

MINUTES OF THE House COMMITTEE ON Energy and Natural Resources

The meeting was called to order by Representative David J. Heinemann at
Chairperson

3:30 ~~xx~~ p.m. on January 12, 1983 in room 519-S of the Capitol.

All members were present except:

Representative Ben Foster (excused)

Committee staff present:

Ramon Powers, Research Department
Theresa Kiernan, Revisor of Statutes' Office
La Nelle Frey, Secretary to the Committee

Conferees appearing before the committee:

Jim Aiken, Director, Division of the Environment, Department of
Health and Environment.
Guy Gibson, Chief Engineer, Division of Water Resources, State
Department of Agriculture.

Chairman Heinemann reiterated the need for all committee members to voice their preference of either serving on the Energy or Natural Resources subcommittee. Representative Ron Fox will chair the Natural Resources Subcommittee and Representative Keith Farrar will chair the Energy Subcommittee.

Jim Aiken outlined the nine programs which the Division of Environment is responsible for. He said these programs include general environmental-governmental regulatory programs that are found in most state and federal governmental agencies, and include: air pollution control, surface water pollution control, ground water pollution control, waste management (which includes hazardous waste, solid waste and general environmental sanitation items), radiation control, public drinking water, and environmental toxicology. He then elaborated on some of the activities and studies that had been undertaken by the Division (see attachment 1). A brief question and answer period followed the presentation.

Guy Gibson discussed the meetings held between the Environmental Protection Agency and the Division of Water Resources regarding the feasibility of Kansas assuming that part of the 404 Program pertaining to dredge and fill activities on non-navigable waters in the State of Kansas (see attachment 2). He reviewed the status of the water quality problem in Groundwater District No. 2 near Burrton, Kansas. He expects to receive a report the first week of February from the interagency task force dealing with this matter. Mr. Gibson reported on the Marais Des Cygnes River study. He said the Kansas Department of Health and Environment and the Fish and Game Commission have determined that through the months of June, July, August and part of September, the stream flow was inadequate. The Corps of Engineers has been releasing water from the Melvern and Pomona Reservoirs but are now in the process of reevaluating this. Mr. Gibson suggested the State of Kansas might want to consider the possibility of purchasing water from these reservoirs. Mr. Gibson explained the background of the Arkansas River-Colorado situation. He said it has been decided to attempt to formulate a procedure for arbitration for the Kansas-Colorado Arkansas River Compact. Mr. Gibson stated that he is very satisfied with his agency's computer system which has some excellent programs being run on it. A brief question and answer period followed the presentation.

There being no further business to come before the committee, the meeting adjourned at 5:00 p.m.

The next meeting of the committee will be held at 3:30 p.m. on January 18, 1983.

Rep. David J. Heinemann, Chairman

Date January 12, 1983

GUESTS

HOUSE ENERGY AND NATURAL RESOURCES COMMITTEE

NAME

ADDRESS

ORGANIZATION

Dick Morrissey

KDHE

Jim Aiken

KDHE

James Power

KDHE

Scot WRIGHTON

CITY OF WICHITA

Richard Kuentz

Dept of Administration

Clark Ruffey

Staff - Ks Water Authority

D. WAYNE ZIMMERMAN

TOPEKA

THE ELECTRIC CO'S ASSOC. OF KS.

Patricia Boham

KCC

David W. Nichel

KCC

Tony D. Clark

E.P.E. Co.

Kunyh Wedel

Kansas Natural Resource Council

Jerry Coorsed

KGE

Scott McConkey

Western Power

LON STANTON

TOPEKA

KP&L

Russ Hatfield

WRD

Jeff Mason

Lawrence

Committee Chairman

Clay E. Gibson

Div. of Water Resour., Ks. St. Bd. of Agric.

1-12-83

House Energy and
Natural Resources

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

DIVISION OF ENVIRONMENT

James F. Aiken, Jr., Director
January 12, 1983

The Division of Environment has statutory authority for control of most environmental contaminants and conditions relating to human health and welfare, aquatic flora and fauna, plant and animal life, and the soil. The division has grown steadily throughout the years with additional legislative changes to the point that balanced, yet interrelated, comprehensive environmental control programs have been achieved. The environmental goals within specific statutory responsibilities are to maintain a healthful environment free from disease-causing agents; reduce and prevent irritants affecting the enjoyment of life and property; preserve our natural resources; and develop environmental control programs which are responsive to the needs of Kansas in a cost-effective manner.

To achieve the environmental goals and legislative mandates, our activities are primarily regulatory in nature; however, the division also provides consultation services to individual citizens, municipalities, and industry. These activities and services are provided through technical review of plans and specifications, not only to indicate probable compliance with standards but additionally to indicate and suggest better and more cost-effective alternatives if possible. Counsel is provided on safe and effective methods of handling a wide variety of chemicals and hazardous wastes. Publications and guidance are provided to local agencies and citizens on construction of effective rural sewerage systems and water supply wells. Training programs are provided to operators of municipal and industrial water supplies, waste treatment plants, and solid and hazardous waste facilities so that compliance, efficiency, and economy will result.

Over the next several years, expanded environmental concern will relate to --

- (a) groundwater pollution from increased petroleum activity;
- (b) control, management, storage, and disposal of hazardous wastes and sources of radiation; and
- (c) environmental toxicology.

Groundwater Pollution

The state water quality management studies were developed under Section 208 of the Federal Clean Water Act and are commonly referred to as the "208 studies." The plan was submitted to the 1979 session of the Kansas Legislature. After extensive committee deliberation, the Kansas Water Quality Management Plan was adopted. Later that year, both Governor Carlin and the Environmental Protection Agency Regional Administrator put their approval on the plan. The Kansas Legislature, in adopting the plan, directed the Kansas Department of Health and

Environment to continue its work on development of a statewide groundwater quality management plan and report to the Legislature in 1981. The plan was submitted to the 1982 session of the Legislature. During this session, the Legislature spent considerable time and effort dealing with that portion of the plan to control and regulate the oil and gas field pollution problems in Kansas. The result of this work was passage of Senate Bill 498. This bill provided statutory authority to implement that portion of the plan. During the last year, the Kansas Corporation Commission and the Kansas Department of Health and Environment have been working on implementing the legislation.

1. Joint district offices are established.
2. Field staffs are integrated.
3. New rules and regulations have been adopted by KCC.
4. The management plan is being finalized.

The remaining elements of the Kansas Groundwater Quality Management Plan were deferred until this session. As a result, Governor Carlin requested the Kansas Water Authority review and make recommendations on the remaining elements. In early July, state agencies met to formulate recommendations on eleven items proposed by the Kansas Department of Health and Environment. The Authority will be making its recommendation during the session.

1. One item will be deferred for consideration by the Authority in development of its master plan.
2. Four items will be introduced for legislative review.
3. Two items involved rules and regulations.
4. Four were handled by interagency agreements.

Hazardous Wastes

In 1981, the Legislature created a new hazardous waste act by extracting provisions from the Solid and Hazardous Waste Act and by adding new sections. The end result was separate solid and hazardous waste programs. The hazardous waste legislation deals with hazardous and radioactive wastes. The Kansas Department of Health and Environment will be recommending legislation to separate these two issues. During this last year, the following has been accomplished:

1. First meetings of the Hazardous Waste Disposal Facility Approval Board were conducted.
2. Cleanup of the hazardous waste site near Furley is progressing smoothly and efficiently with the work expected to be completed within the next three months.

3. U.S.E.P.A. prioritized four abandoned hazardous waste sites as top candidates for continuing study and remedial action -- Tar Creek area in Cherokee County; a refinery near Arkansas City; a sludge lagoon from an old waste oil recovery site in Wichita; and a landfill in Johnson County.
4. KDHE has entered into a contract with a private consulting firm to examine the alternatives to land disposal of selected hazardous wastes.

The last session of the Legislature passed the Central States Low-Level Radioactive Waste Compact and legislation to implement the compact. Since that time, the state of Louisiana has ratified the compact. Indications are Nebraska, Oklahoma, and Arkansas Legislatures will consider and probably ratify the Central States Compact. Missouri, Iowa, and Minnesota will consider the Central and Midwest States Compacts. The Central States Compact should be ratified by a sufficient number of states by midyear to allow transmittal to the U.S. Congress for its ratification.

Legislative Proposals

There are three items which will require legislative review this session. These are:

1. The separation of the hazardous and radioactive waste legislation (K.S.A. 65-3430 through 3448 and K.S.A. 48-1601 et seq.). KDHE requests that the proposed legislation be introduced as committee bills.
2. A minor amendment to the Central States Low-Level Radioactive Waste Compact. The state of Louisiana included South Dakota as an eligible state. Kansas will need to ratify that change. KDHE will request that one of the committees introduce the bill.
3. The Kansas Water Authority will be requesting legislation to implement the Kansas Groundwater Quality Management Plan.
 - (a) All governmental agencies would be required to comply with KDHE regulations on construction and abandonment of wells (new section in K.S.A. 82a-1201 et seq.).
 - (b) Increase the limit of pollutant discharge cleanup fund (K.S.A. 65-171w).
 - (c) Broaden KDHE's authority to deal with polluters not regulated by KDHE (K.S.A. 65-170d).
 - (d) Amend the intensive groundwater use control law allowing the KDHE to identify deterioration of contamination of groundwater resources (K.S.A. 82a-1036).

In 1979, the Kansas Legislature passed Senate Concurrent Resolution 1640 which directed KDHE to report back to the Legislature in 1984 on the state's water quality management plan. The department will be pulling together the various studies this next year and preparing a policy plan for consideration next January.

Resume

Kansas is blessed with a healthy environment relatively free of major pollution problems. The state has been, and still is, a leader in identifying, preventing and correcting environment problems as they occur. This does not mean we are without problems.

Program costs associated with these expanded areas of concern and the others that continue to need to be addressed are rising. Both the state and supplementing federal fiscal resources that have been available to meet these costs are becoming increasingly limited. Perhaps the greatest environmental control challenge that will need to be faced during the next several years will not be what needs to be done, but how, and how much of it, can be done. The key element in making this determination in an effective manner will continue to be the thoughtful and purposeful execution of the responsibilities for the development of sound statewide environmental management control programs that we all share.

Division of Water Resources
Kansas State Board of Agriculture

Feasibility Study for Assuming that Part of the
404 Program Pertaining to Dredge and Fill on Non-Navigable Waters
in the State of Kansas

The Division of Water Resources, Kansas State Board of Agriculture, was approached by the Environmental Protection Agency and formal meetings were held between the Environmental Protection Agency (EPA) and the Division of Water Resources (DWR) on November 15, 1982, November 23, 1982 and December 20, 1982, to discuss the feasibility of Kansas assuming that part of the 404 Program pertaining to dredge and fill activities on non-navigable waters in the State of Kansas. Persons involved in these meetings were Bob Koke and Joe Najarian from EPA and Guy E. Gibson, George Austin and Emmett Dusharm of DWR.

The Federal 404 Program in Kansas is currently being handled by two Corps of Engineers Districts. The Kansas River Basin is under the authority of the Kansas City District and the Arkansas River Basin, under the Tulsa District. DWR has good relationships with both Districts and is not critical of the effort or cooperation of the Districts, but for the benefit of the Kansas public, it seems desirable for them to be served by one state agency. Because of Federal government policy, EPA wants a state agency to assume the 404 Program and since DWR is the regulatory agency which administers the permit program which most closely meets EPA guidelines, EPA has expressed that DWR should conduct a study regarding assumption of the program by DWR. Presently under the provisions of K.S.A. 82a-301 through 305a, DWR processes applications and plans which require a 404 permit. Other laws administered by DWR applicable to the 404 program are K.S.A. 82a-307 through 82a-311 and K.S.A. 24-126.

As a result of the meetings held with EPA, on January 4, 1983, Harland E.

Atch. 2

Priddle, Secretary of the Kansas State Board of Agriculture, signed a grant application in the amount of \$60,135 from the Environmental Protection Agency. This grant application has now been reviewed by the EPA Regional Administrator, Morris Kay, and will be forwarded to Washington, D.C., with a recommendation of approval for funding. These funds will be used by DWR to make a feasibility study of DWR assuming that Section of the 404 program pertaining to dredge and fill on non-navigable waters in the State of Kansas.

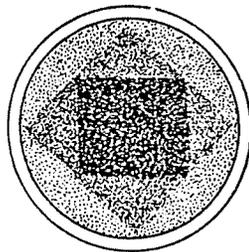
The feasibility study shall consist of five tasks:

1. Conduct an administrative framework analysis of DWR describing the current responsibilities and any additional responsibilities that would be needed for DWR to assume the program.
2. Develop proposals for memorandums of understanding between federal and state agencies to establish procedures to carry out the program.
3. Outline a general description of activities to be coordinated with the U. S. Corps of Engineers relating to navigable waters in the State of Kansas.
4. Determine levels of expertise and costs needed to operate the program.
5. Analyze current statutory authority and determine if additional legislation or regulations are needed for a state program.

This grant study will conclude June 30, 1984, after which a decision will be made as to whether to enter into a pilot program for a period of one year. The pilot program is a training period in which the state gains experience in operating the permit program. At the end of the pilot program a decision will be made whether to retain the program on a permanent basis. DWR may withdraw from the program at any time and the program would revert back to the Corps of Engineers.

FISCAL YEAR 1984

**KANSAS WATER
RESOURCES PROGRAMS**



**A REPORT TO THE
GOVERNOR
AND
LEGISLATURE**

The State of Kansas

JOHN CARLIN, GOVERNOR

KANSAS WATER AUTHORITY

Name	Position	Representing	Term Expires
Mr. Patrick J. Regan Wichita, Kansas	Attorney	Governor	
Mr. Doyle Rahjes Agra, Kansas	Farmer	President of Senate	1983
Mr. F.E. Withrow, Jr. Wichita, Kansas	Wichita City Water Dept.	Speaker of House	1983
Mr. Jack Alexander Topeka, Kansas	Water Commissioner City of Topeka	Kansas League of Municipalities	1985
Mr. Hugh Armstrong Salina, Kansas	Contracting Officer, Spill- man Creek Watershed District	State Assoc. of Kansas Watersheds	1986
Mr. Robert J. Binder Hays, Kansas	Chairman, Ellis Co. Conser- vation District	Kansas Assoc. of Conservation Districts	1984
Mr. Larry K. Panning Ellinwood, Kansas	Chairman, Big Bend Ground- water Management District	Groundwater Manage- ment Districts #2 & #5	1986
Mr. Eugene L. Shore Johnson, Kansas	Chairman, Groundwater Mgmt. District No. 3	Groundwater Manage- ment Districts #1, #3, & #4	1983
Mr. Don C. Smith, Jr. Hutchinson, Kansas	Attorney	At Large	1985
Vacant		Kansas Assoc. of Commerce & Industry	1983
Mr. Marshall N. Tatum Fontana, Kansas	Exec. Sec., Rural Water Dist. Association	Rural Water District Association	1984
Mr. James F. Aiken	Director, Division of Environment	Ex Officio	
Dr. John Dunbar	Director, Agricultural Ex- periment Station, KSU	Ex Officio	
Mr. Guy Gibson	Chief Engineer-Director, Divison of Water Resources	Ex Officio	
Dr. W.W. Hambleton	Director, Kansas Geological Survey, KU	Ex Officio	
Dr. Allyn O. Lockner	Director, Kansas Water Office	Ex Officio	

The State of Kansas

FISCAL YEAR 1984

KANSAS WATER

RESOURCE PROGRAMS

A Report to The

Governor .

And

Legislature

Kansas Water Authority

October 1, 1982

KANSAS WATER AUTHORITY

Patrick J. Regan, chairman



The New England Building Suite 303 · 503 Kansas Avenue · Topeka Kansas 66603 · Telephone (913) 296-3185

The Honorable John Carlin
Governor of Kansas
Kansas Statehouse
Topeka, Kansas 66612

Dear Governor Carlin,

On behalf of the Kansas Water Authority, I transmit to you our review of Fiscal 1984 water resource agencies' budgets and programs. This review raises a number of questions the Authority believes require further investigation by the Governor and the Legislature.

While this report focuses more in-depth on the state's lead planning agency, it is anticipated that subsequent annual reports will focus to a similar degree on other agencies. The Authority, however, has concluded that the state's planning agency is a key to unraveling some of Kansas' water management problems and to charting some new directions in water management in this state. The Kansas Water Authority has satisfied itself that new directions are in order.

It is imperative that this state develop a master water resource development and implementation plan and a master water resource research plan as soon as possible to protect the best interests of the state as a whole. To this end, the Kansas Water Authority submits its budget review and suggests some options for beginning to map, through budgeting, a new course in water management in Kansas.

The voting members of the Kansas Water Authority have unanimously approved this report. Members do not mean for it to be critical as much as we sincerely hope that it is constructive -- a place for the Governor and the Legislature to begin to tackle some of the urgent problems inherent in water resources management in Kansas.

Sincerely,

A handwritten signature in cursive script that reads "Patrick J. Regan".

Patrick J. Regan
Chairman
Kansas Water Authority

PJR:mm

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LETTER OF TRANSMITTAL

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INTRODUCTION

About a year ago the Governor and the Legislature assembled the Kansas Water Authority, a body representative of the diverse water use interests of this state, to review the direction our water laws and water policies and state spending in this area were inevitably leading us. The Legislation created the Authority as a check on state agencies, each responsible for only a fragment of water policy administration or management. That check would be made by a group that would be compelled by consensus to look at the water needs of the state as a whole and at the ramifications of laws and policies on all the various interests and sectors of this state.

The Kansas Water Authority, while a lay board, does bring to its efforts substantial expertise in water use and water management. Members represent the Governor, the Senate president and the House speaker. They represent irrigators and dryland farmers, the Kansas League of Municipalities and the Kansas Rural Water District Association. They represent the Kansas Association of Conservation Districts, the Kansas Association of Watershed Districts, the Groundwater Management Districts and the Kansas Association of Commerce and Industry.

