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INDIVIDUAL FAMILY CONTRIBUTION TO PAPER POLLUTION

IN CACHE COUNTY

by

Carroll Porter Latham

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Home Economics and Consumer Education

## ACKNOWLEDGEMENTS

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Carroll Porter Latham

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## ABSTRACT

Individual Family Contribution to Paper Pollution  
in Cache County

by

Carroll Porter Latham, Master of Science

Major Professor: Miss Edith Nyman  
Department: Household Economics and Management

Paper waste discarded by families of five persons in Cache County was studied for two seven-day periods. The sample consisted of 19 families comprised of a father who was employed full-time, a mother, and three children living at home. A background questionnaire was administered to each family for the purpose of describing the sample.

Sample families were given (1) plastic bags for storing of paper wastes and (2) bathroom tissue, the unused portion of which was collected with the other paper discards. The weight of all paper discards was tabulated for each family and an average was tabulated for families and individuals.

The highest and lowest total paper weights recorded for the 14 days were 55 pounds 6 ounces and 12 pounds 5 ounces respectively. The national average of solid waste discards per person per day is approximately 5.3 pounds, over  $\frac{1}{2}$  or 2.65 pounds of which is estimated to be paper. This sample had an average of 1 pound 12 ounces per family per day and  $5\frac{1}{2}$  ounces per person per day. The large variance between national and sample averages may be due to the following factors:

(1) the light weight of the local newspapers as compared to newspapers from other localities; (2) although 110 magazines entered sample homes each month only seven magazines were discarded during the two seven-day collection periods; (3) sixty-three percent of the sample families raised home gardens and 95 percent of the families preserved some foods at home while 63 percent preserved at least 50 percent of the food used in the home.

Less paper waste was discarded by families when (1) the father was in the labor occupational group; (2) the mother was non-employed; (3) only one newspaper was subscribed to by the family; (4) a home garden was cultivated and harvested; and (5) some food was preserved at home.

(63 pages)

## INTRODUCTION

Although the United States is a relatively young nation it has developed into one of the most rapidly changing and powerful nations on the face of the earth. This has been due in part to the innovativeness of its people, and ". . . an environment ripe for economic growth" (McConnell, 1960, p. 700). Although human material wants are considered by economists to be virtually insatiable, this is not true of resources which are limited or scarce (McConnell, 1960; Gordon and Lee, 1969; Eliassen, 1970). Because of the prospect that there was always more where "this" came from there has been untold waste of natural resources in the United States.

The United States with 6% of the world's population accounts for 35% of the world's consumption of raw materials. In relation to our population and its demands for non-renewable resources, America has already become a resource-poor country, importing many materials upon which our standard of living depends. (Cornell H.R.A. Quarterly, August, 1970, p. 17)

In 1968 the Bureau of Solid Waste Management estimated 800 million pounds of solid wastes of all types were produced in the United States every day (Vaughan, 1968); by 1970 the estimate had been adjusted to 900 million pounds (Vaughan, 1970a). Waste products no longer desirable--from the first settlements to the present day--have been thrown out on the land, burned, buried and dumped into the nearest water source.

In America ". . . our attitude has always been 'we shall overcome'. . . . What has been overcome is the ability of the



environment to assimilate the cast-off wastes of society" (Randolph, 1971a, p. 44). According to Breidenbach and Floyd (1970, p. 4) ". . . our desire and ability to manage the treatment, disposal or reclamation of the wastes we generate has not grown in proportion to our astounding ability to generate them."

In the 1960's we saw the development, marketing, and sale of a wide variety of convenience items.

The throw-away era--what a welcomed ring this phrase had a few short years ago. The prospect of a world of single-use items held out the ultimate of convenience at low cost. Paper and plastic food service, nonwoven sheets and pillow cases--even discarded towels and place mats--were soon to replace their textile and chinaware counterparts. The benefits were characterized as being endless, most importantly the elimination of laundry and dishwashing problems. . . . However, the advent of disposables introduced as many problems as have been solved. In a nutshell--how do you dispose of disposables? (Treeger, 1970, p. 14)

Considering only urban-generated solid wastes, according to Tasseff (1970, p. 1), the total generated each day in the United States has grown ". . . from 2.75 pounds per person per day in 1920 to . . . (5.3) pounds in 1970, and it is expected to reach eight pounds per person by 1980. This . . . mean(s) a total of 5.25 billion tons annually would be generated from an estimated 1980 population of 235 million"--a sizable increase over the 4.19 billion pounds now generated annually (Vaughan, 1970b).

#### Problem

##### Need For More Accurate Analysis:

To the present time, most studies of waste analysis have been based on broad estimates. There is now a need for refuse analysis

studies, according to Golueke and McGauhey in reports of Comprehensive Studies of Solid Waste Management.

As long as technology remained relatively simple, there was no important need to obtain accurate estimates of the relative amounts of various components of solid wastes. . . . It is only where management of solid wastes makes the objective of returning materials to the resources of the nation . . . that a need is felt for a greater knowledge of the composition of refuse. Since these are the objectives of today and tomorrow rather than of yesterday, it is to be expected that detail is lacking on the actual weights and volumes of components. (Golueke and McGauhey, 1970, Section I, p. 18)

In order to obtain accurate information on actual weights and volumes of specific components of refuse it will be necessary to investigate community and individual family waste outputs. The President's Council on Environmental Quality (1970, p. 120) recommended that household sorting ". . . be encouraged. Reliable studies are necessary to determine if greater sorting of solid wastes by households makes economic and social sense."

Refuse analysis studies point out that the more common constituents are: paper 42% to 57%, metals 1.5% to 8%, glass 2% to 15%, rags .16% to 2%, garden debris 10% to 12% and ashes 5% to 19% (Golueke and McGauhey, 1970; Institute of Industrial Research, 1970; Reilly, 1971; Tasseff, 1970; Council on Environmental Quality, 1970). Golueke and McGauhey (1970, Section I p. 19) state that ". . . paper always is ranked as the major component of the rubbish fraction . . . ." According to the Council on Environmental Quality:

Paper constitutes almost 60 percent of roadside litter and is difficult to collect. Last year (1969-1970), 58.3 million tons of paper were consumed in the United States. Nineteen percent of this was recycled. Fifteen percent was temporarily retained or lost its identity in manufacturing processes. The remaining two-thirds--or 40 million tons--was discarded.

. . . Typically, paper comprising 40 to 50 percent of mixed refuse is disposed of at an annual cost of over \$900 million. . . . Much of the discarded paper consists of technically reusable fiber. (Council on Environmental Quality, 1970, p. 117)

#### Individuals Need to Become More Aware of Waste Problem

Awareness that a problem exists is the first step in finding a solution. "Only when confronted daily by their consumptive and wasteful habits will the American people begin to come to terms with the real problem" (Dunkelbarger, 1971, p. 4). Changes must come at the individual and family level for it is at this level that basic attitudes toward management and consumption are formed (McKee, 1955; Wallace, 1971). According to Paolucci and O'Brien (1959, p. 29), "the course of action that a family takes rarely just happens; it is based on decisions," and environmentally correct decisions are possible only when one has knowledge concerning the scope of environmental problems which exist and how he, as an individual, is contributing to these problems.

Brennan (1970, p. 2) states that ". . . for the first time in our history as a nation, our people are becoming concerned with the deteriorating quality of the environment in which they are forced to live." He continues:

. . . If man is the only living thing which can consciously transform, manipulate, control, preserve and destroy his environment, then a knowledge of how he affects his environment and perhaps even more important, of the consequences of his actions should be an essential element of human understanding. (Brennan, 1970, p. 2)

President Richard M. Nixon (1970d, p. 8), in an environment message said that ". . . the task of cleaning up the environment calls for a total mobilization by all of us. It involves government

at every level; it requires the help of every citizen. It cannot be a matter of sitting back and blaming someone else." Wallace (1971, p. 41) tells us that "each individual's unique effectiveness, and certainly his primary responsibility, in reversing degradation resides in his own micro-environment, his personal habitat, or oikos, the Greek word for home and habitat," and from which the term ecology is derived.

Environmental education is needed at all levels. Curricula are being developed to involve children in primary and secondary schools (Reilly, 1971) and college courses are being developed to train leaders in the quest for a cleaner environment for the future, but the present generation of adults cannot be forgotten (Spurr, 1970). They are important for the teaching of today's youth also. According to Paolucci and O'Brien (1959, p. 30), when individuals seek among alternative courses of action, ". . . past experience and persons with whom . . . (they) relate on a face to face basis influence . . . (them) more than impersonal sources. . . ." Therefore, the individual family members must become aware of environmental problems, their contribution to the problems, and become involved in helping to overcome the problems at the family level.

Thus, the purpose of this study was: (1) To gain an accurate measure by weight of the amount of paper a family of five discards over two seven-day periods. (2) To bring the results of the study to the attention of the participating families and the general public with the hope of influencing family purchasing decisions

resulting in a reduction of paper waste. (3) To inform industry of the quantity of paper discarded by the average family of five persons in Cache County with the hope that industry will consider recycling and eliminate over-packaging.

The two objectives formulated for this study were: (1) To measure by weight, the paper discarded by twenty Cache County families over two seven-day periods. (2) To alert the individual citizen through mass media, discussions, and university curricula to the volume of paper waste generated by families in Cache County.

#### Definition of Terms

1. Solid Wastes: Solid materials which come from animal or human life and activities and which are discarded as useless or unwanted.

2. Sanitary Land-fill Operation: A solid waste disposal method where wastes are deposited in an excavated area, compacted and covered daily with a layer of soil.

