51 — Date
R. W. Cummings — Director of Research, N. C. Agricultural Experiment Station

6/29/51 — Date
Commissioner, N. C. Department of Agriculture

March 25, 1952

Mr. Paul F. White, Consulting Engineer
ANTHRACITE INSTITUTE
1247 Broad Street Station Building
Philadelphia 3, Pennsylvania

Dear Mr. White:

Our engineering research program in tobacco curing being carried on in cooperation with the Bureau of Farm Electrification has undergone some personnel changes in the past few weeks. The Bureau has transferred Dr. Brown to Tennessee to undertake some other research in the field of rural electrification. I have been asked to assume the responsibility for directing this complete program for both the federal and state. In the past Dr. Brown has had charge of the program for both state and federal, being responsible to me only for the state part of it. Messrs. Weldon, Puckett and Hassler will still be active on the work.

In discussing the revision of our cooperative undertaking, it is the wish of all to continue with our research work in the use of anthracite for the year 1952 and as covered in our memorandum of understanding. I think, however, that we will want to review the results that have been achieved on this project at the end of this year and make plans for the future accordingly. Mr. Weldon will continue to be responsible for carrying on the cooperative research work that we have with you on the anthracite. If this meets with your approval, it will be quite satisfactory for you to work directly with Mr. Weldon as the objectives and procedures have been pretty much worked out.

With best personal regards,

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:AU

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

July 10, 1951

Professor G. W. Giles, Head
Dept. of Agricultural Engineering
North Carolina State College of
Agriculture and Engineering of the
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

This will acknowledge with thanks your letter of July 6 enclosing two copies of the Memorandum of Understanding. I can see no objection to the two changes which you have made in the final copy.

Yours very truly,

Paul A. Mulcey

PAM:lc

July 6, 1951

Mr. Cecil Thomas
Director of Test Farms
N. C. Department of Agriculture
Raleigh, North Carolina

Dear Mr. Thomas:

Following your suggestions, we have retyped pages 3 and 4 of the Memorandum of Understanding with the Anthracite Institute.

I am attaching hereto these two pages for you to insert in the copy that you kept for your file.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

Enclosure

July 6, 1951

MEMORANDUM TO: Dr. R. W. Cummings

I am attaching hereto a copy of the Memorandum of Understanding that we have developed with the Anthracite Institute.

This copy is for your files.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

Enc.

July 6, 1951

MEMORANDUM TO: Dr. W. E. Colwell

I am attaching hereto a copy of the Memorandum of Understanding that we have developed with the Anthracite Institute.

This copy is for your file.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

Enc.

North Carolina State College of Agriculture and Engineering
of the
University of North Carolina
SCHOOL OF AGRICULTURE
Raleigh

June 18, 1951

MEMORANDUM TO: G. W. Giles

I am returning the seven copies of the Memorandum of Understanding with the Anthracite Institute. I have signed these indicating my approval.

I note the letter from Mr. Paul A. Mulcey dated May 25,1951 with reference to their interpretation of the section dealing with release of information. I believe that his interpretation is satisfactory provided the news items in his weekly bulletin referred to in the letter do not involve the Station in any conclusions or endorsements prematurely. I trust that they will keep you advised regarding the releases they intend to make.

Sincerely yours,

R. W. Cummings

R. W. Cummings
Director of Research.

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

May 25, 1951

Professor G. W. Giles, Head
Dept. of Agricultural Engineering
North Carolina State College of
Agriculture and Engineering of the
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

In reply to your letter of May 23, I am returning all the copies of the Memorandum of Understanding signed by Dr. R. C. Johnson.

The Technical Advisory Committee was particularly anxious that there should be no restriction with respect to the releasing of information concerning this work in the event that such action might be helpful in overcoming the present difficulties involved in the use of anthracite for tobacco curing. Our interpretation of Section 7 in its final form is that the Institute will be free to (1) release news items concerning the test in its weekly bulletin or other publications and (2) give complete data to members of the Anthracite Institute as the work progresses.

On the other hand, any formal publication of overall results would not be made until there had been full consultation between the Experiment Station and the Anthracite Institute. We trust that this interpretation will be satisfactory to you.

Best regards.

Yours very truly,

Paul A. Mulcey

PAM:lc
Enc.

July 6, 1951

Mr. Paul A. Mulcey
ANTHRACITE INSTITUTE
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

The Memorandum of Understanding has been signed by all persons concerned and I am sending you herewith two copies for your file.

The North Carolina Department of Agriculture suggested that we itemize their support which we did on page 3 and also to include their name in paragraph 8 which has to do with using their name for commercial advertisement. I trust that this will be satisfactory to you.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

Enc.

North Carolina
Department of Agriculture

DIVISION OF TEST FARMS
COOPERATING WITH
N. C. AGRICULTURAL EXPERIMENT STATION
AND
U. S. DEPARTMENT OF AGRICULTURE

L. Y. BALLENTINE
COMMISSIONER OF AGRICULTURE
CECIL D. THOMAS
DIRECTOR OF TEST FARMS

RALEIGH, N. C.

July 3, 1951

Mr. G. W. Giles, Head
Department of Agricultural Engineering
N. C. State College
Raleigh, North Carolina

Dear Mr. Giles:

I am returning seven copies of the Memorandum of Understanding relative to studies with Anthracite coal at the Tobacco Test Farm, Oxford, North Carolina. Mr. Ballentine has signed and everything is in order except for the suggestions which I made to you over the telephone last week. I shall review these suggested changes that I would like to recommend:

Under Section 6 it seems to me a subhead (c) "By the North Carolina Department of Agriculture" should be added. The items under 6 (c) could be as follows: (1) Tobacco produced on the farm as required for use in the study (2) Curing barns as required and as agreed upon by the parties concerned (3) Farm labor for handling tobacco or for other related jobs.

Under Section 8 I suggest that the phrase, "or the name of the North Carolina Department of Agriculture or any of its staff", be added.

Outside of these points it seems to me the agreement is well organized.

Very truly yours,

Cecil D. Thomas
Director of Test Farms

CDT/lwb
Enclosures

January 31, 1951

Mr. Paul F. White, Consulting Engineer
Anthracite Institute
1247 Broad Street Station Building
Philadelphia 3, Pennsylvania

Dear Mr. White:

I am in receipt of your two letters enclosing copies of the proposed Memorandum of Understanding covering the cooperative research projects.

I haven't had an opportunity to date to look this over, but will do so in the near future. I will also show it to Dr. Colwell and Dr. Cummings.

Thanks very much.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

ANTHRACITE INSTITUTE
PHILADELPHIA OFFICE
1247 BROAD STREET STATION BUILDING
PHILADELPHIA 3, PENNA.

TELEPHONE
RITTENHOUSE 6-3186

January 29, 1951

Professor G. W. Giles, Head
Agricultural Engineering Department
North Carolina State College
Raleigh, North Carolina

Dear Professor Giles:

We have made several additions to the Memorandum of Understanding.

Please substitute the enclosed two pages for page 1 of the copy which was mailed to you on January 27.

Very truly yours,
ANTHRACITE INSTITUTE

Paul F. White

P. F. White
Consulting Engineer

PFW:mpc
Encl. (2)

MEMORANDUM OF UNDERSTANDING
Between

DEPARTMENT OF AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION
NORTH CAROLINA STATE COLLEGE, RALEIGH, N. C.

And

Anthracite Institute	Wilkes-Barre, Pennsylvania
(Cooperator)	(P. O. Address)
(Cooperator)	(P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Purpose: Because of the favorable experience and promising results obtained by the farmers during the past several years with anthracite in the curing of tobacco there is a great demand and persistent pressure from the farmers to develop the most efficient, effective and practical anthracite system which can be installed in a curing barn at reasonable cost.

3. Procedure:

The program will be divided into two parts.

1. Develop a closed flue system for using anthracite for curing bright leaf tobacco because of the advantages to be derived by the farmer from using competitive fuels and because no satisfactory system for curing tobacco with anthracite is now available. For this use, one tobacco barn (No. 3) at the Oxford Station shall be used for cooperative work with the Anthracite Institute.

The anthracite institute will continue developing if promising it will be studied in No 1

2. For the purpose of developing new equipment and making studies with open flue systems, because of the impressive economy of open curing with anthracite, one tobacco barn (No. 10) at the Oxford Station will be used. Cont

The Anthracite Institute will furnish equipment for making any studies which they instigate.

4. Personnel:

The individuals assigned to the project by the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of

Agriculture, Division of Farm Electrification, and the personnel assigned to the project by the Anthracite Institute will be directly responsible for planning and executing this project.

The following individuals on the staff of the cooperator will be associated with the project as indicated.

Name	Title

Sub-committee of the Technical Advisory Committee of the Anthracite Institute as follows:

Paul A. Mulcey	Director, Anthracite Institute Laboratory
A. A. Norrman	Special Consultant, DL&W Coal Co.
W. N. Sims	Fuel Engineer, P&RC&I Coal Co.
P. F. White	Consulting Engineer, Anthracite Institute

And other engineers from the Anthracite Institute Laboratory who will be assigned part time or called in for consultation.

