December, 1972

Tennessee MAGAZINE

Dedicated to Better Living

PUZZLE CORNER

The Puzzle Corner for November apparently was exactly that for most of our readers. Fewer than 200 ventured an answer to the extent of mailing one in and, of that number, only two (2) came up with the correct answer.

The puzzle, which we admit was difficult, stated that nine boys and three girs agreed to share equally their pocket money. Every boy gave an equal sum to every girl, and every girl gave another equal sum to every boy. Every child then possessed exactly the same amount. The question: what was the smallest possible amount that each then possessed?

The answer: 18 cents. Every boy at the start possessed 12 cents and each gave 1 cent to every girl. Each girl had 36 cents before this transaction, so each now had 45 cents. Now each girl gave every boy 3 cents each, lowering each girl's total to 18 cents and raising each boy's total to that same amount — 18 cents.

The two people answering correctly were Tony Yates of Route One, Greenback, Tennessee 37742, a member of Ft. Loudoun Electric Co-op and Robert Reedy of 106 East Main Street, Mountain City, Tennessee, a member of Mountain Electric Co-op. With only two correct answers, this contest is declared a tie and each of the above will receive a $10 check from The Tennessee Magazine.

Here is the December Puzzle Corner:

If an army 40 miles long advances 40 miles while a dispatch rider gallops from the rear to the front, delivers a dispatch to the commanding general, and returns to the rear, how far has he to travel?

Send your replies, along with your name, address and the name of your electric cooperative to:

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THE TENNESSEE MAGAZINE
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Tennessee MAGAZINE

Official Publication of the

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CONTENTS

STAFF

John E. Stanford .... *Editor*
Don Murray .... *Adv. Mgr.*

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ON THE COVER

Our cover this month features the top contestants in the "Miss Tennessee Rural Electric" beauty contest. Shown left to right first alternate Pamela Neese (Miss Duck River), winner Jana Lee McDaniel (Miss Forked Deer), second alternate Nancy Jane Jones (Miss Gibson County).

Your

STATE ASSOCIATION
OF RURAL ELECTRIC CO-OPS

once again joins with your

LOCAL RURAL ELECTRIC COOPERATIVE

in wishing every member

A Very Merry Christmas

and a

Prosperous New Year

filled with

HEALTH, HAPPINESS AND
THE GOOD WAY OF LIFE

and a feeling of

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as taught and made possible by

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whose birth and life we reverently observe

at this time each year

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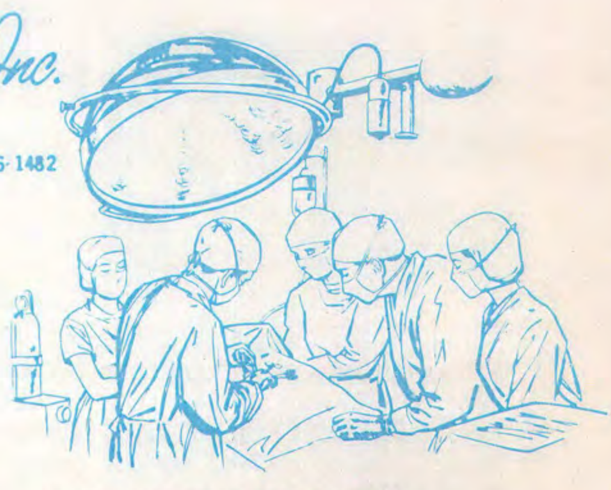

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CUT OUT ALONG DOTTED LINE AND MAIL

TECA's 31st Annual Meeting Theme:

"A PROUD PAST . . . A BRIGHT FUTURE"

By John Stanford

"A Proud Past . . . A Bright Future," the theme of the 31st Annual Meeting of the Tennessee Electric Cooperative Association, provided the more than 300 local cooperative Trustees, Managers, key employees and program friends attending the meeting an opportunity to take a brief backward and a longer forward look at the cooperative rural electrification program which has meant and progressively continues to mean so much to so many members in the rural and small town areas of our State and Nation. The meeting was held the latter part of October at the Hilton Airport Inn in Nashville.

The first morning General Session, presided over by TECA President James Milton, Manager of Gibson County Electric Membership Corporation, was devoted to his own report as President, the Executive Manager's report by J. C. Hundley, the Treasurer's report by Lester Hamm, Trustee of Pickwick Electric Co-op, and the Tennessee NRECA Director's report by John R. Dolinger, Manager of Cumberland Electric Membership Corporation.

The afternoon session, presided over by Powell Valley Electric Co-op Manager Ralph Miner, featured, in order, a Youth Panel and addresses by then U.S. Senate candidates Senator Howard Baker, Jr. and Congressman Ray Blanton. The Youth Panel, entitled "Cooperatives Involved With Youth," was moderated by Dr. George Foster, 4-H Club Specialist and Leader with the University of Tennessee Extension Service. Panel participants and their topics included George E. Moore, Secretary, Tennessee Association of F.F.A. who spoke on "Future Farmers of America and Electric Cooperatives;" Miss Pat Alexander, State Essay Winner representing Southwest Tennessee E.M.C., who spoke on the "The Washington Youth Tour," and Rufus Reese, Junior Board Member of Cumberland Electric Membership Corporation, who spoke on "The Junior Board Concept."

Following the afternoon session, an organization meeting of the Board of Trustees saw the re-election to previous office of President James C. Milton, Vice President Charles Balch (Manager, Appalachian Electric Co-op) and Secretary-Treasurer Lester Hamm. Other trustees elected or re-elected to the Board were Cumberland E.M.C. Manager John Dolinger, Middle Tennessee E.M.C. Trustee Thomas K. Hutchinson, Volunteer Electric Co-op Trustee Beecher E. Lawson and Meriwether Lewis Electric Co-op Trustee Walter S. Nunnelly.

As is traditional, the Annual Banquet evening centered on youth, first on the presentation of a $500 Scholarship Award from the Association to TECA State Essay Contest Winner Pat Alexander and then on seven lovely young ladies representing electric systems from throughout the state in the "Miss Tennessee Electric Cooperative" beauty contest.

Winner of the contest and the right to represent the Volunteer State in the "Miss National Rural Electrification" contest in Dallas, Texas next February was Jana Lee McDaniel of Friendship, Tennessee, who was a first-time representative of Forked Deer Electric Co-op in the State Contest. In addition to the expenses-paid trip to the National Contest, where she will compete for the top prize of a $2,500 scholarship, the pretty, personable, 5'-4" Miss McDaniel won $150 in cash, an engraved silver prize, a bouquet of roses and a sash in the State Contest.

Runner-up in the contest was "Miss Duck River E.M.C.," Pamela Neese of Shelbyville, Tennessee who received a $100 check from TECA plus an engraved silver prize and 1st Alternate sash. Third place, including an engraved silver prize and sash, went to "Miss Gibson County E.M.C.," Nancy Jane Jones of Tiptonville, Tennessee. The coveted "Miss Congeniality" award, voted by her competitors, went to "Miss Middle Tennessee E.M.C.," Debbie Hahn of Mt. Juliet, Tennessee,

Also competing and receiving silver gifts in the State Contest were "Miss Cumberland E.M.C.," Kathy Walker of Bumpus Mills; "Miss Holston Electric Co-op," Jayne Hawthorne of Surgoinsville; and "Miss Mountain Electric Co-op", Ann Bliss Hawkins of Mountain City.