3. Incineration: A waste reduction method accomplished by burning at high temperatures to reduce burnable waste to ashes.

4. Composting: A method of recycling organic wastes, the results of which are used to fertilize and condition soil.

5. Salvage: Recovery of waste products.

6. Recycling: Any method used to reclaim waste products and process them for reuse.

7. Resources: The basic components which may be transformed into goods and services which will sustain life.

8. Environment: Those surroundings which sustain the life of an individual--may be physical (geographical location) or social (family, etc.).

9. Ecology: A term derived from the Greek word "oikos" meaning home or habitat and which refers to the relationship between a living organism and its environment.

10. Pollution: The presence of unclean, unwanted and/or harmful substances in an environment.

11. Disposable: Something that can be "gotten rid of" without leaving a trace behind. Eliassen (1970, p. 57) states that "'disposability' has been interpreted only in terms of user consideration."

12. Waste output: The totality of all waste products discarded by an individual or family.

#### Hypotheses

Since this was an exploratory study no hypotheses were formulated.

## REVIEW OF LITERATURE

Government Involvement

Individuals and government agencies have long been concerned with the pollution problems which surround us. For more than twenty years

the Bureau of Mines has had a modest research program in secondary waste metals . . . but these studies have generally concerned high-value metallic wastes, such as scrap metals, drosses, and residues from metallurgical processing. . . . (However), in the early 1960's . . . the Public Health Service was the principal federal agency responsible for protecting man from air and water pollution. (NAE-NAS, 1970, pp. 8-9)

As pollution problems became more pressing, the Congress began passing a series of bills and appropriating funds to strengthen and broaden the effort for improvement and correction of the pollution situation. A Federal Water Pollution Control Act and a Federal Water Quality Improvement Act were passed in 1961. A Clean Air Act, Title II of which dealt with solid waste, was signed into law in 1963.

In 1964, the Federal Council for Science and Technology arranged with the National Academy of Science and its National Research Council to prepare a report on the national pollution problem. In compliance with this agreement and with the support of the Department of the Interior and the Department of Health, Education, and Welfare, an ad-hoc Committee on Pollution was formed with Dr. Athelstan Spilhaus as chairman. The committee report, Waste Management and Control, 1966, represented "an effort to determine areas in which science and technology could effectively assist in reducing and controlling pollution . . . through establishment of appropriate agencies and programs" (NAE-NAS, 1970 p. 5).

This committee recommended:

1. That a full-scale experimental residue-control system be planned, designed, and constructed in a new city -- this system to embody the newest and best principles of recycling, re-using, and recovering residues, and to serve as (a) demonstration model.
2. That one or more experimental, regional, environmental design groups be established to:
  - a. Develop residue-management plans in concert with comprehensive land-use plans.
  - b. Advise agencies and bureaus of the several federal departments as to information, data, instrumentation, and other needs of local (state, city, subregional) bodies to design and construct plans and systems.
  - c. Assist local planners and authorities with needed data, services, and techniques to develop subplans compatible with regional design.
3. That there be provided within the structure of the federal government:
  - a. A center for Criteria and Standards, to collect, compile, and issue critical data from national and international sources on acceptable levels of residue concentrations for guidance of regional and local bodies.
  - b. A Development Center for the testing and evaluation of system and subsystem components, with strong ties to professional associations, industry, and state and municipal authorities.
4. That there also be provided, within the structure of the federal government, a program including contract work, to support the following:
  - a. A legal study on legislative precedents and needs, including questions of equity, simplification of access to courts, and development of model legislation relating to society's use of national resources of air, inland and coastal waters, and land.
  - b. Biological and ecological studies.
  - c. Engineering studies, including economic considerations, relating to residue management.
  - d. All relevant studies toward closing the loop from resource



to user to reuse as a resource.

5. That a National Commission for Environmental Protection be established under presidential appointment to:
  - a. Promote national awareness of the need and opportunities to preserve the health and beauty of our national environment.
  - b. Promote better use of the resources we mine and consume.
  - c. Draw attention to notable progress in innovation, design, and practice developed by national and local authorities and industry.
  - d. Monitor progress of the composite national program.
  - e. Advise the President and people of needed remedies and desired goals. (NAE-NAS, 1970, pp. 14-24)

On October 20, 1965, The Solid Waste Disposal Act was signed into law by the President as an amendment to the Clean Air Act of 1963 (Vaughan, 1970a). It had a four year expiration date which was extended one year (Doyle, 1971). This was probably the first major piece of legislation because it allotted funds for comprehensive studies regarding solid waste.

Within months . . . the fledgling Federal solid wastes program was carefully but steadily awarding grant monies as authorized-- for research, training, demonstrations, and planning. Earlier Public Health Service solid-waste-related activities were gathered into the new program. (Vaughan, 1970b, p. iii)

According to Vaughan this new Federal program contracted with the National Academy of Science to:

establish a committee on solid waste management in the National Research Council's Division of Engineering. In particular, this Committee (was) . . . asked to advise the Bureau (of Solid Waste Management which was organized in 1969 as a result of the 1965 Solid Waste Disposal Act) on the feasibility of implementing the NAS-NAC (sic) recommendations as they related to solid wastes. (Vaughan, 1970b, pp. iv-v)

The Committee on Solid Waste Management was also asked to advise

the Bureau of Solid Waste Management on:

1. Whether other similar courses of action are feasible or should be studied.
2. A priority rating for the courses of action . . . and the estimated costs of implementing these actions.
3. Criteria for the selection of sites for actual studies or demonstrations of the recommendations.
4. To advise on research and development efforts in the solid waste field which are necessary for developing required indexes and parameters for implementation of a systems concept. (NAE-NAS, 1970, p. 6)

The Committee on Solid Waste Management, under the chairmanship of Donald N. Frey, recommended to the Bureau of Solid Waste Management:

1. That there be established a solid waste management information center designed to accumulate all applicable present and future information from both foreign and domestic sources, evaluate, and disseminate this information to various groups.
2. That research, development, and large- or full-scale demonstrations on solid waste systems and components be carried out in metropolitan areas where solid waste problems derive from the several sectors of the community -- these activities to include the technological, operational, and economic factors for the newest and best approaches to storage separation, collection, transportation, salvage, processing, preparation for recycle, and deposit.
3. That there be substantial expansion of efforts to improve management information, planning, and manpower training including coordination with other federal, state, regional, and local government groups and with private enterprise . . . .  
(NAE-NAS, 1970, pp. 46-48)

In the "Forward" to the Kenilworth (Washington D. C.) Model Sanitary Landfill: Interim Report, Vaughan states that the Solid Waste Disposal Act of 1965 directed the Secretary of the Department of Health, Education, and Welfare:

to initiate, encourage, and support a national program aimed at discovering and evaluating better methods of coping with the solid waste problem.

The Secretary is authorized: (1) to conduct and support

research on the nature and scope of the problem, on methods of more safely and efficiently collecting and disposing of solid wastes, and on techniques for recovering from solid wastes potentially valuable materials and energy; (2) to provide training and financial and technical assistance to local and State agencies and other organizations in the planning, development, and conduct of solid waste management programs; (3) to encourage and support projects that may demonstrate new and improved methods of solid waste collection, handling and disposal.

To carry out these responsibilities, the Bureau of Solid Waste Management was established (with Richard D. Vaughan as director). (Vaughan, 1969a, p. iii)

The Solid Waste Disposal Act also designated the Department of Interior responsible ". . . for solid waste problems resulting from the extraction, processing, or utilization of minerals or fossil fuels" (NAE-NAS, 1970, p. 8).

The National Environmental Policy Act of 1969 was signed into law in January 1970 and established the Council on Environmental Quality under direction of the President (Nixon, 1970a). The Council is charged with coordinating all environmental quality programs and reviewing all Federal programs which affect the environment.

The Council published two annual reports which according to law:

trace current environmental trends and the adequacy of natural resources to fulfill human and economic needs. It . . . review(s) programs and activities of Federal, State, and local governments and of nongovernment entities or individuals, detailing the effects on the environment. And it . . . suggest(s) ways of remedying the deficiencies of existing programs and activities. (Council on Environmental Quality 1970, p. 1)

The Council on Environmental Quality was considerably strengthened:

. . . by the Environmental Quality Improvement Act of 1970 . . . which was passed as title II of the Water Quality Improvement Act of 1970. This act created a new Office of Environmental Quality, which provide(d) staff support to the Council (on Environmental Quality) . . . . The Environmental Quality Improvement Act also (specified that) . . . the Council and the Office . . . should review monitoring (done by Federal agencies of their own activities), evaluate the effects of

technology, and assist Federal agencies in the development of environmental standards. (Council on Environmental Quality, 1970, p. 21)

According to Tasseff (1970, p. 1), the Resource Recovery Act of 1970 began a new phase in solid waste management in the United States by emphasizing ". . . the need for research and development in recycling and reuse of solid waste-materials." This change in emphasis is a reflection of the growing problem of what to do with the large quantity of waste generated each day in the United States.

The Environmental Education Act of 1970, according to the U.S. Department of Health, Education and Welfare (1971, p. 5), was ". . . landmark legislation which reflected . . . a national commitment to the search for enlightened life styles . . . ."