Additional expertise is provided by the ex officio members representing the Kansas Division of Environment; the Division of Water Resources, State Board of Agriculture; the Kansas Geological Survey; the Agricultural Experiment Stations and the Kansas Water Office.

Each meeting of the Authority further illustrates that individually, members have neither the authority, nor the resources, nor the expertise to get a handle on Kansas' water resources needs and planning solutions independent of each other. Collectively, however, the Authority has all of the resources to make all of the long overdue recommendations for improvements in Kansas water policy. Most importantly, this Authority is the only place where total responsibility rests in one place for water appropriation, allocation, sale and management subject to the approval of the Governor and the Legislature.

Voting members of the full Authority unanimously approved this report and its recommendations.

OVERVIEW

The Kansas Water Office is the state agency primarily charged with long-range planning for the management and development of water resources and the planning and coordination of related research programs in the interest of the state as a whole.

The Kansas Water Authority therefore concentrated its budget review on planning efforts and the direction of planning programs in the Kansas Water Office. The Authority is frustrated and surprised at the state of planning efforts and at the lack of planning results in the Kansas Water Office and encourages the Governor and the Legislature to pursue questions the Authority raises and alternatives it presents regarding this crucial responsibility entrusted to this agency.

The Authority has made a special effort to analyze both planning philosophies and work products in terms of their responsiveness to anticipated water resource and water supply problems. The budget review necessarily measured the KWO's progress in devising a water management and development implementation plan to address statewide needs and assessed the relationship of KWO's research program to planning needs and efforts.

The Authority raises serious questions about the planning philosophy which underpins this agency's entire effort and about the realistic ability of the KWO's research planning and coordination program to respond on a timely basis to planning needs. The Authority seriously questions whether KWO spending is properly balanced to provide decisionmakers recommendations and alternatives for water management and development.

Some general observations are necessary for perspective. Just as there are nearly infinite demands for the use of water, so are there countless approaches to planning for managing and developing water resources unless statewide general guidelines are outlined and implementation strategies adopted.

In Kansas, the statutes provide some broad general guidelines and goals for water development and management. But the statutes are silent on any actual implementation plan that orders priorities and sets timetables and specific methods for achieving or accomplishing the goals.

Without this, the Authority finds numerous instances where it appears that data collection and research activities of the state are not directed by any particular statewide planning and policy demands. While numerous research activities are conducted in Kansas, many of the studies do not appear to address issues pressing lawmakers. There are also numerous technical planning studies and programs, but numbers do not appear to be directed toward providing information for the most urgent water policy recommendations. Solid coordination of research to maximize results for dollars invested, multi-agency ability to store and retrieve information collected for the state as a whole and the real ability to use the information is thwarted.

While there may be a great deal of intent or attempt to do planning in Kansas water resource agencies, the results are elusive. As one Authority member put it: "I guess I've farmed in western Kansas too long. We're used to seeing things done on a yearly basis. Either you get a harvest or you don't. It seems we're just not reaping a full harvest here."

The lack of results on a cumulative basis, on an annual basis and the lack of acceptable proposed results is disturbing, particularly measured against the dollars and manpower budgeted and allocated.

Excluding funding for the Kansas Water Authority, passed through the Kansas Water Office, about \$842,400 can be identified for KWO data collection and research, technical planning and policy planning. The Authority is concerned, and would direct the attention of the Legislature and the Governor to the fact, that only about 5 percent of this budget is actually earmarked for policy planning in Fiscal 1984. The scales are heavily tipped toward data collection and research -- about 59 percent of the disposable funds are earmarked for data collection and research and about 36 percent of the total budget is targeted toward technical planning.

An examination of the total picture for all state water-related agencies and spending indicates dollars budgeted for policy planning are at a minimum -- a situation with significant potential for seriously undermining a total water resource management investment exceeding \$15 million in Kansas, much of it State General Fund dollars.

For all water-related agencies, many of which have cornered some particular aspect of planning responsibility, roughly \$2.33 million is budgeted in Fiscal 1984 for data collection and research, technical planning and policy planning. Of that amount, policy planning captures only 10 percent of the proposed spending. Again, about 68 percent is requested for data collection and research and about 22 percent is proposed for technical planning. The imbalance in policy planning priorities weighed against data collection and research and technical planning is pervasive.

Data collection, research and technical planning are of little value unless these activities are driven by master management and development implementation plans, decisionmaking priorities or a master research plan integrally related to the most urgent policy decisions or implementation decisions. Likewise, when dollars are allocated in all directions to support a myriad of undirected projects or programs, the harvest reaped on that investment can only be disappointing.

The Authority is surprised at the apparent low priority for policy planning reflected in the percentage of funds allocated to this responsibility in the Kansas Water Office -- the lead planning and policy agency. There appear to be significant and potentially detrimental gaps in policy planning for the state as a whole which affect not only the value of data collection, research and technical planning, but can contribute to disjointed regulatory, enforcement and administrative directions throughout the water resource agencies.

The Authority is extremely concerned that the Kansas Water Office program, instead of concentrating on a statewide strategy for achieving water development and management goals and a strategy for truly marrying the long-range research program to this plan, is on a track more in competition with the predominant responsibilities of other state agencies whose roles are more specifically data collection and research or technical assistance to local units of government.

The Authority can readily identify more than \$2 million in water resource related technical assistance to local units of government provided by state agencies and state agency personnel. Roughly another \$2 million in state monies is passed on directly to the hands of local units of government for water-related activities.

Exclusive of the Kansas Water Office, other state agencies provide technical assistance to local governments such as responses to about 1,500 requests by the Kansas Geological Survey beyond such special assistance as projects for Groundwater Management Districts. Other agencies with substantial assistance programs include the State Conservation Commission's aid to local soil conservation districts; the Agricultural Experiment Station's programs and the Kansas Department of Health and Environment's water supply and water quality assistance to cities and rural water districts, quality testing and wastewater management assistance programs.

It would seem that all of these technical assistance efforts could be enhanced with real direction from a master research plan and a master water management and development plan that should be developed in the planning branch of the water resource agencies in Kansas. It would seem to the Authority that the benefits generated for the dollars spent for water data collection and water research in other agencies could be improved as well as benefits enhanced from dollars invested in regulatory, enforcement and administrative programs if the state's primary planning agency had developed the master research and implementation strategies to underpin all water activities.

Because of the small percentage of funds allocated to policy planning particularly in the Kansas Water Office, but in water resource programs for the state as a whole, the Authority examined other Kansas Water Office programs to try to understand why they claim larger percentages of the planning agency's available funds. This examination raised additional questions as to whether the Kansas Water Office's concentration of spending and manpower in non-policy planning areas is truly in the best interest of the state now and over the longterm. The Kansas Water Authority believes that it is not in the best interest of the state.

The following sections of this report provide the Kansas Water Authority's review of the programs and budgets of the individual state agencies. Each section provides a brief description of the agency's water-related programs corresponding to its budget documents. Expenditure estimates may be approximations of anticipated expenditures to accomplish objectives because some agencies submitted estimates to the Authority before budgets were finalized.

KANSAS WATER OFFICE

WATER RESOURCES PROGRAM: Water Resources

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Planning and Policy Development Subprogram

RELATION TO STATE WATER PLAN GOALS: The Subprogram addressed all of the goals and objectives listed at KSA 82a-927 in that it evaluates them, formulates proposed revisions of them, and reviews proposed actions in accordance with them.

PROGRAM EXPLANATION: Primary activities in this Subprogram are:

1. The formulation of area water plans for each area of the state and the establishment of a process for plan implementation, evaluation and revision.
2. The definition of minimum streamflows for streams in Kansas.
3. The analysis of the mineralization of Kansas streams and the formulation of proposed solutions.
4. The evaluation of the State Water Plan and related legislation and the formulation of proposed revisions.
5. The provision of technical analyses to executive and legislative entities on water-related topics.
6. The coordination of water-related activities among federal, state and local resource agencies.
7. Pilot groundwater recharge projects.

PROPOSED FY 1984 OPERATIONS: Area planning activities are being done in several sections and are going to extend over several years. The 1984 year should see the conclusion of the first section covering the Neosho Basin. The minimum streamflow activity will parallel the area planning studies. The Ninnescah is the target region for mineral intrusion studies in 1984. State Water Plan review operates as a continuing activity to assure goals, objectives, policies and programs that address Kansas water problems. The Legislature and other governmental agencies require analyses of various water-related questions. The coordination of the activities of the water resources agency operations is a continuing activity. Improvements will continue to be made in managerial and other internal operating procedures. Resumption of pilot groundwater recharge projects will be requested.

APPROXIMATION OF EXPENDITURES*	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$534	\$572	\$612	\$655	\$701
Aid to Local Units	56	144	200	200	0
Other Assistance					
Capital Improvements					
Total	\$590	\$716	\$812	\$855	\$701
Expenditures by Fund:					
State General Fund	\$590	\$716	\$812	\$855	\$701
Special Revenue Funds					
Total	\$590	\$716	\$812	\$855	\$701
Full Time Positions	13	13	13	13	13

*All expenditures are stated in thousands of dollars and in terms of projected 1984 prices and the proposed 1984 salary policy.

KANSAS WATER OFFICE

WATER RESOURCES PROGRAM: Water Resources

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Technical Services Subprogram

RELATION TO STATE WATER PLAN GOALS: The Subprogram addresses all of the goals stated in K.S.A. 82a-927 by providing technical assistance to the Planning and Policy Development Subprogram and other entities. Technical Services also undertakes the Water Marketing and Weather Modification activities.

PROGRAM EXPLANATION: Collect and interpret information about precipitation, stream-flow, and sediment to understand the hydrologic process and formulate decisions for management, conservation, and development of the state's water resources. Collect and interpret data on municipal, industrial, and other water uses to determine water needs and problems. Conduct hydrologic studies. Review and comment on studies by other agencies to improve and increase the knowledge of the water resources of Kansas.

Negotiate to purchase water supply storage capacity in federal reservoirs. Negotiate contracts for the sale of water from storage in nine federal reservoirs, monitor water use, and send bills and receive payments.

Evaluate applications and issue licenses and permits for weather modification activities. Monitor for compliance with restrictions. When possible, collect data and evaluate results.

PROPOSED FY 1984 OPERATIONS: Negotiation of several contracts for sale of water is anticipated. A moratorium was imposed by Kansas Water Authority (KWA) in February 1982, pending review of the state water marketing program. Changes to the marketing program will influence potential purchasers' beginning or continuing negotiations. Funds are needed for collecting data and evaluating effects of sediment problems.

Payments to the federal government for reservoir repayment will be higher in FY 1984 due to higher operation and maintenance costs. Negotiations for purchase of reallocated storage in existing federal reservoirs are expected to be in progress during 1984.

Hydrologic studies are underway as part of the cooperative agreement with the U.S. Geological Survey (USGS). They will continue in FY 1984 and beyond. They are important to determining the connection between surface water and groundwater adding to other knowledge of water resources. Site-specific information is needed for planning purposes and for guidance in water rights administration.

Weather modification activity will include processing applications and issuing licenses and permits. Only limited compliance monitoring will be possible. Funds are requested for evaluation of results.

Improvements will continue to be made in managerial and other internal operating procedures.

APPROXIMATION OF EXPENDITURES*	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$2,642	\$3,227	\$3,261	\$3,282	\$3,318
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	\$2,642	\$3,227	\$3,261	\$3,282	\$3,318
Expenditures by Fund:					
State General Fund	\$2,642	\$3,227	\$3,261	\$3,282	\$3,318
Special Revenue Funds					
Total	\$2,642	\$3,227	\$3,261	\$3,282	\$3,318
Full Time Positions	6.5	6.5	7.5	7.5	7.5

* All expenditures are stated in thousands of dollars and in terms of projected 1984 prices and the proposed 1984 salary policy.

KANSAS WATER OFFICE

WATER RESOURCES PROGRAM: Water Resources

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Administration Subprogram

RELATION TO STATE WATER PLAN GOALS: The Subprogram addresses all of the goals and objectives listed at KSA 82a-927 by providing management and executive direction for the Kansas Water Office (KWO) and secretarial, clerical, administrative and accounting services for the other KWO subprograms.

PROGRAM EXPLANATION: Functions carried out in the Administration Subprogram include the day-to-day work activities required for effective and efficient management of the entire Water Resources Program: Management and Executive Direction; Typing/Reception; Budgetary/Accounting/Purchasing; Personnel/Affirmative Action/Benefits; Records/Filing; and Maintenance of agency management system. These activities are currently being carried out by seven managerial, administrative, clerical, secretarial, and accounting staff personnel. Two positions held open during F.Y. '82 due to budgetary constraints are anticipated to be filled in F.Y. '83. Activities are carried out in response to the needs of the agency as a whole, and in response to the specific needs of the other subprograms of the agency.

PROPOSED FY 1984 OPERATIONS: To meet anticipated needs of Water Resources Program in FY 1984 and beyond, the Subprogram will continue to improve managerial and other internal operations and procedures. Also, the following are proposed: maintaining staffing level at 9, addition of state of the art word processing stations, purchase of conference recording equipment and replacement of inadequate copying equipment. This would enable the KWO to make more effective and efficient use of clerical and secretarial personnel.

APPROXIMATION OF EXPENDITURES*	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$343	\$348	\$353	\$365	\$370
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	\$343	\$348	\$353	\$365	\$370
Expenditures by Fund:					
State General Fund	\$343	\$348	\$353	\$365	\$370
Special Revenue Funds					
Total	\$343	\$348	\$353	\$365	\$370
Full Time Positions	9	9	9	10	10

*All expenditures are stated in thousands of dollars and in terms of projected 1984 prices and the proposed 1984 salary policy.

KANSAS WATER AUTHORITY REVIEW
OF THE KANSAS WATER OFFICE

PLANNING:

The Kansas Water Office director confirmed to the Authority that no real statewide water management, development or allocation plan exists with implementation strategies to meet the needs of the state as a whole. While broad general goals are outlined in statutes, there is no real method or plan or timetable for realizing these goals and no established priorities for action to develop or acquire the water needed to meet statewide needs.

In fact, the Authority has found it difficult to obtain from the KWO a realistic, valid picture of updated needs projections. The Authority also found it difficult to determine whether KWO has any priorities or a timetable for actions to meet needs that promise to become critical rapidly in particular areas of the state.

A great deal of assistance had to be sought from the Kansas Department of Health and Environment's Bureau of Water Supply for the Authority to get a handle on immediate water supply needs. Water supply needs determinations are important because management, financing and policy decisions may have to be made if the state is to meet statutory responsibilities of "The development to meet the anticipated future needs of the people of the state of sufficient supplies of water for beneficial purposes" and its responsibility for "The efficient and economic distribution of the water supplies of the state."

But the Authority must question how close a touch KWO really has with the water supply needs and problems actually developing now in areas of the state. Money has historically been budgeted and allocated to KWO for inter-agency (federal-state-local) coordination programs. KWO proposes spending \$84,900 for this activity in fiscal 1984. The agency is responsible for inter-agency coordination and for collection of information from all state water-related agencies.

But the Authority experienced instances in which KWO was apparently unaware of working information on hand in KDHE's Bureau of Water Supply regarding a city or rural water district's immediate new supply needs, its plans for developing that supply, where poor water quality might force a city to find a new source of supply. The Bureau under current water agency structure is largely responsible for water supply crisis responses. Responses may often lead to assistance or direction to local entities whose ultimate decisions on how much water to take where affect water supplies available for the state as a whole. This assistance and direction now has to operate without the benefit of any statewide plan to meet water needs.

KWO's information gathering system and interagency coordination system simply has not, in some cases, picked up these particulars or factored them into statewide supply and demand considerations. There were other instances in which the Chief Engineer of the Division of Water

Resources brought cities' new source needs to the attention of the Authority because those entities had been to the Division seeking new permits to appropriate water. Again, KWO's inter-agency coordination and information gathering abilities have failed to pick this up and factor it into the statewide picture of needs and demands and available sources of supply.

State Water Plan - Area Planning:

For Fiscal 1984, KWO proposes to spend about \$42,000 to reassess the adequacy of the goals outlined in the state water plan statute and about \$254,000 for "area" water planning in the Neosho River Basin area. The KWO advises the Authority that KWO proposes 10 to 12 area plans be developed over 10 to 15 or 20 years at a total cost that would then approach nearly \$3 million. KWO argues that a statewide plan may come out of the area planning process in a decade and a half or longer and confirms that this planning process will be characterized by pieces and individual projects directed by the priorities local interests establish. The KWO advises that one of its primary interests is in the "process" of planning and in getting a "process" established whereby local interests can continue to plan. The director's alternative for spending \$3 million over 10 to 15 years or longer that maybe will result in some planning conclusions for the state as a whole is to appropriate more money and manpower to this program to reduce the time frame.

The Authority seriously questions the wisdom of this approach. While assistance and support to local planners is desirable, the Authority believes it is imperative for this state and its decisionmakers to have the full picture of the problems facing the state as a whole and a proposed plan for resolving these problems in the best interest of the continued viability of all the regions of the state. It would seem that such an overall picture would also be of valuable assistance to local or regional planners, enabling them to first get a fix on the role their area plays in the state's overall water supply picture and the extent that the water demands of their region affect decisions by the Governor and Legislature to support or participate in unavoidable development projects or approve distribution plans.

Again, KDHE's Bureau of Water Supply and Technical Services Bureau assist in filling the niche for state assistance to local planners. Those bureaus are capable of responding in crisis situations and of assisting local officials in planning to avert a repeat of the crisis. But there is no state agency truly filling the niche for development of statewide planning implementation strategies at a time when the development, management and distribution of major new sources of water will rapidly become more critical to maintaining industries and jobs and the vitality of cities across this state.