At the first General Session of the second morning, presided over by Sequachee Valley Electric Cooperative Trustee Ralph Hale, Middle Tennessee Member Services Director Joe Sloan spoke on "Making Full Use of the Tennessee Magazine". Following was a Panel on "Planning For Cooperatives' Capital Needs" which was moderated by Charles S. Mayhew, Manager of Tri-County E.M.C. Panel participants and their subjects were H. N. Stroud, Assistant General Manager of T.V.A. — "Financial Needs to Meet Projected Growth"; Homer J. Tidwell, Jr., President of the Ashland City Bank and Trustee of Cumberland E.M.C. — "Corporate Structures and Financing Possibilities;" and Philip Costas, Borrowers' Operations Specialist of the Cooperatives Financing Coropration — "REC-CFC Financing Outlook."

In the Final Business Meeting,

presided over by TECA President James Milton, the report of the Resolutions Committee was made by Chairman Charles Barnett, Manager of Tennessee Valley Electric Cooperative. More than a dozen resolutions, including an amendment to one from the floor, were adopted by the voting delegates.

The Tennessee Electric Cooperative Association is a Statewide service organization comprised of and supported by all of the 22 Electric Cooperatives distributing electricity to more than 375,000 member families, businesses and other services in Tennessee.

U.S. Senator Howard Baker, Jr. addressed a large crowd on the first afternoon of the TECA Annual Meeting. At left is Powell Valley Electric Co-op Manager Ralph Miner, who presided over the session at which Senator Baker spoke.

U.S. Congressman Ray Blanton also addressed the first afternoon session of the TECA Annual Meeting.

These seven lovely young ladies from throughout the state competed for the title of "Miss Tennessee Electric Cooperative". Winner was Miss Jana Lee McDaniel, third from left.

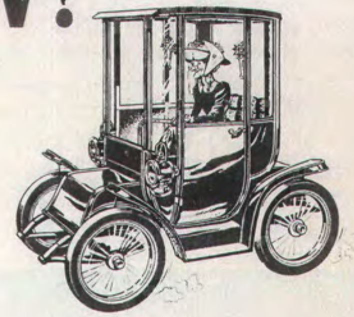
Dr. George Foster, 4-H Club Specialist and Leader at the University of Tennessee, introduces the three members of the Youth Panel. From left to right under sign are Cumberland E.M.C. Junior Board Member Rufus Reese, TECA State Essay Contest Winner Pat Alexander and FFA State Secretary George Moore.

TECA Executive Manager J.C. Hundley gives his report to delegates as the organization's President, J.C. Milton, Manager of Gibson County Electric Membership Corporation (seated at left) listens.

Tennessee's NRECA Director John Dolinger, Manager of Cumberland E.M.C., brings Annual Meeting delegates up to date on matters pertaining to rural electrification at the national level.

An interested guest of the TECA Annual Meeting was Bill Jenkins, the newly appointed and approved member of TVA's Board of Directors.

WHICH ELECTRIC VEHICLES ARE FEASIBLE NOW?



— *Every age has its own specific problems, the solving of which moves mankind forward.*

By Jim Griffin
Director of Member Services
Meriwether Lewis Electric Cooperative

A gigantic task of our nation today is the transporting of people and material. During the past decade, some progress was made to solve this problem with the electric vehicle. Only recently, the successful marketing of battery powered golf carts, fork lifts, and lawn and garden tractors has made this solution attractive to industry. Also encouraging is a few successful trial installations of mass transit systems.

These advantages of the electric vehicle has spurred accelerated research and development.

Zero pollutant emissions
Noiselessness
Low Cost operation
Fewer moving parts
Lower maintenance costs
Instant start
Beter control of speed and direction
Longer life
Safety of low voltage d-c power

BATTERY POWER

Earlier, industry felt that electric vehicle development must await a major battery breakthrough. Recently, however, industry has produced and marketed electric vehicles designed to do special jobs more economically than the internal combustion engine.

The lead-acid battery was the only economical battery in available supply, and could not take a vehicle far enough and fast enough on a single charge to replace such vehicles as the powerful, high speed family auto or cross-country bus.

These successful applications of battery powered vehicles, then, are special jobs that require only short-range, slow speeds, and intermittent use that allow adequate time for recharging. In Europe, battery exchange systems have been utilized successfully with commercial delivery trucks and busses in highly populated areas.

Much research is being conducted on mercury-cadmium, zinc-air and other batteries as well as the use of such metals as sodium and lithium in power cells. Of course a "big battery breakthrough" would make electric vehicles overwhelmingly superior to gasoline powered vehicles.

The low cost electric cars available today have a cruising speed of 30 mph and a range of 60 miles between charges. They sell for under $2000 and operate for about 2 cents per mile for battery charging and replacement.

FOR SALE

The low cost electric cars available today are mostly small fiber-glass bodies, with a range of 60 miles at 30 mph between charges. It's lead acid batteries weigh about 700 lbs., cost $300, and last about 20,000 miles. It has a state-of-charge gauge, motor-temperature gauge, accelerator and brakes. Turn on the switch, accelerate to top speed of 65 mph quickly and quietly. Plug it in a regular 120 volt outlet at home and it recharges over-night at a cost of about ½ cent per mile. As an urban car it makes a lot of sense.

The more expensive electric car has a more conventional body, a top speed of 90 mph and a range of 300-500 miles, and can be re-charged in 20 minutes. It has lead-cobalt batteries that last 50,000 miles and cost $700. Its 20 hp DC motor can develop 120 hp, accelerate from 0 - 40 mph in 10 seconds. It has an economical cruising speed of 55-60 mph. It can be quick-charged to 80% in 30 minutes, but ***not*** at home in a 120 volt outlet.

PAY LOAD

The multi-stop delivery truck offers much more potential for electric vehicles than the car. They travel at low town speeds, carry sizeable bulky loads and idle their engines about 85% of the time making deliveries and at traffic signals. During idling conditions, maintenance problems are aggravated and air pollution is greatest with the internal combustion engine. The average electric van manufactured today has a cruising speed of 40 mph and a range of 75 - 80 miles with a 2000 lb. payload.

The Post Office has its own testing program underway.

The most successful applications of battery powered vehicles today are special jobs that require only short range, slow speeds, and intermittent use to allow for recharging. This electric van will cruise at 40 mph and travel 75-80 miles with a 2000 lb. payload very economically.

In European metropolitan areas these electric delivery vehicles have been in use for several years. They use the inexpensive lead-acid battery packs that can be exchanged quickly and easily.

MASS TRANSIT

The traffic handling ability of one two-track railroad line is estimated equal to that of seven four-lane highways. Experts agree that the technology, equipment and economic advantages for electrifying mainline railroads in the US is at hand.

Success of the two-year old rapid-transit system that connects the Cleveland Airport and downtown Cleveland indicates how mass transit can be used effectively in this country. A Personal Rapid Transit System by Monocab, used effectively at the US International Transportation Exposition at Dulles International Airport, provided service as often as every 10 seconds.

This Personal Rapid Transit unit will accommodate 15 persons. The system will handle 1000 passengers every 20 minutes, at speeds of up to 30 mph.

An estimated 8 million people have ridden the world's first fully automated passenger shuttle system at Tampa International Airport during the first year. The rubber tired vehicles have traveled more than 380,000 miles since April 1971. "It's just like an automatic elevator".

Grumman holds a federal contract to build a research model of 300 mph tracked air cusion vehicle. Messerschmitt is building an electromagnetic train for West Germany that may attain 350 mph.

THE MARKET

The family car accounts for nearly half the air pollution in the US and considerably more than half in major cities. Traffic congestion is a top environmental problem as well as traffic noise.