Programs of environmental education will involve the entire American educational system, both formal and nonformal, . . . will develop supplementary materials to work through the traditional curriculums such as English, biology, mathematics, and history . . . and will develop . . . new curriculums applicable to nearly all teaching and learning situations . . . . The approach is to infuse environmental and ecological concepts into all studies which lend themselves to changing man's life style to one of harmony with his world. (U.S. Department of Health, Education, and Welfare, 1971, pp. 23-24)

The Environmental Protection Agency was formed by law on December 2, 1970. "It consolidated into one agency the major Federal programs dealing with air pollution, water pollution, solid waste disposal, pesticide regulation, and environmental radiation" (Council on Environmental Quality, 1971, p. 4). The Agency was organized with an administrator as head and five assistant administrators over the areas of (1) planning and management, (2) enforcement, (3) research and monitoring, (4) air and water programs, (5) pesticide, radiation, and

solid wastes programs. Within three weeks of its formation, the Environmental Protection Agency had announced a "series of water pollution enforcement actions," and within the following few months "made major moves to implement the Clean Air Act and to cancel pesticide registrations for DDT, aldrin, dieldrin, and Mirex" (Council on Environmental Quality, 1971, p. 4).

On March 25, 1971, the President proposed to Congress that a new Department of Natural Resources be formed. According to the Second Annual Report of the Council on Environmental Quality:

the Department would consist of five parts: land and recreation; water resources; energy and mineral resources; oceanic atmospheric, and earth sciences; and Indian and territorial affairs.

The Department would embrace most of the agencies now in the Department of the Interior; the Forest Service and the Soil Conservation Service from the Department of Agriculture; the civil works planning functions of the Army Corps of Engineers; the civilian power functions of the Atomic Energy Commission; and the National Oceanic and Atmospheric Administration from the Department of Commerce. (Council on Environmental Quality, 1971, pp. 6-8)

No action had been taken at the writing of this paper.

During 1970 and 1971 the Congress of the United States ". . . reorganized and expanded existing committees to give more explicit attention to the environment," and proposed the formation of a Joint Committee on the Environment which would study the impact of environmental and technological changes. House and Senate versions of the proposal differ and ". . . may require a conference to negotiate a single version for final passage" (Council on Environmental Quality, 1971, p. 8).

Problems and Recommendations Concerning Solid Waste Management

Morse and Roth (1970, p. 9) identify the functions of solid waste management as "collection, transportation, processing and disposal . . . ." The objectives of solid waste management, according to Morse and Roth, are three fold:

1. . . . to relocate the solid waste (at the lowest price) to an area which is unobjectionable to the population. . . .
2. . . . to transform solid waste into inert material which does not pollute the environment and to accomplish this transformation in a manner which is acceptable to the standards (e.g. sensory, aesthetic) prescribed by the population.
3. . . . to reclaim and reuse, as much as possible, the solid waste materials which are currently destroyed. (Morse and Roth, 1970, p. 10)

Through research and demonstration, various methods of managing (a) refuse collection and transportation, (b) refuse composition and disposal, and (c) refuse salvage have been explored. Studies reported in Grant Activities (Moore, Sabo, and Vankirk, 1969) indicated progress in the management of solid wastes in each of the above areas. These and other reported studies have given insight into the extent of the solid waste pollution problem and have suggested possible solutions.

(a) Refuse Collection and Transportation

One of the newest methods of refuse collection and transportation was demonstrated by Zandi, who

established that the fully automatic collection and removal of domestic solid waste in pressured pipes is technologically feasible and under conditions prevailing in the core of a metropolitan area (such as center city of Philadelphia) is also economically attractive (if the disposal point is 50

miles away, it is less expensive than truck collection). It was also found that the cost of collection and removal from each premise in a residential community (such as Radnor, Pennsylvania, pop. 30,020) for pipeline is slightly more than double the present truck collection. The system becomes economically attractive if each three or four houses is served by one access to the pipeline. (Zandi, 1969, p. 332)

(b) Refuse Composition and Disposal

The Institute of Industrial Research (1970) outlined the method of incinerating solid wastes in Jefferson County, Kentucky as inadequate. They made the following recommendations:

The initiating of

1. sanitary landfill operations
2. a public information and public relations program to "sell the general public on sanitary landfill as a disposal method" (p. 10)
3. incineration continued with present facilities
4. salvage
5. high temperature destruction (in the future)
6. studies to determine the source and composition of waste materials.

Thomas, Dean, and Hoskins, Incorporated (1970), in a study of solid waste management in Cascade County, Montana found the individual city collection and the open pit and landfill methods of disposal to be inadequate and unhealthy. Their recommendations to improve the situation included:

1. a county-wide refuse collection and disposal system with appropriate clarification of authority to manage the system
2. amending of Montana statutes to prohibit abandonment of automobiles on private land
3. licensing and regulating of junk yards
4. use of additional proposed landfill sites

According to Kupchik (1971), in 1934 the United States Supreme Court ordered New York City to cease disposing of its raw garbage at sea and the city began an incineration and landfill program. The incinerators are now obsolete and the landfill areas are about used up. New large quantity incinerators are approved but not in operation. New landfill sites are being sought, but in some localities only discarded inert construction wastes and incinerator residue can be deposited to avoid attracting birds to airports and beach areas. Having stated that "these aspects are not limited to New York City," Kupchik (1971, p. 365) recommended:

1. the use of barges and subways to transport solid wastes.
2. completing construction and activating of the new incinerators.
3. locating of new landfill sites possibly further inland.

Samuel F. Hulbert (1969, p. 305), recognizing that many packaging materials are non-biodegradable and are adding to the pollution problem, developed a water-soluble glass container which when broken was readily dissolved. The glass container was coated with "metallic oxides from selected organic esters." Because the toxicology of the manufacturing system, the effect of the system on water quality, and the economic evaluation of processing procedures had not been determined, the water soluble glass had not been prepared for public use at the time of the report.

According to Golueke and McGauhey (1970) studies of waste composition were conducted in the City of Berkeley, California in 1952 and 1967. The total weight of seven loads of solid waste was 40 percent greater in 1967 than in 1952. The greatest increases in volume



were noted for bottles and broken glass, plastics, and compostable materials such as paper.

. . . The garbage fraction of the 1967 refuse was only about 50 percent that of the 1952 refuse. The decrease in the garbage fraction is due, as is true throughout the U. U. to:

1. Increase in the number of homes equipped with garbage disposal units in the medium and high income areas;
2. Increase in frozen food consumption; and
3. Increase in the consumption of "TV" dinners.

The increase in the frozen food consumption was accompanied by an increase in the generation of soiled paper. According to this study, the increase in the consumption of "TV" dinners was especially pronounced in the low income areas--as judged by the number of empty "TV" dinner containers in their refuse. (Golueke and McGauhey, 1970, Section I, p. 38)

(c) Refuse Salvage and Reuse

Shuster (1970, p. 95) studied the possibility of processing solid organic wastes to recover simple compounds of economic value. Shuster states that ". . . considerable potential exists" through the use of partial oxidation. From a mixture of paper, leaves, and other organic materials, he recovered tars, an aqueous mixture, an organic fraction and a mixture of gases.

Shell and Boyd (1969, p. 1) found that the composting of de-watered sewage sludge was economically feasible. "The compost produced can be used effectively as a soil conditioner with a fertilizer value about the same as cattle manure, or as innocuous, odor-free landfill that does not need additional cover material." According to Shell and Boyd (1969), however, composting has two main problems--cost and marketing of the final product.

According to a report in Compost Science (1971a, p. 11), Louisiana

State researchers have developed ". . . a protein with a nutritionally favorable selection of Amino acids" from waste paper. "The first goal of the researching team (was) . . . to perfect an economical animal feed. Next step is to further refine the product for human consumption." It is estimated the cost will be lower than for fish protein concentrates now used.

Kramer (1969, p. 329) found that tomato and cheese wastes could be utilized. Tomato cannery wastes were converted to ". . . cattle feed having a nutritional value intermediate between corn and alfalfa. At the same time most of the tomato proteins were isolated, and could be used as a protein supplement in protein deficient diets." Most of the additional wastes ". . . may be used as . . . soil nutrient(s) and conditioner(s) . . . ." According to Kramer, prior to this study most cheese wastes could not be utilized as food because of protein instability. This problem was solved and from whey, which makes up the principal portion of cheese wastes, "whey wine . . . , vinegar . . . , ice cream, sherberts, cultured whey, and citrus fruit drinks were . . . prepared using whey solids as replacement and/or supplemental components." All were taste-tested and found acceptable.

Banerjee (1969, p. 385) recognized that "solid waste disposal, even in the form of municipal incinerator residue is a mounting problem in our society." Incinerator residues were transferred to a calcination/melting furnace. When the resulting product was ground, fired, and milled, a ceramic oxide powder was produced which may be used for bricks or as facing material. With the addition of lime before firing, the incinerator residue can ultimately be used in concrete

and other road surfacing.

Recycling: The Trend of the Future

According to Donald N. Frey (1970), chairman of the NAE-NAS Committee on Solid Waste Management,

Matter can be neither created nor destroyed. Man processes and uses matter. In so doing he may change its chemical form or alter its physical state; but, in some combination of gases, liquids, or solids, all of the original material continues to be part of the world about us. (Frey, 1970, p. vii)

Not only is the management of wastes proving a problem but the drain on our natural resources is continuing at an ever accelerating rate (Wakefield, 1970). In a recent article, C.T. Prout (1971, p. 51), United States Chief Forester, expressed concern that "in America the need for wood products will double in the next 30 years and the land available for growing trees will shrink." The Forest Service is trying to develop "super trees" (trees which grow very large and very fast) to help meet this need, but in the meantime, other methods must be used to conserve this valuable natural resource. For every ton of paper recycled, seventeen full grown trees are released for other uses (Carter, 1970; National Association of Secondary Materials Industries, 1971).