The Authority is concerned that this area planning approach, that will largely consume planning resources of the state's only statewide planning agency, promises to perpetuate fragmented responses to problems that all regions of the state actually share. It is difficult to comprehend that conclusions developed from this piecemeal approach will result in identifying the best and most supply-reliable alternatives when the best and most reliable options may be development outside

of or in conjunction with, another region. There is particular concern when the KWO's proposed priorities for area planning are widely separated by geography. For example, KWO's first priority is the Neosho River area. It's second is northwest Kansas. If reliable options for augmenting water supplies in the Neosho area include water supply sources in the Marais des Cygnes or Kansas River basins, how can Neosho area planners settle upon or continue working in the direction of importing additional supplies when they have no idea whether this would be consistent with the priorities or desires of the Marais des Cygnes area or Kansas River area planners. And with the area planning process moving to northwest Kansas, what would Neosho area planners do in the interim awaiting the "process" getting underway in the adjacent areas?

The Authority further notes that the Neosho area planning process chart provided to the Authority by KWO indicates that largely area officials will write local plans and then formal public hearings will be held. The chart anticipates that the Kansas Water Authority will then formally approve these plans which will also be approved by the Governor and the Legislature and then returned to local planners for implementation and coordination. The Authority seriously questions how it could approve a single area plan independent of the water management and development needs for the state as a whole. The Authority believes that it, the Governor and the Legislature have responsibilities to all regions of this state to develop, manage and allocate the water resource this state holds in trust for all of its people.

The KWO working chart would also appear to anticipate that KWO will assist local governments in developing needed regulations, in providing technical assistance and in arranging legal assistance. The chart further alludes to financial along with the technical assistance. In discussions with the director, the Authority was further advised that KWO plans to assign one staff member per one or two areas to assist local officials in maintaining the process.

The Kansas Water Authority must seriously question this commitment of financial, technical, legal and manpower assistance to this program over 10 to 15 or more years. The Authority further questions KWO's ability to deliver on this fragmented approach even in this time frame. The Authority would note that substantial monies were budgeted in Fiscal 1982 and Fiscal 1983 to area planning and KWO budget documents justified this with the statements that the area planning process and the first area plan -- the Neosho plan -- would be completed. However, the Fiscal 1984 document still speaks to efforts to complete the Neosho plan and an attempt to begin work in extreme northwest Kansas. The Authority seriously questions whether there is acceptable progress for the dollars allocated and whether additional allocations approaching \$3 million or more over the period anticipated to do this job will produce results the state needs.

The Authority believes the Governor and the Legislature should seriously consider directing state planning agency dollars toward developing a statewide water management and development plan and an implementation plan with a timetable for achieving implementation. Concurrently,

a portion of the planning funds should be directed toward devising a master research plan that produces information needed on the timetable needed for implementation decisions.

The Authority has sought advice from professional consultants with experience in developing statewide planning programs and from federal officials who contributed to statewide planning development for other states. The Authority believes very serious consideration should be given to spending what would amount to a fraction of the proposed longterm area planning commitment to obtain professional consultants to develop a statewide plan and recommend options for policy decisions that would assist the state in developing, managing, allocating and distributing limited water supplies in the most effective and fair manner possible. Without the umbrella of a state implementation plan and related state policy to guide local officials in their planning and policy decisions, the Authority is deeply concerned that the result could be underdevelopment of supply sources, maldistribution of limited sources and regional conflict to the detriment of the state as a whole.

Minimum Streamflows:

The Kansas Water Office proposes to spend about \$50,000 in fiscal 1984 to define and determine minimum streamflows, part of which may be done in conjunction with the proposed area planning process. The Authority has very deep reservations about KWO's grasp of the real options available for preserving minimum streamflows and about KWO's ability to manage this responsibility and produce results.

The Authority would again point out that sums of money have been allocated to this purpose for several fiscal years and not a single recommendation has come from KWO for even a portion of one stream. Apparently, none of the funds were returned to the state's general fund.

As early as 1980, KWO documents speak to an urgency to get about the business of determining minimum streamflows as per the Legislature's directive. In March, 1982, the Kansas Water Authority chairman asked the KWO director for an explanation of the status of recommendations or options that could be pursued to establish minimum streamflows.

The director advised that an inter-agency committee had been formed, about five meetings were held in eight months from August 1980 to March of 1981 and that the committee had not met for nearly a year. KWO had taken the responsibility for the committee of drafting a report that would have apparently outlined procedures and future work plans for accomplishing the Legislative mandate. However, KWO had done nothing. Despite allocations specifically for minimum streamflow work and budgeted dollars for interagency coordination, KWO argued it did not have the manpower to do this and apparently did not consider it enough of a priority to reallocate manpower. The minimum streamflow work was stalled. KWO further proposed what would amount to perhaps 10 to 15-year additional delays by insisting minimum streamflow recommendations should be incorporated into the area planning process. The Authority would note that KWO has proposed, as a part of its U.S. Geological Survey cooperative agreement, additional research to be used

to make minimum streamflow recommendations and proposes this research and analysis for the Neosho will be completed some time beyond the timetable for developing the Neosho area plan.

The lack of progress or results in this program prompted the Authority chairman to seek assistance from another state agency, believing that data already existed sufficient to get this work off dead center and to avoid a decade or more delay in which water would have to continue to be appropriated and little if any would be left to meet streamflows or idle reservoir water would go unused to help meet streamflow until it was required for other uses.

The chief engineer of the Division of Water Resources, an ex officio member of the Authority whose agency does not receive specific funding for minimum streamflow work or interagency coordination, agreed to try to assist the Authority despite these constraints.

Within two months the Division of Water Resources assessed options available to the Authority for minimum streamflow recommendations for the entire length of the Marais des Cygnes River and its tributaries. No new data was created or developed to make the assessment. The assessment was made using existing water data from published reports and data gleaned from stream gage records. Existing water use on the river was determined from Division records. Kansas Fish and Game Commission streamflow needs were obtained as well as water quality and stream pollution abatement streamflow needs estimated from U.S. Army Corps of Engineers studies and communications with the Department of Health and Environment. Simple data tabulations were made to estimate what kind of streamflows can be anticipated and options including in-house management and reservoir releases to augment streamflows were provided.

The Authority will proceed to utilize this assistance to make a recommendation on this and perhaps one other stream for the Legislature's and Governor's considerations. Based on this experience, the Authority must seriously question the ability of the Kansas Water Office to proceed with minimum streamflow assessments, must question the results that can be anticipated for the investment of dollars for inter-agency coordination and directly for this program, and must question the timetable the Kansas Water Office has apparently adopted for this work.

The chief engineer has estimated that with Authority assistance and support and backing from the Legislature, his agency could put the Authority in a position to make any recommendations it decided were needed to implement minimum streamflows on about 10 streams by spring or early summer.

In contrast, the Kansas Water Office, after the chief engineer presented a preliminary report to the Authority, notified agencies that it wanted to reactivate the inter-agency minimum streamflow committee. KWO has suggested in budget documents that it may be able to do work on reaches of or portions of two streams in Fiscal 1983 and in its Fiscal 1984 budget document, KWO says it can work on one reach of

one stream unless it is able to fund hiring an additional hydrologist and then work can be done on three reaches of a stream or streams.

The Authority would note here that in an agency of 26 employees, that much of the explanation for the lack of results in budgeted programs to date and much of the explanation for the possible shortfall of program results in fiscal '84 appears to hinge on whether the agency hires a hydrologist. The agency's ability to develop one and a half instead of one area plan, assessments of three stream reaches instead of one and the ability to identify one site for a mineral intrusion study instead of none at all hinge on this one position for fiscal 1984. This one hydrologist would also increase inter-agency coordination meetings by 20 percent and reduce turnaround time in responding to requests from five to three days. In short, this agency's program results, which are unacceptable to the Authority, cannot be improved in the agency's estimation without more funds to support more manpower and even then the proposed results are minimal.

The Authority believes that recommendations on meeting streamflow needs are a priority and that the chief engineer should be encouraged and financially assisted in proceeding with assessments that will provide the Authority with a basis for recommendations in the best interest of accomplishing anything in this area. The Authority seriously questions the wisdom of allocating any funding to the Kansas Water Office -- either directly to support minimum streamflow work or for inter-agency coordination in minimum streamflow assessments.

RESEARCH, DATA COLLECTION, TECHNICAL ASSISTANCE:

KWO proposes allocating \$16,500 to a mineral intrusion study, \$80,000 to conduct an evaluation of weather modification data, \$56,000 for groundwater recharge projects and \$340,000 toward a U.S. Geological Survey data collection and research effort. About \$30,000 is dedicated to analyzing and determining reservoir operating plans and some \$15,000 to \$20,000 is earmarked for sediment surveys. KWO proposes spending about \$120,000 to administer the reservoir water marketing program.

KWO explains that collection and interpretation of data is essential in understanding hydrological processes and in determining water needs. KWO explains that it conducts hydrologic studies and prepares reports in a written form. It has been the Authority's limited experience that, for the most part it appears, the bulk of this work is contracted out, including interpretive studies, to such professionals as the U.S. Geological Survey, the Corps of Engineers, the Bureau of Reclamation and others with the KWO often serving as a conduit for publishing.

KWO's budget document justifies expenditures in this area by explaining that the agency analyzes available data to determine where and how much water supply storage is needed and the cost of acquiring such storage. Again, in the Authority's limited experience, such detailed analyses are performed by federal agencies connected with reservoir construction and management in Kansas.

The Kansas Water Authority would alert the Governor and the Legislature to the proposed revival of spending in this program for groundwater recharge and weather modification activities previously rejected by the Governor and the Legislature. The Authority would urge the Legislature and the Governor to consider whether, if endorsed, this research responsibility would be better shifted to the Regents Institutions where the Agricultural Experiment Stations and the Kansas Geological Survey are deeply involved in related projects.

Regarding the U.S. Geological Survey data collection and research cooperative agreements, the Authority would alert the Governor and the Legislature to some problems. Most importantly, the Authority strongly recommends that a state master research plan be developed which directly supports and coincides with a state plan for management and development of water resources. Without this direction, it would appear that data collection and research efforts will continue to go off in all directions with no clear notion of what must be done on what timetable to assist policymakers in the decisions that must be made soon for the state as a whole.

Much of the U.S. Geological Survey contract work results in projects in which numerous models are analyzed and tested and finally used to make a myriad of calculations. These mathematical tools are capable, no doubt, of assisting in economical and intelligent water resources management. Water resource modeling probably can be crucial in predictive planning.

But, to be truly cost effective and truly beneficial to this state for the dollars invested, it would appear that this state must overcome what appears to be a lack of coordination taking place in model development, and the dissemination and use of the model and results. Effective joint modeling efforts appear to be rare. Pursuing independent creation and use of these models, often computerized and capable of millions of calculations a minute, results in dollars invested for results that can fail to address decisionmakers' needs for information. It can also result in directing acquisition of impractical amounts of data or development of model systems that are not well enough explained and coordinated for others to use them. This coupled with the trend to build models in response to haphazard research decisions, instead of research decisions based on the results of integrated planning, can be extremely costly.

In general, without a direct relationship to policy and management implementation plans, research proposes to develop models that may or may not respond to implementing the policies finally decided upon. Research proposes to spend money and manpower for projects that fall into the "pure research for research's sake" category, a luxury the Authority believes this state cannot afford at this time.

The Authority is concerned not only with the research proposals, the patterns in which they have been developed, but also the scheduling. For example, research proposed to be done on stream-aquifer relationships or stream gains and losses, while perhaps in part desirable, is scheduled to be completed on the Cottonwood and Neosho rivers some time beyond the schedule for initial area plans. This appears to

further emphasize the crucial need to design and mesh master water management planning and master research planning.

The Authority will continue to examine alternatives such as reallocating some of the resources the state would have to commit on this program to establishing a group of professionals that can develop a master research and implementation plan or direct the state in developing it.

The state needs to build a real base for long-range, future research planning. Among pressing needs are defining and establishing a water data system that truly coordinates the work of all state and federal agencies -- specifically a system that enables all agencies -- federal and state -- to make raw data inputs that can be retrieved in a number of different ways to answer questions put to the system by all the different agencies.

There needs to be established a real outline of long-range research needs of all agencies and a priority system developed for allocating research dollars now spent by Kansas agencies to meet the timetable for action each has. The entire effort must be undergirded by a deliberate identification of all long-range water policy issues and a master policy implementation plan.

Although there is a certain effort now to check with other agencies to determine whether they are already doing similar, duplicative research -- real coordination of the thrust of all research in Kansas against the timetable for water development and policy implementation decisions is lacking.

Just as the state stands to pay a severe price for not having the right research program to predict and identify developing problems that must be resolved in a short amount of time, so too does the state pay a price if it is spending its small amount of research dollars for excessive, unnecessary data collection or low priority projects. That price has consequences more devastating than simply wasting money. The Authority believes there is some merit in putting proposed new research programs, which will run as long as a half dozen years, on hold until alternatives can be determined that will better direct the research effort.

Water Marketing - Reservoir Operations:

The KWO proposes spending about \$120,000 to administer the reservoir water marketing program and some \$30,000 to develop and administer operating plans for the reservoirs' pools of water.

The Authority is advised that the allocation for marketing anticipates substantial amounts will be spent rewriting rules and regulations, including funds for attorney fees to advise KWO and examine the new rules and regulations. The spending also includes agency overhead for negotiating water purchase contracts and fees for contract attorney services to examine the contracts.

The Authority seriously questions this volume of spending and the necessity of spending for contract attorney services. The Authority would encourage the Governor and the Legislature to pursue questions about the efficiency of this program and the necessity of attorneys services. The Authority would note that other state agencies are apparently capable of drafting rules and regulations without an attorney. The Authority further notes that the Attorney General must examine rules and regulations and contracts, therefore contracting an outside attorney to do this would appear to be duplicative and unnecessary. Additionally, the Authority notes that water purchase contracts are largely boiler plate language and the Authority seriously questions the overhead anticipated by KWO for "negotiating" these contracts.

The Authority brings to the attention of the Governor and the Legislature spending increases for attorneys fees from actual Fiscal '82 of \$5,250 and estimated Fiscal '83 of \$5,207 to \$7,500 under budget level B and \$10,500 under budget level C. The difference in levels B and C is explained as needed "to provide a more detailed review of rules and regulations and draft recommended changes."

The Authority would also note to the Governor and the Legislature that serious questions have arisen about the manner in which KWO chooses to alter reservoir operating plans forwarded to the Corps of Engineers. It would appear that at least one plan has considered dumping water supply storage at one reservoir, and the water supply storage at other reservoirs may be affected by operating programs that could increase siltation and sedimentation that reduces amounts of water supply available to sell.

The Authority has put KWO on notice that these agreements with the federal government should properly be brought to the attention of the Authority. Further, these operating plans speak directly to the need for statewide water management implementation policy decisions. Decisions on what interests have what priorities in the scheme of operating reservoirs relates directly to how vital this stored water supply is to water supply needs and to meeting other beneficial use demands.

Specifically, regarding the estimated \$30,000 expenditure for developing and administering operating plans for the reservoirs, the Authority sought explanation from KWO. This program is aimed at coordinating pool level management plans and water release schedules from the major Kansas reservoirs. The explanation appears to point to the fact that the total management plan is virtually entirely aimed at enhancing fish and wildlife habitat, enhancing food production for fish and wildlife, attracting waterfowl for hunting and increasing fish spawning.

The reservoirs, at times, are managed to hold water pools steady to enhance growth of aquatic weed beds to stimulate the growth of food organisms. Vegetation dying and decomposing results in, among other things, stimulation of plankton growth, all raising questions regarding how much this may contribute to detrimental silting in of the reservoirs water supply storage which can reduce the amount of water supply water available to meet municipal and industrial needs.

The Authority brings to the attention of the Governor and the Legislature the fact that this entire operating program is largely dedicated to fish and wildlife habitat and food production management which certainly has a place in the benefits afforded Kansans by the reservoirs. But none of the fee resources of the Kansas Fish and Game Commission are dedicated to this planning and management responsibility of state government for the benefit of the Fish and Game Commission.

ADMINISTRATION SERVICES:

The Authority would bring to the attention of the Legislature and the Governor one other item -- the \$340,000 allocated in the Kansas Water Office Budget for Administration Services or agency operating overhead. The Authority would note that this spending approaches 25 percent of the disposable funds of the Kansas Water Office that are not used to meet reservoir repayment obligations. The Authority would encourage the Legislature and the Governor to further examine the wisdom and necessity of spending what seems an excessively high percentage of the budget of this crucial planning program for administrative overhead. The Authority would note, as it has earlier, that this sum would largely cover the best estimates professionals have made to the Authority for contracting consultants to provide the state with a master water resource development and management implementation plan.

The Authority would also encourage the Governor and the Legislature to question whether personnel have adequate qualifications to meet the planning responsibilities of the agency. While the Authority is uncertain to what extent it should question agency personnel decisions, there may be a direct correlation between agency personnel decisions and the inability of this agency to take the lead in developing urgently needed statewide planning programs. The Authority was advised that graphic designers and illustrators will be used for area planning work and that three new hires have no real depth of experience in planning.

KANSAS STATE BOARD OF AGRICULTURE
DIVISION OF WATER RESOURCES

WATER RESOURCES PROGRAM: Water Administration

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Regulation of Water Resources Program/Water Administration Sub-program.

RELATION TO STATE WATER PLAN GOALS: This program provides support services for other programs to address the goals of the State Water Plan.

PROGRAM EXPLANATION: The Chief Engineer-Director of the Division of Water Resources and other members of his staff have administrative responsibilities involving all of the other subprograms of the Division. The Chief Engineer-Director assisted by an Assistant Chief Engineer directs an organization consisting of 77 full-time employees, one intermittent (seasonal) employee, and several temporary employees with a current operating budget in excess of \$2,700,000. The Division is a regulatory agency responsible for administration of 22 state laws and several assigned programs such as the National Flood Insurance Program. The administrative staff under this subprogram is responsible for personnel, fiscal, contract negotiations, legislative, purchasing, organizational, and other administrative matters pertinent to the regulation of water resources assigned to this Division by statutes or gubernatorial designation.