In 1970, a survey by Opinion Research Corporation showed 50 million Americans interested in a short-range, battery-driven vehicle marketed under $2000. It's here!

Uncle John's Page

This page is reserved for the young folks. We will pay one dollar for each poem or drawing published. ALL WORK MUST BE ORIGINAL. Drawings should be in black, and drawn on white, unlined paper. Tell us your age, address, and Electric Co-op, and

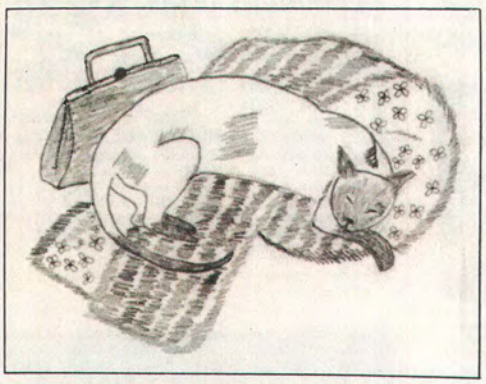
Send all items to:

UNCLE JOHN, The Tennessee Magazine
710 Spence Lane, Nashville 10, Tenn.

Jody Hart, Age 15
Box 13
Troy, Tennessee 38260
Gibson County Electric Cooperative

Pamela Davis, Age 14
Route 2, Box 93
Roan Mtn., Tennessee 37687
Mountain Electric Cooperative

Sandra Moore, Age 17
Box 45
Grandview, Tennessee 37337
Volunteer Electric Cooperative



Wilma Strickland, Age 16
Rt. 1
Bethel Springs, Tennessee 38315
Pickwick Electric Cooperative

Kathy Teal, Age 16
Route 2
Manchester, Tennessee 37355
Duck River Electric Membership Corp.

George Green
Rt. 3
Erin, Tennessee 37061
Meriwether Lewis Electric Cooperative

Winter Ventilation For Increased Profits

Good winter ventilation of livestock buildings can mean increased profits. Well ventilated livestock quarters reduce sickness and provide greater feed efficiency. The buildings and equipment last longer too because of less moisture in the air to cause rust and rot.

Good winter ventilation maintains a suitable temperature, removes excess moisture and provides sufficient fresh air for health. That's a big job when you consider that 1,000 hens release about 30 gallons of moisture daily and that one 1,400-pound Holstein cow gives off 3,500 British thermal units units (BTU) of heat an hour.

Ventilation needs vary with the type and age of the animals and with the seasons. Many authorities advise that winter ventilation should be about half that of summer. But it must be better planned and controlled.

Insulation is important. It keeps animal heat in the building so that incoming cold outdoor air will not need artificial heat. "We insulate to hold heat—so we can ventilate" is the way one researcher puts it. An accepted standard is an R factor of 10 for the walls and 15 for the ceiling. These can be achieved with two-inch blankets in the walls and four-inch batts or six to eight inches of loose insulation in the ceiling.

Air movement is also important, regardless of the temperature. That's why many farmers use a combination of time-switches and thermostats to control their fans. During moderate weather, the thermostats turn the fans on and off to maintain the desired temperature. In weather too cold to trip the thermostats, the time-switches will take over and operate the fans for a short time every few minutes to keep fresh air in the building.

One of the secrets of success in winter ventilation is placing the fans on the downwind side of the building so they do not blow against the prevailing winds. Another secret is selecting fans of the right size for the number of animals in the building. Sows with litters should have 8.5 to 9.5 cubic feet per minute (CFM) of air while a 200-pound hog needs 10 to 11 CFM, according to one authority. For poultry one cubic foot per minute per pound of bird is sufficient.

If the fan motors do not have built-in overload protection, proper fusing must be used. Totally enclosed motors are more costly than open-frame motors but their construction protects the starting mechanism and windings from corrosion by the moisture and fumes in the air. If maintenance is likely to be neglected, sealed ball bearing motors are worth their extra cost. Motors of one-half horsepower or larger should be operated on 230 volts.

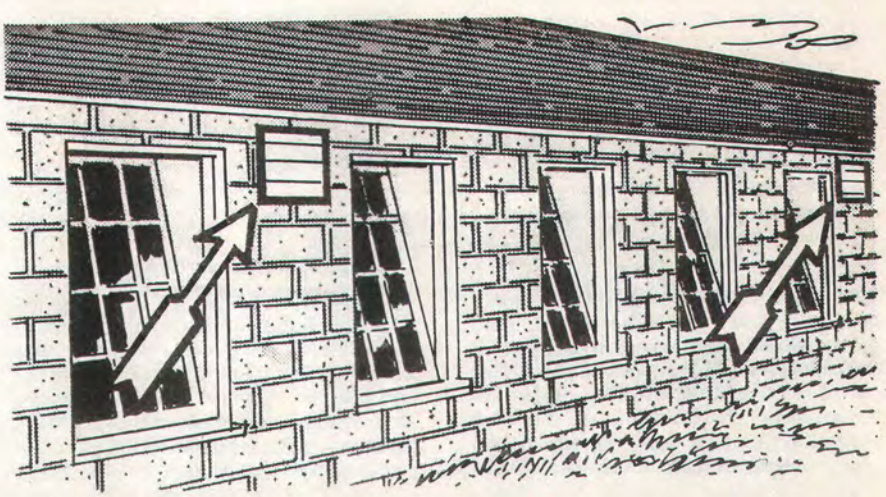
The fans that will be used for winter (including spring and fall) should be reversible for summer operation. They should be of good quality because they will be used throughout the year. If additional fans are installed for use only in summer, they need not be reversible and can be less expensive models since they will be used only a small part of the year. They should have close-fitting doors on the outside to seal their openings in winter.

An important step is providing air inlet space equal to the capacity of the fans as shown in the manufacturer's rating.

Some authorities recommend bringing outdoor air through the attic (if the building has one) to temper it with heat that has escaped through the ceiling. In this case, the louvered openings in the gables or under the eaves should be about $1\frac{1}{2}$ times the size of the opening from the attic into the space below.

Other ventilation experts prefer exhaust fans placed high in the walls near the ceiling with ducts extending to near the floor to draw out cool moist air in the winter. For summer use, the lower openings are sealed and another duct opening, at fan level, is opened and the fans reversed to blow outdoor air directly into the building.

With any ventilation system, the time spent in learning how to plan and install it correctly will pay dividends through the years in efficient operation and lower operating and maintenance costs.



Self-closing shutters are a must to prevent unwanted drafts when the fans are not running. Fans used only in summer should have winter covers that seal tightly.

Let your kitchen say Merry Christmas

Lemon Balls

2-1/2 cups sifted flour
1/2 teaspoon soda
1/2 teaspoon salt
2 1-ounce squares unsweetened chocolate
1 cup shortening
2-1/2 cups brown sugar
2 eggs
1/2 cup chopped nuts
1/2 cup flaked coconut

Sift together flour, soda, salt. Melt chocolate. Cream together shortening and sugar until fluffy. Add eggs, beat well. Stir in melted chocolate. Beat well. Add flour mixture to creamed mixture, mixing well. Stir in nuts and coconut. Drop by teaspoonfuls on greased baking sheets. Bake at 350° F. 12-15 minutes. Makes five dozen.