In a 1956 edition of The American Way of Life, Barnes and Ruedi (1956, p. 77) stated that "over 300 acres of forest are required to furnish enough pulp wood to print one Sunday issue (about 800,000 copies) of the New York Times." In 1970-1971, "the annual consumption of paper and paperboard products was more than 55,000,000 tons. Average per capita consumption in the United States has been over 500

pounds annually, compared with a recent per capita average of under 50 pounds for all other countries" (Changing Times, 1971).

At the present time, as Hanlon (1971) reports, the United States recycles 19 percent of its paper, Japan 45 percent, Austria more than 35 percent, The Netherlands 55 percent, West Germany about 30 percent and the United Kingdom about 25 percent. "Countries reusing less than 19% (sic) include Norway, Sweden, Canada and Denmark, making it appear that the rate of reuse . . . is lowest in countries that have access to large stands of trees suitable for wood pulp" (Hanlon, 1971, p. 35).

According to Compost Science (1971c, p. 3) ". . . of the 11.4 million tons of waste paper reclaimed last year (1970), the major part came from corrugated containers, corrugated clippings and mixed papers from office buildings, followed closely by newspapers and high-grade papers from printing and converting plants."

Many of those concerned with the present pollution problems feel that recycling is the answer (Treeger, 1970; Breidenbach and Floyd, 1970; Golueke and McGauhey, 1970; Adams, 1971). However, in a study of densification and size reduction equipment, Engdahl (1970, pp. 3-4) found that prior to 1970 ". . . disposal by salvage had accounted for an extremely small percentage of solid waste." Breidenbach and Floyd (1970, p. 8) expressed the opinion that ". . . the concept of reclamation and recycling must be considered as a way of life for coming generations."

#### Problems of Recycling

Of concern to those interested in reclamation of wastes are transportation costs from the point of collection to the point of

recycling. In most instances the cost is prohibitive (Kolb, 1971; Thompson, 1971). For example, of paper were collected in Utah, a small percentage could be used in insulation or be shredded for packaging. The remainder would have to be shipped to Wisconsin or other mid-western states for recycling (Kay, 1971).

A second concern is that recycling of paper (or other materials) will not take place until there are assured markets for secondary materials (Compost Science, 1971c, p. 2). Some groups and businesses who have been interested in assisting with the reclamation and recycling of paper have had problems because of an inadequate market for their reclaimed materials (Meyer, 1971a; Connolly, 1971). This problem may be gradually decreasing in magnitude; for example, recycled paper is being used exclusively for inside pages of one national magazine (Meyer, 1971b) and two daily and Sunday papers in Jefferson County, Kentucky are using some recycled paper and will expand the usage ". . . if a method can be developed for collecting most of the 95 tons of newspaper circulated daily . . ." (Bureau of National Affairs, Inc. 1970a, p. 473). In addition, government at all levels is stressing the use of recycled paper (Council on Environmental Quality, 1970; Bureau of National Affairs, Inc., 1971b; Compost Science, 1971b).

Still another difficult problem is the reclamation of soiled and unmixed wastes. According to the Institute of Industrial Research (1970, p. 137), ". . . the paper contained in domestic refuse is generally too contaminated for salvage, and the salvage of such paper could only be accomplished by separate collection." Golueke and McGauhey (1970) found that of 26,581 pounds of paper collected in residential areas, 20,603 pounds was soiled and had no market as salvage.

Connolly (1971) of the Environmental Protection Agency states that ". . . any individual, organization or government unit seeking to engage in (recycling) . . . should be prepared to deal with:

First, marketability--the market for materials to be recovered must be established if it is not already there.

Second, economics--there must be economic incentives and, possibly, "disincentives" to get recycling under way.

Third, technology-- . . . much development is needed in separation technology if we hope to separate each recyclable component out of the waste stream . . . . The long-range capability of any garbage separation system based (solely) on voluntary separation by individual households . . . (is doubtful). (Connolly, 1971, p. 6)

#### Change: A Result of Individual Action

Brennan (1970, p. 2) states that ". . . for the first time in our history as a nation, our people are becoming concerned with the deteriorating quality of the environment in which they are forced to live." According to the Council on Environmental Quality (1971) there are approximately 3100 organizations working for improved environmental conditions.

Water pollution led the list of specific problem areas (concentrated on), followed by solid wastes, air pollution, land use, and conservation of natural resources.

. . . The examples of successful action by local groups during (1970-1971) . . . included challenges to such projects as a refinery in Maine, a shopping center in California, a dam on the Delaware River, a road through a forest in North Carolina, a hydroelectric facility in Wisconsin, a strip mine in Arizona, a new community in Illinois, a nuclear power plant in Michigan, collection and recycling centers, and litter clean-up efforts. (Council on Environmental Quality, 1971, pp. 90-91, 96-97)

#### Environmental Education Needed

Duszynski (1971) cited the factors which influence citizens'

willingness to cooperate in waste control as: personal interest, emotions, habits, background, home life, education and income. To enhance the chances of citizen cooperation, education is an immediate need. Randolph states that:

. . . the most formidable barrier to a clean environment is the mind of man. We tend to become fixed in our thinking. We reject the sharp departures from the old, comfortable ways which are needed to reduce the likelihood of man becoming his own executioner.

Foremost among the efforts we must make is a change of attitude, a willingness to question old concepts and reorder personal and national priorities. (Randolph, 1971b, p. 59)

Dubridge (1970, p. 70), Director of the President's Committee on Science and Technology, has advocated "a broad educational program . . . to inform the average citizen that (a) his actions may degrade the environment and (b) he must be willing to share the costs of environmental improvement through higher taxes or higher costs for the products he buys." Spurr tells us that some action is being taken to make

environmental training and sensitization as basic a part of education as the three R's. But we cannot afford the time lag of waiting for a new crop of right-thinking and acting adults. We cannot give up the present generation . . . Perhaps we should borrow from the successful Agricultural Extension Service and utilize such a frame work to get the message out to the present adult population. (Spurr, 1970, p. 106)

Efforts to educate adults to ecological factors are already being made by some state Cooperative Extension Services and other interested groups. For example, Hahn and Wood (1971) of the New York State Cooperative Extension service prepared and circulated a newsletter concerning food packaging and ecology. They touched on the extent of the refuse disposal problem and gave 18 specific suggestions

as to how the householder could reduce his own household refuse volume.

#### Studies Needed on Individual Level

Golueke and McGauhey (1970) agree with the Council on Environmental Quality (1970) that studies are needed to determine waste volumes of individual households, specifically with recycling and reuse of much of the waste as a goal; however, few studies have been conducted at the individual level. In an effort to bring the pollution problem to the attention of the public, two recent informal studies dealt with individual families and their waste output. Trelour (1971), in a series of articles on man and his environment, reported on the contribution to environmental problems of an "average" family of five. In a one week period this family contributed 83.5 pounds of solid waste to the pollution problem. A Michigan State University group of five students brought into their home 142 bags of groceries and from these same groceries carried out 72 bags of garbage (Paolucci, 1971).

Management of wastes, including recycling, may well be the next new American industry (Kolb, 1971; Quinn, 1971), but before it can become such, not only must government and industry become involved, but the individual citizen must become educated to the use of recycled materials and this could be a slow process. In addition, as Randolph (1971a, p. 44) states, "Individual citizens must be made aware that environmental degradation is the product of their activities as well as the activities of industry." As Wallace points out:

A multitude of mundane individual choices face us daily. Each choice is a precise opportunity to respond environmentally positive. Household managers, . . . which includes both sexes and the unmarried, must equate ecological considerations with



economic considerations in every choice. Will an individual reduce his personal contribution of five pounds of solid waste per day? Will he use paper and natural fiber instead of synthetics or plastics? Will he recycle newspapers, aluminum cans, return bottles? Will he avoid using persistent pesticides and herbicides in house and garden? Discontinue outdoor burning? Tune auto properly and install pollution control devices? Use lead-free gasoline? Walk instead of drive to shop? Take bus or car pool to work? Use soap instead of detergents and hang laundry outdoors instead of using automatic dryer? Having learned to live by environmental principles in his own oikos, will he influence family and neighbors, business and government, to follow his example?

Each individual must move beyond his micro-environment to introduce a new dimension of civic responsibility into the macro-environment . . . . (The change from environmental pollution requires) an attitudinal revolution (because) . . . reversing environmental degradation is a function of individual choices . . . . (Wallace, 1971, p. 41)

Although it is generally accepted by those who are involved with solid waste management that studies are needed on the individual's contribution to the pollution problem and on individual awareness of a personal contribution to pollution, a review of literature reveals very little actual work done in these areas.

## METHODS AND PROCEDURES

Sample

The purposive sample was comprised of nineteen Cache County families, each of which included a father, mother and three children living at home. The father was employed full-time; however, employment of the mother was not considered a variable. The families were selected from three areas of Cache County on the basis of population distribution according to the 1970 census as follows:

Logan City - 8 families  
South Cache County - 6 families  
North Cache County - 6 families

Families were contacted by the researcher to ascertain if they met the criteria, were apprized of the purpose and scope of the study, and were asked for their cooperation in the study.

Pretest

A background questionnaire composed of 13 background factors was administered to three Utah State University student families. As a result of the pretest analysis the following changes were made: the one question dealing with ages of family members was expanded to three questions; parents' ages were identified by seven spans of four years each rather than a specific age; and income range was expanded from three to five categories.

### Study Instrument

A 15 item background information questionnaire was administered to one of the parents during the initial contact. The purpose of the questionnaire was to obtain a description of the sample.