ANTHRACITE INSTITUTE
PHILADELPHIA OFFICE
1247 BROAD STREET STATION BUILDING
PHILADELPHIA 3, PENNA.

TELEPHONE
RITTENHOUSE 6-3186

January 27, 1951

Professor G. W. Giles, Head
Agricultural Engineering Department
North Carolina State College
Raleigh, North Carolina

Dear Professor Giles:

We wish to express appreciation for the loan of the cooperative agreement which was proposed last year and is enclosed herewith. You will also find enclosed carbon copy of a draft which we have sent to our office for their approval and which will be forwarded for your approval when it is complete.

Very truly yours,
ANTHRACITE INSTITUTE

Paul F. White

P. F. White
Consulting Engineer

PFW:mpc
Enclosures (2)

MEMORANDUM OF UNDERSTANDING
Between

DEPARTMENT OF AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION
NORTH CAROLINA STATE COLLEGE, RALEIGH, N. C.

AND

Anthracite Institute (Cooperator)	Wilkes-Barre, Pennsylvania (P. O. Address)
(Cooperator)	(P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Purpose: To arrive at the most efficient, effective and practical anthracite system which can be installed in a curing barn at reasonable cost.

3. Procedure:

The program will be divided into two parts.

1. Develop a closed flue system for using anthracite for curing bright leaf tobacco because of the advantages to be derived by the farmer from using competitive fuels and because no satisfactory system for curing tobacco with anthracite is now available. For this use, one tobacco barn (No. 3) at the Oxford Station shall be used for cooperative work with the Anthracite Institute.

2. For the purpose of developing new equipment and making studies with open flue systems, because of the impressive economy of open curing with anthracite, one tobacco barn (No. 10) at the Oxford Station will be used.

The Anthracite Institute will furnish equipment for making any studies which they instigate.

4. Personnel:

The individuals assigned to the project by the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the personnel assigned to the project by the Anthracite Institute will be directly responsible for planning and executing this project.

3

5. Support:

The cooperator agrees to place at the disposal of the North Carolina Agricultural Experiment Station the following items of equipment to aid in carrying out this research:

(a) 2 Anthracite stokers
(b) material for 2 furnaces
(c) flues and stack for one closed system
(d) apparatus and instruments for making observations

All equipment furnished by the Anthracite Institute will remain the property of the Anthracite Institute.

6. Reports:

The research worker, either State or cooperator, will furnish a copy of all data and reports to interested individuals, weekly or as soon as available.

The North Carolina Agricultural Experiment Station shall furnish to the cooperator or cooperators a report each year on the investigations. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by the North Carolina Agricultural Experiment Station and no publication or formal release will be made without its knowledge. In all publications containing the results of this cooperative work the cooperation of the other parties shall be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

7. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

8. The cooperator agrees to assume full responsibility for bodily injury to its employees working on this project and for damage to its property assigned to this project.

9. It is the policy of the Department of Agricultural Engineering of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is benefitted.

If items of commercial value are developed as a result of this cooperative project the Department of Agricultural Engineering has the right of initiating patent or copyright action within 8 months from the time that the existance of patent rights is first known.

Inasmuch as the cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale will be tendered the cooperator upon the completion of a legal

contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development will pay for its development. The amount of royalty is to be agreed upon through conference. Should the cooperator not desire a license the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

10. This memorandum of understanding shall continue in effect to December 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

_____ (Date) _____ (Cooperator)

_____ (Date) _____ Head, Department of Agricultural Engineering

_____ (Date) _____ In Charge, Tobacco Investigation

_____ (Date) _____ Director, N.C. Agricultural Experiment Sta.

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

May 7, 1951

Prof. G. W. Giles, Head
Dept. of Agricultural Engineering
School of Agriculture
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

This will acknowledge with thanks your communication of May 4. I will take this up with our people and give you a final answer within the next two or three days. However, I would like to point out that the main purpose of my suggested change is not in order to withhold information, but rather to make it available by report or other publication to anyone in the anthracite or in the equipment industry who might have use for it.

With respect to the last paragraph, section 10, I believe your wording is quite satisfactory since our only wish was to extend the legal rights to the use of the information to our members as well as the Anthracite Equipment Corporation.

Thank you again for your cooperation. I will return the Memorandum of Agreement within the next few days.

Yours very truly,

Paul A. Mulcey

PAM:lc

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

April 23, 1951

Professor G. W. Giles, Head
Dept. of Agricultural Engineering
School of Agriculture
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

This will acknowledge with thanks your letter of April 16, enclosing eight copies of the proposed Memorandum of Agreement. However, I believe there has been a secretarial error in that several of the paragraphs follow the original wording rather than that which we agreed upon in earlier correspondence and covered in your letter of March 6. I have particular reference to the second paragraph of section 7. The second and third sentences of this paragraph as agreed upon read--

> "Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party and no publication or formal release will be made without the permission of both parties."

The present agreement contains the sentence--

> "Rights to publication or formal release of the data are retained by the North Carolina Agricultural Experiment Station but publication or formal release of the data will not be made without consultation with the cooperator."

Also the last paragraph of section 10 previously read--

> "All rights under this section shall be available to each member of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate."

The present memorandum of agreement reads--

> "Upon recommendation of the Anthracite Institute, the rights under this section may be extended to the several members of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate".

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

The reason our subcommittee feels that the first wording is correct rather than the second is that it would permit us to report at regular intervals to the various members of the Anthracite Institute and, if it appeared desirable, to publish any portion of the work, subject to your approval, which might be of value to the industry. Likewise, we feel that the rights under the agreement should be automatically extended to all members of the Anthracite Institute even though the actual planning and execution is done through the Institute.

If you are in agreement with this, we will revise the two pages concerned and return the signed agreements to you.

Yours very truly,

Paul A. Mulcey

PAM:lc

North Carolina State College of Agriculture and Engineering
of the
University of North Carolina
Raleigh

SCHOOL OF AGRICULTURE
RESEARCH EXTENSION
RESIDENT TEACHING

OFFICE OF DEAN AND DIRECTORS

March 31, 1951

MEMORANDUM TO: G. W. Giles

I am returning the copies of the proposed memorandum of understanding between the North Carolina Agricultural Experiment Station and the Anthracite Institute transmitted in your letter of March 21. I would like to suggest that Sections 7, 9, and 10 be modified somewhat along the lines indicated by the attached statements. I would appreciate your reaction to this modification.

Sincerely yours,

R W Cummings

R. W. Cummings
Director of Research.

March 1951

MEMORANDUM OF UNDERSTANDING

Between

DEPARTMENT OF AGRONOMY AND AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION, NORTH CAROLINA STATE COLLEGE, RALEIGH, N.C.

And

Anthracite Institute (Cooperator) — Wilkes-Barre, Pennsylvania (P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Objectives:

   (a) To develop a satisfactory closed flue system for converting farmer-owned open flue anthracite burners.

   (b) To investigate factors affecting the quality of tobacco cured in gases from the combustion of anthracite as a basis for the development of an open flue anthracite curing system.

3. Reasons for Undertaking for Study:

   (a) At the end of the 1949 curing season there were about 1500 anthracite curing units in the bright leaf area. These units liberated the products of combustion from anthracite coal into the curing barn and are called open systems. About 1300 of these units were new anthracite stokers with metal combustion chambers centrally located within the barn and with 6" radial pipes for heat distribution. The remaining 200 units were bituminous stokers converted to anthracite burners with the same type of heat distribution system. Most of these 1500 units are in North Carolina in the areas around Lumberton, Whiteville, Dunn, Lillington, Goldsboro, Kinston, Wilson, and Nashville. The new open systems were sold to the farmers for about $350 each and the farmers were allowed from 2 to 3 years in which to complete payments. About 90 per cent of the open systems were converted in 1950 to some kind of a closed flue system with stacks. However, most of the converted systems are inefficient, having an estimated efficiency of 30%. The efficiency of the present heat distribution systems for bituminous coal is about 44%. In addition, the converted systems are hazardous in that the flue temperatures operate at about 700° F whereas safe flue temperatures are at 500° or less. The farmers who purchased anthracite burners cannot afford to throw this equipment away ($500,000). This phase of the research is to develop a satisfactory system of converting these units to a closed system at nominal cost.

   (b) Furnaces for burning anthracite fuel and releasing the products of combustion into the barn has promise of supplying one of the cheaper sources of heat for curing. The results of experiments at the Oxford Station in 1950 showed a fuel saving of as much as $12.60 in favor of curing with an open flue system as compared with a closed flue system. No estimate can be made at this time of the increase of quality value as a result of better heat distribution, etc.

In addition to fuel economy, the open system is cheaper to install and maintain. The present flue system has an average life of about 2 years when used with coal.