PROPOSED BY 1984 OPERATIONS: The present administrative staff can perform all functions to support the enhancements to other subprograms as authorized for FY 1983 and proposed for FY 1984 except for the legal consultation wherein the number of active law suits is progressively increasing and assistance is needed to reduce the work load of the attorney assigned to the Division of Water Resources to enable cases to be resolved more expeditiously. Therefore, one(1) additional position, a law clerk, is being requested for this subprogram.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$414,000	\$414,000	\$420,000	\$420,000	\$420,000
Aid to Local Units	0	0	0	0	0
Other Assistance	0	0	0	0	0
Capital Improvements	0	0	0	0	0
Total	\$414,000	414,000	420,000	420,000	420,000
Expenditures by Fund:					
State General Fund	\$414,000	414,000	420,000	420,000	420,000
Special Revenue Funds	0	0	0	0	0
Total	\$414,000	414,000	420,000	420,000	420,000
Full Time Positions	12	12	12	12	12

All costs based on FY 1983.

KANSAS WATER AUTHORITY REVIEW

The water administration program provides those support functions necessary for the Division of Water Resources, State Board of Agriculture, to administer 22 state laws and several designated programs and projects. A review of the Division of Water Resources' activities for the past five years indicates that its areas of responsibilities have increased and that its responsibilities are increasing in complexity. The Kansas Water Authority is concerned about the agency's ability to effectively administer its programs. As a result, it would encourage the State Board of Agriculture to investigate the possibility of utilizing the most advanced technology in this field and the possibility of utilizing innovative management techniques as part of a comprehensive program to assist in the administration of the Division of Water Resources' activities. If the state is to effectively manage its water resources in future years, the water administration program must develop methods to achieve fully operational and effective regulatory programs.

The State Board of Agriculture has requested a new Law Clerk position for FY 1984 to assist in the reduction of the work load of the Attorney to enable law suits to be resolved more expeditiously. The Kansas Water Authority agrees that the number of active law suits is progressively increasing and further assistance for legal services is necessary. Therefore, it has no objection to this clerical position if the agency can justify how it will increase the productivity of its attorney. Since this is a clerical position, this action would not be inconsistent with the Authority's position that, to the extent practical, water-related legal services should be provided by the Office of the Attorney General.

The current level of operations is recommended for this program for FY 1984.

KANSAS STATE BOARD OF AGRICULTURE
DIVISION OF WATER RESOURCES

WATER RESOURCES PROGRAM: Water Appropriations

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Regulation of Water Resources Program/Water Appropriate Sub-program.

RELATION TO STATE WATER PLAN GOALS: The sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: To control, conserve, regulate, allot and aid in the distribution of the water resources of the state, the Division processes new applications for permits to appropriate water, applications for changes in place of use, points of diversion, or use made of water and temporary permits; conducts field inspections to determine extent a water right is perfected; issues certificates of appropriations; conducts investigations, holds hearings to resolve impairments or dismiss water rights; allocates water in times of low supply; controls waste of water; reviews, accepts, and/or adopts Groundwater Management Districts programs and rules and regulations; issues orders or declares moratoriums on approval for applications to prolong the life of the supply of water; and collects water use data.

PROPOSED FY 1984 OPERATIONS: Work will continue on all phases the processing of new applications to appropriate water from receipt of the application to issuance of a certificate of appropriation. The backlog of field inspections to be made and certifications issued will be reduced in part by the hiring of 4 Engineering Technicians in FY 1983 and awarding contracts to consulting firms to conduct inspections. A 50% increase in funding for contracts and two clerk typist positions are being requested for FY 1984. There will be an increase in hearings to dismiss water rights, review impairment, or determine extent a water right should be granted.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$2,091,000	\$2,219,000	\$2,219,000	\$2,300,000	\$2,300,000
Aid to Local Units	0	0	0	0	0
Other Assistance	0	0	0	0	0
Capital Improvements	0	0	0	0	0
Total	\$2,091,000	2,219,000	2,219,000	2,300,000	2,300,000
Expenditures by Fund:					
State General Fund	\$1,964,000	2,089,000	2,099,000	2,180,000	2,180,000
Special Revenue Funds	127,000	130,000	120,000	120,000	120,000
Total	\$2,091,000	2,219,000	2,219,000	2,300,000	2,300,000
Full Time Positions	54	54	54	54	54

*Include fee funds and federal funds
All costs based on FY 1983.

KANSAS WATER AUTHORITY REVIEW

With few exceptions, the Water Appropriation Act, as amended, effective January 1, 1978, makes it unlawful for any person to appropriate water from any source without first applying for and obtaining a permit to appropriate water. The amendments to this Act have resulted in a tremendous increase in the number of applications received by the Division of Water Resources to appropriate water. The State Board of Agriculture indicated that at the beginning of calendar year 1981, there were 16,046 applications to appropriate water that were approved but not certified. The agency further indicated that with present staffing, the rate that audits are being completed, and at the rate of issuance of certificates it is merely keeping up with new applications received. Of the total number of applications, the agency indicated that approximately 9,000 could have certificates issued if audits were completed. To eliminate the backlog, the Governor recommended and the Legislature enacted a program enhancement for FY 1983 which began a program designed to eliminate the backlog of applications to appropriate water and the audit of water rights. This enhancement also initiated a reassessment of the program to determine if these backlogs can be eliminated in less than eight years.

For FY 1984 the agency has proposed a 50 percent increase in funding for contracting for water audits and two additional Clerk-Typists positions to process the increased number of documents which would result from the increased contracting authority. The agency believes this enhancement will allow it to achieve a workable backlog of approved applications awaiting audit and/or certification within a five to six year period and eliminate delays in the entire process.

Although it is too early to assess the effectiveness of this program enhancement, the Kansas Water Authority does recommend that this program be further enhanced as proposed by the State Board of Agriculture for FY 1984. The program should be closely monitored for the remainder of FY 1983 and during FY 1984 to determine if a workable backlog can be achieved within six years as is now being proposed by the agency. In addition, the agency should complete the reassessment of the program and be prepared to periodically report its progress. The Kansas Water Authority cannot overemphasize the importance of eliminating this backlog for the overall effectiveness of water resources management in Kansas.

KANSAS STATE BOARD OF AGRICULTURE
DIVISION OF WATER RESOURCES

WATER RESOURCES PROGRAM: Dams, Levees and Channel Changes; Watershed and Irrigation Districts

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Regulation of Water Resources Program/Dams, Levees and Channel Changes; Watershed and Irrigation Districts Sub-program.

RELATION TO STATE WATER PLAN GOALS: The reduction of damaging floods and of losses resulting from floods.

PROGRAM EXPLANATION: This subprogram provides for the review of construction plans, issuance of permits, and conducting inspections for dams, levees, and channel changes; reviewing petitions for formation of irrigation districts; certifying the completion of a dam and capacity of the reservoir, and giving detailed information to county officials for tax exemption eligibility; reviewing petitions for the formation of watershed districts, general plans, and specific project plans; and inspection of sand plants.

PROPOSED FY 1984 OPERATIONS: The agency will continue with its present staff to review plans, issue permits and inspect structures including dams during and upon completion of construction and to inspect other dams upon receipt of complaints. This does not provide for inspecting existing dams on a regular basis or updating the inventory that was completed under the federally funded National Dam Inspection Program. It is proposed for FY 1984 that two civil engineers, with expertise in hydraulics, dam design or geotechnical, and one clerk stenographer be employed by the State to conduct inspections on existing dams classified as high hazard with respect to downstream habitation and update and maintain an inventory on nonfederal dams in Kansas that was completed during 1981. The engineers would reinspect all high hazard dams on a regular scheduled basis beginning with the dams appearing more suspect of failure in FY 1984.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$445,000	\$445,000	\$445,000	\$445,000	\$445,000
Aid to Local Units	0	0	0	0	0
Other Assistance	0	0	0	0	0
Capital Improvements	0	0	0	0	0
Total	\$445,000	445,000	445,000	445,000	445,000
Expenditures by Fund:					
State General Fund	\$445,000	445,000	445,000	445,000	445,000
Special Revenue Funds	0	0	0	0	0
Total	\$445,000	445,000	445,000	445,000	445,000
Full Time Positions	10	10	10	10	10

All costs based on FY 1983.

KANSAS WATER AUTHORITY REVIEW

In 1977 the federal government began a four-year program for the inspection of private dams in Kansas. The inspection phase, which included updating the inventory, was completed during FY 1982 and this program was terminated. The updated inventory included 5,004 nonfederal dams of which 135 were classified as "high-risk" (This classification does not mean that the dam is about to fail, but that there are inhabited buildings downstream from the dam.) and 306 as "significant hazard." Each year, approximately 150 dams that meet the inventory criteria are constructed in Kansas. The agency also noted that the Soil Conservation Service has stated that "after 1985, Soil Conservation Service will not provide financial assistance for dams in any state which does not have an adequate program for inspection, operation, and maintenance of dams in force." However, the Soil Conservation Service has not defined what constitutes an adequate program.

For FY 1984 the agency has proposed two new Civil Engineer positions and a new Clerk-Stenographer to conduct inspections on existing dams classified as high risk and to maintain an inventory on nonfederal dams in Kansas. It should be noted that the Division of Water Resources currently conducts an inspection on all newly constructed dams and is required to inspect any existing dam upon request. Because the Division of Water Resources currently has authority to inspect nonfederal dams and because the Soil Conservation Service has not provided a definition for an adequate program, it is the recommendation of the Kansas Water Authority that this activity not be expanded at the present time.

KANSAS STATE BOARD OF AGRICULTURE
DIVISION OF WATER RESOURCES

WATER RESOURCES PROGRAM: Floodplain Management

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Regulation of Water Resources Program/Floodplain Management Sub-program.

RELATION TO STATE WATER PLAN GOALS: The reduction of damaging floods and of losses resulting from floods.

PROGRAM EXPLANATION: Statutes require the review and approval by the Division of Water Resources, Kansas State Board of Agriculture, of proposed ordinances, resolutions, and regulations or plans for cities and counties which affect changes in flooding plains. The program provides a state review of local regulations for conformance to uniform engineering criteria in floodplain management to accomplish a flood damage reduction goal of the State Water Plan.

PROPOSED FY 1984 OPERATIONS: State coordination action in the National Flood Insurance Program will continue from initial study stage to adoption of floodplain regulations. It is also anticipated that there will be approximately 12 variances to floodplain regulations received for approval. Flood hazard considerations and comments in the A-95 review and Kansas Department of Transportation project notices will continue at present level.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Aid to Local Units	0	0	0	0	0
Other Assistance	0	0	0	0	0
Capital Improvements	0	0	0	0	0
Total	\$50,000	50,000	50,000	50,000	50,000
Expenditures by Fund:					
State General Fund	\$50,000	50,000	50,000	50,000	50,000
Special Revenue Funds	0	0	0	0	0
Total	\$50,000	50,000	50,000	50,000	50,000
Full Time Positions	1	1	1	1	1

All costs based on FY 1983.

KANSAS WATER AUTHORITY REVIEW

The State Board of Agriculture indicated that the designation of a state agency for approval of floodplain plans is a necessity for the state to participate in the Federal Flood Insurance Program. The agency indicated that each year from 15 to 20 floodplain regulations are reviewed, five or more variances from these regulations approved, and several communities assisted with their flood insurance program under the floodplain management program. After review of the program operations and performance measures, the Kansas Water Authority recommends the current level of operations for this program.

KANSAS STATE BOARD OF AGRICULTURE
DIVISION OF WATER RESOURCES

WATER RESOURCES PROGRAM: Data Processing, Water

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Regulation of Water Resources
Program/Data Processing-Water Sub-program

RELATION TO STATE WATER PLAN GOALS: The sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: The Water Rights Computer system is an integral part of the Water Appropriation subprogram to perform tasks to control, conserve, regulate, allot and aid in the distribution of the water resources of the State. The manual system of record keeping for over 36,300 applications to appropriate water for beneficial use and for the 2,200 vested rights is being replaced by a computerized system. The system is designed to provide administrative support and management information for the Division of Water Resources as well as other agencies or individuals that have programs or concerns relating to Water Resources in Kansas.

PROPOSED FY 1984 OPERATIONS: During Fiscal Year 1984, additional enhancement will be made to the system to include management related programs to retrieve water rights data more effectively. The updating and validation of data base will be continued. Additional water use data will be entered into the system as it becomes available.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$337,000	\$350,000	\$360,000	\$360,000	\$360,000
Aid to Local Units	0	0	0	0	0
Other Assistance	0	0	0	0	0
Capital Improvements	0	0	0	0	0
Total	<u>\$337,000</u>	<u>\$350,000</u>	<u>\$360,000</u>	<u>\$360,000</u>	<u>\$360,000</u>
Expenditures by Fund:					
State General Fund	\$337,000	350,000	360,000	360,000	360,000
Special Revenue Funds	0	0	0	0	0
Total	<u>\$337,000</u>	<u>350,000</u>	<u>360,000</u>	<u>360,000</u>	<u>360,000</u>
Full Time Positions	4	4	4	4	4

All costs based on FY 1983.

KANSAS WATER AUTHORITY REVIEW

The State Board of Agriculture indicated that the first phase of the water rights information system is nearing completion and during FY 1983 the terminals will be installed and become operational in four field offices. During this time, the computerized system will be used on a parallel basis with the present manual system for a period of one year. At that time the manual system will be phased out and the emphasis will be to improve the computer system which will allow for compilation of data and rapid retrieval of information needed by the Division and other water-related entities.

After review of the past activities of this program, the Kansas Water Authority is disturbed by the delays and lack of results which have been achieved by this program. As the manual system is phased out it is the hope of the Kansas Water Authority that the Board of Agriculture will be in a position to identify cost savings due to the reduction in activities within the manual system. These savings could then be utilized to provide additional assistance for the development of the water rights information system in an effort to make the system fully operational at an earlier date. It is the recommendation of the Kansas Water Authority that an appropriate level of expenditures be provided for the State Board of Agriculture to implement a fully operational water rights information system at the earliest possible time.

DEPARTMENT OF HEALTH AND ENVIRONMENT

WATER RESOURCES PROGRAM: Public Drinking Water

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Public Drinking Water Program

RELATION TO STATE WATER PLAN GOALS: The sound management both public and private of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: Engineering plans, specifications, and permit applications are required for all new public water supply systems and extensions or modifications to existing systems. It is the responsibility of this program to assure drillers relating to special water supply projects are in compliance with state and federal laws and regulations.

All public water supply systems are required to submit samples of water either to the department laboratory or to a private or municipal laboratory certified by the department.

The Technical Assistance Section responds to requests for assistance in dealing with all aspects of water supply problems. In addition to offering advice concerning such problems, the section also helps explore anticipated future water needs, including coordination of possible new water sources with other state and federal agencies.

PROPOSED FY 1984 OPERATIONS: At Budget Level B, a decrease in technical assistance will occur, even though technical assistance is an all-encompassing activity of the Bureau. The Bureau will continue as much as possible to provide service to the community and non-community public water supply systems with the available resources. The activities in the past have been concentrated in developing wholesale water districts and other cooperative efforts whereby more resources in terms of people and money could be pooled together to resolve problems. As a result of the section's activity, the number of systems violating the turbidity, chemical, and physical maximum contaminant levels has decreased, but other activities have taken their place as the result of new Federal Regulations.

APPROXIMATION OF EXPENDITURES	FY 1982	FY 1983	FY 1984 A	FY 1984 B	FY 1984 C
Expenditures by Object:					
State Operations	\$569,000	\$631,000	\$629,000	\$629,000	\$699,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	<u>\$569,000</u>	<u>\$631,000</u>	<u>\$629,000</u>	<u>\$629,000</u>	<u>\$699,000</u>
Expenditures by Fund:					
State General Fund	\$174,000	\$206,000	\$366,000	\$366,000	\$436,000
Special Revenue Funds	<u>395,000</u>	<u>425,000</u>	<u>263,000</u>	<u>263,000</u>	<u>263,000</u>
Total	<u>\$569,000</u>	<u>\$631,000</u>	<u>\$629,000</u>	<u>\$629,000</u>	<u>\$699,000</u>
Full Time Positions	20.1	20.1	18.2	18.2	20.2

KANSAS WATER AUTHORITY REVIEW

The public drinking water program administers laws designed to ensure the purity and quality of public water supplies. The Department of Health and Environment indicated that during calendar year 1981 it reviewed 146 water line extension projects and 203 other projects including wells, new sources of supply, storage facilities and treatment plants. During this same period, 220 permits were issued and 118 consultations and conferences were held. The agency further stated that during this time over 90 percent of all known public water supply systems were in compliance. However, over 450 public notices were required for either monitoring failure or exceeding a maximum contaminant level. During this calendar year 658 engineering appraisal reports were submitted to the suppliers of water.

The Department of Health and Environment stated that any reductions in funding for this program would result in a decrease in technical assistance. The Kansas Water Authority would emphasize the importance of the technical assistance section which responds to requests for assistance for all aspects of water supply problems by local units of government. This program can be of significant benefit in resolving local water supply problems and such a program should result in even further compliance by public water supply systems. Based on the response to this assistance from local units of government, the Kansas Water Authority believes these technical assistance activities should not only be maintained but enhanced. Therefore, before these activities are decreased the agency should be encouraged to reexamine its priorities. It should also be noted that at the time the Kansas Water Office was created, two positions were added to that agency for the purposes of assisting local units of government in their water supply planning efforts. The Kansas Water Authority would encourage the Department of Health and Environment and the Kansas Water Office to establish a comprehensive program for water supply planning and technical assistance for local units of government.