### Procedure

The researcher approached a householder at the latter's home and explained the study and its purpose. If the family met the required criteria (ie. five persons living at home: father who is working full-time, mother, three children) they were asked to become part of the sample. Of twenty-two families approached, twenty accepted although one was later dropped from the study due to lack of cooperation during the second seven-day period.

Families were asked to save all paper waste including newspapers, magazines, can labels, paper towels, packaging materials, etc., during the weeks of January 8-14 and 22-28. Newspapers were kept separate from other paper because of ease of recycling. On January 7, 1972, one day before they were to begin the first seven-day period, each family was visited by the researcher and given (1) three 20-gallon-capacity plastic bags for storing of the paper waste, (2) five rolls of two-ply bathroom tissue, the unused portion of which was collected and weighed at the end of the week, and (3) a card containing the researcher's name and telephone number. During the week of collection each family was contacted once by telephone to give encouragement and answer any questions which might have arisen. Three homemakers called

the researcher during the first week regarding identification of some items. At the end of each seven-day period the paper waste and unused bathroom tissue were collected, labeled with numbers which had been assigned to each family and weighed on scales located at the Animal Science and Physiology Laboratory of Utah State University. The scales weighed to the  $\frac{1}{2}$  ounce. The newspapers and bags containing the paper were then delivered to the Logan City Sanitary Landfill by prior arrangement with the district sanitarian. When the first weeks paper was collected, an additional five rolls of two ply bathroom tissue and three 20-gallon-capacity plastic bags were delivered to each family. One day prior to starting the second seven-day period and once during the week the researcher contacted each family by telephone.

#### Analysis of Data

Paper output was weighed to determine:

- (1) weight of newspapers discarded per family
- (2) weight of bathroom tissue used per family
- (3) weight of all other paper discarded per family
- (4) total paper output by weight per family
- (5) total paper output by weight per person
- (6) total weight of newspapers for all families
- (7) total weight of bathroom tissue for all families
- (8) total weight of all other paper discarded for all families
- (9) total paper output by weight for all families

An average was determined for daily paper waste output per person.

Averages were determined per family for:

- (1) weight of newspapers discarded
- (2) weight of bathroom tissue consumed
- (3) weight of all other paper discarded
- (4) total paper output

## RESULTS AND DISCUSSION

The present investigation was designed to (1) obtain an accurate measure by weight of the amount of paper a family of five discards during two seven-day periods, and (2) bring the results of the study to the attention of the participating families and the general public through mass media, discussion, and university curricula. For two seven-day periods the participating families saved all paper discards with the exception of bathroom tissue; the paper was then collected and weighed.

Sample

Twenty-two families were asked to cooperate in the study. Of these, two declined and one was dropped from the sample due to lack of cooperation during the second seven-day period.

With the exception of the family which was dropped from the study, all were very cooperative. All families expressed interest in the study and requested a copy of the results. This information will be sent to them at the conclusion of the study. Four families with children between the ages of six and 12 indicated that the children became very much involved as they took labels from cans, saved gum and candy wrappers and watched other family members to see that all paper was saved.

Ages of family members.

Ages of the fathers ranged from the 25 to 29 year old category to the over 50 category. Twelve of the fathers of 63 percent were 39 years of age or under. The ages of the mothers ranged from under 25 to

over 50. Thirteen of the mothers, or 68 percent, were 39 years of age or less (Table 1).

Table 1.

Ages	Ages of parents		Total
	No. of fathers	No. of mothers	
Under 25	0	1	1
25-29	5	6	11
30-34	4	2	6
35-39	3	4	7
40-44	2	2	4
45-50	2	3	3
Over 50	3	1	4

The sample families included 57 children from the ages of three months to 25 years. The families may have been larger at some time in the past but at the time of the study only three children were living in each home (Table 2).

Table 2.

Ages	Ages of children	
	No. of children	% of sample
0-5	19	33
6-11	14	24
12-17	22	39
18-25	2	4
Totals	57	100

#### Occupation of the father.

Occupations of the fathers were divided into four categories:

- (1) professional, including those occupations requiring an education beyond high school (ie. educator, engineer, accountant, etc.);
- (2) laborer (ie. truck driver, herdsman, general laborer, etc.);
- (3) salesman; and (4) farmer, including those whose principal income

was from farming or dairying. Nine fathers, or 47 percent of the sample were laborers (Table 3).

Table 3.

Occupations of fathers		
Occupations	No. of fathers	% of sample
professional	5	26
laborer	9	47
salesman	2	11
farmer	3	16
Totals	19	100%

#### Family income.

None of the families sampled declared an income under \$5,000 and one income was undeclared (Table 4).

Table 4.

Family income distribution		
Incomes	No. of families	% of distribution
\$4,999 or less	0	0
\$5,000-\$7,999	4	21
\$8,000-\$9,999	5	26
\$10,000-\$11,999	6	32
\$12,000 or more	3	16
Undeclared	1	5

#### Employment of mother.

Eleven or 58 percent of the homemakers were not employed outside of the home; however, four, or 21 percent were employed full-time and four others were employed part-time.

#### Education of parents.

None of the fathers and only one of the mothers had less than 10 years of schooling. Fifty-eight percent of the fathers and 84 percent



of the mothers had at least 12 years of schooling (Table 5).

Table 5.

Years of education	Education of parents		Total
	No. of fathers	No. of mothers	
10 or less	4	4	8
12	7	12	19
14	3	--	3
16 or more	5	3	8

Subscriptions to newspapers and magazines.

Two families took no newspaper while another subscribed to a paper but gave the paper to a relative. Of the 17 families subscribing to at least one newspaper, 16 or 94 percent received the Herald Journal, a Logan City daily. Five families subscribed to at least two newspapers and one family received three daily papers (Table 6).

All families subscribed to at least two magazines. Eight families or 42 percent subscribed to at least five magazines and one family subscribed to 13 magazines (Table 6).

Table 6.

	Family subscriptions to newspapers and magazines					
	number of subscriptions					
	0	1	2	3	4-8	9 or more
Newspapers	2	12	4	1	0	0
Magazines	0	0	1	8	8	2

Home gardens and food preservation.

Sixty-three percent or 12 of the sample families raised home gardens. Eighteen families, or 95 percent did some home preservation of foods and 12 families or 63 percent preserved at least 50 percent of the food used in the home.

### Results

Paper waste was collected from each of the nineteen families comprising the sample and was weighed to the  $\frac{1}{2}$  ounce. Table 7 indicates average weights per family for the various types of paper waste collected. Table 8 indicates paper weights of each family and totals for all families.

Table 7.

Item	Paper waste averages*	
	Ave. weight per family	
	pounds	ounces
Newspapers	6	$11\frac{1}{2}$
Bathroom tissue	2	6
Other paper wastes	15	$1\frac{1}{2}$
Total paper wastes	24	4

\* weight to the closest  $\frac{1}{2}$  ounce

During the first week the highest total weight of 31 pounds 8 ounces was collected from family number 18 and the lowest weight of 5 pounds 9 ounces from family number 17. These two families had the highest and lowest total weights also. During the second week two different families had the highest and lowest weekly weights with 24 pounds 13 ounces and 4 pounds 12 ounces from families number 15 and 7 respectively. The highest total weight collected was 55 pounds 6 ounces with the lowest weight being 12 pounds 5 ounces. The total paper waste collected from the 19 family sample was 461 pounds 13 ounces which represents an average of 24 pounds 4 ounces per family for 14 days or 1 pound 12 ounces per family per day and  $5\frac{1}{2}$  ounces per person per day which is far below the national average. According to Golueke

Table 8

## Waste Totals by Weight\*

Family	Newspapers						Other Paper Waste						Total Paper Waste					
	Week 1		Week 2		Total		Week 1		Week 2		Total		Week 1		Week 2		Total	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
1	9	12	12	13	22	9	6	14	5	7	12	5	16	10	18	4	34	14
2	1	9	1	14	3	7	4	13	5	5	10	2	6	6	7	3	13	9
3	--	--	--	--	--	--	9	14	5	5	15	3	9	14	5	5	15	3
4	1	8	2	7	3	15	7	10	19	1	26	11	9	2	21	8	30	10
5	3	8	4	4	7	12	6	2	6	3	12	5	9	10	10	7	20	1
6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	3	2	1	2	4	4	5	2	3	10	8	12	8	4	4	12	13	--
8	2	4	3	1	5	5	9	11	5	13	15	8	11	15	8	14	20	13
9	3	5	1	12	5	1	6	6	10	2	16	8	9	11	11	14	21	9
10	--	--	--	--	--	--	7	15	15	3	23	2	7	15	15	3	23	2
11	3	11	8	12	12	7	8	13	5	4	14	1	12	8	14	--	26	8
12	3	1	--	10	3	11	12	14	6	12	19	10	15	15	7	6	23	5
13	5	7	2	1	7	8	12	10	11	5	23	15	18	1	13	6	31	7
14	3	1	2	4	5	5	6	--	3	11	9	11	9	1	5	15	15	--
15	3	8	3	3	6	11	8	2	6	3	14	5	11	10	9	6	21	--
16	1	9	2	7	4	--	9	1	22	6	31	7	10	10	24	13	35	7
17	2	--	2	14	4	14	3	9	3	14	7	7	5	9	6	12	12	5
18	7	12	10	12	18	8	23	12	13	2	36	14	31	8	23	14	55	6
19	1	8	3	12	5	4	4	10	7	4	11	1 1/2	6	2	11	--	17	2
20	2	11	4	8	7	3	4	11	11	14	16	9	7	6	16	6	23	12
Totals	59	4	68	8	127	12	158	9	167	12	326	5	217	13	236	4	454	11

\*Average per family 1 lbs. 12 oz. per day  
 Average per person 5 1/2 oz. per day

and McGauhey (1970) the national average of total solid waste in the United States is 5.3 pounds per person per day, approximately  $\frac{1}{2}$  of which, or 2.65 pounds is paper. Three specific factors which might effect this are:

(1) Newspapers -- The Logan City daily newspaper, The Herald Journal, was subscribed to by 16 families, one of which gave the paper to someone else and so did not discard any newspapers during the two seven-day periods. Three families subscribed to The Salt Lake Tribune and two subscribed to the Deseret News. All three of these newspapers weigh less than most other state-wide papers from other parts of the United States. Table 9 is a comparison of various newspaper weights.