These savings can be made available to the farmer provided the injury to the tobacco leaf as a result of the gases can be prevented or eliminated.

4. Procedure: The program will be divided into two parts according to the two objectives.

(a) The Anthracite Institute, working with materials that are available in the bright leaf area, will develop in its laboratory an anthracite closed flue system for curing bright leaf tobacco. This work will include furnace design, flue systems (shape, size and arrangement), heat liberation, and any measurements and tests that may be conducted in a barn without tobacco. When the Institute has completed its laboratory tests, the equipment developed by them, providing it is promising, will be set up at the Oxford Tobacco Branch Station and installed in Barn No. 3 for further testing during the tobacco curing season. A controlled experiment for 1951 is not anticipated.

(b) The Anthracite Institute is continuing the study of the composition of stoker combustion gases with particular reference to possible effect on the tobacco leaf. The Institute will collaborate with the state and federal agencies in studying the influence of gases upon tobacco. If the results of any of the investigations are promising, by mutual agreement, experiments will be conducted on a full size barn at the Oxford Station.

Each group will furnish equipment for making any studies which it instigates.

5. Personnel:

The individuals assigned to the project by the Head of the Department of Agronomy and the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the Subcommittee on Tobacco Curing of the Anthracite Institute assigned to the project by the Technical Advisory Committee, will be directly responsible for planning and executing this project.

The Subcommittee on Tobacco Curing for the Anthracite Institute comprises the following:

P. A. Mulcey	Director, Anthracite Institute
A. A. Norrman	Special Consultant, D. L. & W. Coal Co.
W. N. Sims	Fuel Engineer, Phila. & Reading Coal & Iron Co.

The following individuals are at present associated with the project. Subject to the exigencies of the overall research program of the respective agencies, it is anticipated that these and/or other individuals will participate as required:

P. F. White	Anthracite Institute
J. W. Eckerd	Anthracite Institute

6. Support:

Each party agrees to place at the disposal of the personnel carrying out the project such material and equipment as may be agreed upon. While it is not intended to set a minimum or a limit upon such contributions, it is planned that the following will be made available at the start:

(a) By the Anthracite Institute

(1) Two anthracite stokers
(2) Materials for construction of two or more furnaces, including "solite" and cement blocks, fire brick refractory lining material, flues and sheet metal.
(3) One sheet metal furnace
(4) Apparatus and instruments (for use in Wilkes-Barre) for testing of various furnaces, including optical pyrometers, surface pyrometers, recording potentiometers, thermocouples and equipment for measuring velocities and drafts.

(b) By the Department of Agricultural Engineering and Agronomy

(1) Test barns No. 3 and 10 for preliminary runs provided developments are promising. Additional barns may be provided for controlled experiments.
(2) Tobacco produced on station farm as required to fill barns.
(3) Such instruments as pyrometers, hygrometers, and potentiometers, etc., needed at Oxford Station for barn testing
(4) Test cabinets and equipment for study of effect of gases upon tobacco

All equipment furnished by both parties will remain the property of each respective organization.

7. Reports:

The research worker, either State or cooperator, will furnish a copy of all data and reports to interested individuals, weekly or as soon as available. This shall be interpreted to mean that both parties by mutual agreement shall be free to distribute these reports on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the Cooperator a report each year on the investigations. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party and no publication or formal release will be made without the permission of both parties. In all publications containing the results of this cooperative work, the cooperation of the other parties shall be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

8. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

9. Each party agrees to assume full responsibility for bodily injury to its employees while working on this project and for damage to its property assigned to this project.

10. It is the policy of the ~~Department of Agronomy and of Agricultural Engineering of the~~ North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is ~~benefitted.~~ safeguarded.

If items of commercial value are developed as a result of this cooperative project the ~~Department of Agricultural Engineering and the Department of Agronomy have~~ the right of initiating patent or copyright action within 8 months from the time that the existance of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party is engaged, that party shall retain its full rights thereto.

North Carolina Agricultural Experiment Station has

Inasmuch as the Cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale ~~will~~ shall be tendered the Cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development ~~will~~ shall pay for its development. The amount of royalty ~~is to~~ shall be agreed upon through conference. Should the Cooperator not desire a license, the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

Upon recommendation of the Anthracite Institute, the ~~All~~ rights under this section ~~shall~~ may be ~~available~~ assigned to ~~each~~ the several members of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate.

11. This memorandum of understanding shall continue in effect to December 31, 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

March 15, 1951 Date	Anthracite Institute
March 15, 1951 Date	G. L. Gale Head, Dept. of Agricultural Engineering
March 17, 1951 Date	W. T. Coverell Head, Department of Agronomy and In Charge, Tobacco Investigation, N. C. Agricultural Experiment Station
Date	Director, N. C. Agricultural Experiment Station

Suggested Modifications in Agreement with Anthracite Institute

7. Reports:

The research workers assigned to this project will maintain full exchange of information and data on the project as the work progresses. Each worker on the project will be free to supply this information to his superior officers in his respective organization on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the cooperator a written report on the investigations each year. Rights to publication or formal release of the data are retained by the North Carolina Agricultural Experiment Station but publication or formal release of the data will not be made without consultation with the cooperator. In publications containing the results of this cooperative work, the cooperation of the Anthracite Institute will be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

9. Neither party to this agreement assumes any responsibility for bodily injuries to the employees of the other party or its cooperators while working on the project nor for damage to the property of other parties working on the project.

10. It is the policy of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is safeguarded.

If items of commercial value are developed as a result of this cooperative project the North Carolina Agricultural Experiment Station has the right of initiating patent or copyright action within eight months from the time that the existence of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party

is engaged, that party shall retain its full rights thereto.

Inasmuch as the cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale may be tendered the cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development would defray the costs of its development. The amount of royalty would be agreed upon through conference. Should the cooperator not desire a license, the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

Upon recommendation of the Anthracite Institute, the rights under this section may be extended to the several members of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate.

March 1951

MEMORANDUM OF UNDERSTANDING

Between

DEPARTMENT OF AGRONOMY AND AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION, NORTH CAROLINA STATE COLLEGE, RALEIGH, N.C.

And

Anthracite Institute (Cooperator) — Wilkes-Barre, Pennsylvania (P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Objectives:

   (a) To develop a satisfactory closed flue system for converting farmer-owned open flue anthracite burners.

   (b) To investigate factors affecting the quality of tobacco cured in gases from the combustion of anthracite as a basis for the development of an open flue anthracite curing system.

3. Reasons for Undertaking for Study:

   (a) At the end of the 1949 curing season there were about 1500 anthracite curing units in the bright leaf area. These units liberated the products of combustion from anthracite coal into the curing barn and are called open systems. About 1300 of these units were new anthracite stokers with metal combustion chambers centrally located within the barn and with 6" radial pipes for heat distribution. The remaining 200 units were bituminous stokers converted to anthracite burners with the same type of heat distribution system. Most of these 1500 units are in North Carolina in the areas around Lumberton, Whiteville, Dunn, Lillington, Goldsboro, Kinston, Wilson, and Nashville. The new open systems were sold to the farmers for about $350 each and the farmers were allowed from 2 to 3 years in which to complete payments. About 90 per cent of the open systems were converted in 1950 to some kind of a closed flue system with stacks. However, most of the converted systems are inefficient, having an estimated efficiency of 30%. The efficiency of the present heat distribution systems for bituminous coal is about 44%. In addition, the converted systems are hazardous in that the flue temperatures operate at about 700° F whereas safe flue temperatures are at 500° or less. The farmers who purchased anthracite burners cannot afford to throw this equipment away ($500,000). This phase of the research is to develop a satisfactory system of converting these units to a closed system at nominal cost.

   (b) Furnaces for burning anthracite fuel and releasing the products of combustion into the barn has promise of supplying one of the cheaper sources of heat for curing. The results of experiments at the Oxford Station in 1950 showed a fuel saving of as much as $12.60 in favor of curing with an open flue system as compared with a closed flue system. No estimate can be made at this time of the increase of quality value as a result of better heat distribution, etc.

In addition to fuel economy, the open system is cheaper to install and maintain. The present flue system has an average life of about 2 years when used with coal.

These savings can be made available to the farmer provided the injury to the tobacco leaf as a result of the gases can be prevented or eliminated.

4. Procedure: The program will be divided into two parts according to the two objectives.

(a) The Anthracite Institute, working with materials that are available in the bright leaf area, will develop in its laboratory an anthracite closed flue system for curing bright leaf tobacco. This work will include furnace design, flue systems (shape, size and arrangement), heat liberation, and any measurements and tests that may be conducted in a barn without tobacco. When the Institute has completed its laboratory tests, the equipment developed by them, providing it is promising, will be set up at the Oxford Tobacco Branch Station and installed in Barn No. 3 for further testing during the tobacco curing season. A controlled experiment for 1951 is not anticipated.