Sprinkle-Top Cookies

Cooky Base:
2 cups sifted flour
2 egg yolks
1/2 cup sugar
1/4 teaspoon salt
3/4 cup butter
Topping:
1/2 cup jam or jelly
2 egg whites
1/2 cup sugar
1/4 teaspoon cinnamon
1/2 cup slivered almonds

Sift flour into bowl. Make "well" in center, add egg yolks, sugar, salt, butter. Work together with hands until well blended. Press dough in square pan 9 x 9 x 1 3/4 inches. Bake 15-20 minutes at 400° F. Cool slightly, spread with thick jelly or jam. Beat egg whites until foamy. Gradually add sugar, cinnamon. Continue beating until egg whites stand in stiff peaks. Spread meringue over jelly or jam, sprinkle with almonds. Bake 8-10 minutes until meringue is brown. Cut into 1 1/2 inch squares. Makes 32.

Chocolate Coconut Crispies

1 cup soft butter
3/4 cup confectioners' sugar
3 teaspoons vanilla
3/4 teaspoon salt
1/2 cup uncooked oats
2 cups sifted flour
1/2 cup semi-sweet chocolate pieces
1/4 cup milk
Finely chopped walnuts or pecans
Shredded coconut
Chocolate sprinkles

Mix well the butter, sugar, vanilla. Stir in salt, oats, flour. With fingers, shape teaspoonfuls of dough into balls, crescents, triangles and bars. Bake on ungreased baking sheet 20-25 minutes at 325° F. or until golden around edges. Cool. Melt chocolate, add milk; blend until smooth. Drop cookies round-side-down in chocolate, then in nuts, coconut or sprinkles. Makes four dozen. (Watch baking time; easily overbaked.)

Golden Nuggets

1 cup butter
1/2 cup confectioners' sugar
1 teaspoon lemon extract
2 cups sifted flour
1/4 teaspoon salt
Lemon Butter Filling:
1 egg
Grated rind of 1 lemon
2/3 cup sugar
3 tablespoons lemon juice
1-1/2 tablespoons softened butter

Cream butter and sugar. Add rest of ingredients; mix well. Measure level teaspoonfuls of dough, round into ball and flatten slightly. Place about one inch apart on ungreased baking sheet. Bake 8-10 minutes at 400° F. Cool. Put together with a little Lemon Butter Filling. Roll in confectioners' sugar. Makes five dozen.

For filling, blend slightly beaten egg with other ingredients. Cook over low heat until thick, stirring constantly. Set aside to cool.

Almond Meringue Shortbreads

1 cup dried apricots, coarsely chopped
1/2 cup water
1 cup shortening (part butter)
1/2 cup brown sugar
1/2 cup sugar
1 egg
1/2 teaspoons almond flavoring
1 teaspoon vanilla
1-3/4 cups flour
1/2 teaspoon salt
2 teaspoons baking powder
1-1/2 cups flaked coconut
Toasted whole almonds

Cook apricots in water over low heat five to ten minutes. Do not drain. (Water should be absorbed.) Mix shortening and sugars until fluffy. Add egg, flavoring and cooled apricots. Mix flour, salt and baking powder; stir in. Chill dough several hours. Drop heaping teaspoonfuls of dough into coconut to coat. Place two inches apart on baking sheet and top with almonds. Bake at 350° F. 12-15 minutes. Makes six dozen.

Greek Sesame Seed Cookies

2/3 cup sesame seeds
1 cup soft butter
1-3/4 cups sugar
2 eggs
4 cups flour
2 teaspoons baking powder
1/2 teaspoon salt
1/4 cup water

Toast sesame seeds in electric skillet at 325° F. or in heavy skillet over medium heat, stirring constantly, until lightly browned. Remove from heat. Cream butter, sugar and eggs until fluffy. Mix in 1/3 cup seeds. Blend dry ingredients, add alternately with water to creamed mixture. Chill dough until stiff enough to roll. Heat oven to 350° F. Roll dough on lightly floured board into rectangle one-eighth inch thick. Cut dough into strips 2 1/2 x 3/4 inches. Press one entire top side of each strip into dish containing the remaining sesame seeds. Loop one end over at right angle to the other, making bow-knot effect. Bake 8-10 minutes. Makes about nine dozen cookies.

Sunshine Dream Bars

Cookie Base:
1 cup sifted all-purpose flour
1/3 cup sugar
2 teaspoons grated lemon rind
¼ cup butter
¼ cup (2 ounces) cream cheese (Reserve remainder of 8-ounce package for Lemon Cheese filling.)

Lemon Cheese Filling:
3/4 cup (6 ounces) cream cheese
1/3 cup sugar
2 eggs, unbeaten
1 teaspoon grated lemon rind
2 tablespoons lemon juice

Golden Nut Topping:
2 eggs
1 teaspoon vanilla
1 cup brown sugar, firmly packed
2 tablespoons flour
1 teaspoon baking powder
½ teaspoon salt
1 cup chopped walnuts

Prepare cookie base by combining flour, sugar and lemon rind in mixing bowl. Cut in butter and cream cheese until particles are fine. Press into bottom of well greased 13x9x2-inch pan. Bake at 350° for 10 to 12 minutes until light golden brown. Prepare Lemon Cheese Filling by blending cream cheese with sugar until smooth. Blend in eggs, lemon rind and lemon juice. Pour filling over baked cookie base then spoon on the Golden Nut Topping made by beating eggs with vanilla until foamy. Gradually add brown sugar and beat well. Blend in flour, baking powder and salt. Stir in 3/4 cup walnuts. Sprinkle topping with remaining nuts. Bake at 350° for 25 to 30 minutes. When cool, cut into bars with damp knife. If desired, sprinkle with confectioner's sugar before serving. Makes 3 dozen bars.

Double-Peanut Balls

2/3 cup shortening
1/3 cup brown sugar, firmly packed
2 eggs, separated
½ teaspoon almond extract
1 cup sifted all-purpose flour
½ teaspoon baking powder
½ cup smooth peanut butter
1½ cups chopped salted peanuts

Cream shortening and brown sugar. Add egg yolks and extract and beat until light and fluffy. Stir in flour sifted with baking powder. Shape in 24 balls and flatten slightly. (Chilling cookie dough for 30 minutes will make the dough easier to handle.) Put about 1 level teaspoon peanut butter in center of each ball and wrap dough around being sure edges are sealed. Roll each ball in slightly beaten egg whites, then in peanuts. Place on ungreased cookie sheet and bake at 350° for 12 to 15 minutes. Makes 2 dozen balls.

Applebrosia Brownies

½ cup shortening
2 squares unsweetened chocolate
1 cup sugar
½ teaspoon vanilla
2 eggs, beaten
1 cup sifted all-purpose flour
1 teaspoon baking powder
½ teaspoon salt
1 teaspoon cinnamon
½ teaspoon mace
1½ cups finely grated apple
½ cup chopped walnuts
½ cup chopped dates

Melt shortening and chocolate together; beat in sugar and vanilla. Add eggs. Sift together flour, baking powder, cinnamon and mace; mix into first mixture. Stir in apple, nuts and dates. Spread in greased 9-inch square pan. Bake at 350° for 30 to 35 minutes. Cut while warm into squares. Makes 2 dozen brownies.

Spiced Coconut Fingers

1/3 cup butter, melted
1 teaspoon pumpkin pie spice
3/4 cup brown sugar
1 egg
1 teaspoon vanilla
2/3 cup sifted all-purpose flour
1 teaspoon baking powder
½ teaspoon salt
3/4 cup shredded coconut

Blend pumpkin pie spice into butter, add sugar and mix well. Beat in egg and vanilla. Sift together flour, baking powder and salt and blend into first mixture. Stir in coconut. Spread in greased, lightly floured 8-inch square pan. Bake at 350° for 30 minutes. Cool 10 minutes before cutting into 3/4-inch wide fingers. Store in tightly closed container. Makes 30 fingers.