The Department of Health and Environment indicated that federal Environmental Protection Agency funds available to the agency will decrease from approximately \$425,000 for FY 1983 to approximately \$263,000 for FY 1984. However, the agency is requesting the same level of program operations for FY 1984. This level of operations would require a rather significant increase of State General Fund support for the public drinking water program. It should also be noted that this program assists the water and wastewater laboratory facilities of the agency in generating approximately \$350,000 in fees which are deposited in the State General Fund.

After review of the operations and performance information of the public drinking water program the Kansas Water Authority recommends that this program be continued at its current level of operations for FY 1984 so its technical assistance activities can be maintained and possibly enhanced. The Authority further recommends that the agency pursue the possibility of increasing fees charged by the agency which are deposited into the State General Fund to help offset the increased State General Fund demand in maintaining the current level of operations for the public drinking water program.

DEPARTMENT OF HEALTH AND ENVIRONMENT

WATER RESOURCES PROGRAM: Groundwater Pollution Control

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Groundwater Pollution Control Program

RELATION TO STATE WATER PLAN GOALS: The protection and the improvement of the quality of the water supplies of the state, and the prevention of the pollution of the water supplies of the state.

PROGRAM EXPLANATION: The program is made up of three subprogram areas:

1. Oil field pollution and underground injection control activities which principally involve the review of injection well applications, evaluation of oil field pollution control equipment and taking enforcement action when violations are found;
2. Pollution hydrogeology which carries out groundwater pollution control regulatory and technical assistance programs related to landfills, hazardous waste sites, buried petroleum storage tanks, industrial wastewater lagoons, LPG storage wells and water well construction; and
3. Research and special project activities which include developing quality management systems for areas of groundwater contamination. This activity examines groundwater data, develops models, and transforms findings into technical reports for all Bureau activities.

PROPOSED FY 1984 OPERATIONS:

1. Have 95% of all permitted injection well facilities in compliance with permit conditions by the end of FY 1984.
2. Conduct field testing of 20% of all permitted injection wells during FY 1984 to determine well integrity.
3. Investigate all occurrences of groundwater pollution and determine sources of at least 95% of all reported cases investigated.
4. Review and evaluate groundwater monitoring needs for 40% of all pollution control facilities permitted by the Division of Environment.
5. Design and establish through aquifer evaluation and modeling at least ten groundwater quality management systems in areas of groundwater contamination from past practices.
6. Conduct field inspection of 500 water wells drilled during FY 1984 to determine compliance with regulations.

APPROXIMATION OF EXPENDITURES	FY 1982	FY 1983	FY 1984 A	FY 1984 B	FY 1984 C
Expenditures by Object:					
State Operations	\$813,000	\$1,008,000	\$1,036,000	\$1,036,000	\$1,199,000
Aid to Local Units					
Other Assistance					
Capital Improvements		5,000	6,000	6,000	17,000
Total	\$813,000	\$1,013,000	\$1,042,000	\$1,042,000	\$1,216,000
Expenditures by Fund:					
State General Fund	\$364,000	\$ 525,000	\$ 741,000	\$ 741,000	\$ 915,000
Special Revenue Funds	449,000	488,000	301,000	301,000	301,000
Total	\$813,000	\$1,013,000	\$1,042,000	\$1,042,000	\$1,216,000
Full Time Positions	33.0	33.0	31.0	31.0	34.0

KANSAS WATER AUTHORITY REVIEW

The purpose of the groundwater pollution control program is the protection of the quality of the groundwaters of the state as provided by the Kansas Groundwater Exploration and Protection Act. The Department of Health and Environment indicated that under this program approximately 5,090 permits were issued covering oil field injection units, 50 permits were issued for industrial injection wells, it has responded to over 500 emergency environmental problems such as oil spills, and since 1974 well drillers have supplied 35,000 records on new wells. In addition, the agency indicated that FY 1984 operations will include the second year of implementation for underground injection control. Finally the agency will be involved in the administration of Senate Bill No. 498 which was adopted by the 1982 Legislature and provided for joint jurisdiction with the Kansas Corporation Commission over oil and gas field pollution problems.

The Department of Health and Environment stated that federal funds which are made available for the Groundwater Pollution Control Program will decrease from approximately \$390,000 in FY 1983 to approximately \$187,000 for FY 1984. However, the agency is requesting the same level of program operations for FY 1984 as it maintained for FY 1983. This level of operations would result in a rather significant increase in State General Fund and fee fund support for the program. It should also be noted that this program generates approximately \$492,000 in oil field fees which are deposited in the State General Fund.

After review of the Groundwater Pollution Control Program and considering the increased responsibilities which were added to this program during the last few years, the Kansas Water Authority recommends that this program be continued at its current level of operation. The Authority further recommends that the agency pursue the possibility of increasing its fees to help offset the increased State General Fund demand which would be required to maintain this level of program operations.

DEPARTMENT OF HEALTH AND ENVIRONMENT

WATER RESOURCES PROGRAM: Surface Water Pollution Control

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Surface Water Pollution Control Program

RELATION TO STATE WATER PLAN GOALS: The protection and the improvement of the quality of the water supplies of the state, and the prevention of the pollution of the water supplies of the state.

PROGRAM EXPLANATION: The program monitors surface water quality and assures adequate wastewater treatment and collection systems are provided to maintain water quality and public health. Program activities are accomplished through two sections within the Bureau of Water Quality: The Pollution Investigation and Assessment Section which monitors surface water quality and the Waste Treatment Section which assures wastewater treatment facilities are adequate to protect surface water quality and public health.

PROPOSED FY 1984 OPERATIONS:

A. Water Quality Management Section

1. The final project elements of the water quality management plan will be completed.
2. The water and wastewater sampling activities will continue to provide water quality information for assessment.
3. The stream and lake biological monitoring activities will continue to provide information for aquatic environmental assessment.
4. Special water quality projects and studies will include studies related to the water quality management plan.

B. Water Pollution Control Section

1. Continued administration of the Construction Grant Program.
2. Technical assistance will be provided to Kansas communities.
3. Continued administration of the permit program.
4. Technical reviews will continue.
5. Operation and maintenance assistance will be provided for wastewater treatment plant operations.
6. Financial and management review assistance will be provided for public wastewater works.

APPROXIMATION OF EXPENDITURES	FY 1982	FY 1983	FY 1984 A	FY 1984 B	FY 1984 C
Expenditures by Object:					
State Operations	\$1,767,000	\$1,863,000	\$1,847,000	\$1,847,000	\$2,085,000
Aid to Local Units	38,000				
Other Assistance					
Capital Improvements	7,000				20,000
Total	<u>\$1,812,000</u>	<u>\$1,863,000</u>	<u>\$1,847,000</u>	<u>\$1,847,000</u>	<u>\$2,105,000</u>
Expenditures by Fund:					
State General Fund	\$ 808,000	\$ 698,000	\$ 599,000	\$ 599,000	\$ 857,000
Special Revenue Funds	1,004,000	1,135,000	1,248,000	1,248,000	1,248,000
Total	<u>\$1,812,000</u>	<u>\$1,863,000</u>	<u>\$1,847,000</u>	<u>\$1,847,000</u>	<u>\$2,105,000</u>
Full Time Positions	66.3	67.3	63.2	63.2	68.2

KANSAS WATER AUTHORITY REVIEW

The surface water pollution control program maintains the Kansas Water Quality Management Plan, regulates municipal, industrial and agricultural discharges into the surface water systems of the state and monitors surface water quality. This program assures the quality of water by issuing discharge permits, reviewing treatment plant designs, formulating municipal and regional waste treatment plans, awarding grants to municipalities for the construction of waste treatment plants, and regularly monitoring and investigating pollution levels. The Department of Health and Environment indicated that through this program discharge permits exist for over 600 municipal facilities, 270 industries, 1,570 feedlots, and has authorized permits for over \$45 million in construction of municipal sewage facilities. This program has also initiated county-wide wastewater management plans and provided for appraisal and operational assistance to municipalities and industries. Finally, this program is charged with implementation of the Kansas Water Quality Management Plan.

The Kansas Water Authority encourages the Department of Health and Environment to continue its emphasis on the program's technical and operation and maintenance assistance activities to local units of government for wastewater treatment. Based on the response to this assistance from local entities, the Kansas Water Authority believes this program can be of significant benefit in resolving local wastewater problems. With an effective assistance program, local units of government should be able to achieve better permit compliance and increase the agency's ability to meet its program objectives.

After review of the current level of operations of the program, which includes increased emphasis on assistance activities, the Kansas Water Authority recommends the continuation of this level of operation for FY 1984.

Department of Health and Environment

WATER RESOURCES PROGRAM: Technical and Support Services

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Technical and Support Services program

RELATION TO STATE WATER PLAN GOALS: The prevention of the pollution of the water supplies of the state and the protection and the improvement of the quality of the water supplies of the state.

PROGRAM EXPLANATION: The program purpose is to protect and enhance the general environment by training and certification of environmental facility operators, environmental policy development through planning and informing the public on environmental concerns. The training and certification involve nearly 3,000 operators. Training is provided through joint effort of the Kansas Department of Health and Environment, Department of Education and various organizations. The Environmental Protection Agency has made a grant to the Kansas Department of Health and Environment for the program of \$500,000 for equipment purchase over the next five years.

The environmental planning and policy section assists the Division of Environment administration and the Secretary in the formulation and evaluation of state environmental policy, conducting special projects and studies, and providing planning and evaluation consultation services to the division's other bureaus. The section assists the Advisory Commission on the Environment in its function as an advisory group to the Secretary. The section assists and coordinates in development and negotiations on the annual plan of work with the U.S. Environmental Protection Agency. During the year results of the plan of work are tracked and reported. The level of effort is 1.6 full time equivalent in personnel of which less than half deals with water resources.

Public information is a cost effective way to inform, educate and involve citizens in environmental concerns. Staff provide assistance to division personnel on public information and involvement programs.

APPROXIMATION OF EXPENDITURES	FY 1982	FY 1983	FY 1984A	FY 1984B	FY 1984C
Expenditures by Object:					
State Operations	\$202,000	\$188,000	\$173,000	\$254,000	\$254,000
Aid to Local Units					
Other Assistance					
Capital Improvements		72,000	43,000	45,000	45,000
Total	<u>\$202,000</u>	<u>\$260,000</u>	<u>\$216,000</u>	<u>\$299,000</u>	<u>\$299,000</u>
Expenditures by Fund:					
State General Fund	\$ 19,000	\$ 53,000	\$158,000	\$239,000	\$239,000
Special Revenue Funds	183,000	207,000	58,000	60,000	60,000
Total	<u>\$202,000</u>	<u>\$260,000</u>	<u>\$216,000</u>	<u>\$299,000</u>	<u>\$299,000</u>
Full Time Positions	8.0	7.0	5.0	9.0	9.0

KANSAS WATER AUTHORITY REVIEW

The Department of Health and Environment stated the purpose of the Technical and Support Services program is to protect and enhance the general environment by training and certification of environmental facility operators, environmental policy development through planning and informing the public on environmental concerns. Although the major activities of this program are not water related, the agency indicated that approximately .8 full-time equivalent in personnel of the environmental planning and policy section work directly in the area of water resources planning.

The Kansas Water Authority has found the water-related planning activities of this program to be very helpful in its deliberations during the past year. However, the Authority would question the effectiveness of the coordination of these activities with the Kansas Water Office. If the Kansas Water Office is to fulfill its role as the state's water resources planning agency, all water-related planning of other state agencies must be coordinated to ensure a comprehensive state planning effort.

The Kansas Water Authority recommends the current level of operations for this program for FY 1984.

DEPARTMENT OF HEALTH AND ENVIRONMENT

WATER RESOURCES PROGRAM: Waste Management

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Waste Management Program

RELATION TO STATE WATER PLAN GOALS: The prevention of the pollution of the water supplies of the state.

PROGRAM EXPLANATION: The program consists of three subprogram areas: Hazardous Waste Management, Solid Waste Management, and General Sanitation. Even though the work assignments are, to a large extent, intercoordinated with staff serving as generalists, the three missions are distinctly different. Increased emphasis upon hazardous wastes in recent years has caused that subprogram to grow to 53% of the total Bureau effort, while solid waste management and general sanitation account for 24% and 23% respectively of the total effort. Both hazardous waste and solid waste management have rather specific and direct purpose missions: to ameliorate and prevent environmental insults and health programs which results from improper waste handling and disposal. The mission of the general sanitation subprogram is general in its nature. General sanitation basically includes all miscellaneous environmental concerns which do not specifically fit within any other Division of Environment program area.

PROPOSED FY 1984 OPERATIONS: The requested budget is intended to maintain surveillance and enforcement activities at current levels. These activities are initiated through an estimated 3,500 field inspections. A key proposal is completion of the initial appraisal of the 700 hazardous waste generators, storers, treaters, and disposers who registered under the new requirements of state and federal laws (Resource Conservation and Recovery Act). It is anticipated that at least 85% of the "grandfather" permits issued by the U.S. Environmental Protection Agency will be revoked and replaced by KDHE permits based upon site surveys and certification of compliance with Kansas Administrative Regulation on hazardous wastes. Increased emphasis is to be placed upon reducing the landfill disposal of hazardous wastes, seeking more environmentally sound alternatives. Efforts in resource recovery promotion are also to continue within the solid waste area through operator training and revision of local solid waste management plans. Groundwater monitoring will be continued at approximately 45 selected solid waste disposal sites. Responsiveness to citizen complaints and local authorities' requests for consultation, approximately 700 requests per year, is to be maintained.

APPROXIMATION OF EXPENDITURES	FY 1982	FY 1983	FY 1984 A	FY 1984 B	FY 1984 C
Expenditures by Object:					
State Operations	\$854,000	\$800,000	\$824,000	\$824,000	\$926,000
Aid to Local Units					
Other Assistance					
Capital Improvements	53,000	1,000			2,000
Total	<u>\$907,000</u>	<u>\$801,000</u>	<u>\$824,000</u>	<u>\$824,000</u>	<u>\$928,000</u>
Expenditures by Fund:					
State General Fund	\$346,000	\$432,000	\$474,000	\$474,000	\$578,000
Special Revenue Funds	561,000	369,000	350,000	350,000	350,000
Total	<u>\$907,000</u>	<u>\$801,000</u>	<u>\$824,000</u>	<u>\$824,000</u>	<u>\$928,000</u>
Full Time Positions	29.7	27.6	24.6	24.6	27.6

KANSAS WATER AUTHORITY REVIEW

The waste management program attempts to prevent environmental problems and damage associated with waste management. The program has two primary functions: to administer permits to waste facilities and to correct environmental nuisances. The major areas of activity for this program are hazardous waste management, solid waste management and general sanitation. Although the major activities of this program are not water related, improper waste handling and disposal could have a direct impact on the deterioration of the water quality in Kansas.

The Department of Health and Environment indicated that federal funds for this program will be reduced from approximately \$369,000 for FY 1983 to approximately \$350,000 for FY 1984. The agency indicated that it has requested approximately the same level of program operations for FY 1984. This request will require an increase in State General Fund support to maintain the same level of operations for FY 1984. It should be noted that this program does generate approximately \$35,000 in fees which are deposited in the State General Fund. Because this program directly assists in the state effort to prevent the pollution of water supplies of the state, the Kansas Water Authority believes consideration should be given to continuing this program at its same level of operations for FY 1984.

STATE CONSERVATION COMMISSION

WATER RESOURCES PROGRAM: State Aid to Conservation Districts

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Conservation of Natural Resources Program/Aid to Conservation Districts Sub-program.

RELATION TO STATE WATER PLAN GOALS: This program addresses the goal of the sound coordination of the development of the water resources of the State with the development of the other resources of the State.

PROGRAM EXPLANATION: As conservation districts' responsibilities and activities expanded, operational costs increased proportionally. This left districts with a major problem in obtaining financing at an acceptable level. Equipment, office and field staff requirements are, and will continue to be, most critical. Financial assistance provided districts by county commissions, with matching funds from the state, enable districts to provide liaison between their constituents and federal and state assistance programs, keep them advised of conservation problems and solutions, and coordinate water resources programs with other districts and state and federal agencies.

PROPOSED FY 1984 OPERATIONS: To provide state funds, on a matching basis, for each of the conservation districts to carry out their activities and functions. (K.S.A. 2-1907c) To accomplish this, each conservation district submits a district budget approved by the supervisors. The budget includes certification from the County Commissioners of the amount they will provide to the conservation district. The amount from all districts will then be requested for funding in the budget document.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations					
Aid to Local Units	\$727,125	787,000*	826,500	867,500	911,000
Other Assistance					
Capital Improvements					
Total	\$727,125	787,000	826,500	867,500	911,000
Expenditures by Funds:					
State General Fund	\$727,125	787,000	826,500	867,500	911,000
Special Revenue Funds					
Total	\$727,125	787,000	826,500	867,500	911,000
Full Time Positions	0	0	0	0	0

*Maximum by existing statute authorization. Projected amount above this figure will require revision to statute.

KANSAS WATER AUTHORITY REVIEW

The state aid in Conservation Districts Program, which began in 1953, has allowed each district to continue their conservation programs, education endeavors, and local leadership roles in conservation. In addition to the coordination of the development of the water resources of the state, this program can assist the state in planning to meet future needs of sufficient supplies of water and the sound management of those supplies. The Kansas Water Authority recognizes the importance of this financial assistance which enables local conservation districts to assist their constituents in planning and coordinating state and federal conservation practices within the State of Kansas. It is the recommendation of the Kansas Water Authority that this program be funded at \$727,125, the full amount provided by law.

STATE CONSERVATION COMMISSION

WATER RESOURCES PROGRAM: State Assistance in Construction of Watersheds

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Conservation of Natural Resources Program/Watershed Construction Sub-program.

RELATION TO STATE WATER PLAN GOALS: This program addresses the goal of the reduction of damaging floods and of losses resulting from floods.