(b) The Anthracite Institute is continuing the study of the composition of stoker combustion gases with particular reference to possible effect on the tobacco leaf. The Institute will collaborate with the state and federal agencies in studying the influence of gases upon tobacco. If the results of any of the investigations are promising, by mutual agreement, experiments will be conducted on a full size barn at the Oxford Station.

Each group will furnish equipment for making any studies which it instigates.

5. Personnel:

The individuals assigned to the project by the Head of the Department of Agronomy and the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the Subcommittee on Tobacco Curing of the Anthracite Institute assigned to the project by the Technical Advisory Committee, will be directly responsible for planning and executing this project.

The Subcommittee on Tobacco Curing for the Anthracite Institute comprises the following:

P. A. Mulcey	Director, Anthracite Institute
A. A. Norrman	Special Consultant, D. L. & W. Coal Co.
W. N. Sims	Fuel Engineer, Phila. & Reading Coal & Iron Co.

The following individuals are at present associated with the project. Subject to the exigencies of the overall research program of the respective agencies, it is anticipated that these and/or other individuals will participate as required:

P. F. White	Anthracite Institute
J. W. Eckerd	Anthracite Institute

6. Support:

Each party agrees to place at the disposal of the personnel carrying out the project such material and equipment as may be agreed upon. While it is not intended to set a minimum or a limit upon such contributions, it is planned that the following will be made available at the start:

(a) By the Anthracite Institute

(1) Two anthracite stokers
(2) Materials for construction of two or more furnaces, including "solite" and cement blocks, fire brick refractory lining material, flues and sheet metal.
(3) One sheet metal furnace
(4) Apparatus and instruments (for use in Wilkes-Barre) for testing of various furnaces, including optical pyrometers, surface pyrometers, recording potentiometers, thermocouples and equipment for measuring velocities and drafts.

(b) By the Department of Agricultural Engineering and Agronomy

(1) Test barns No. 3 and 10 for preliminary runs provided developments are promising. Additional barns may be provided for controlled experiments.
(2) Tobacco produced on station farm as required to fill barns.
(3) Such instruments as pyrometers, hygrometers, and potentiometers, etc., needed at Oxford Station for barn testing
(4) Test cabinets and equipment for study of effect of gases upon tobacco

All equipment furnished by both parties will remain the property of each respective organization.

7. Reports:

The research worker, either State or cooperator, will furnish a copy of all data and reports to interested individuals, weekly or as soon as available. This shall be interpreted to mean that both parties by mutual agreement shall be free to distribute these reports on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the Cooperator a report each year on the investigations. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party and no publication or formal release will be made without the permission of both parties. In all publications containing the results of this cooperative work, the cooperation of the other parties shall be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

8. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

9. Each party agrees to assume full responsibility for bodily injury to its employees while working on this project and for damage to its property assigned to this project.

10. It is the policy of the Department of Agronomy and of Agricultural Engineering of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is benefitted.

If items of commercial value are developed as a result of this cooperative project the Department of Agricultural Engineering and the Department of Agronomy have the right of initiating patent or copyright action within 8 months from the time that the existance of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party is engaged, that party shall retain its full rights thereto.

Inasmuch as the Cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale will be tendered the Cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development will pay for its development. The amount of royalty is to be agreed upon through conference. Should the Cooperator not desire a license, the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

All rights under this section shall be available to each member of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate.

11. This memorandum of understanding shall continue in effect to December 31, 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

Date	Anthracite Institute
Mar 15, 1951 Date	G. W. Gabe Head, Dept. of Agricultural Engineering
March 17, 1951 Date	W. E. Cornell Head, Department of Agronomy and In Charge, Tobacco Investigation, N. C. Agricultural Experiment Station
Date	Director, N. C. Agricultural Experiment Station

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

April 9,1951

Professor G. W. Giles, Head
Department of Agricultural Engineering
North Carolina State College of Agriculture
and Engineering of the
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

We have no objection to the changes to the Memorandum of Agreement which you mention in your letter of April 5. I assume that you intend to leave paragraphs 1, 2 and 4 of Section 10 in the agreement.

One avenue of approach to our problem which we have as yet left untouched is the possibility that fungus activity may have some bearing on the so-called bleached spots in anthracite open flue-cured tobacco. Do you think it would be possible to enlist the interest of a plant pathologist from the School of Agriculture who might be available to work with us during the coming season? I would appreciate it if you would discuss this matter with Dr. Cummings. We have some concrete ideas along this line and would like to discuss them with someone acquainted with the field of plant pathology in order to determine whether it is worthwhile to carry out pertinent studies during this forthcoming season.

Yours very truly,

Paul A. Mulcey

PAM:lc
CC: Mr. A. A. Norrman
Mr. W. N. Sims

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

February 9, 1951

Professor G. W. Giles, Head
Agricultural Engineering Dept.
North Carolina State College
Raleigh, North Carolina

Dear Professor Giles:

The Subcommittee on Tobacco Curing of the Technical Advisory Committee of the Anthracite Institute has studied the question of a memorandum of understanding covering the cooperative study of tobacco curing with anthracite. We have enlarged upon, and in places, changed the preliminary draft which I understand Mr. White sent to you. We have done this on the basis of our understanding that you would like us to make as complete a listing as possible of the participation of the Anthracite Institute both from a point of view of personnel and material. We have also modified Sections 6 and 9 in an attempt to liberalize the provisions while at the same time protecting the legal requirements placed upon the Department of Agricultural Engineering by the State of North Carolina.

We understand that this agreement is in the nature of an understanding concerning our respective parts in this project and is not to be considered legally binding insofar as future commitments are concerned. We have already started our furnace development work at the Anthracite Institute and plan to start at Oxford as soon as Mr. Weldon and Dr. Brown are ready to let us do so. Naturally the statements made in this memorandum reflect only what plans we can make at present and cannot cover further expansion of the project which might become desirable as time goes on.

We will appreciate your comments concerning the enclosed suggested memorandum and assure you of our desire to cooperate in every way possible.

Yours very truly,

Paul A. Mulcey
Director of Laboratory
Anthracite Institute

PAM:lc
Enc.

~~ROUGH DRAFT~~

MEMORANDUM OF UNDERSTANDING

BETWEEN

DEPARTMENT OF AGRICULTURAL ENGINEERING, N.C. AGRICULTURAL EXPERIMENT STATION
NORTH CAROLINA STATE COLLEGE, RALEIGH, N.C.

and

Anthracite Institute	Wilkes-Barre, Pennsylvania
(Cooperator)	(P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Purpose: Because of the favorable experience and promising results obtained by the farmers during the past several years with anthracite in the curing of tobacco there is a great demand and persistent pressure from the farmers to develop the most efficient, effective and practical anthracite system which can be installed in a curing barn at reasonable cost.

3. Procedure: The program will be divided into two parts.

1. To develop a closed system for using anthracite for curing bright leaf tobacco in order to give the farmer the benefit of the advantages of this fuel. For this use, one tobacco barn (No. 3) at the Oxford Station shall be used for cooperative work with the Anthracite Institute.

2. To develop new equipment and to make studies with open systems, because of the impressive economy of open curing with anthracite. One tobacco barn (No. 10) at the Oxford Station will be set aside for this purpose.

Each group will furnish equipment for making any studies which it investigates.

5. Personnel:

The individuals assigned to the project by the Head of the Department of Agricultural Engineering, North Carolina Agricultural Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the Subcommittee on Tobacco Curing assigned to the project by the Technical Advisory Committee, will be directly responsible for planning and executing this project.

The Subcommittee on Tobacco Curing comprises the following:

P. A. Mulcey	Director, Anthracite Institute Laboratory
A. A. Norrman	Special Consultant, D. L. & W. Coal Co.
W. N. Sims	Fuel Engineer, Phila.& Reading Coal & Iron Co.

The following individuals are at present associated with the project. Subject to the exigencies of the overall research program of the respective agencies, it is anticipated that these and/or other individuals will participate as required:

P. F. White	Anthracite Institute
J. W. Eckerd	Anthracite Institute

6. Support:

Each party agrees to place at the disposal of the personnel carrying out the project such material and equipment as may be agreed upon. While it is not intended to set a minimum or a limit upon such contributions, it is planned that the following will be made available at the start:

(a) By the Anthracite Institute

(1) Two anthracite stokers
(2) Materials for the construction of two or more furnaces, including "solite" and cement blocks, fire brick refractory lining material, flues and sheet metal
(3) One sheet metal furnace
(4) Apparatus and instruments (for use in Wilkes-Barre) for testing of various furnaces, including optical pyrometers, surface pyrometers, recording potentiometers, thermocouples and equipment for measuring velocities and drafts.

(b) By the Department of Agricultural Engineering

All equipment furnished by both parties will remain the property of each respective organization.