Lemon Crunches

1 cup shortening
2 cups sugar
2 eggs, well beaten
1 teaspoon lemon flavoring
3½ cups sifted all-purpose flour
½ teaspoon salt
2 teaspoons baking powder
1 cup finely crushed lemon drops

Cream shortening and sugar. Add eggs and flavoring. Blend thoroughly. Sift dry ingredients together. Add to first mixture. Blend thoroughly. Add lemon drops in small quantities, mixing thoroughly. Form in 2½-inch rolls. Wrap in wax paper. Chill at least 12 hours. Cut in 1/8-inch slices. Bake at 350° for 10 to 12 minutes. Makes 10 dozen.

Island Ginger Bars
(Spicy 'n chewy!)

1 cup brown sugar, firmly packed
1 egg, unbeaten
2 tablespoons butter
¼ cup molasses
1 teaspoon vanilla
1 cup sifted all-purpose flour
½ teaspoon soda
½ teaspoon salt
½ teaspoon cinnamon
½ teaspoon ginger
¼ teaspoon cloves
¼ cup milk
1 cup nuts, coarsely chopped

Mix together sugar, egg, butter, molasses and vanilla. Sift flour with soda, salt and spices; add alternately with milk. Mix well. Add nuts. Pour into greased 9-inch square pan. Bake at 350° for 30-35 minutes. Cool in pan, then cut. Makes 2 dozen bars.

Alpine Nuggets

Cookie:
1½ cups sifted all-purpose flour
½ teaspoon salt
½ teaspoon soda
1 cup brown sugar
3/4 cup shortening
2 eggs
1/3 cup milk
1 teaspoon vanilla
2 squares unsweetened chocolate, melted
2 cups quick oats

Glaze:
1 cup confectioners' sugar
2/3 cup maple syrup
Nutmeats

Sift together flour, salt and soda. Cream brown sugar and shortening; add eggs, milk, vanilla and melted chocolate. Add flour mixture, then oats and blend well. Drop by the teaspoonful on ungreased cookie sheet. Bake at 350° for 12 to 15 minutes. When cool, glaze. Make glaze by combining confectioners' sugar and maple syrup. Boil 2 minutes. Remove from heat and stir until glaze thickens. Glaze cookies and decorate with pecan halves.

Timely Topics

A CALF A YEAR IS DAIRYMAN'S GOAL

A profitable goal for dairymen is to have each cow produce a calf every 12 months, according to a University of Tennessee dairy specialist.

"The latest DHIA summary shows that the average calving interval is 14 months, but there are some things you can do to shorten this interval to a year," says William M. Miller, associate professor with the UT Agricultural Extension Service.

He suggests that dairymen breed all healthy cows the first time at or near 50 days after calving. This will usually be the second heat period. You should wait until 90 days for cows that had calving troubles before breeding again.

Check cows for heat signs regularly and often, Miller says. A good time to do this is late at night, just before you go to bed. At this time the cows are usually relaxed, except those in heat. They can be spotted easier than when you're milking or feeding.

Miller stresses that complete breeding, calving and heat records on each cow are necessary.

Finally, work closer with your veterinarian on problem cows, getting them treated earlier so they will have a better chance of settling sooner.

CORN IS STILL VERY IMPORTANT

Corn is still an important crop in Tennessee even though production has dropped to about 660,000 acres in 1972.

About 120,000 acres will be harvested for silage and 540,000 acres harvested for grain, explains a UT Extension forage specialist.

The value of the 1972 corn crop is estimated at $50 million, says Joe Burns, University of Tennessee associate professor. The estimated total grain production of 30 million bushels is worth $37.5 million at $1.25 per bushel. With a silage production of 1.25 million tons at $10 per ton, it has a value of 12.5 million dollars.

Many industries other than agriculture share in the production of corn. The fertilizer and lime industry, the seed corn, herbicide, fuel and farm machinery industries sell about 20 to 25 million dollars worth of products to farmers.

Most of the corn grown for grain and silage in Tennessee is fed on the farm. Therefore, the total cash sale of corn in Tennessee is relatively small. Cash receipts from corn in Tennessee have been 12 to 14 million dollars for the last few years, concludes Burns.

USE SOIL SURVEY INFORMATION TO SELECT HOME SITE

What do you know about the soil you live on, or that you intend to buy and build on?

"Tennessee soils vary greatly in their desirability as home sites," points out George J. Buntley, associate professor of Plant and Soil Science, University of Tennessee Agricultural Extension Service.

Homes built on problem soils can be expensive to keep up, worrysome to live in, and extremely difficult to sell, he explains. Include learning about the soil in your plans to build or buy that dream house; it could keep your dreams from turning into a nightmare.

"Soil survey maps and assistance in using them are available in Extension offices in those counties where soil surveys have been completed," says Buntley. "These surveys can provide you with information which can help you avoid problems before they happen."

Soils on the flood-plains of streams are high-risk home construction sites, says the soil scientist. Flood damage to homes on flood-plain soils amounts to millions of dollars every year.

If you plan to have a basement, learn about the drainage characteristics of the soil. Do not expect a dry basement if the watertable rises above the level of the basement floor. Flat, wet soils with gray-colored subsoils should be avoided for basement construction.

BEEF COWS NEED CARE IN WINTER

Nutritional needs of a beef cow vary considerably before and after calving, says a University of Tennessee animal husbandman.

"The normal winter feeding period for Tennessee beef cow herds is between December 1 and April 1," explains Fred C. Powell, assistant professor with the UT Agricultural Extension Service. "The bulk of a calf crop is dropped during the last two months of this period. Many cow herd owners provide for an average supply of supplemental feed that consists of mostly forage with little thought given to brood cow nutrition needs before and after calving."

Before calving the requirement is for body maintenance, says Powell. Based on a 1000 pound cow, this requirement can be met with low quality or grass hay fed at the rate of 18 pounds per day. Silage fed at the rate of 40 to 45 pounds per day plus one-half pound of protein supplement provides a similar level of nutrition.

After calving, the beef cow nutritional needs are increased considerably. The nutrition needs now include milk production for the suckling calf and body maintenance. The cow now needs about 50 percent more feed or 27 pounds of hay and the ration should be of higher quality, says Powell. Mixed grass-legume hay or a combination of two-thirds grass hay and one-third legume hay will generally meet these needs. Silage fed at the rate of 65-70 pounds per day plus one and one-fourth pounds of protein supplement will also meet the requirements.

Meeting the basic nutritional needs of the beef cow during winter and early spring can help increase profits by having a heavier calf to sell this year and an earlier and more uniform calf crop next year, he concludes.

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POWER, ENVIRONMENT, AND YOUR POCKETBOOK

By A. J. Wagner
Chairman of the Board
Tennessee Valley Authority

Over the past several years we have seen public concern over the quality of our physical environment awaken and grow. It was high time that it should.

We have seen that concern expressed in many ways. Sometimes it has been guided by thoughtful analysis and deliberate action. At other times it has been fed by little more than emotion and fear. But always, I believe, the concern has been genuine.

There can be no doubt that corrective action is essential. The problem is to establish and maintain some kind of balance as we make the corrections. Just how much improvement is really needed and how do we get it? Where shall we proceed first?

I want to make it clear that I believe we must take whatever steps are necessary to insure that our physical environment is safe and healthful. And we must accept and pay the costs that go with it.