PROGRAM EXPLANATION: The program provides state cost-sharing to organized watershed districts of 70% of the construction costs (maximum of \$90,000) for flood detention and grade stabilization structures which have benefits of a community nature. Upstream land treatment is an important factor as well as coordination with Fish and Game representatives. Benefits must exceed the costs and the plans and specifications must be approved by the Chief Engineer, Division of Water Resources. The 1984 program is planned to continue the construction cost-sharing at the 70% level and provide some assistance for engineering and inspection costs. Besides carrying on where individual landowner's conservation programs stop, it also in many cases fills in the gaps in Federal PL 566 structural systems.

PROPOSED FY 1984 OPERATIONS: The major objectives of the program is to stabilize streams to prevent erosion degradation of the drainage area due to excessive erosion and to provide protection to downstream agricultural land, urban areas and transportation systems. This will be accomplished by providing sufficient funds to assist in construction of 25 new detention/stabilization structures.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations					
Aid to Local Units					
Other Assistance	\$900,000	1,500,000	2,000,000	2,200,000	2,500,000
Capital Improvements					
Total	\$900,000	1,500,000	2,000,000	2,200,000	2,500,000
Expenditures by Fund:					
State General Fund	\$900,000	1,500,000	2,000,000	2,200,000	2,500,000
Special Revenue Funds					
Total	\$900,000	1,500,000	2,000,000	2,200,000	2,500,000
Full Time Positions	0	0	0	0	0

KANSAS WATER AUTHORITY REVIEW

The State Assistance in Construction of Watershed Programs was established in 1977 to assist on a cost-sharing basis the 84 organized watershed districts in the construction of detention dams and grade stabilization structures for the prevention of soil erosion and to provide protection for downstream areas from flood water and siltation damage. This program was designed to supplement the Federal Watershed Protection and Flood Prevention Act (P.L. 566) and as such any structures approved for construction by the state must not be eligible for the federal program. As a result, this program gives watershed districts a dimension that increases the overall effectiveness of watershed protection and flood prevention programs in Kansas.

The State Conservation Commission's long-range projections for this program indicate that an increase in watershed district's need for cost-share assistance of state funded structures will be a minimum of \$1 million annually by FY 1985. The Kansas Water Authority would also note that under the preferred program of the federal government, federal funds available for all conservation practices in Kansas will be reduced by approximately 25 percent. This reduction in federal funding for conservation programs in Kansas will further increase the demand for state funded detention structures.

When the Kansas Water Authority studied the water needs and water supplies of Kansas, it questioned why this program has not included the potential water supply for proposed structures as part of the overall benefit of the structure. While these structures may be too small for a major source of water supply, it would appear that they have a potential for solving water supply problems for limited areas of the state.

The Kansas Water Authority recommends that this program be funded at approximately \$900,000 to allow it to keep up with rising construction costs. It is also recommended that state agencies pursue the possibility of developing the water supply in watershed structures.

STATE CONSERVATION COMMISSION

WATER RESOURCES PROGRAM: Water Resources Cost-Share Program

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Conservation of Natural Resources Program/Water Resources Cost-Share Sub-program.

RELATION TO STATE WATER PLAN GOALS: This program addresses the goal of the prevention of the pollution of the Water Supplies of the State.

PROGRAM EXPLANATION: A state financed program to cost-share with private landowners for the construction of enduring conservation practices for the conservation, development, and/or improvement of the quality of water resources in Kansas. The program initiates, through conservation districts, a program in each Kansas county to share costs for the installation of conservation measures which are most needed in that county for the conservation or development of water supplies or for the improvement of the water quality entering the streams or lakes. This program is a supplement to the USDA Agricultural Conservation Program (ACP), and the Great Plains Conservation Program (GPCP), and the Rural Clean Water Program (RCWP) and is an intergral part of the Kansas Water Quality Management Program.

PROPOSED FY 1984 OPERATIONS: The major objectives of the program are to reduce the discharge of toxic pollutants and dissolved solids, to minimize pollution caused by organic waste from agricultural production, to reduce the nutrients reaching the water from agricultural runoff, to achieve sediment reduction goals set forth in the Agricultural Runoff Water Quality Management Plan, to increase the efficiency of water use in agriculture and to increase agricultural water supplies. These objectives will be reached by providing sufficient cost-share funds in all conservation districts based upon their needs.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations					
Aid to Local Units					
Other Assistance	\$1,750,000	2,500,000	3,250,000	4,000,000	4,750,000
Capital Improvements					
Total	\$1,750,000	2,500,000	3,250,000	4,000,000	4,750,000
Expenditures by Fund:					
State General Fund	\$1,750,000	2,500,000	3,250,000	4,000,000	4,750,000
Special Revenue Funds					
Total	\$1,750,000	2,500,000	3,250,000	4,000,000	4,750,000
Full Time Positions	0	0	0	0	0

KANSAS WATER AUTHORITY REVIEW

The Water Resources Cost-Share Program was established in FY 1981 in response to the Kansas 208 Water Quality Management Plan to improve water quality and to conserve and develop water resources in Kansas. To date, approximately 50 percent of the land area in Kansas has adequate resource management systems applied. This program is designed to assist in the development of conservation programs to establish adequate resource management systems for all Kansas land areas. Soil and water conservation practices under this program also have a direct influence on the quantity of agriculture runoff pollution delivered to streams and upon stream use, thereby reducing waste of existing surface and underground water supplies.

The State Conservation Commission indicated that requests for assistance by landowners have exceeded funding available for the water resources cost-share program in all but a few areas of Kansas. The original long-term plan of the agency was to increase funding for this program until it reached \$5 million in FY 1985. The Kansas Water Authority would note that the agency has now modified this plan as it anticipates that annual program needs will "top out" at \$5 million annually by FY 1990. The Authority would also note that under the preferred program of the federal government, funds available for conservation practices from all federal programs will be decreased in Kansas by approximately 25 percent. This reduction in federal funds for conservation practices will further increase demand for state funding for this program.

The Kansas Water Authority believes most private landowners who received cost-sharing assistance fulfill their obligations for participation in this program. However, the Authority is concerned about the few who do not complete conservation projects and those who do not provide adequate maintenance practices once a project has been constructed. The Kansas Water Authority believes the State Conservation Commission should take appropriate action to ensure that private landowners subscribe to appropriate maintenance practices and to establish a mechanism for restitution of funds if projects are not constructed.

It is the recommendation of the Kansas Water Authority that this program be funded at approximately \$1,750,000 to keep up with rising construction costs. It is further recommended that the Commission establish procedures to ensure these funds are utilized in the proper manner.

KANSAS FISH AND GAME COMMISSION

WATER RESOURCES PROGRAM: Management/Development/Maintenance of Water-Related Recreational Resources

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): A part of the Fisheries Program

RELATION TO STATE WATER PLAN GOALS: "The development, to meet the anticipated future needs of the people of the state, of sufficient supplies of water for beneficial purposes."

PROGRAM EXPLANATION: This program includes: (1) development and maintenance of lands, waters and facilities related to recreational use of public waters, (2) improvement of aquatic ecosystems to provide desirable fisheries, furbearer, waterfowl and non-game water related animal life, (3) investigation of fish kills and water pollution incidents and (4) surveys and inventories to assess the magnitude of recreational outputs and the desires of our publics for water related recreational activities.

PROPOSED FY 1984 OPERATIONS: Major 1984 objectives are to provide 9,977,296 fishing; 648,000 waterfowl hunting; 3,675,000 boating; and as yet an undefined number of furbearer trapping and non-game (aquatic wildlife) man-days of recreation.

Actions proposed to accomplish these objectives include: (1) continued operation and maintenance of public waters for recreational opportunity, (2) improvement of use facilities on state lands and waters, (3) assessment of fish kills and pollution related incidents, (4) technical assistance to other governmental entities for the enhancement of aquatic habitats and recreational benefits on other than state owned public waters, (5) investigations to determine techniques to better manage public waters and (6) continued stocking of fish to maintain viable fish populations in man-made impoundments.

The letting of a contract for the construction of the Milford Fish Hatchery at a total estimated cost of \$6,000,000 is anticipated for May 1984 with work to be completed in FY 1984.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$4,465,593	\$4,644,217	\$4,829,985	\$5,023,185	\$5,224,112
Aid to Local Units					
Other Assistance					
Capital Improvements	\$6,000,000				
	<u>\$10,465,593</u>	<u>\$4,644,217</u>	<u>\$4,829,985</u>	<u>\$5,023,185</u>	<u>\$5,224,112</u>
Expenditures by Fund:					
State General Fund					
Special Revenue Funds	*\$10,465,593	\$4,644,217	\$4,829,895	\$5,023,185	\$5,224,112
Total	<u>\$10,465,593</u>	<u>\$4,644,217</u>	<u>\$4,829,895</u>	<u>\$5,023,185</u>	<u>\$5,224,112</u>
Full Time Positions	75	75	75	75	75

*Includes \$6,000,000 Bond Issue.

KANSAS WATER AUTHORITY REVIEW

The Fish and Game Commission is responsible for managing the conservation of the state's aquatic and terrestrial wildlife resources and for ensuring the optimum public use of these resources. In 1977 the agency began a comprehensive planning process to assist in carrying out these responsibilities. This on-going process has proven to be an effective tool in the Fish and Game Commission's operations and long-range planning effort. Through this long-range resource management planning, the agency is better able to define its goals and objectives, define problems in meeting those objectives, and to develop strategies for accomplishing these goals and objectives.

The major activity of the Fish and Game Commission which relates to the state's water resources is the management, development, and maintenance of water-related recreational resources in Kansas. These activities are conducted by the agency to achieve its objectives for the number of fishing, waterfowl hunting, fur-bearer trapping, and boating man-days of recreation for the sportsman in Kansas. Among the problems the Commission has identified which will prevent it from meeting these objectives are declining water supplies in certain areas of the state, the pollution of water supplies, stream alterations and reservoir construction which is conducted without proper consideration for wildlife benefits and for certain laws and regulations which do not permit effective management and resource utilization. The agency has also developed and is implementing numerous strategies to resolve these problems. The Kansas Water Authority believes the most effective strategy to assist the Commission in achieving its objectives is the agency strategy to "cooperate with other entities affecting the water of the state, to ensure adequate considerations are given to the state's wildlife resources."

The Kansas Water Authority supports the current level of operations for the Fish and Game Commission, including the construction of the Milford Fish Hatchery. However, the Authority is concerned by the Fish and Game Commission's philosophy that it is basically independent because the Commission is entirely fee supported. Although the Commission is fee supported, the authority for that revenue source is authorized by Kansas law the same as other state agencies. This matter concerns the Kansas Water Authority because of the critical interrelationship of all expenditures for water-related activities in Kansas. The Fish and Game Commission must cooperate with other agencies and private land owners to ensure that the maximum beneficial use of the states' water resources can be achieved at the least possible cost. In this regard the Authority is disturbed with the approach the Fish and Game Commission has taken in pursuing water supplies from the Webster, Cedar Bluff, Keith Sebelius and Kirwin reservoirs. The Authority believes this issue can only be resolved by a mutual agreement of all water interests in Kansas.

PARK AND RESOURCES AUTHORITY

WATER RESOURCE PROGRAM: State Park Operations and Development

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): State Park Operation's Program/State Park Development Program

RELATION TO STATE WATER PLAN GOALS: The sound coordination of the development of the water resources of the state with the development of the other resources of the state.

PROGRAM EXPLANATION: The work activities of the program are the continued development of state park facilities for the use and enjoyment by the citizens of Kansas. The objectives for 1984 are to continue the development of the program, with the various items of development for both day use and overnight use, and other related activities in the Authority outdoor recreation program. The state park development is in tandem because development has taken place on small lakes and major irrigation, flood control and water supply reservoirs.

PROPOSED FY 1984 OPERATIONS: For FY 1984, the proposed operations includes the continued high-level operation and maintenance of 21 established state parks. El Dorado State Park, brought into the system in 1971, is presently under construction, and it is anticipated that partial operations will commence in early 1983. It is estimated that annual visitation will exceed 800,000 in the first full year with succeeding years to increase. Clinton State Park visitation continues to increase, and operations and maintenance must be expanded to serve the recreating public. Requested FY 1984 capital improvements will include upgrading of utility systems, remodeling of existing buildings, new facilities, shoreline protection, provisions for the handicapped, and special maintenance items. Master planning for the newly designated Hillsdale State Park will continue in Fiscal 1984. Wind and solar energy facilities to supplement traditional energy sources will continue to be a major concern under this program.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditure by Object:					
State Operations	\$3,947,414	\$4,203,996	\$4,477,256	\$4,768,278	\$5,078,216
Aid to Local Units	900,000	-	-	-	-
Other Assistance	-	-	-	-	-
Capital Improvements	85,127	90,660	96,553	102,829	109,513
Total	<u>\$4,932,541</u>	<u>4,294,656</u>	<u>4,573,809</u>	<u>4,871,107</u>	<u>5,187,729</u>
Expenditures by Fund:					
State General Fund	\$2,532,541	2,544,656	2,723,809	2,871,107	3,187,729
Special Revenue Funds	2,400,000	1,750,000	1,850,000	2,000,000	2,000,000
Total	<u>\$4,932,541</u>	<u>4,294,656</u>	<u>4,573,809</u>	<u>4,871,107</u>	<u>5,187,729</u>
Full Time Positions	116.7	119.0	121.3	123.6	126.1

KANSAS WATER AUTHORITY REVIEW

The Park and Resources Authority was established for the purpose of planning the development and conservation of the state's natural resources and providing for their use and enjoyment. The Park and Resources Authority indicated that the basic function of state park operations program is the operation and maintenance of a system of state parks for Kansas. The agency further stated that the state park development program encompasses the five major functions of planning, designing, budgeting, preliminary engineering and construction.

The Park and Resources Authority indicated that a reduction in federal funds could have a significant impact on agency operations in future fiscal years. The Land and Water Conservation Fund Program was created by an act of Congress in 1964 to cover a period of 25 years from 1965 to 1990. The program was established to provide funds to federal, state and local governmental units for the acquisition and development of recreational lands and facilities. Based on recent actions by the federal government the agency does not anticipate any further federal funds being made available for this program. The areas affected by this reduction will be matching funds for state park capital improvements, aid to local units of government for the park and recreation projects, and administrative fee collections as a source of receipts for the general fees fund. The Park and Resources Authority has proposed a combination of three actions to offset this reduction in federal funding. These actions include a fee increase for state park permits, elimination of certain services and/or personnel in positions directly related to the land and water program, and increases in State General Fund support for certain portions of the agency's operations. The Kansas Water Authority supports this effort of the Park and Resources Authority to minimize the impact of this loss of federal funds on the services provided by the agency.

The 1981 Legislature added Hillsdale State Park to the state park system and authorized the Park and Resources Authority to negotiate a contract with the Corps of Engineers for the development of Hillsdale State Park. At the present time the Park and Resources Authority has been unable to reach an acceptable contractual agreement with the Corps of Engineers. The Park and Resources Authority believes there are three alternatives to resolve this issue. The first alternative would be to allow for the total development of the park by the Corps of Engineers. The second alternative would be for the Park and Resources Authority to request funding for the entire park project for FY 1984. The third alternative would be for the agency to begin its park development activities at Hillsdale State Park before a contractual agreement has been reached with the Corps of Engineers. The Park and Resources Authority has included approximately \$500,000 in its FY 1984 budget request to begin such development activities. While the Kansas Water Authority can appreciate the difficulties that would be caused by further delays in the development of the Hillsdale State Park, it does believe that it would be premature to begin development of the park until an agreement can be reached with the Corps of Engineers. The Kansas Water Authority would encourage resolution of this issue so the Park and Resources Authority can determine if it should proceed with the development of Hillsdale State Park.

KANSAS GEOLOGICAL SURVEY

WATER RESOURCES PROGRAM: Geohydrology of Major Aquifer Systems Program

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Kansas Geological Survey

RELATION TO STATE WATER PLAN GOALS: The protection and improvement of the quality of the water supplies of the state and sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: This program seeks to define and evaluate major aquifer systems in Kansas in order to learn the nature and amount of the available groundwater. Because aquifers are heterogeneous systems that are influenced by a number of factors, it is necessary to study them on a broad, regional basis rather than county-by-county. This research focuses on regional studies in order to learn, for example, the affect of alluvial pumping on streamflow or the extent of buried glacial valleys in north-eastern Kansas. Research in this program concentrates on three types of aquifer systems: those found in rivers, valleys, or ancient glacial systems; those that form the Ogallala in western Kansas; and carbonate or sandstone systems, primarily in southeastern and east-central Kansas. The results should help determine these aquifers' ability to meet anticipated future water needs.

PROPOSED FY 1984 OPERATIONS: In FY 1984, this program's activities will consist of studies of (1) glacial deposits of northeastern Kansas, including quantity and quality analyses of groundwater supplies in 17 northeastern Kansas counties; (2) the Smoky Hill River between Cedar Bluff and Kanopolis, looking expecially at the interaction of stream-flow and pumping from alluvial wells; (3) management options for the Walnut Creek, focusing on problems encountered by the local groundwater management district and the Cheyenne Bottoms wildlife area; (4) future water supplies for Cheyenne Bottoms, with emphasis on groundwater development along the Arkansas River between Kinsley and Great Bend; (5) geohydrology of the Douglas Group, a formation that supplies groundwater to much of northeastern and east-central Kansas, and (6) interaction of surface water and groundwater in the Ninnescah River Valley.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	209,000	222,000	235,000	249,000	264,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	209,000	222,000	235,000	249,000	264,000
Expenditures by Fund:					
State General Fund	209,000	222,000	235,000	249,000	264,000
Special Revenue Funds					
Total	209,000	222,000	235,000	249,000	264,000
Full Time Positions	3 FTE				

KANSAS WATER AUTHORITY REVIEW

The Kansas Geological Survey has listed numerous accomplishments of the geohydrology of major aquifer systems program. In the glacial valley study, a number of aquifers have been located, groundwater levels measured, saturated thicknesses calculated, and 200 water samples analyzed. In the Smoky Hill Study, a variety of data have been collected and field work is underway. In the Walnut Creek Study, groundwater level data have been collected, water samples analyzed, LANDSAT imagery has been processed, and observation wells have been drilled. In the study of the Douglas group, the water well records have been collected, observation wells installed, and water levels have been checked in the field.