7. Reports:

The research worker, either State or cooperator, will furnish a copy of all data and reports to interested individuals, weekly or as soon as available. This shall be interpreted to mean that both parties by mutual agreement shall be free to distribute these reports on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the Cooperator a report each year on the investigations. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party and no publication or formal release will be made without the permission of both parties. In all publications containing the results of this cooperative work, the cooperation of the other parties shall be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

8. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

9. Each party agrees to assume full responsibility for bodily injury to its employees while working on this project and for damage to its property assigned to this project.

10. It is the policy of the Department of Agricultural Engineering of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is benefitted.

If items of commercial value are developed as a result of this cooperative project the Department of Agricultural Engineering has the right of initiating patent or copyright action within 8 months from the time that the existence of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party is engaged, that party shall retain its full rights thereto.

Inasmuch as the Cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale will be tendered the Cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development will pay for its development. The amount of royalty is to be agreed upon through conference. Should the Cooperator not desire a license, the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

All rights under this section shall be available to each member of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate.

10. This memorandum of understanding shall continue in effect to December 31, 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

Date	Anthracite Institute
Date	Head, Department of Agricultural Eng.
Date	In Charge, Tobacco Investigation
Date	Dir. N. C. Agr. Experiment Station

Mr. G. H. Giles

February 19, 1951

MEMORANDUM TO: Tobacco Group

FROM : W. E. Colwell

Attached is a summary of our conference at Oxford on February 14 with respect to acreage requests at the various tobacco stations for 1951. It was also decided at this meeting that Dr. Townes would assume responsibility for ordering the necessary chlordane for all of the stations and would supply Mr. Price with a breakdown of the requests so that appropriate charges could be made. With respect to other insecticides, it was considered best that each station superintendent handle the problem as he sees fit.

In addition to certain experiments described on the attached forms it was felt that at all stations certain demonstration plantings would be provided for special use on field days. This matter is to be discussed with Mr. Bennett and Mr. Hawks as the planting season approaches.

It was considered advisable to accept the equipment for irrigation even though the type of experiment to be conducted may not be as complex as the one now at McCullers.

TOBACCO ACREAGE REQUESTED FOR 1951

McCULLERS EXPERIMENT STATION

Department	Nature of Experiment	Acres To be cured	Acres Not to be cured
Agronomy	Source of nitrogen	0.7	
	Starter solution	0.7	
	Methods of planting	0.7	
	Radioactive Ca study	.5	
	Chemical weed control		.2
	Sucker control and evaluation studies	.3	.5
	Variety x stage of curing* (Cured at Oxford)		
	Irrigation studies	.4	
	Root development studies with P^{32}		.2
	Subsoil tillage	.2	
	16 Variety Study	1.0	
	F_1 hybrid study	2.0	
	Species hybrid study	.8	
	Nursery and head-to-row test	.3	.7
Pathology	Livibility test	.2	
	Fusarium breeding		.7
	Root Knot breeding inoculation	1.0	1.2
	Mosaic inoculation breeding	.5	
	Crop Rot (3.7 total area)	1.5	
	Winter Cover (Work at Wilson Mills handled separately)	.7	
Entmology	Aphid study	.2	
	Residue study	3.0	
		14.7	3.5
	TOTAL:	18.2	

* Not necessary to be cured

TOBACCO ACREAGE REQUIRED FOR 1951

UPPER COASTAL PLAIN EXPERIMENT STATION

Rocky Mount

Department	Nature of Experiment	Acres	
		To be cured	Not to be cured
Agronomy	Source of nitrogen	.7	
	Starter solution	.7	
	Fertilizer experiment	2.5	1.0
	Minor element	.7	
	Sucker control evaluation studies	.3	
	16 variety study	1.0	
	F_1 hybrid experiment	2.0	
Pathology	Nothing planned		
Entomology	Residue test* (Possible wireworm study)	3.0	
Engineering	Nothing planned		
		10.9	1.0
	TOTAL	11.9	

* 3 or 4 curing environments

TOBACCO ACREAGE REQUESTED FOR 1951

LOWER COASTAL PLAIN TOBACCO RESEARCH FARM

Greenville

Department	Nature of Experiment	Acres	
		To be cured	Not to be cured
Agronomy	Fertilizer placement	1.1	
	Rate of fertilizer x spacing	.5	
	Sucker control evaluation study	.3	
Pathology	Yield trial - Advanced	.7	
	F_4 lines	.6	
	Inoculation experiment (3 acres off station not cured)		.5
		3.2	.5
	TOTAL	3.7	

TOBACCO ACREAGE REQUESTED FOR 1951

UPPER PIEDMONT TOBACCO RESEARCH FARM

Rural Hall

Department	Nature of Experiment	Acres	
		To be cured	Not to be cured
Agronomy	Source of nitrogen	.7	
	Starter solution	.7	
	Regular fertilizer study	1.5	
	Sucker control and evaluation studies	.6	
	Crop rotation (2 acres)	.0	
	16 Variety Study	1.0	
Pathology	Advanced lines	.4	
	F_4 lines	.6	
	Leaf spot inoculation off Farm (2 acres Black Shank, Stokes Co., and Black Root Rot .50)	.3	
Entomology	Plans being developed (experimental or demonstrational plots)		
Engineering	Cultivation	1.0	
	Total	6.8	

TOBACCO ACREAGE REQUESTED FOR 1951

BORDER BELT TOBACCO RESEARCH FARM

Whiteville

Department	Nature of Experiment	Acres	
		To be cured	Not to be cured
Agronomy	Source of nitrogen	.7	
	Rate of fertilizer x spacing	.5	
	Sucker control and evaluation studies	.6	
	16 variety test	1.0	
	Species hybrid study	.8	
Pathology	Fusarium Breeding	2.1	
	Transplant off station location (1 acre not cured)	.1	
Entomology	Aphids	.2	
Engineering	Cultivation	1.0	
	Total	7.0	

TOBACCO ACREAGE REQUESTED FOR 1951

OXFORD

Department	Nature of Experiment	Acres To be cured	Acres Not to be cured
Agronomy	Fertilizer Placement	1.1	
	Crop rotation lime study (2 acres)	1.0	
	Minor element study	.7	
	Sucker control evaluation study	.3	
	Rate of fertilizer spacing (Possibly demonstration)	.5	
	Variety x stage of curing (1.2 duplicate)	1.5	
Pathology	Wilt plots (1.0 duplicate)	2.0	6.5
	Black shank Clay Station		5.0
Entomology	Aphid		.2
	Residue study (The fraction of this cured for Entomology work to be determined later)	3.0*	
Agr. Eng.	Methods of cultivation (Wilson)	1.0	
	Times and costs	.4	
	Power and Labor (2 duplicate)	2.0	
	Curing:		
	Compartment Barn (General Crop)	10.0	
	Engineering problem in marketing leaf (Hassler)	1.0	
	Engineering studies in tobacco production (Puckett)	1.0	
	Tobacco curing general-source of fuels	3.0	
	Testing barn operation procedure	7.0	
	Automatic control	2.0	
		38.5	11.7
	less 4.2 dup.	-4.2	
		34.3	
	less 2 (Curing)	2.0	
		32.3	
	TOTAL:	44.0	

* in 3 or more curing environments

March 2, 1951

Mr. Paul A. Mulcey
ANTHRACITE INSTITUTE
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

This will acknowledge receipt of your letter of February 27, 1951 and also your letter of February 28, 1951.

I appreciate your comments in regard to this Memorandum of Understanding. Apparently we have had a misunderstanding in regard to the extent of the cooperative work and the procedure for carrying it out. I will make an effort to get the folks here interested in this project together for reworking the Memorandum in line with your suggestions.

You may expect to hear from me again in the not too distant future.

Thanking you, I am

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:am

February 15, 1951.

Mr. N. W. Weldon,
Research Professor of Agricultural Engineering,
North Carolina State College,
P. O. Box #2,
Oxford, N. C.

Dear Mr. Weldon:

We confirm the statement made during our telephone conversation today that we consistently use 60% as the average efficiency for estimating comparative fuel costs with anthracite fired in domestic type stokers.

The generally accepted figure for the efficiency of a domestic bituminous coal stoker is 55%.

This 5% differential is accepted by the United States Housing Administration.

For a closed system, I have made tentative estimates of the loss to the chimney of sensible heat from anthracite and find that it is about 13.7% based on a maximum stack temperature of 500° F. With fuels of high hydrocarbon content, additional losses occur due to unburned carbon (smoke) which must be included.

A comparison of bituminous coal and anthracite burned in stokers should include consideration of the burning characteristics of each fuel. Anthracite burns within the confines of the retort. Bituminous coal due to its caking, coking and clinkering characteristics, requires frequent manual attention of the fuel bed to avoid excessive losses in the form of unburned coke in the ashes.

With best regards, I am

Very truly yours,
ANTHRACITE INSTITUTE

Paul F. White

Paul F. White,
Consulting Engineer.

PFW:jsb

CC - Prof. G. W. Giles
Mr. M. R. Grover

February 20, 1951

Mr. Paul A. Mulcey
Director of Laboratory
Anthracite Institute
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

This will acknowledge your letter of February 9, 1951 with the proposed memorandum of understanding covering cooperative research work.