At the same time it is already clear that the costs will be considerable and that we face them on almost every front of human activity — from automobiles to airplanes, from manufacturing to sewage disposal, from agriculture to power generation. With so many demands it is obvious, I believe, that we must take costs into account whether we want to or not as we select our priorities and as we determine the degree of cleanup needed in each instance. Where health and safety are clearly endangered, there can be no compromise. But an environmental improvement which, for example, involves only aesthetics, particularly if it is extremely expensive, may have to accept a lower priority. Otherwise, there simply will not be enough resources to do the vitally essential jobs.

One of the principal areas of current environmental concern is related to the generation and use of electric energy. In the TVA system we have been doing something about these concerns for many years. We began installing electrostatic precipitators at our coal-burning plants in 1959, to reduce fly ash problems. We have worked for strip mine reclamation since the late 1940's. We completed our first pilot plant work on SO_2 removal from stack gases in 1955. And we have been monitoring air and water quality along with other environmental features in the vicinities of our major plants for many years.

But we must do even more. With our system now at 20 million kilowatts and demand still about doubling every 10 years, the problems take on proportions of an entirely new magnitude. And so, I want to put some dimensions on the possible costs of meeting varying environmental tests in TVA's power system. Admittedly they are very rough approximations, particularly in some instances where the technology to do the job is not yet developed. But they indicate the probable range of costs and hope they will be helpful to you as we proceed to solve these environmental problems; because the public that is demanding environmental improvement is the same public which, through its electric bills and otherwise, will pay for it. And it seems important to me that consumers should know the price tag on the things they ask for.

STRIP MINING

Let me turn first to the environmental costs related to mining the coal for our coal-burning plants. TVA has always maintained that surface (or strip) mines producing coal should be reclaimed. Since 1965 the cost of TVA's reclamation requirements has, of course, been reflected in the price we pay for coal and must charge for electricity. Considering that our newest requirements for reclamation will add further to the costs, I should think $10 million per year is a reasonable estimate for the cost of what we would consider to be responsible reclamation. If some of the greater refinements in reclamation that have been proposed should be required, this figure for reclamation could go to perhaps $30 million per year. Or if, as some strongly urge, strip mining should be banned entirely, we believe added costs of obtaining the coal from deep mines with necessary additional transportation would add at least $100 million to present annual coal costs. In addition, we estimate that improved safety requirements in underground mining will run about $15 million annually, and could go to two or three times that high.

The range, then, of added power costs to solve the problem of strip mining will vary from a low figure of about $10 million to a maximum of perhaps $100 million per year, depending on the nature of the solution ultimately required. At the same time it must

The potential of careful strip mine reclamation is illustrated by these Morgan County, Tenn., scenes of an orphan strip mine reclaimed as a demonstration by TVA. The photographer visited the site late in fiscal year 1971, eight years after the first picture was taken of the abandoned mine.

be recognized that if strip mining should be banned without a considerable phasing-out period, other fuel sources simply could not be developed soon enough to fill the gap. Power and industrial shutdowns of the most serious proportions would certainly result. The economic consequences would be incalculable.

FLY ASH REMOVAL

Turning from the mining of coal to the burning of coal and its environmental effects, we have a complex interlacing of chemical and engineering factors. Standards for coping with them under Federal and state laws are still in the process of development.

The situation with respect to standards on the removal of fly ash — technically, "particulate material" — is a good example of this evolving process. Standards adopted in 1966 for Federal installations called for the removal of all except 0.2 to 0.3 pound of fly ash per million Btu. TVA about that time embarked on a program of upgrading electrostatic fly ash collection equipment at its coal-burning plants. It is designed to remove 99 percent of the fly ash from the stack gases. It has been a lengthy program, spanning eight years by the time it is completed in 1975. It is necessary to take a generating unit out of service when this new equipment is installed. Careful scheduling is therefore required in order to have enough generating capacity on the line at all times. We have 63 generating units at our coal-burning plants.

But now, six years after these standards were set for Federal installations, the individual states acting under the Federal Clean

Workmen are shown installing an electrostatic precipitator for fly ash control at TVA's Colbert Steam Plant in North Alabama. The agency is engaged in a program to upgrade electrostatic fly ash collection equipment at its steam plants.

Air Act are establishing their own criteria. In Kentucky, Tennessee, and Alabama where TVA steam plants are located, these criteria are more strict than the Federal standards of 1966. They require removal of all but 0.1 to 0.15 pound of fly ash per million Btu. These state standards can be met by TVA. But at some plants it will require more than 99 percent removal system we are presently building. For installations not yet made, we would have to redesign at higher cost. But for units already installed, the problem is more complex. In some cases we may be able to meet the higher standards by improving the efficiency of the existing equipment. In other cases, it could be done only by tearing out what is there now — some of it installed only recently — and putting in new redesigned equipment. Thus by moving quickly to meet Federal standards six years ago, TVA has been, in effect, penalized as a result of changing standards.

The cost aspects in this situation are rather surprising. The upgrading program to give us equipment at all plants designed to remove 99 percent of the fly ash will cost about $120 million.

(Continued on page 20)

Heated Water Discharges From Steam Plants May Become Useful Resource

By Harold L. Falkenberry,
Power Research and
Development Branch,
Tennessee Valley Authority

Some of the most popular spots for fishing in the Tennessee Valley region are the condenser water discharge basins at TVA steam-electric generating plants. This is because the condenser discharge water is warm, and warm water attracts fish, especially in the fall and winter months.

On the other hand, if the temperature effect on receiving streams is too great, there is a possibility of harmful effects on fish and other aquatic organisms. This is where the concern about "thermal pollution" arises, particularly as still larger plants are being built to keep up with the growing needs for more electricity.

What causes the water to become warm in the first place? Power plants that generate electricity from steam use a flow of cooling water through the plant's condensers to change the spent steam from the turbines back into water for recycle to the plant's boilers. In the process, the cooling water that flows through the condenser picks up heat and takes it outside the plant where it must be dissipated.

If an abundance of cooling water is available from a river or lake, it is pumped through the condensers and discharged at a point downstream, warmer than when it entered the plant. At plants where this method is not adequate, cooling towers or other auxiliary cooling methods can be used.

The heat that water picks up in the condensers must eventually be released to the environment by some method. There is a need for research to determine what the temperature effects are on aquatic organisms in the water to ensure their protection. There is also a need for research to determine if this otherwise wasted heat by-product from power generation can be converted into a useful resource. TVA is taking action in both of these areas.

One of the research projects holds promise of answering many of the questions being asked about temperature effects on the aquatic environment. As it now stands, to determine safe stream temperatures and temperature increases, subjective judgments must be made. These criteria may overestimate or underestimate the degree of protection needed by aquatic life. Error in either direction would be costly.

The proposed research project is the Browns Ferry Biothermal Research Facility that TVA will undertake cooperatively with the Environmental Protection Agency. The purpose of the facility is to objectively determine the effect of changes in annual temperature regimes on warm water use.

Twelve experimental channels, each 14 feet wide and 360 feet long with depths varying from 1 to 4 feet, will be constructed at the Browns Ferry Nuclear Plant in North Alabama. Three of the channels will serve as biological controls with unheated reservoir water passing through them continuously to provide a near natural habitat. The other nine channels will have heated water of varying temperatures flowing through them. The channels will be stocked with several different species of important sport and commercial fish over a period of years.

The experiments, carefully planned to check differences and effects, should go far in providing basic, objective information that is needed.

Several schemes have been advanced for using heated water discharges beneficially, and TVA has many of them under investigation or in the planning stage.

Channel catfish, one of our southern favorites, is gaining acceptance all across the Nation. And so, ways to grow them bigger and faster are being investigated.