After review of the results which have been achieved by this program, the Kansas Water Authority found that most of the projects which are being conducted by the agency are the type of activities which have a tremendous value in providing information for water planning and policy decisions. The Kansas Geological Survey also provided information to the Kansas Water Authority on its research goals and objectives for over approximately a five year period. The Kansas Water Authority believes this information planning process is what allows the Kansas Geological Survey to be responsive to the information needs of the water planning and policy process. The Authority would encourage other water-related research agencies to follow the lead of the Kansas Geological Survey in acquiring information which can be integrated into the overall water management system.

The Kansas Water Authority believes this program is currently funded at an adequate level, although it believes reductions would limit information about aquifer systems and would impair other programs, not only at the survey but at other governmental agencies that depend on this type of information.

KANSAS GEOLOGICAL SURVEY

WATER RESOURCES PROGRAM: Assistance to State and Local Units of Government Program

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Kansas Geological Survey

RELATION TO STATE WATER PLAN GOALS: The protection and the improvement of the quality of the water supplies of the state and the sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: Because of the increase in water-related problems in Kansas, the Survey has received a growing number of requests for groundwater information and assistance in managing groundwater problems. Most do not require additional research, but simply the compilation and application of previously collected data. In some cases, however, the Survey has taken on full-fledged research projects in cooperation with governmental agencies on the state, local, and federal levels. Other parts of this program, such as the state-wide collection and display of groundwater data, are historically carried out to provide current information on groundwater levels and saturated thickness and are done in cooperation with several state and federal agencies.

PROPOSED FY 1984 OPERATIONS: In FY 1984, this program's activities will consist of (1) studying management alternatives in problem areas of groundwater management district #4 in northwest Kansas, including the development and calibration of a model to help manage water problems in areas of greatest drawdown; (2) studying saline intrusion in south-central Kansas in cooperation with groundwater management district #5; this long-term program involves establishing an observation well network to model groundwater quality and provide information related to management; (3) statewide data acquisition and display, including the collection of water levels, a program done in cooperation with the U.S. Geological Survey's water resources division; (4) short-term hydrologic investigations and public inquiry, which includes answering questions concerning water from a variety of sources and investigating the possible effect of proposed new applications to divert water; (5) studying the geohydrology of Marion County, looking at water quality and water quantity problems in the county.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	335,000	355,000	367,000	399,000	423,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	335,000	355,000	367,000	399,000	423,000
Expenditures by Fund:					
State General Fund	335,000	355,000	367,000	399,000	423,000
Special Revenue Funds					
Total	335,000	355,000	367,000	399,000	423,000
Full Time Positions	6.5 FTE				

KANSAS WATER AUTHORITY REVIEW

The Kansas Geological Survey has provided a list of its accomplishments for the Assistance to State and Local Units of Government Program. In the Northwest Kansas Study, the Survey has collected data on water rights for 3,600 large-capacity irrigation wells in the District and has tabulated data on aquifer characteristics for use in modeling. In the Big Bend Groundwater Management District, the Survey has installed 35 nests of observation wells and should complete installation by the end of 1985; information from the network is already used by the District to monitor critical water quality problems. The statewide data acquisition program continues to accumulate and to provide water-related data. Under short-term investigations, the Survey has compiled at least eleven reports on problem areas, such as the Furley hazardous waste disposal site, and has completed a number of reports related to water appropriation rights. In Marion County, observation wells have been established and field work is underway.

After review of the results achieved by the Assistance to State and Local Units of Government Program, the Kansas Water Authority found that most of the projects which are being conducted by the agency are the type of activities which are of tremendous value in providing information for water planning and policy decisions. The Kansas Geological Survey also provided the Kansas Water Authority with information on its research goals and objectives for over approximately a five-year period. The Authority believes that this information planning process is what allows the Kansas Geological Survey to be responsive to the information needs of groundwater management districts and other governmental entities. The Kansas Water Authority would encourage other water-related research agencies to follow the lead of the Kansas Geological Survey in acquiring information which can be integrated into the overall water management system.

The Kansas Water Authority believes this program is currently funded at an adequate level. However, it believes reductions in this program would impair the activities of groundwater management districts, other state agencies, and individuals who rely on the Survey for water related information.

KANSAS GEOLOGICAL SURVEY

WATER RESOURCES PROGRAM: Applied and Basic Research

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Kansas Geological Survey

RELATION TO STATE WATER PLAN GOALS: The prevention of the pollution of the water supplies of the state and the sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: Groundwater decisions must be based on adequate knowledge of the quantity and quality of water in aquifers, knowledge that comes through new research techniques and the application of known analytical techniques. For example, mathematical models can provide estimates of the amount of water in aquifers and can predict how aquifers will be affected by increased pumping. But many of the complex models are in the developmental stage and must be applied to Kansas water problems. The same is true of a number of geophysical techniques that are under investigation in this program. Other projects in this program do not involve basic research, but the application of known analytical techniques to Kansas groundwater problems by collecting data on the rate of replenishment of Kansas aquifers and on the quality of Kansas groundwater. Research in this program falls into three categories: investigations of groundwater management; investigations of water quality; and geophysical investigations.

PROPOSED FY 1984 OPERATIONS: In FY 1984, this program's activities will consist of (1) the design and development of aquifer predictive and management models, which are mathematical models of aquifers that are used in management of groundwater quality and quantity; (2) studying natural groundwater recharge dynamics in Kansas High Plains, including the establishment of two experimental sites in central Kansas to investigate the rate and mechanisms of groundwater recharge; this is a cooperative program with the U.S. Geological Survey's water resources division; (3) studying the geochemistry of irrigation waters, which will include a re-evaluation of several critical areas discovered during previous investigations and the production of a synoptic report on groundwater quality of western and south-central Kansas; (4) studying the geochemistry of inter-active water systems to determine the sources and movement of chemical constituents in the hydrologic cycle of small prairie watersheds; (5) the application and development of seismic, resistivity, and geothermal assessments to groundwater problems in Kansas.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditure by Object:					
State Operations	285,000	302,000	320,000	340,000	360,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	285,000	302,000	320,000	340,000	360,000
Expenditure by Fund:					
State General Fund	285,000	302,000	320,000	340,000	360,000
Special Revenue Funds					
Total	285,000	302,000	320,000	340,000	360,000
Full Time Positions	F FTE	5 FTE	5 FTE	5 FTE	5 FTE

KANSAS WATER AUTHORITY REVIEW

The Kansas Geological Survey has provided a list of accomplishments of the Applied and Basic Research Program. A management model was developed and applied to the Pawnee Valley area in south-central Kansas, while several other models are being applied to the Smoky Hill River alluvium aquifer, the Equus Beds aquifer and Northwest Kansas Groundwater Management District. The experimental sites have been established and most of the necessary equipment installed in the study of recharge dynamics. In the study of the geochemical quality of irrigation water, samples have been taken and analyzed for all of western and south-central Kansas, and reports have been published as this project moves into the final stages. The geophysical study has completed testing and analysis of several techniques, particularly seismic reflection and refraction studies aimed at shallow aquifers. This program also completed an assessment of water quality models of the Equus Beds aquifer, a project funded by the Kansas Water Resources Research Institute; and it completed a mathematical analysis of the efficiency of the observation well networks of the state and several groundwater management districts.

After review of the results achieved by the Applied and Basic Research Program, the Kansas Water Authority found that most of the projects which are being conducted by the agency are the type of activities which have a tremendous value in providing information for water planning and policy decisions. The Kansas Geological Survey also provided information to the Authority on its research goals and objectives for over approximately a five-year period. The Kansas Water Authority believes that this information planning process is what allows the Kansas Geological Survey to be responsive to the information needs of the water planning and policy process. Kansas Water Authority would encourage other water-related research agencies to follow the lead of the Kansas Geological Survey in acquiring information which can be integrated into the overall water management system.

The Kansas Water Authority believes this program is currently funded at an adequate level, however it believes reductions in the programs activities would have an adverse effect on other surveys programs and on other governmental agencies who depend on this research.

KANSAS STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE

WATER RESOURCES PROGRAM: Crop Water Resources Education Program

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Public Service Program/Cooperative Extension Service Subprogram

RELATION TO STATE WATER PLAN GOALS: This program primarily addresses the State Water Plan Goal related to the sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: Work Activities: (1) Providing educational assistance to Groundwater Management Districts. (2) Intensifying education programs for irrigation farmers to help them utilize water efficiently and to evaluate the economic feasibility of new technology, proposed water regulations and cultural practices including water monitoring, measurement, energy use and irrigation efficiency. (3) Developing factual materials for a public affairs program on water policy, including alternative courses of action, and consequences of such action at the local level.

PROPOSED FY 1984 OPERATIONS: Encourage the adoption of water resource management practices which will protect and maximize the economic benefits from Kansas water resources to all Kansans. Teach irrigation and dry land farmers how to use engineering techniques such as water measurement systems, soil moisture monitoring crop water-use equations, and minimum tillage practice to increase water use efficiency and economic returns. Help farmers minimize soil erosion and maximize the utilization of rainfall and runoff waters. Secure the most efficient and economic use of energy in crop production. Maintain the environmental quality of Kansas water through the adoption and use of practical, proven management practices.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$425,000	\$459,000	\$496,000	\$536,000	\$579,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	\$425,000	\$459,000	\$496,000	\$536,000	\$579,000
Expenditures by Fund:					
State General Fund	\$212,000	\$229,000	\$248,000	\$268,000	\$290,000
Special Revenue Funds	\$213,000	\$230,000	\$248,000	\$268,000	\$289,000
Total	\$425,000	\$459,000	\$496,000	\$536,000	\$579,000
Full Time Positions	9.0	9.0	9.0	9.0	9.0

KANSAS WATER AUTHORITY REVIEW

The water-related programs of the Cooperative Extension Service are generally agricultural in nature. These services include such activities as irrigation management, agricultural engineering, agricultural economics, conservation and agronomy. The Service indicated that educational work on irrigation scheduling, on pumping plant efficiency and management of irrigated land that can maximize net return with minimum amounts of irrigation water will continue for F.Y. 1984. In addition, planning for the sixth indepth workshop on irrigation technology and continued assistance and cooperation with groundwater district personnel will occur during F.Y. 1984. The Service indicated that a larger educational effort is needed in the crop water resource area and additional funding is needed to expand work on irrigation scheduling and in the development of materials for a public affairs program on water policy.

After review of the existing programs of the Cooperative Extension Service and a report of the agency's request for specific program enhancements, the Kansas Water Authority would encourage the Service to continue its efforts in establishing a priority for programs within the Service. As was noted in the F.Y. 1983 Water Resources Programs report, the Cooperative Extension Service is encouraged to establish a coordinated program with the state's water-related research agencies in order to incorporate research results from these projects into current education programs. With this coordinated effort and the continuation of the highest priority programs of the Service, the Cooperative Extension Service should be in a position to provide effective educational programs for the sound management of the water supplies of the state. As a result, the Kansas Water Authority recommends the current level of program operations for this program.

KANSAS STATE UNIVERSITY
 AGRICULTURAL EXPERIMENT STATION

WATER RESOURCE PROGRAM: Agricultural Experiment Station

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Research Program/Agricultural Experiments Station Sub-program.

RELATION TO STATE WATER PLAN GOALS: This program addresses the State Water Plan Goal for the sound management, both public and private, of the atmospheric surface and groundwater supplies of the state.

PROGRAM EXPLANATION: The Kansas Agricultural Experiment Station is that division of Kansas State University concerned with the needed research and development to improve agriculture in the state. The Kansas Agricultural Experiment Station has long been involved in various research and development efforts to bring about economic enrichment of the agricultural production, marketing, and utilization efforts. The Kansas Agricultural Experiment Station encompasses the following subdivisions: Agricultural Experiment Branch Stations at Colby, Fort Hays, Garden City, Tribune and the Southeast Kansas Branch; experiment fields, and organized research - Agricultural Experiment Station.

PROPOSED FY 1984 OPERATIONS: FY 1984 Operations will include irrigation development research, irrigation management, irrigation land management, water management for crop production, soil and water conservation research, soil and water management and natural resources research. It is the goal of these research activities to achieve at least a 25 percent savings in irrigation water being applied.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$ 2,465,000	\$ 2,662,000	\$ 2,822,000	\$ 2,991,000	\$ 3,200,000
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	<u>\$ 2,465,000</u>	<u>2,662,000</u>	<u>2,822,000</u>	<u>2,991,000</u>	<u>3,200,000</u>
Expenditures by Fund:					
State General Fund	\$ 2,465,000	2,662,000	2,822,000	2,991,000	3,200,000
Special Revenue Funds					
Total	<u>2,465,000</u>	<u>2,662,000</u>	<u>2,822,000</u>	<u>2,991,000</u>	<u>3,200,000</u>
Full Time Positions	67.8	67.8	67.8	67.8	67.8

KANSAS WATER AUTHORITY REVIEW

The goal of the Agricultural Experiment Station is to conduct basic and applied research in agriculture and related fields. Part of this research is aimed at conserving natural resources and at protecting the environment for the future. To accomplish this goal, the Agricultural Experiment Station conducts numerous research activities related to the conservation of the water supplies of the state. It is a goal of Experiment Station research to achieve at least a 25% savings in irrigation water being applied.

After review of the research activities of the Agricultural Experiment Station, the Kansas Water Authority questions if its projects have been coordinated with other water-related agencies of the state. (As an example the Authority would question why this agency has not participated in pilot groundwater recharge projects.) The Authority believes the agency should establish priorities for its programs and coordinate these priorities with other agencies. This coordinated effort should assist the Agricultural Experiment Station in determining which research projects have the highest priority in terms of the overall research needs of Kansas.

Kansas Water Authority recommends the current level of operations for this program.

BOARD OF REGENTS

WATER RESOURCES PROGRAM: Kansas Water Resources Research Institute

TITLE IN BUDGET (PROGRAM/SUBPROGRAM): Kansas State University and the University of Kansas

RELATION TO STATE WATER PLAN GOALS: The sound management, both public and private, of the atmospheric, surface, and groundwater supplies of the state.

PROGRAM EXPLANATION: Established the same year that Congress passed the Water Resources Act (1964), the Kansas Water Resources Research Institute has a double charge: to conduct both basic and applied research on water use and to train scientists in areas related to water resources. By Board of Regents stipulation, representatives of Kansas State University and the University of Kansas participate in Institute policy making and research. The Institute can support water resources research in any appropriate department of either university - toward the end of providing maximum benefit to all Kansans. Research is focused on or evolves from an understanding of all aspects of this renewable reserve. This is the Institute's approach to finding the most effective ways of conserving, using, and distributing available water for the greatest benefit of both today's and tomorrow's citizens.

PROPOSED FY 1984 OPERATIONS: Operations for FY 1984 have not been planned because of the uncertainty surrounding the availability of funds for FY 1984.

FY 1982 funds did not become available until late in FY 1982. Currently the Institute is involved in six annual cooperative projects and involved to a very limited extent with two carry-over matching grant projects. If additional funding is not received by March 31, 1983, there will be little likelihood that any additional research will be activated.

APPROXIMATION OF EXPENDITURES	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Expenditures by Object:					
State Operations	\$110,000				
Aid to Local Units					
Other Assistance					
Capital Improvements					
Total	<u>\$110,000</u>				
Expenditures by Fund:					
State General Fund					
Special Revenue Funds	\$110,000				
Total	<u>\$110,000</u>				
Full Time Positions	0.0				

KANSAS WATER AUTHORITY REVIEW

The research efforts undertaken by the Water Resources Research Institute involve a broad range of problems, issues and concerns. A review of past research projects indicate that the Institute has been responsive to the research needs of the water-related agencies of the state. The agency stated that the availability of federal funds for F.Y. 1984 is uncertain at this time. As a result, the Institute has not planned any research activities beyond F.Y. 1983. To continue research activities for F.Y. 1984, it has been suggested that state general funds be provided to continue Institute projects. Before such funding is approved, the Kansas Water Authority believes that the Institute's five-year research plan should be reviewed with the other water-related agencies of the state to determine which projects have the highest priority in terms of the overall research needs of Kansas.

The Kansas Water Authority cannot make a recommendation for this program until the F.Y. 1984 research activities have been planned by the Institute.

Toxicology Committee & Bureau Established

The Kansas Department of Health and Environment recently announced steps to deal with the complex area of chemical exposure to the public. Joseph F. Harkins, KDHE Secretary, announced the formation of a permanent Toxicology Advisory Committee and a reorganization within the Department.

"We recognize the increasingly complex problem associated with the contamination of the environment and the exposure of the public to chemicals of all kinds," Harkins said in making the announcement. "The degree of hazard, in many cases, is unknown and needs evaluation by the most informed experts available. For this reason, KDHE has formally established the Toxicology Advisory Committee, comprised of the state's leading experts in the field of toxicology."

In announcing the appointment of the committee, Harkins noted Dr. Joseph Hollowell, Director of KDHE's Division of Health, will be the permanent chairman of the committee. Other members of the Toxicology Advisory Committee are Dr. John Doull, Professor of Pharmacology, Dr. Wayne Snodgrass, Assistant Professor of Pediatrics, Dr. John Neuberger, Assistant Professor of Community Health, Dr. R. Neil Schimke, Professor of Medicine, Dr. Fred Holmes, Professor of Medicine, all of the University of Kansas Medical Center, Kansas City; Dr. James Bridgens, Shawnee Mission Medical Center, Shawnee Mission; Dr. William Eckert, St. Francis Hospital, Wichita; Dr. Sechin Cho, University of Kansas Medical Center, Wichita; and Dr. Fred Oehm, Professor of Veterinary Medicine, Kansas State University, Manhattan.