There are a few changes that we would like to propose dealing with the procedure and objectives of the research work and we will get these made within the near future after which a revised copy will be sent to you. I am sorry that this has taken so long but it is one of those things that apparently just has to move slowly.

The changes that you have suggested on the memorandum seem satisfactory as far as I am concerned and as soon as I can make a few changes, I will submit it to our administration.

Thanking you, I am

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

February 22, 1951

Dr. W. E. Colwell
118 Ricks Hall
Campus

Dear Dr. Colwell:

I am submitting herewith four copies of a proposed Memorandum of Understanding between this Experiment Station and the Anthracite Institute.

Although there are other research projects that would yield much greater returns to the farmer than this one, you will note that this cooperative project will not involve a great deal of time by the engineers at the Oxford Station. Because of this fact, I have approved this Memorandum and I am submitting it to you for your consideration and approval. If the work done by the engineers of the Anthracite Institute is fruitful, it will require a sufficient amount of tobacco for testing on the Station farm during this 1951 season.

If you approve it, I would appreciate your signing four copies and sending it to Dr. Cummings along with a letter asking that he give it consideration.

I am going to be gone during the first half of next week and if at all possible, I would appreciate it if you could reach a decision before I return.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

Enclosure

Giles Copy

February 22, 1951

Mr. Paul A. Mulcey
Director of Laboratory
Anthracite Institute
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

I am attaching hereto a revised copy of our proposed Memorandum of Understanding. I am of this date submitting it to our administration for their consideration with the request that they approve it. I would judge that this will take approximately one week.

The changes that we have made in this Memorandum involve the objectives, reasons for undertaking the study and procedure. I have also filled in the section, "Support by the Department of Agricultural Engineering".

I trust that you find these changes to be satisfactory but if they are not, please do not hesitate to make any changes on your copy and return it to me.

As soon as I have a decision from our administration, I will let you know immediately.

Thanking you, I am

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

cc: O. A. Brown
N. W. Weldon
P. F. White

Gilbert Copy

MEMORANDUM OF UNDERSTANDING

Between

DEPARTMENT OF AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION
NORTH CAROLINA STATE COLLEGE, RALEIGH, N. C.

And

Anthracite Institute (Cooperator) — Wilkes-Barre, Pennsylvania (P.O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Objectives:

   (a) To develop a satisfactory closed flue system for converting farmer-owned open flue anthracite burners.

   (b) To develop a reasonable cost, efficient, and practical open flue anthracite system.

3. Reasons for Undertaking the Study:

   (a) At the end of the 1949 curing season there were about 1500 anthracite curing units in the bright leaf area. These units liberated the products of combustion from anthracite coal into the curing barn and are called open systems. About 1300 of these units were new anthracite stokers with metal combustion chambers centrally located within the barn and with 6" radial pipes for heat distribution. The remaining 200 units were bituminous stokers converted to anthracite burners with the same type of heat distribution system. Most of these 1500 units are in North Carolina in the areas around Lumberton, Whiteville, Dunn, Lillington, Goldsboro, Kinston, Wilson, and Nashville. The new open systems were sold to the farmers for about $350 each and the farmers were allowed from 2 to 3 years in which to complete payments. About 90 per cent of the open systems were converted in 1950 to some kind of a closed flue system with stacks. However, most of the converted systems are inefficient having an estimated efficiency of 30%. The efficiency of the present heat distribution systems for bituminous coal is about 44%. In addition, the con-

verted systems are hazardous in that the flue temperatures operate at about 700° F whereas safe flue temperatures are at 500° F or less. The farmers who purchased anthracite burners cannot afford to throw this equipment away ($500,000). This phase of the research is to develop a satisfactory system of converting these units to a closed system at nominal cost.

(b) Furnaces for burning anthracite fuel and releasing the products of combustion into the barn has promise of supplying one of the cheaper sources of heat for curing. The combustion efficiency of anthracite is about 60% while that of bituminous is 55%. The present cost of fuel per 1,000,000 B.T.U. is $0.69 for anthracite and $0.55 for bituminous. Next to wood, these are the cheapest fuels available to the farmer. The price difference between bituminous and anthracite is due to freight rates; anthracite costing about $3.00 per ton higher. It is expected that with a greater demand, this discrimination will disappear. Bituminous contains approximately 14,000 B.T.U. per ton or 1,000 more B.T.U. per ton than anthracite but with greater combustion efficiency and considering the same price rate, it seems that the two fuels will cost the farmer approximately the same per B.T.U. released directly into the barn or into a flue system. However, gases from the combustion of bituminous must be released into a fuel system and this incurs a minimum loss of 14%. Therefore, the overall efficiency of anthracite, provided the products can be released into the barn without harmful effects, would be greater. It is estimated that for each cure a farmer can save from $3 to $5 on fuel. No estimate is made of the increase of quality value as a result of better heat distribution, etc.

In addition to fuel economy, the anthracite furnace requires less attention. Bituminous cakes and forms clinkers and causes frequent attention to prevent excessive losses in the form of unburned coke in the ashes.

Because of the above advantages, the Anthracite Institute is continuing in its laboratories the study of the causes and effects of the combustion gases

on the tobacco leaf. If satisfactory equipment is developed, it is the objective of this cooperative research to test such units at the Oxford Tobacco Station.

4. Procedure: The program will be divided into two parts according to the two objectives:

(a) The Anthracite Institute, working with materials that are available in the bright leaf area, will develop in its laboratory an anthracite closed flue system for curing bright leaf tobacco. This work will include furnace design, flue systems (shape, size, and arrangement), heat liberation, and any measurements and tests that may be conducted in a barn without tobacco. When the Institute has completed its laboratory tests, the equipment developed by them, providing it is promising, will be transferred to the Oxford Tobacco Branch Station and installed in Barn No. 3 for further testing during the tobacco curing season. A controlled experiment will not be set up in 1950.

(b) The Anthracite Institute will continue in its laboratories the study of the causes and effects of the combustion gases on the tobacco leaf. If satisfactory equipment is developed, it will be moved to Oxford and installed in Barn No. 10 for testing with tobacco. A controlled experiment will not be set up in 1950.

Each group will furnish equipment for making any studies which it investigates.

5. Personnel:

The individuals assigned to the project by the Head of the Department of Agricultural Engineering, North Carolina Experiment Station, by the engineer acting in charge for the U. S. Department of Agriculture, Division of Farm Electrification, and the Subcommittee on Tobacco Curing assigned to the project by the Technical Advisory Committee, will be directly responsible for planning and executing this project.

The Subcommittee on Tobacco Curing for the Anthracite Institute comprises the following:

P. A. Mulcey	Director, Anthracite Institute Laboratory
A. A. Norrman	Special Consultant, D. L. & W. Coal Co.
W. N. Sims	Fuel Engineer, Phila. & Reading Coal & Iron Co.

The following individuals are at present associated with the project. Subject to the exigencies of the overall research program of the respective agencies, it is anticipated that these and/or other individuals will participate as required:

P. F. White	Anthracite Institute
J. W. Eckerd	Anthracite Institute

6. Support:

Each party agrees to place at the disposal of the personnel carrying out the project such material and equipment as may be agreed upon. While it is not intended to set a minimum or a limit upon such contributions, it is planned that the following will be made available at the start:

(a) By the Anthracite Institute

(1) Two anthracite stokers
(2) Materials for construction of two or more furnaces, including "solite" and cement blocks, fire brick refractory lining material, flues and sheet metal.
(3) One sheet metal furnace
(4) Apparatus and instruments (for use in Wilkes-Barre) for testing of various furnaces, including optical pyrometers, surface pyrometers, recording potentiometers, thermocouples and equipment for measuring velocities and drafts.

(b) By the Department of Agricultural Engineering

(1) Test barns No. 3 and 10 for preliminary runs provided developments are promising. Additional barns may be provided for controlled experiments.
(2) Tobacco produced on station farm as required to fill barns.
(3) Such instruments as pyrometers, hygrometers, and Potentiometers, etc., needed at Oxford Station for barn testing.

All equipment furnished by both parties will remain the property of each respective organization.

7. Reports:

The research worker, either State or cooperator, will furnish a copy of all data and reports to interested individuals, weekly or as soon as available. This shall be interpreted to mean that both parties by mutual agreement shall be free to distribute these reports on a confidential basis.

The North Carolina Agricultural Experiment Station shall furnish to the Cooperator a report each year on the investigations. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party and no publication or formal release will be made without the permission of both parties. In all publications containing the results of this cooperative work, the cooperation of the other parties shall be acknowledged. Provision may be made for with-

holding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

8. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

9. Each party agrees to assume full responsibility for bodily injury to its employees while working on this project and for damage to its property assigned to this project.

10. It is the policy of the Department of Agricultural Engineering of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is benefitted.