Table 9.

Newspapers	Average newspaper weights in ounces		
	Ave. daily weight	Ave. Sunday weight	Ave. weekly weight
Herald Journal	$2\frac{1}{2}$	$9\frac{1}{2}$	$3\frac{1}{2}$
Salt Lake Tribune	$8\frac{1}{2}$	22	7
Deseret News	11	22	12
Chicago Tribune	9	34	$12\frac{1}{2}$
New York Times	$11\frac{1}{2}$	57	18
Los Angeles Times	$17\frac{1}{2}$	57	23

(2) Magazines -- Magazine subscriptions of this sample included 86 monthly and six weekly (24 issues) or a total of 110 magazines per month. Although all families subscribed to at least two magazines, 18 of the families or 94 percent of the sample either retained the entirety of their magazines, gave them to other persons, gave them to charitable organizations or discarded them at some time other than during the study. Family number 18 which subscribed to 13 magazines was the only one to

discard magazines during the two seven-day periods and they discarded seven magazines.

(3) Food preservation -- Ninety-five percent of the families did some home preservation of foods and used glass bottles or metal cans. This would result in fewer paper packaging materials entering the home.

#### Discussion

According to Golueke and McGauhey (1970) the amount of solid waste generated is in direct proportion to income. This was true of the Cache County sample; however, the difference in paper waste discarded by families in the various income categories was not great. The four families who had incomes of less than \$8,000 or 21% of the sample, discarded an average of 23 pounds 11 ounces of paper waste for the two seven-day periods. The three families who declared incomes above \$12,000 generated 28 pounds 8 ounces per family for the same periods, a difference of 4 pounds 13 ounces.

Those families who raised a home garden had an average of 21 pounds 8 ounces of paper waste while those not raising a home garden had an average of 16 pounds 2 ounces or an increase of 6 pounds 10 ounces.

Families who preserved at least 50 percent of the food used by the family generated an average of 23 pounds 3 ounces of paper waste; however, the families who preserved less than 50 percent of their food, including one family who did no food preservation, generated 35 pounds 6 ounces or an increase of 12 pounds 3 ounces.

Sample families in which the father was in the 35-39 year age

group discarded 12 pounds 1 ounce more paper waste than other families.

Table 10.

Average paper weights by age of parents			
Age of father	No. of fathers	Average weight of paper discards	
		pounds	ounces
Under 25	0	--	--
25-29	5	18	15
30-34	4	22	14
35-39	3	37	1
40-44	2	16	2 $\frac{1}{2}$
45-50	2	24	$\frac{1}{2}$
Over 50	3	25	
-----			
Age of mother	No. of mothers	Average weight of paper discards	
		pounds	ounces
Under 25	1	24	2
25-29	6	18	15 $\frac{1}{2}$
30-34	2	25	3 $\frac{1}{2}$
35-39	4	32	1 $\frac{1}{2}$
40-44	2	18	6
45-50	3	23	10
Over 50	1	30	10

The five families where the father was in the professional occupation category discarded an average of 29 pounds 13 ounces while the farmer category discarded 25 pounds 2 ounces, a difference of 4 pounds 11 ounces. The salesman and laborer categories had 23 pounds 14 ounces and 19 pounds 4 ounces respectively.

It would appear that a homemaker working outside the home would use more convenience foods and hence have more paper waste than the non-employed homemaker, however, in this sample there was a variance of only 1 pound 12 ounces. This may be due in part to the fact that of the eight working homemakers, six perserved at least 50 percent of

the food consumed by the family, one preserved some of the family food, and one did no food preservation in the home.

When a family subscribes to two or more newspapers it is to be expected that they would generate more paper waste than those subscribing to only one newspaper. Those in the sample who subscribed to at least two newspapers (one subscribed to three) had an average total waste paper weight of 33 pounds 11 ounces as compared to 20 pounds 6 ounces average of those who subscribed to only one newspaper, a difference of 13 pounds 5 ounces.

To accomplish the second objective of this study a summary of the results and discussion will be mailed to the participating families and the following individuals and organizations:

Miss Aileen Erickson, State Supervisor, Home Economics Education,  
Salt Lake City, Utah

Dr. Margaret Merkely, Supervisor, Utah Cooperative Extension  
Service Family Life Programs, Utah State University

Helen Thackeray, Consumer Information Specialist, Utah Cooper-  
ative Extension Service, 75 West South Temple, Salt Lake  
City, Utah

National Home Economics Association, 2010 Massachusetts Ave.,  
N. W., Washington, D.C. 20036

Dr. Phyllis Snow, Dean, College of Family Life, Utah State  
University

Mary G. Lowe, Chairman, Department of Home Economics, University  
of Utah, Salt Lake City, Utah

Stanley E. Richards, Chairman, Department of Family Life, Weber  
State College, Ogden, Utah

Virginia F. Cutler, Chairman, Department of Family Economics  
and Home Management, Brigham Young University, Provo, Utah

Dr. Beatrice Paolucci, Chairman of Department of Ecology,  
Michigan State University, East Lansing, Michigan

Mr. Willard Hill, District Sanitarian, Logan, Utah

Dr. Mary S. Pickett, 41 A, Mackay, College of Home Economics,  
Iowa State University, Aims, Iowa 50010

The Utah State University Information Services which has contacts with state-wide newspapers, radio stations, and TV stations.

On February 2, 1972, KSL-TV, Salt Lake City, Utah, prepared and presented a film of approximately 5 minutes length showing the researcher and her assistant picking up plastic bags filled with paper at the home of one of the participating families, labeling and depositing the paper in a truck, and weighing the bags on the scales at the Animal Science and Physiology Laboratory. The reporter gave a resume of the purpose and some findings of the study.

To date the results have been forwarded to the editors of the Utah Home Economics Association Newsletter and the Western Region Conference of Teachers of Home Management-Family Economics Newsletter. The results have been cited in two management classes at Utah State University.



## SUMMARY AND CONCLUSIONS

Paper waste discarded by families of 5 persons in Cache County was investigated. Little research concerning actual discards of individual families has been conducted but is considered necessary by the Council on Environmental Quality (1970) and Golueke and McGauhey (1970).

The sample was composed of 19 Cache County families comprised of a father working full time, mother, and three children living in the home. A background questionnaire was administered to each family for the purpose of describing the sample.

The highest total weight collected for the two seven-day collection periods was 55 pounds 6 ounces and the lowest, 12 pounds 5 ounces. The average waste paper weight per family was 24 pounds 5 ounces or 1 pound 12 ounces per day per family, or  $5\frac{1}{2}$  ounces per person per day. This was far below the national average of approximately 5.3 pounds of solid waste per person per day, over  $\frac{1}{2}$  of which or approximately 2.65 pounds is paper (Golueke and McGauhey, 1970)

This was an exploratory study, therefore no hypotheses were formulated.

The following conclusions may be drawn from this study:

1. The Cache County sample had a lower daily per person average of paper waste than the national average. This may be due to the following factors:
  - a. Newspapers in this northern Utah area weigh less than papers from other sections of the country.

b. Although a total of 110 magazines entered sample homes each month only 7 magazines were discarded during the 2 seven-day periods. This indicates that among sample families magazines are not generally relegated to the trash barrel on a regular basis.

Sample families who raised a home garden and preserved food for family consumption had less paper waste from packaging materials.

2. Although Golueke and McGauhey (1970, Section II, p. 38) indicate that ". . . waste generation is a function of extent to which a product is used, variety of products purchased, and frequency of purchase of a particular product (and hence of discard); and these, in turn, are functions of income," the results secured from this sample indicate that income was not an important variable.

3. In families where the homemaker was employed outside of the home, a greater amount of paper waste was discarded than in those families where the homemaker was not employed outside the home.

4. Families headed by fathers in professional occupations discarded more paper waste than other families.

#### Recommendations

It is recommended that a similar study be conducted concerning paper waste discards considering the following factors:

1. A larger sample would give a broader and more comprehensive view of paper waste discards.
2. Golueke and McGauhey (1970, Section II, p. 38) state that "income is one of the variables used in explaining variation in wastes

generation. The manner in which income level affects wastes generation is fairly obvious and needs no stressing . . .," however, this was not "obvious" with regard to the present sample, and should be investigated.

3. Homemaker's age, education and employment are variables which should be considered.

4. Occupation of the father and its effect on family paper waste generation should be further explored.

5. Paper waste of families who raise home gardens and subsequently preserve food at home and the materials they use should be compared with paper waste of families who do not raise gardens or preserve food at home.

6. Since recycling of wastes appears to be a ". . . way of life for coming generations," (Breidenbach and Floyd, 1970, p. 8) individual willingness to cooperate in home separation and collection or deposit of recyclable waste needs to be explored.

7. A sampling of paper waste discarded at various times of the year would indicate variations due to seasonal differences and family activities.