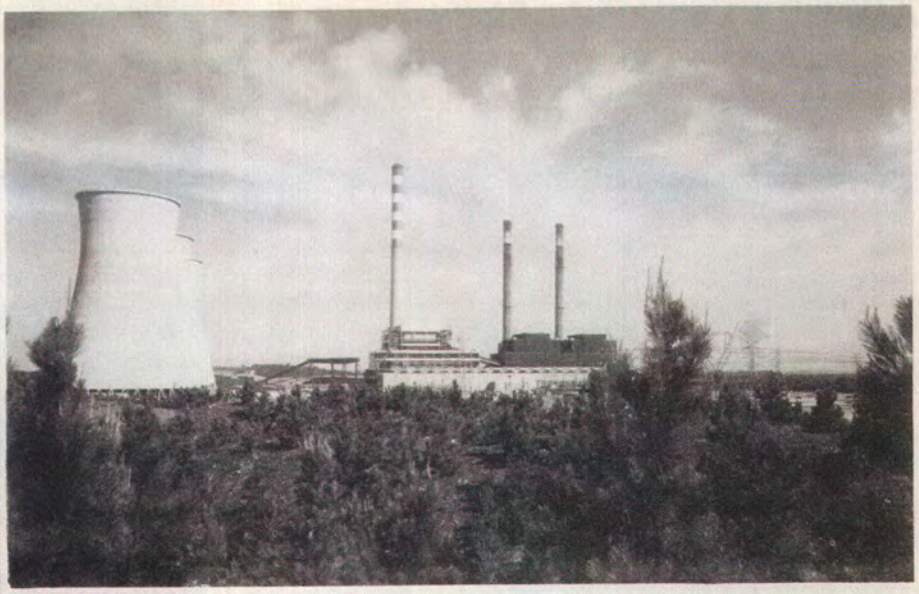
TVA's Office of Power entered into a cooperative agreement with a predecessor organization to Cal-Maine Foods, Inc., to evaluate the feasibility of raceway production of catfish in heated water discharges at the Gallatin Steam Plant. This early effort demonstrated that growth rates of catfish are greatly enhanced in heated water. Under the terms of a subsequent agreement with Cal-Maine, a TVA multidisciplinary team is cooperating with Cal-Maine in a study of the engineering, economic, and biological problems associated with the large-scale production of channel catfish to determine if heated water discharges from power plants can be used in the commercial production of catfish.

To test additional ways of using waste heat beneficially, TVA has set aside 180 acres of land at Browns Ferry. The initial effort will be in developing greenhouse technology for the production of high-value crops using warm water not only for heating but also for cooling.

Construction has begun on a pilot-scale greenhouse at Muscle Shoals, the site of TVA's National Fertilizer Development Center. Later, a demonstration scale greenhouse is planned for Browns Ferry. The pilot project will use the latest research information developed by Oak Ridge National Laboratories, and it is set to be in operation around the first of the year.

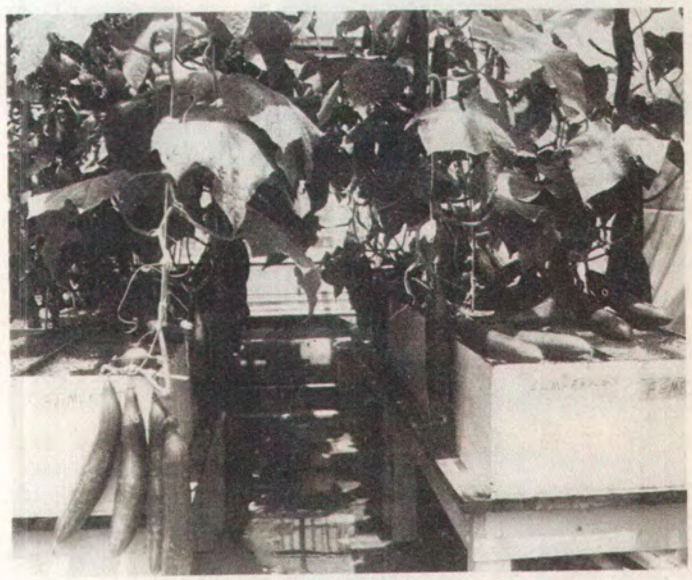
The warm water also can be used in field production of crops by circulating the water through the soil in an underground network of pipes that will provide heating as well as irrigation. Testing of this technique is planned also at the Browns Ferry plant.

The concept of using a steam power plant's waste heat in agriculture and aquaculture is not new, but environmental ncern today gives it added impetus. nd there appears to be a significant potential for changing waste heat from a liability into an asset — a usable energy for the production of human food and fiber which could have a major impact on total resource development.

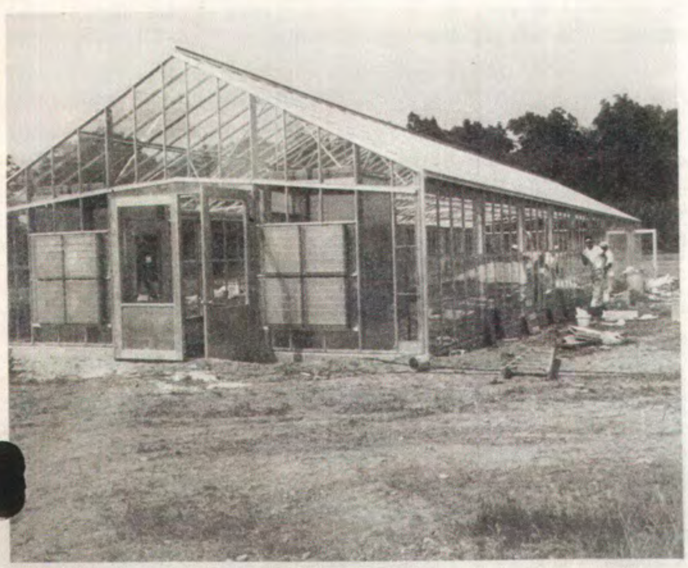


At TVA's Paradise Steam Plant in Kentucky, three cooling towers (left) prevent excessive heat discharges to the Green River. The concrete shells, more than 400 feet high, act as "chimneys" to pull cooling air upward through the tower.

TVA's Engineering Laboratory, this model of a 5-mile-long stretch Wheeler Lake reproduces lake water temperatures resulting from operation of Browns Ferry Nuclear Plant. At center is an underwater diffuser pipe simulating the discharge facility for warm water from the plant's condensers. Four hundred thermistors are suspended in the water and linked to a computer to measure and record water temperatures resulting from various combinations of flow, temperature, and plant operation.



In the future, warmwater discharges from power plant condensers may be used in large-scale greenhouse production of high-value crops such as these premium cucumbers. These were grown by TVA agricultural specialists in preliminary experiments at Muscle Shoals, Alabama.