If items of commercial value are developed as a result of this cooperative project the Department of Agricultural Engineering has the right of initiating patent or copyright action within 8 months from the time that the existence of patent rights is first known. This applies to those phases of the program in which both parties are jointly engaged. In the event that patentable invention results from any part of the work in which only one party is engaged, that party shall retain its full rights thereto.

Inasmuch as the Cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale will be tendered the Cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development will pay for its development. The amount of royalty is to be agreed upon through conference. Should the Cooperator not desire a license, the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

All rights under this section shall be available to each member of the Anthracite Institute and to the Anthracite Equipment Corppration, its wholly owned affiliate.

11. This memorandum of understanding shall continue in effect to December 31, 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

Date	Anthracite Institute
Date	Head, Department of Agricultural Engineering
Date	In Charge, Tobacco Investigation
Date	Dir. N. C. Agricultural Experiment Station

North Carolina State College of Agriculture and Engineering
of the
University of North Carolina
Raleigh

SCHOOL OF
AGRICULTURE AND FORESTRY
RESEARCH EXTENSION
RESIDENT TEACHING

DEPARTMENT OF AGRICULTURAL ENGINEERING

P.O. Box 19
Oxford, North Carolina
February 5,1951

Professor G. W. Giles, Head
Agricultural Engineering Department
State College Station
Raleigh, North Carolina

Dear Professor Giles:

As per your request I have written the proposed substitute for page 1 in the Anthracite Institute contract. Item 4 on page 1 of the original would now become item 5.

Please criticise and instruct me as to the next move.

Very truly yours,

N. W. Weldon

N. W. Weldon
Research Assistant Professor
Agricultural Engineering

Enclosure
NWW:ef

1. Subject: Curing bright leaf tobacco with automatically fired anthracite.

2. Purpose: To develop the most efficient, effective, and practical anthracite system which can be installed in a curing barn at reasonable cost.

3. Reasons for Undertaking the Study:

At the end of the 1949 curing season there were about 1500 anthracite curing units in the bright leaf area. These units liberated the products of anthracite combustion into the curing barn among the tobacco leaves and are called open systems. About 1300 of these units were new anthracite stokers with metal combustion chambers centrally located within the barn and with 6" radial pipes for heat distribution. The remaining 200 units were bituminous stokers converted to anthracite burners with the same type of heat distribution system. Most of these units are in North Carolina in the areas around Lumberton, Whiteville, Dunn, Lillington, Goldsboro, Kinston, Wilson, and Nashville. The new open systems were sold to the farmers for about $350 each and the farmers were allowed from 2 to 3 years in which to complete payments. About 90 per cent of the open systems have been converted to some kind of a closed flue system with stacks. Most of the converted systems are inefficient and the fire hazard is very high. The conversions cost the farmers about $130 each. The farmers cannot afford to throw this equipment away ($500,000 worth) and buy new equipment. Heat from anthracite costs less than heat from oil or gas, and with proper equipment it might be cheaper to heat with anthracite than with bituminous coal.

4. Procedure: The program will be divided into two parts:

1. The Anthracite Institute, working with materials that are available in the bright leaf area, will develop in its laboratory

an anthracite closed flue system for curing bright leaf tobacco. This work will include furnace design, flue systems (shape, size, and arrangement), heat liberation, and any measurements and tests that may be conducted in a barn without tobacco. When the Institute has completed its laboratory tests, the equipment developed by them will be transferred to the Oxford Tobacco Branch Station and installed in Barn No. 3. for further testing ~~and~~ during the tobacco curing season. seasonal curing of tobacco.

2. ~~Because of the impressive economy and popular demand for curing tobacco with anthracite open flue systems,~~ The Anthracite Institute will continue in its laboratories the study of the causes and affects of the combustion gases on the tobacco leaf. If ~~new~~ satisfactory equipment is developed, it will be moved to Oxford and installed in Barn No. 10 for testing with tobacco. ~~The~~ A controlled experiment involving 2 barns may be ~~used~~ set up if ~~desirable~~ desirable

~~The Anthracite Institute will furnish equipment for making any studies which they instigate.~~

Each group will furnish equipment for making any studies which it investigates.

20000.
.05
1000.00

29.000.
.05
700.00

North Carolina State College of Agriculture and Engineering
of the
University of North Carolina
Raleigh

SCHOOL OF
AGRICULTURE AND FORESTRY
RESEARCH EXTENSION
RESIDENT TEACHING

DEPARTMENT OF AGRICULTURAL ENGINEERING

P.O. Box 19
Oxford, North Carolina
February 19,1951

Professor G. W. Giles, Head
Agricultural Engineering Department
State College Station
Raleigh, North Carolina

Dear Professor Giles:

Mr. White sent you a copy of his letter to me in which he gave the relative combustion efficiency of anthracite and bituminous coals.

We do not have a satisfactory heat distribution system for bituminous coals. The best estimate that I can make is that the present flue system is about 44 percent efficient.

The converted systems are about 30 percent efficient or about 2/3 as efficient as the present flue systems.

Very truly yours,

N. W. Weldon

N. W. Weldon
Research Assistant Professor
Agricultural Engineering

NWW:ef

May 23, 1951

Mr. Paul A. Mulcey
ANTHRACITE INSTITUTE
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

Your letter of May 10, 1951 has been received and it is satisfactory with this station to reword the paragraph in Section 7 as you have indicated in your letter.

We will be looking forward to receiving the corrected Memorandum with proper signatures.

Yours very truly,

G. W. Giles, Head
Department of Agricultural Engineering

GWG:au

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

May 10, 1951

Professor G. W. Giles, Head
Dept. of Agricultural Engineering
North Carolina State College of
Agriculture and Engineering
University of North Carolina
Raleigh, North Carolina

Dear Professor Giles:

After a discussion of your letter of May 4 with Dr. Johnson, I believe we have arrived at a simple phrasing for the second paragraph of section 7 which should meet with your requirements. This would read as follows:

> "The North Carolina Agricultural Experiment Station shall furnish to the cooperator a written report on the investigations covered by this agreement each year. Any phase of the work may be released as it is completed. Rights to publication or formal release of the data will be retained by each party except that no formal release will be made without the permission of the North Carolina Agricultural Experiment Station nor will formal release of the data be made without consultation with the cooperator. In publications containing the results of this cooperative work, the cooperation will be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement."

The paragraph now reads exactly as in the agreement which you sent us with the exception of the underlined sentences. This, I believe, complies with the limitations placed upon you. In other words, it leaves you free to publish the results, but at the same time gives us the right to publish statements or results, providing your approval is obtained first. In line with the ideas contained in the last two paragraphs of your letter of May 4, I have changed the word may to will in the last paragraph of section 10. This will then channel all requests to you through the Anthracite Institute and at the same time assure all of the Anthracite Institute members of full participation in the results of this cooperative undertaking.

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

Since this wording appears to fit in with the point of view expressed in your letters, I will change the copies and submit them for approval to the Technical Advisory Committee which meets tomorrow. If approved, these will then be signed and mailed to you.

Yours very truly,

Paul A. Mulcey

PAM:lc

May 4, 1951

Mr. Paul A. Mulcey
ANTHRACITE INSTITUTE
Wilkes-Barre, Pennsylvania

Dear Mr. Mulcey:

I wish to thank you for your letter of April 23, 1951 in which you raise questions in regard to the release of data and to making patent rights available to all members of the Anthracite Institute as covered in our proposed Memorandum of Agreement.

In regard to publication and release of data, would the following paragraph be satisfactory:

"The North Carolina Agricultural Experiment Station shall furnish to the cooperator a written report on the investigations covered by this agreement each year. Publication and release of the results of this study shall be by mutual agreement of the parties to this memorandum, but in case of disagreement as to release of data or method of publication, the North Carolina Agricultural Experiment Station shall have the right to publish any information obtained in the study after submitting to the cooperator a copy of the manuscript it intends to publish and after a period of six months has elapsed from the time of submission of the manuscript. During this time the cooperator shall have the opportunity to register its objections and make suggestions for revision of the manuscript or further postponement. If desired by the cooperator in such case of disagreement, the North Carolina Agricultural Experiment Station will take full responsibility for the conclusions reported. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement."

Where public funds are involved for carrying out research at an institution such as ours, it is impossible for us to enter into an agreement which would permit the withholding of data from publication. Occasionally agreement is made for withholding data for a limited time in the interest of the cooperator. To my knowledge, the only time when agreement not to release data is made is where the full cost of the research project is borne by the commercial interest. This would mean all costs including overhead in connection with the production, harvesting and marketing of tobacco as well as the salary of the engineers. The above paragraph will give the station the flexibility needed by a public research agency, and I trust that this will also be satisfactory to you. If it is, you may revise the page concerned.

Mr. Paul A. Mulcey
May 4, 1951

In regard to the last paragraph, Section 10, on patent rights, we felt that the wording should be as follows:

"Upon recommendation of the Anthracite Institute, the rights under this section may be extended to the several members of the Anthracite Institute and to the Anthracite Equipment Corporation, its wholly owned affiliate."