## BIBLIOGRAPHY

- Adams, Ruth. 1971. Recycling to bolster our dwindling reserves. *Compost Science: Journal of Waste Recycling*. 12(1):20-22.
- American Public Works Association Research Foundation. 1969. The Tezuka refuse compression system: a preliminary report. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 45 p. (HE 20.1102:T31)
- Atkinson, J. W. 1964. An introduction to motivation. D. Van Nostrand Company, Inc. Princeton, New Jersey. 335 p.
- Banerjee, Bani R. 1969. Converting incinerator residue into useful materials. In Raymond T. Moore, Julius J. Sabo, and Donna M. Vankirk. 1969. Grant activities. U.S. Department of Health, Education, and Welfare. Environmental Health Service. Environmental Control Administration. Rockville, Maryland. 559 p. (HE 20.1102:G76)
- Barnes, H. E. and Oreen M. Ruedi. 1956. The American way of life: an introduction to the study of society and social problems. Prentice-Hall, Inc. New York. 802 p.
- Breidenbach, A. W. and E. P. Floyd. 1970. Needs for chemical research in solid waste management. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. (HE 20.1402:C42) 28 p.
- Brennan, Matthew J. 1970. Making tomorrow now: building a qualitative environment for all children. *Childhood Education*. 47(1):2-5.
- Bureau of National Affairs, Inc. 1970a. Louisville newspapers announce plans for reclaiming, recycling operation. *Environment Reporter: Current Developments*. 1(18):473-474.
- Bureau of National Affairs, Inc. 1970b. American Paper Institute. *Environment Reporter: Current Developments*. 1(30):763-764.
- Bureau of National Affairs, Inc. 1970c. Boise Cascade Corporation. *Environment Reporter: Current Developments*. 1(30):730.
- Bureau of National Affairs, Inc. 1971a. Nixon asks Congress for new laws to control pollution, check land use. *Environment Reporter: Current Developments*. 1(42):1097-1099.

- Bureau of National Affairs, Inc. 1971b. Poll shows environment ranked as "most serious" national problem. Environment Reporter: Current Developments. 1(35):896.
- Carter, Louis. 1970. In Louisville newspapers announce plans for reclaiming, recycling operations. Bureau of National Affairs, Inc. Environment Reporter: Current Developments. 1(18):473:474.
- Changing Times. 1971. Your questions answered. 25(10):18.
- Compost Science: Journal of Waste Recycling. 1971a. Animal, possibly human, food derived from waste paper? 12(1):11.
- Compost Science: Journal of Waste Recycling. 1971b. Mayor Lindsay's announcement and paper recycling bids. 12(1):17.
- Compost Science: Journal of Waste Recycling. 1971c. We need more waste paper in cereal boxes, or let's drop tokenism out of recycling. 12(1):2-3.
- Connolly, Hugh. 1971. In John Kolb. Special report of the first national conference on composting-waste recycling. Compost Science: Journal of Waste Recycling. 12(4):4-11.
- Cornell H. R. A. Quarterly. 1970. 11(2):17.
- Council on Environmental Quality. 1970. Environmental quality: the first annual report. U.S. Government Printing Office. Washington, D.C. 326 p.
- Council on Environmental Quality. 1971. Environmental quality: the second annual report. U.S. Government Printing Office. Washington, D.C. 360 p.
- DeMarco, Jack, Daniel F. Keller, Jerold Leckman, and James L. Newton. 1969. Incinerator guidelines--1969. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 98 p. (HE 20.1108:In2)
- Department of Sanitary Engineering, District of Columbia. 1969. Kenilworth model sanitary landfill: interim report on a solid waste demonstration project: December 1967--January 1969. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 105 p. (HE 20.1102:K35)
- Doyle, Kathleen F. 1971. Manpower for pollution control. Bureau of National Affairs, Inc. Environment Reporter: Monograph No. 7. 1(37):1-17.

- Dubridge, Lee A. 1970. Challenge in our time. In Huey D. Johnson (Ed). No deposit--no return; man and his environment: a view toward survival. Addison-Wesley Publishing Company. Reading, Massachusetts. 351 p.
- Dunkelbarger, Phillip. 1971. In John Kolb. Special report on the first national conference on composting-waste recycling. Compost Science: Journal of Waste Recycling. 12(4):4-11.
- Duszynski, Edward. 1971. In John Kolb. Special report on the first national conference on composting-waste recycling. Compost Science: Journal of Waste Recycling. 12(4):4-11.
- Eliassen, Rolf. 1970. Solid waste management. In Huey D. Johnson (Ed.). No deposit--no return; man and his environment: a view toward survival. Addison-Wesley Publishing Company. Reading, Massachusetts. 351 p.
- Engdahl, Richard B. 1970. Solid waste processing: a state-of-the-art report on unit operations and processes. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 72 p. (HE 20.1102:So4)
- Environmental Control and Safety Management. 1971. 141(4):38.
- Frey, Donald N. 1970. Preface. In National Academy of Engineering--National Academy of Sciences. Policies for solid waste management. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 64 p. (HE 20.1402:P75)
- Golueke, C. G. and P. H. McGauhey. 1970. Comprehensive studies of solid waste management: first and second annual reports. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 245 p. (HE 20.1402:C73)
- Goodyear, M. R. and M. C. Kohr. 1965. Managing for effective living. (2nd ed.). John Wiley and Sons, Inc. New York. 290 p.
- Gordon, Leland J. and Stewart M. Lee. 1969. Economics for consumers. (5th ed.). Appleton-Century-Crofts. New York. 589 p.
- Gross, Irma H. and E. W. Crandall. 1963. Management for modern families. (2nd ed.). Appleton-Century-Crofts. New York. 589 p.
- Hahn, Jean I. and Mary B. Wood. 1971. Focus on the food markets: another look at food packaging--ecology. New York State Cooperative Extension Service. Cornell University. F:20:71.

- Hanlon, Joseph. 1971. In J. G. Meyer. 1971b. Closing the circle Environment. 13(7):35.
- Hill, Wilhemina. 1970. Environmental education: the state of the art. Childhood Education. 47(1):14-18.
- Hook, Nancy C. and Beatrice Paolucci. 1970. The family as an ecosystem. Journal of Home Economics. 62(5):315-318.
- Hulbert, Samuel F. 1969. Design of a water disposable packaging container. In Raymond T. Moore, Julius J. Sabo, and Donna M. Vankirk. 1969. Grant activities. U.S. Department of Health, Education, and Welfare. Environmental Health Service. Environmental Control Administration. Rockville, Maryland. 559 p. (HE 20.1102:G76)
- Ingram, William T. and F. P. Francia. 1968. Quad-city solid wastes project: an interim report, June 1, 1966 to May 31, 1967. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 181 p. (HE 20.2:So4)
- Institute of Industrial Research, University of Louisville. 1970. Louisville, Ky.--Ind. metropolitan region solid waste disposal study: interim report on a solid waste demonstration project: Volume 1: Jefferson County, Kentucky. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 205 p. (HE 20.1402:193 V.1)
- Johnson, Huey D. (Ed). 1970. No deposit--no return; man and his environment: a view toward survival. Addison-Wesley Publishing Company. Reading, Massachusetts. 351 p.
- Jones and Henry Engineers Limited. 1970. Proposals for a refuse disposal system in Oakland County, Michigan. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 146 p. (HE 20.1402:0a4)
- Kay, Roy. 1971. personal interview. Logan, Utah. (December).
- Kobler, Jay. 1971. Solid waste management--industries job? Environmental Control and Safety Management. 142(2):29-31 (August).
- Kolb, John. 1971. Special report on the first national conference on composting-waste recycling. Compost Science: Journal of Waste Recycling. 12(4):4-11.

- Kramer, Amihud. 1969. Using wastes formed in vegetable and cheese production. In Raymond T. Moore, Julius J. Sabo, and Donna Vankirk. 1969. Grant activities. U.S. Department of Health, Education, and Welfare. Environmental Health Service. Environmental Control Administration. Rockville, Maryland. 559 p. (HE 20.1102:G76)
- Kupchik, George J. 1971. Solid waste management: the metropolitan view. American Journal of Public Health. 61(2):359-365.
- Levinson, Eliot and Saul Yanofsky. 1971. After the water is clean (or not), then what? how? and why? Social Education. 35(1):67-73.
- Management Technology Inc. 1970. Automobile scrapping processes and needs for Maryland. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 63 p. (HE 20.1402:AU8)
- McKee, William W. 1955. Values in home management. Personal copy from Proceeding of conference on values and decision-making in home management. Department of Home Management and Child Development, Michigan State University, East Lansing, Michigan. July 4-6, 1955.
- Meyer, Judith G. 1971a. Back in circulation. Environment. 13(7):30-33.
- Meyer, Judith G. 1971b. Closing the circle. Environment. 13(7):35-37.
- Moore, Raymond T., Julius J. Sabo, and Donna M. Vankirk. 1969. Grant activities. U.S. Department of Health, Education, and Welfare. Environmental Health Service. Environmental Control Administration. Rockville, Maryland. 559 p. (HE 20.1102:G76)
- Morse, Norman and Edwin W. Roth. 1970. Systems analysis of regional solid waste handling. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 123 p. (HE 20.1402:Sy8)
- National Academy of Engineering-National Academy of Sciences. 1970. Policies for solid waste management. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 64 p. (HE 20.1402:P75)
- National Association of Counties Research Foundation. 1969. Citizen support for solid waste management. U.S. Department of Health Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 20 p. (HE 20.1402:C49)