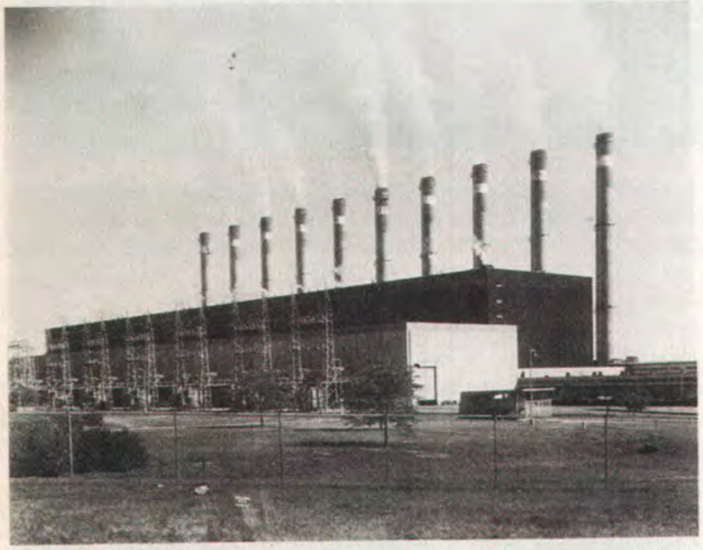
This new greenhouse at TVA's National Fertilizer Development Center will be used to simulate the use of power plant warmwater discharges in greenhouse temperature control. If experiments look promising, they will be expanded in larger facilities at Browns Ferry Nuclear Plant.

POWER-ENVIRONMENT

(Continued from page 17)

But when you try to step up the efficiency of precipitators beyond 99 percent, your costs skyrocket. To design and build equipment of 99.5 percent efficiency would cost an additional 50 percent. To go to 99.8 percent efficiency would double the cost. These figures relate to new equipment for a new plant. To go back and remodel old equipment at existing plants to achieve these only slightly greater efficiencies, the cost would not merely double but would triple and quadruple.

To reduce these figures to annual costs, the removal system we are now building will cost about $15 million annually for fixed and operating charges. To go to the higher standards I mentioned would increase this figure to perhaps $35 million.



The results of more efficient air quality control equipment being installed by TVA coal-fired power plants are evident in this view of the ten stacks at Shawnee Steam Plant in Kentucky. At the time this photo was taken, new high-efficiency ash collectors were in operation on four stacks, while conspicuous smoke plumes continued from the six stacks where these installations had not yet been completed.

SULFUR DIOXIDE PROBLEMS

Another air quality problem presented by our coal-burning plants is the sulfur dioxide (SO_2) in stack gases. This is a pollutant which, in sufficient concentrations at ground level, can adversely affect plant life and human health. Clearly, controls must be provided to insure that safe levels are not exceeded.

Here the problem is much more difficult than with fly ash removal. The plain fact is that technology is not yet available for removing SO_2 from stack gases at large power plants. Research is well advanced and TVA is deeply involved in it. But no one yet has successfully operated removal equipment in continuous performance on a large coal-burning generating unit. The electric industry, including TVA, has thus far relied on the use of very high stacks to disperse the gases high into the atmosphere and effectively limit ground level concentrations. Resulting levels of SO_2 at the ground level — in the air that we breathe — can be kept safe by this method, supplemented by the use of low-sulfur coal and other operational controls during critical weather situations.

The air at ground level, where we live and breathe, is called the "ambient air." And the air quality standards set to control it are called "ambient standards." It is important to note that these are

One method for controlling sulfur dioxide emissions from coal-burning power plants using powdered limestone and gas-scrubbing equipment has been installed at Shawnee Steam Plant to help find answers to technical problems not yet solved. TVA is carrying out the experiment in cooperation with the Environmental Protection Agency and the Bechtel Corporation.

the standards that relate to our health and safety. They must be met (assuming, of course, that they are realistically set). And we can meet them in our TVA system by the methods I have mentioned at an annual cost of at least $30 million.

But in addition to the ambient standards, "emission standards" are also being set. These are standards to control the amount of SO_2 that comes out of the stacks, regardless of what happens to it or how it affects ground level concentrations. To meet some currently proposed emission standards at our existing plants will be tremendously expensive if it can be accomplished at all.

One alternative would be to use low-sulfur fuel. But adequate supplies of low-sulfur coal or other fuels are simply not available within reach of our system at any tolerable cost. To shift to low-sulfur coal from the West, for example, would add an estimated $300 million to our annual costs.

We are presently designing and will install a $35 million SO_2 removal experimental plant on a generator at Widows Creek. If it, or research under way by others, is successful, this would appear to be one solution for our system. But it would take even longer to install in all units than the eight years needed for electrostatic precipitators. And the installation cost would be between $1 and $1½ billion. The annual costs, including operation and maintenance, would be about $200 million. A tax on sulfur or SO_2 has been proposed. If a tax of 10 cents a ton were imposed, it could add about $235 million to our present annual costs.

DISPOSING OF WASTE HEAT

Another environmental problem common to both coal-fired and nuclear plants is disposing of the waste heat. Except at our Paradise plant, where cooling towers have been installed, we have handled this by simply returning the warmed condenser cooling water to the lake or river. There have been no harmful results. But legislation and regulations now either in effect or under consideration would prevent this in the future.

While some of the proposals seem to us extreme and not essential to protect the quality of our waters, it is nevertheless clear that growing demands for electricity will require some method for heat dissipation for future plants other than discharge into our rivers and lakes.

We believe that the system we had designed for our Browns Ferry plant would have responsibly protected the water quality in Wheeler Reservoir. Nevertheless, standards are being considered by the State of Alabama which our plan would not meet. Accordingly, to insure against the very costly delays that might result if our system did not meet these standards, we have decided to add cooling towers at a cost of more than $36 million. We believe that, for our existing system and plants now under construction, adequate protection from damage due to waste heat discharges can be accomplished for an estimated cost of about $5 million annually.

If, however, it should be necessary to install cooling towers at all of our plants, the installation cost would be about $320 million and the annual costs about $50 million.

LICENSING PROBLEMS

There is yet another cost factor introduced by the necessity to meet environmental requirements that is not readily visible although it is very real. That is the cost of delays due to licensing problems, changes in standards and other requirements and, in some instances, lawsuits. A private utility executive told me not long ago that it was costing his company $1½ million per week because a lawsuit has prevented their bringing a large nuclear plant into commercial service.

In our system, we now need to add about 1½ million kilowatts of new capacity each year. Each year's delay for that much capacity costs about $55-65 million. It is already clear that delays of at least a year and possibly two years are inevitable in the near term future.

UP TO $830 MILLION PER YEAR

In summary, the total estimated costs per year for the environmental control programs I have outlined range from about $75 million to a possible maximum of $830 million per year, excluding the cost of transmission line undergrounding.

The $75 million figure includes actions or arrangements that are, for the most part, already included in our operations and immediate plans. Here let me emphasize that this "minimum cost" should not be interpreted as the cost to accomplish a "minimum" job — that is, the cost of just scraping by with superficial environmental control. Rather, it represents our current thinking concerning the minimum cost of doing a responsible job of meeting environmental needs.

The larger total reflects added control measures either already required by state or Federal regulations or those being actively proposed and considered.

To put these figures in perspective, TVA's power revenues last year were just about $600 million. In other words, if it should become necessary to meet all of the tests and requirements I have discussed, TVA would be faced with an approximate doubling of our revenue requirements. The far-reaching consequences for all power users and the national economy are, I believe, self-evident.

I recognize that these are sobering figures. And I emphasize again their approximate nature. But I believe it is important that, as we work for the cleaner physical environment that we all want and must have, we fully understand what our demands will cost. I think it is important that we see them in total — added up. Only in this way can we make intelligent choices and establish a realistic set of priorities.

This, then, is the kind of crucial decision that the public must make. An increasingly major factor in the rising cost of power will be the expense of environmental control. Still to be determined is how great those expenses must be. Only society — and that means all of us — can make that decision. Only by determining our priorities and by setting up realistic methods of reaching those priorities can society hope to make satisfactory and lasting choices. The consequences of those choices reach to the total fabric of our lives. We cannot gamble on a piecemeal approach.

MARKETPLACE