This will convey all the rights to the members of the Anthracite Institute upon recommendation. It will prevent members coming direct to us rather than through the Anthracite Institute, the cooperator on this particular project. It is not intended to prevent the extension of the rights and we do not feel that it does. However, if you still prefer the other wording, please change it and it will be satisfactory to us.

I hope I have made our thoughts clear and if we are still not in agreement, please let us hear from you again.

Yours very truly,

C. W. Giles, Head
Department of Agricultural Engineering

CWG:au

February 16, 1950

Mr. Raymond C. Johnson
Vice-President - Research
Anthracite Institute
Wilkes-Barre, Pa.

Dear Mr. Johnson:

In accordance with our promise of a few weeks ago I am attaching hereto three copies of a memorandum of understanding covering a proposed cooperative research project dealing with the effect of gases from the combustion of anthracite coal on the quality of tobacco.

This proposed memorandum of understanding follows pretty much along the line of a standard form that the Department of Agricultural Engineering is using with any cooperative research that they enter into with commercial interests. We would welcome any suggested changes that you would care to make in this memorandum. You will note that parts of section 4 and 5 are left blank and we would expect you to help fill these in. If it is the wish of your organization to contribute financial support to this project, we can advise you later whether this is to be paid to the North Carolina Experiment Station or an agency it may wish to designate. To develop this memorandum completely and satisfactory to all parties concerned, it may take an exchange of a few letters.

Inasmuch as the Head of the Department of Agronomy is also in charge of all tobacco investigation work, I did not provide an additional spot for his signature.

I trust that you find this proposal satisfactory but if there are any changes or suggestions, please do not hesitate to write me.

With best personal regards, I am

Yours very truly,

G. W. Giles, Head
Department Agricultural Engineering

GWG:oc

cc: Dr. W. E. Colwell

ANTHRACITE INSTITUTE
WILKES-BARRE, PA.
TELEPHONE: 2-4142

February 13, 1950

Dr. G. W. Giles, Head
Department Agricultural Engineering
North Carolina State College of
Agriculture and Engineering
University of North Carolina
Raleigh, North Carolina

Dear Dr. Giles:

I wish to thank you for sending us the papers of your department on crop drying. If you have any papers coming out in the future we would be very glad to receive them.

Kindest personal regards.

Very truly yours,

Raymond C. Johnson
Vice President - Research

RCJ:B

Bills (5 copies)

9 Copies

MEMORANDUM OF UNDERSTANDING
Between

DEPARTMENT OF AGRICULTURAL ENGINEERING, N. C. AGRICULTURAL EXPERIMENT STATION
NORTH CAROLINA STATE COLLEGE, RALEIGH, N. C.

and

Anthracite Institute	Wilkes-Barre, Pennsylvania
(Cooperator)	(P. O. Address)
(Cooperator)	(P. O. Address)

COVERING COOPERATIVE RESEARCH IN THE PRODUCTION, HARVESTING, CURING AND/OR GRADING OF TOBACCO.

1. Subject:

The effect of gases from the combustion of anthracite coal on the quality of tobacco.

2. Purpose:

To study the effects of certain environmental factors in the curing barn, particularly gases from the combustion of anthracite coal and their interactions on the quality of cured tobacco.

3. Procedure:

a. Attempts will be made to produce the anthracite-injury in all degrees of severity under controlled experimental conditions. Factorial experiments in which all combinations of factors under study are represented lend themselves to problems of this kind where multiple factors may be involved. For effective experimentation, factorial designs require a rather large number of experimental units. Since the aim of the experiment is to willfully damage the tobacco, the impracticability of large experimental units is emphasized, particularly since only a few pounds of cured tobacco will be required for the evaluation tests.

It is proposed therefore to construct sixteen curing chambers. Sixteen boxes are contemplated on the basis of the flexibility in experimental design that this number of testing chambers would permit. Thus, in any experiment, two factors at four levels or three factors at two levels in two replications or four factors at two levels or other combinations could be studied simultaneously.

b. Design, construct and make work one curing compartment in which temperature, water vapor pressure, and the composition of the gas medium can be closely regulated.

The cabinet will be provided with thermostatically and manually controlled electric heaters to provide heat, and a circulating fan and conditioning chamber where the composition of the circulating atmosphere will be regulated. A humidity standardizing chamber will control the water vapor pressure of the mixture of gases entering the cabinet. This device will be taken from developed humidity controls or developed with this project.

The cabinet will be provided with a balanced rack to facilitate the recording of weight lost during the curing process without disturbing the tobacco in the cabinet.

Windows and suitable lighting will be installed to observe the progress of the cure without opening the cabinet.

c. After the pilot cabinet has proven satisfactory the additional units will be constructed.

d. Evaluation of the cured products will include (1) observation for characteristic injury and (2) chemical analysis and histological examination as suggested by the results of the preliminary tests now in progress. In the laboratory analyses will be made for organic constituents of quality: sugars, nitrogen compounds, nicotine, volatile bases, organic acids, etc. Pending supportive evidence from the histological studies, pectic substances will receive special attention since these materials are reputedly attacked by sulfur dioxide. In addition, these experimental tobaccos will be examined for evidence of the poisoning of certain enzyme systems, probably the chlorophyllose system, as techniques can be adapted for this evaluation. Provision will be made for forced aging of these tobaccos if the preliminary aging now in progress indicates that the injury is accentuated during aging.

4. Personnel:

The investigations are under the general direction of the Heads of the Departments of Agricultural Engineering and Agronomy.

The following individuals of the North Carolina Agricultural Experiment Station will be directly responsible for the planning and execution of this project.

Name	Department	Relation to Project
J. A. Weybrew	Agronomy	Leader
H. B. Puckett	Agricultural Engineering and U.S.D.A.	Co-leader
D. B. Anderson	Botany	Co-leader
O. A. Brown	Agricultural Engineering and U.S.D.A.	Co-leader

The following individuals on the staff of the cooperator will be associated with the project as indicated.

Name	Title	Relation to Project

5. Support:

The cooperator agrees to place at the disposal of the North Carolina Agricultural Experiment Station _____ dollars for aid in carrying out this research. Payment is to be made as follows:

The cooperator agrees to place at the disposal of the North Carolina Agricultural Experiment Station the following items of equipment to aid in carrying out this research:

The following individuals on the staff of the cooperator will be associated with the project as indicated.

Name	Title	Relation to Project
1.		
2.		

5. Support:

The cooperator agrees to place at the disposal of the North Carolina Agricultural Experiment Station _____ dollars for aid in carrying out this research. Payment is to be made as follows:

The cooperator agrees to place at the disposal of the North Carolina Agricultural Experiment Station the following items of equipment to aid in carrying out this research:

The equipment listed above shall be disposed of as follows upon completion of the research work or upon termination of this agreement:

6. Reports:

The North Carolina Agricultural Experiment Station shall furnish to the cooperator or cooperators a report each year on the investigations. Rights to publication or formal release of the data will be retained by the North Carolina Agricultural Experiment Station and no publication or formal release will be made without its knowledge. In all publications containing the results of this cooperative work the cooperation of the other parties shall be acknowledged. Provision may be made for withholding publication for a limited period in the interests of the cooperator. The release of any secret or confidential information will be determined by mutual agreement.

7. The name of the North Carolina Agricultural Experiment Station or any of its staff or agencies of the United States Department of Agriculture and its staff are not to be used in any commercial advertisement relating to this work unless written permission is secured.

8. The cooperator agrees to assume full responsibility for bodily injury to its employees working on this project and for damage to its property assigned to this project.

9. It is the policy of the Department of Agricultural Engineering of the North Carolina Agricultural Experiment Station to control patents arising from research activities where public funds are involved. This is done so that public interest is benefitted.

If items of commercial value are developed as a result of this cooperative project the Department of Agricultural Engineering has the right of initiating patent or copyright action within 8 months from the time that the existance of patent rights is first known.

Inasmuch as the cooperator on this project has given financial and/or other support to this project, exclusive non-transferable license for manufacture and/or sale will be tendered the cooperator upon the completion of a legal contract with the North Carolina Agricultural Experiment Station or its designated agency. A small amount of royalty may be required in order that individual public members purchasing and thus benefitting from this development will pay for its development. The amount of royalty is to be agreed upon through conference. Should the cooperator not desire a license the North Carolina Agricultural Experiment Station reserves the right to tender either an exclusive or non-exclusive, non-transferable license to any other commercial interest.

10. This memorandum of understanding shall continue in effect to December 1951 unless terminated sooner at the wish of either party upon three months notice, or extended by mutual consent.

(Date)	(Cooperator)
(Date)	Head, Department of Agricultural Engineering North Carolina State College
(Date)	In Charge, Tobacco Investigation
(Date)	Director, N. C. Agricultural Experiment Station