- National Association of Secondary Materials Industries. 1971. In Judith G. Meyer. 1971a. Back in circulation. Environment. 13(7):30-33.
- Nickel, Paulena and J. M. Dorsey. 1967. Management in family living. (4th ed.). John Wiley and Sons, Inc. New York. 554 p.
- Nixon, Richard M. 1970a. Environmental quality; Presidential message to Congress recommending a 37 point administration and legislative program, February 10, 1970. U.S. Department of Health, Education, and Welfare. Public Health Service. U.S. Government Printing Office. Washington, D.C. 8 p. (HE 20.1302:En8)
- Nixon, Richard M. 1970b. Speech delivered before the 25th anniversary session of the general assembly of the United Nations, October 23, 1970. Vital Speeches of the Day. 37(3):67-69.
- Nixon, Richard M. 1970c. State of the Union message delivered before the Congress of the United States, Washington D.C. January 22, 1970. Vital Speeches of the Day. 36(8):226-229.
- Nixon, Richard M. 1970d. In Cornell H. R. A. Quarterly 11(2):2-4 (August).
- Odum, Howard T. 1971. Environment, power, and society. Wiley-Interscience. New York. 33 p.
- Paolucci, Beatrice. 1971. Personal interview with Dr. Paolucci. June 1971.
- Paolucci, Beatrice and Carol B. O'Brien. 1959. Decision-making: the crux of management. Forecast for Home Economics. November 1959: 75(9):29-30, 48.
- Prout, Carrow T. Jr. 1971. Bringing up a forest. Soil Conservation. 37(3):51.
- Quinn, James B. 1971. Next big industry: environmental improvement. Harvard Business Review. September-October 49:120-131.
- Randolph, Jennings. 1971a. In Social Education asks: what can social studies teachers to help combat environmental pollution. Social Education. 35(1):44-45.
- Randolph, Jennings. 1971b. A world wide commitment. Journal of Air Pollution Control Association. 21(2):57-59.
- Reilly, Patricia R. 1971. Teaching about environmental pollution. Social Education. 35(1):26-33+.

- Shell, G. L. and J. L. Boyd. 1969. Composting dewatered sewage sludge. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 28 p. (HE 20.1102:Se8)
- Shuster, William W. 1970. Partial oxidation of solid organic wastes. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 99 p. (HE 20.1402:0x3)
- Sorg, Thomas J. and H. Lanier Hickman, Jr. 1970. Sanitary landfill facts. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 30 p. (HE 20.1402:L23/2)
- Spurr, Stephen H. 1970. Developing a natural resource management policy. In Huey D. Johnson (Ed). No deposit--no return; man and his environment: a view toward survival. Addison--Wesley Publishing Company. Reading, Massachusetts. 351 p.
- Steidl, Rose E. 1969. An ecological approach to the study of family managerial behavior. A speech presented at national conference on the family: focus on management. Pennsylvania State University. June 30, 1969. Personal copy.
- Tasseff, Ann. 1970. Solid wastes programs and research. Bureau of National Affairs, Inc. Environment Reporter: Monograph 6. 1(33):1-27.
- Teller, A. J. 1971. Solid waste disposal: impossibility vs. profitability. Environmental Control and Safety Management. 141(3):11-12.
- Thomas, Dean and Hoskins, Inc. 1970. Comprehensive study of solid waste disposal in Cascade County, Montana: final report on a solid waste demonstration. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 188 p. (HE 20.1402:C26)
- Thompson, William. 1971. In John Kolb. Special report on the first national conference on composting-waste recycling. Compost Science: Journal of Waste Recycling. 12(4):4-11.
- Treeger, T. C. 1970. Disposables and disposability. Cornell H. R. A. Quarterly. 11(2):14-17.
- Trelour, James A. 1971. The earth and Eric Matus. The Detroit News. May 1971.
- U.S. Department of Health, Education, and Welfare. 1971. Environmental education: education that can't wait. U.S. Government Printing Office. Washington, D.C. 40 p.

- Vaughan, Richard D. 1968. Forward. In William T. Ingram, and F. P. Francia. 1968. Quad-city solid wastes project: an interim report, June 1, 1966 to May 31, 1967. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 181 p. (HE 20.2:So4)
- Vaughan, Richard D. 1969. Forward. In Department of Sanitary Engineering, District of Columbia. Kenilworth model sanitary landfill: interim report on a solid waste demonstration project: December 1967-January 1969. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 105 p. (HE 20.1102:K35)
- Vaughan, Richard D. 1970a. Forward. In Institute of Industrial Research, University of Louisville. Louisville, Ky.--Ind. metropolitan region solid waste disposal study: interim report on a solid waste demonstration project: Volume I: Jefferson County, Kentucky. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 205 p. (HE 20.1402:L93 V. 1)
- Vaughan, Richard D. 1970b. Forward. In National Academy of Engineering-National Academy of Sciences. Policies for solid waste management. U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management. U.S. Government Printing Office. Washington, D.C. 64 p. (HE 20.1402:P75)
- Wagar, J. A. 1970. The challenge of environmental education. Today's Education. 59(9):14-18.
- Wakefield, B. D. 1970. In Ruth Adams. Recycling to bolster our dwindling reserves. Compost Science: Journal of Waste Recycling. 12(1):20-22.
- Wallace, Elizabeth S. 1971. The individual and the environmental revolution. Social Education. 35(1):38-43+.
- Zandi, Iraj. 1969. Pipe transport of domestic solid waste. In Raymond T. Moore, Julius J. Sabo, and Donna M. Vankirk. 1969. Grant activities. U.S. Department of Health, Education, and Welfare. Environmental Health Service. Environmental Control Administration. Rockville, Maryland. 559 p. (HE 20.1102:G76)

## APPENDIX

December 20, 1971

To Whom It May Concern:

This letter is to introduce our graduate student, Carroll Latham. Carroll is doing some research sponsored by the Environment and Man Program at Utah State University.

If you could be of any assistance to her, we would appreciate your cooperation in this project.

Sincerely yours,

Edith Nyman,  
Household Economics  
and Management

Phyllis R. Snow, Dean  
College of Family Life

## BACKGROUND INFORMATION SHEET

1. Name of Father \_\_\_\_\_
2. Address \_\_\_\_\_
3. Age of father \_\_\_\_\_
- Under 25 \_\_\_\_\_
- 25 - 29 \_\_\_\_\_
- 30 - 34 \_\_\_\_\_
- 35 - 39 \_\_\_\_\_
- 40 - 44 \_\_\_\_\_
- 45 - 50 \_\_\_\_\_
- Over 50 \_\_\_\_\_
4. Age of mother \_\_\_\_\_
- Under 25 \_\_\_\_\_
- 25 - 29 \_\_\_\_\_
- 30 - 34 \_\_\_\_\_
- 35 - 39 \_\_\_\_\_
- 40 - 44 \_\_\_\_\_
- 45 - 50 \_\_\_\_\_
- Over 50 \_\_\_\_\_
5. Ages of children \_\_\_\_\_
6. Occupation of father \_\_\_\_\_
7. Is mother employed outside of home? Yes \_\_\_ No \_\_\_
- Part-time \_\_\_ Full-time \_\_\_
8. Education of father:
- |                  |                     |               |
|------------------|---------------------|---------------|
| Grade school ___ | Number of years ___ |               |
| High School ___  | Number of years ___ | Graduated ___ |
| College ___      | Number of years ___ | Graduated ___ |
9. Education of mother:
- |                  |                     |               |
|------------------|---------------------|---------------|
| Grade school ___ | Number of years ___ |               |
| High School ___  | Number of years ___ | Graduated ___ |
| College ___      | Number of years ___ | Graduated ___ |
10. Income level (Check the level which applies to you.)
- \$4,999 and under \_\_\_
- 5,000 - 7,999 \_\_\_
- 8,000 - 9,999 \_\_\_
- 10,000 - 11,999 \_\_\_
- 12,000 and above \_\_\_
11. Do you take a newspaper? Yes \_\_\_ No \_\_\_ Please give the names of  
those you subscribe to or buy regularly: \_\_\_\_\_
- \_\_\_\_\_

12. What magazines do you subscribe to or buy regularly?

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13. Do you plant and harvest from a home garden? Yes \_\_\_ No \_\_\_

14. Do you do home canning? Yes \_\_\_ No \_\_\_

15. If you do home preserving, please estimate the percentage you purchase \_\_\_\_\_ and the percentage you preserve for home use. \_\_\_\_\_

## VITA

Carroll Porter Latham

Candidate for the Degree of

Master of Science

Thesis: Individual Family Contribution to Paper Pollution in Cache County

Major Field: Household Economics and Management

## Biographical Information:

Personal Data: Born at Salt Lake City, Utah March 24, 1930, of Irven Henry and Nellie Hicks Porter; married Mark Guy Latham March 15, 1957; three children -- Hope, Lynanne, Max.

Education: Attended elementary school at Edison School in Salt Lake City, Utah and Buffalo Grade School at Buffalo, Wyoming; attended Johnson County High School and Vernal (Utah) High School; graduated from Johnson County High School, Buffalo, Wyoming in 1948; received the Bachelor of Science degree from the Brigham Young University with a composit major in Home Economics in 1955; completed requirements for the Master of Science degree in Household Economics and Management, at Utah State University in 1972.

Professional Experience: 1959-62, Home Agent, Greenley and Coconino Counties, Arizona; 1956-58, Home Demonstration Agent, Big Horn County, Wyoming; 1955-56, teacher of home economics, biology, English 1-2, 3-4, and Spanish 1, Dayton High School, Dayton, Wyoming; 1952-53, third and fourth grade teacher, Reno Hill School, Johnson County Wyoming.