Dr. Hollowell noted the committee will convene on a regular basis to discuss toxicological problems and research needs. Members will also meet on a subcommittee basis to investigate the hazards associated with specific incidents such as chemical spills or public water supply contaminations.

"This is a unique joint venture between KDHE and professionals, both in private practice and on university faculty, which will give the best possible service regarding complex matters," Hollowell stated. "I am pleased these persons, who have such

(TOXICOLOGY)

superb academic and professional backgrounds, have agreed to assist KDHE in making the best informed decisions relating to the health and safety of all Kansans."

In conjunction with the announcement of the appointments, Harkins announced the formation of a permanent Bureau of Environmental Toxicology within KDHE. The bureau will be headed by John Irwin, formerly of KDHE's Occupational Health Section.

"John Irwin has highly specialized training in occupational health and has years of experience in assisting industries throughout the state in evaluating the degree of hazards involved for employees," Harkins said. "His expanded responsibilities now will include assisting and consulting with professionals within the Department and across the state."

A direct link between the Toxicology Advisory Committee and the new bureau exists in that the more complicated problems will be referred to the advisory committee for assessment.

"These steps build an effective bridge between the environment and health so that in cases of environmental problems, questions of danger to humans will be dealt with in an effective manner," Harkins noted.

Both the appointment of the committee and the reorganization take effect immediately.

NIES Cleanup Continues

Cleanup of the hazardous waste site near Furley, Kansas is progressing smoothly and efficiently with the work expected to be completed within the next three months.

The National Industrial Environmental Services (NIES) site was closed by KDHE on January 18, 1982 when contamination was found in a spring located north of the site. Further geological studies indicated that two zones of groundwater existed beneath the site located 35 and 45 feet, respectively, below the surface. The first zone (Level A) was discontinuous and had been contaminated by chemicals leaching from the treatment ponds. It has

(NIES)

been determined through the extensive hydrogeological studies that no hydrological connection exists between the two zones of groundwater. Migration of chemicals is restricted to Level A and these chemicals are the same as those found in the spring near Prairie Creek north of the site.

Last spring, cleanup plans were outlined which included a series of drainage trenches to drain contaminated liquids and elimination of the evaporation and treatment ponds that had treated liquid wastes on site.

The drainage trenches excavated at the north and south ends of the treatment ponds are eliminating the groundwater mound below the site. An estimated 50 thousand gallons of contaminated liquid has been retrieved and placed into the nearby evaporation pond for treatment. No liquids remain in the four treatment ponds on site.

The areas of the site where wastes are presently buried have been reworked and recovered with a three foot layer of clay mixed with flyash to prevent the clay from shrinking, thus preventing infiltration of water runoff.

The new disposal cell where solidified sludges from the treatment and evaporation ponds will be placed has been completed. The new disposal cell is lined with compacted clay over which has been installed a polyethylene (plastic) liner, resistant to chemicals and moisture. Sump pumps will be installed to help remove any liquid that may accumulate. This new area has the capacity for 40,000 cubic yards of material.

An injection well permit for deep disposal has been submitted to KDHE. Chemical Waste Management, owner of the site, has requested that the liquid wastes from the ponds be delisted as non-hazardous waste and gravity fed into the injection well for placement in the Arbuckle Formation, an estimated 3,500 feet below ground level.

Further cleanup will involve construction of the injection well if approved, draining the liquid wastes currently in the evaporation ponds for disposal in the injection well and solidifying the remaining wastes for placement in the new disposal cell.  p.p.

MEMORANDUM OF AGREEMENT
BETWEEN
THE STATE CORPORATION COMMISSION AND
THE KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

SUBJECT: A management plan to integrate field operation for the regulation of oil and gas activity.

PREAMBLE: This Memorandum of Agreement is executed jointly by the State Corporation Commission (KCC) and the Kansas Department of Health and Environment (KDHE) in the interest of providing a plan for the management of field operations in the regulation of oil and gas activity pursuant to Sub. Senate Bill No. 498. Both agencies agree that the following procedures shall be implemented in order to execute 1982 Session Laws of Kansas, Chapter 228.

I. General Provisions

- A. All activities concerning the protection of fresh and usable water as it pertains to the oil and gas industry shall be handled by the joint KCC-KDHE integrated staff.
- B. All activities concerning solely oil and/or gas conservation shall be handled by the KCC staff.
- C. All activities concerning water matters unrelated to oil and/or gas operations shall be handled by the KDHE staff.
- D. A policy manual detailing joint field operations shall be written jointly by KCC and KDHE. This manual shall include explanations of the permitting process, the monitoring process, the inspection and compliance process, the enforcement process, the investigation process, and other operating procedures. The manual shall be reviewed at least annually and revised as needed by mutual agreement of KCC and KDHE.

II. Location of Offices

- A. The joint District Offices shall be located at the six existing KDHE district offices.
- B. Additional offices may be opened at locations mutually agreed upon by KCC and KDHE.

III. Division and Integration of Responsibilities

- A. Operations shall be conducted in accordance with the attached flow chart which is made a part of this agreement.
- B. Both KCC and KDHE field staff involved in activities covered by this agreement shall be integrated into district offices.

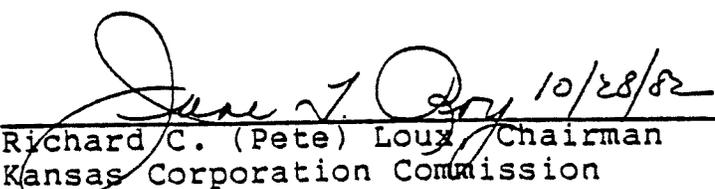
- C. The Officer in Charge (OIC) of each district office shall be a geologist appointed by KDHE.
- D. The Deputy OIC of each district office shall be a Petroleum Industry Regulatory Technician (PIRT) supervisor appointed by KCC. In the absence of the OIC, the Secretary may designate an acting OIC and shall notify KCC of such designation.
- E. In each district, a rotating duty roster shall be maintained to provide coverage 24 hours per day, 7 days per week. The integrated staff shall share in this responsibility.
- F. The district OIC, when having determined enforcement actions are desirable, shall provide such recommendations to KCC and KDHE.
- G. Enforcement procedures shall be in accordance with K.S.A. Chapters 55 and 65, as appropriate.

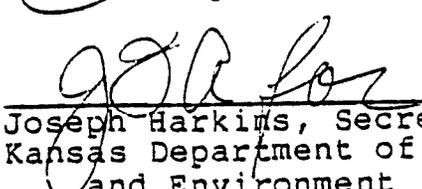
IV. Training of Integrated Personnel

All integrated personnel shall be trained by both KCC and KDHE in areas of shared responsibility as designated in I. A. of this agreement.

V. Miscellaneous Provisions

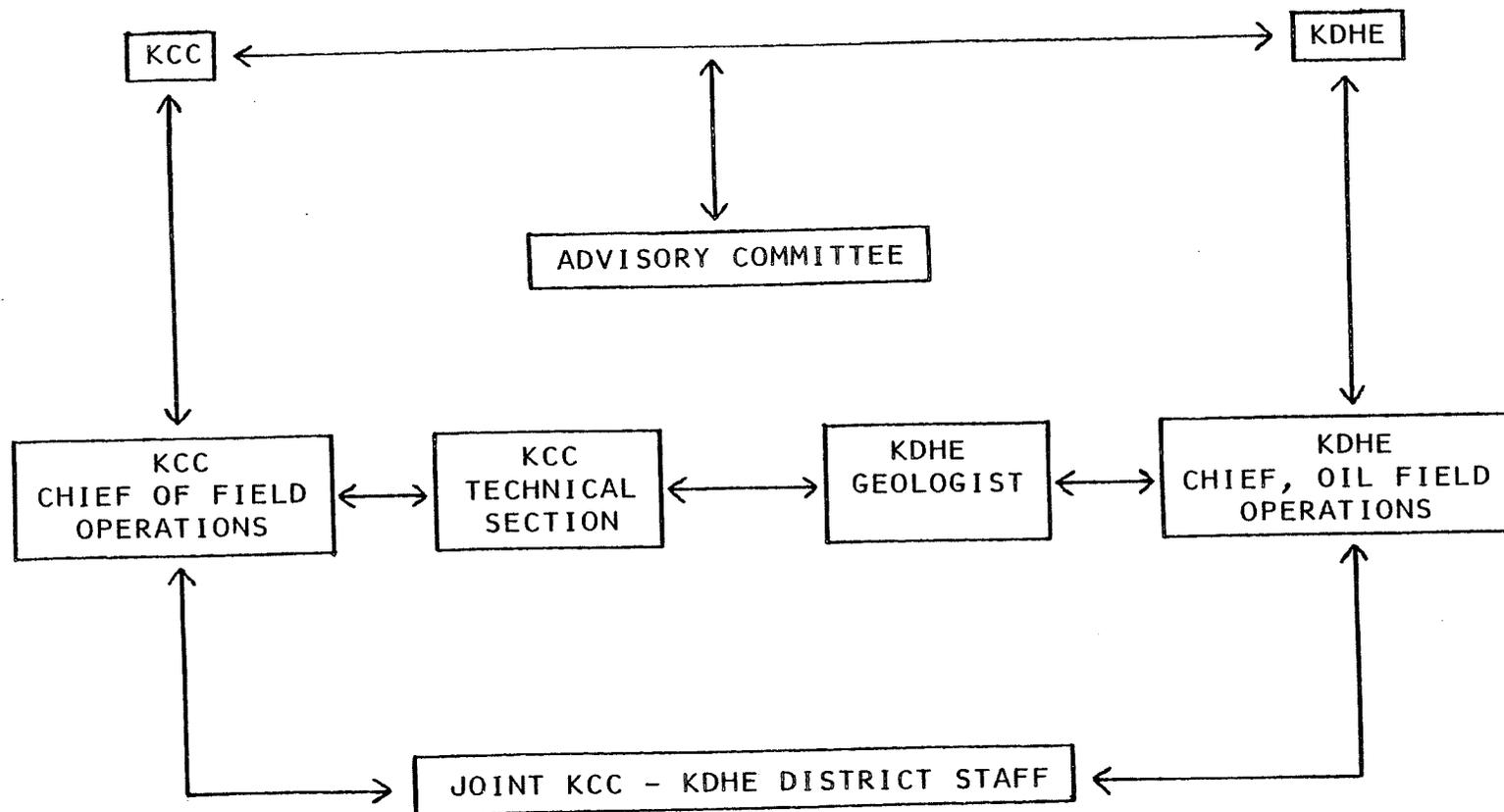
- A. Activities conducted pursuant to the Underground Injection Control (UIC) Program shall be handled in accordance with the memorandum of agreement entered into by KCC and KDHE as submitted to the Environmental Protection Agency.
- B. KCC and KDHE shall share all information and technical data relevant to the joint responsibilities.
- C. No budget request or obligation of funds from the KCC Conservation Fee fund by KDHE shall occur without prior consultation with and written approval from the KCC. Day to day operating expenditures of the joint district offices shall be handled in a mutually agreed upon manner.


Richard C. (Pete) Loux, Chairman
Kansas Corporation Commission


Joseph Harkins, Secretary
Kansas Department of Health
and Environment

10-28-82

WORKFLOW: KCC - KDHE



RESOURCE RECOVERY
FROM
MUNICIPAL SOLID WASTES

February 1982

This report was prepared by Joseph E. Cronin, P.E., and Charles H. Linn, P.E., Staff Engineers, Engineering and Sanitation Section, Bureau of Environmental Sanitation, Kansas Department of Health and Environment.

Kansas Department of Health and Environment
Bureau of Environmental Sanitation
Topeka, Kansas 66602

RESOURCE RECOVERY STUDY

INTRODUCTION

Solid waste generation is an inevitable fact of economic life. However, it is apparent that society has a broad range of choices regarding the types and quantities of residuals we produce and the manner we deal with them afterwards. It is basically these choices, relating to the non-disposal aspects of solid waste management, that are the subject and focus of this report.

Kansas households and commercial sources generate about 1.4 million tons of solid waste annually. An estimated two or three percent of this post-consumer municipal waste is recovered for productive uses. The rest is disposed of in the state's landfills or littered on city streets or county landscapes. In addition, sewage sludge, demolition and construction refuse, unrecycled junked autos, etc., add further substantial burdens to the municipal waste problem.

There are two basic alternatives to disposal of solid wastes and its attendant problems, "waste reduction" and "recycling." Waste reduction involves waste prevention or diminishing the quantity of solid wastes generated. Society can accomplish this by redesigning products or by changing its consumption habits so that reduced quantities of materials are used to satisfy our wants. More durable and longer lived products; reusable rather than throwaway or single use products and packaging; improvements to the materials themselves so that less material is needed to accomplish the purpose; redesigning products and packaging systems to reduce material requirements; and shifting buying habits toward a less materials intensive mix of goods and services, are all examples of waste reduction approaches.

On the other hand, the term "resource recovery" is a general concept which refers to any productive use of what would otherwise be a waste material requiring disposal. This concept can be redefined in more specific ways as follows:¹

"Reuse" - utilizing a waste in its original form and for its original purpose such as reuse of a beverage container.

"Material conversion" - utilizing a waste in a different form of material, such as compost from wastepaper or road-paving material from auto tires.

"Energy recovery" - capturing the heat value from organic waste, either by direct combustion or by first converting it into an intermediate fuel product.

"Recycling" - reprocessing wastes to recover an original raw material; for example, the steel content from tin cans or the fiber content of wastepaper.

This report will examine the source reduction and the recycling issues and make recommendations as to the role state government should take in furthering each of these objectives.

In October 1970, the U.S. Congress enacted the Resource Recovery Act of 1970 which included, among its purposes the demonstration, construction and application of solid waste management and resource recovery systems. During the 1970's, a number of issues concerning the recycling and resource recovery systems arose. The federal government sponsored numerous symposia, funded an impressive list of research and demonstration projects, encouraged private industry to begin resource recovery activities, and ordered federal agencies to initiate recycling activities. The Resource Conservation and Recovery Act of 1976 established a Resource Conservation Committee comprised of several departments of and agencies of the federal government. In 1980, Congress enacted the Energy Security Act of 1980 which constitutes another step in the efforts to increase recycling. The initial expectations were that recycling would reduce or eliminate the solid waste problem and, as a side benefit, would conserve valuable material and energy resources.⁴

SO WHAT IS THE PROBLEM?

Interest in resource recovery springs from two major sources. One was a concern that landfills were a source of health and environmental degradation. When state and federal regulations decreed that landfills must be "sanitary," communities complained that they no longer wanted landfills in their backyards. New sanitary landfills were located farther from populated areas and became expensive to haul to. Landfills became more expensive to build and maintain.²

During this period the public became more resource and recycling conscious. Partially because, in many people's minds there is a belief that a mass consumer-mass disposal society simply makes no sense; and partially because, OPEC publicized our petroleum shortfall which logic extends to many other strategic materials.³

Resourcists began to look at every segment of our economy for sources of materials which could be salvaged and recycled. Municipal residential and commercial solid waste streams carried a huge potential for such materials. The solution became quite obvious, municipal solid wastes

appeared to be an "Urban Gold Mine", which divided itself into a four point theory. (1) If materials could be extracted from solid wastes; (2) they could be sold at a profit; (3) waste disposal costs would fall to zero; (4) landfill volumes would be reduced.

As we begin the 1980's, we find that the optimism of 1970's in regard to the role of resource recovery changed to at least a mild pessimism. Conflicting reports on the success or failure of recycling materials and energy projects have the public and all levels of government in a very real quandry over what, if any, projects should be undertaken. The confusion stems from a mixed bag of social, economic, technological, and institutional problems that are barriers to the growth of resource recovery. These include such things as: 1) lack of demand and available markets for reclaimed materials; 2) inadequate and undependable supply of wastes; 3) conflicting public policies such as tax laws and transportation regulations favoring the use of virgin materials; 4) institutional impediments; 5) the failure of markets to recognize the true economic and environmental externalities of the land disposal of solid wastes; 6) increasing scarcity of mineral resources; and, 7) the general lack of national overall energy and materials policies. A basic understanding of these problems is essential to formulating public policy which encourages alternatives to land disposal of solid wastes.

WHAT ARE THE SOURCES OF SOLID WASTE?

A generalized overview of materials flow and its relationship to the production, disposal, and recovery of solid wastes is illustrated in Figure 1. The principal components of the materials cycle include:⁵

Extraction. Virgin raw materials enter the economic system through the mining, forestry, agriculture, and fishing industries. Several billion tons per year are involved, of which the major part is stone, sand, gravel, clays, and other non-metallic minerals. Although difficult to define and estimate, solid waste generation on a national basis by these industries (including mine tailings and spoils, forest residues, and crop residues) is probably about 2 to 3 billion tons per year. These solid wastes are usually disposed of on land near the point of production and do not, as a rule, enter the solid waste management system. These wastes contain few wastes that could be considered hazardous wastes.

Material refining. Most crude material goes through one or more stages of purification, chemical refinement, physical forming, or cleaning on the way to becoming a "finished" raw material (steel from iron ore, lumber from saw logs, wood pulp from pulpwood). These include the heavy processing stages for most materials, generating very large volumes of solid wastes that often contain a large percentage of those solid wastes defined as hazardous wastes may be the most difficult to control. Industry increasingly directs its efforts to produce by-product raw material or

energy materials from these wastes and to reclaim and recycle processing chemicals, solvents, and other materials. Solid wastes from material refining, usually are self-managed by the producing industry and, as a general rule, are not managed by the community solid waste management system. Land disposal is the most commonly used disposal method.⁵

Finished product converting, fabricating, assembling. Including semi-finished and final product manufacturing and the construction industries, this sector currently uses over 2.5 billion tons of raw materials annually to produce the economy's output of finished capital and consumer goods. For the most part, these represent "lighter" industries; usually with much lower volumes of waste relative to finished product, than the crude material refining and processing industries. These activities produce most of the hazardous waste.⁵

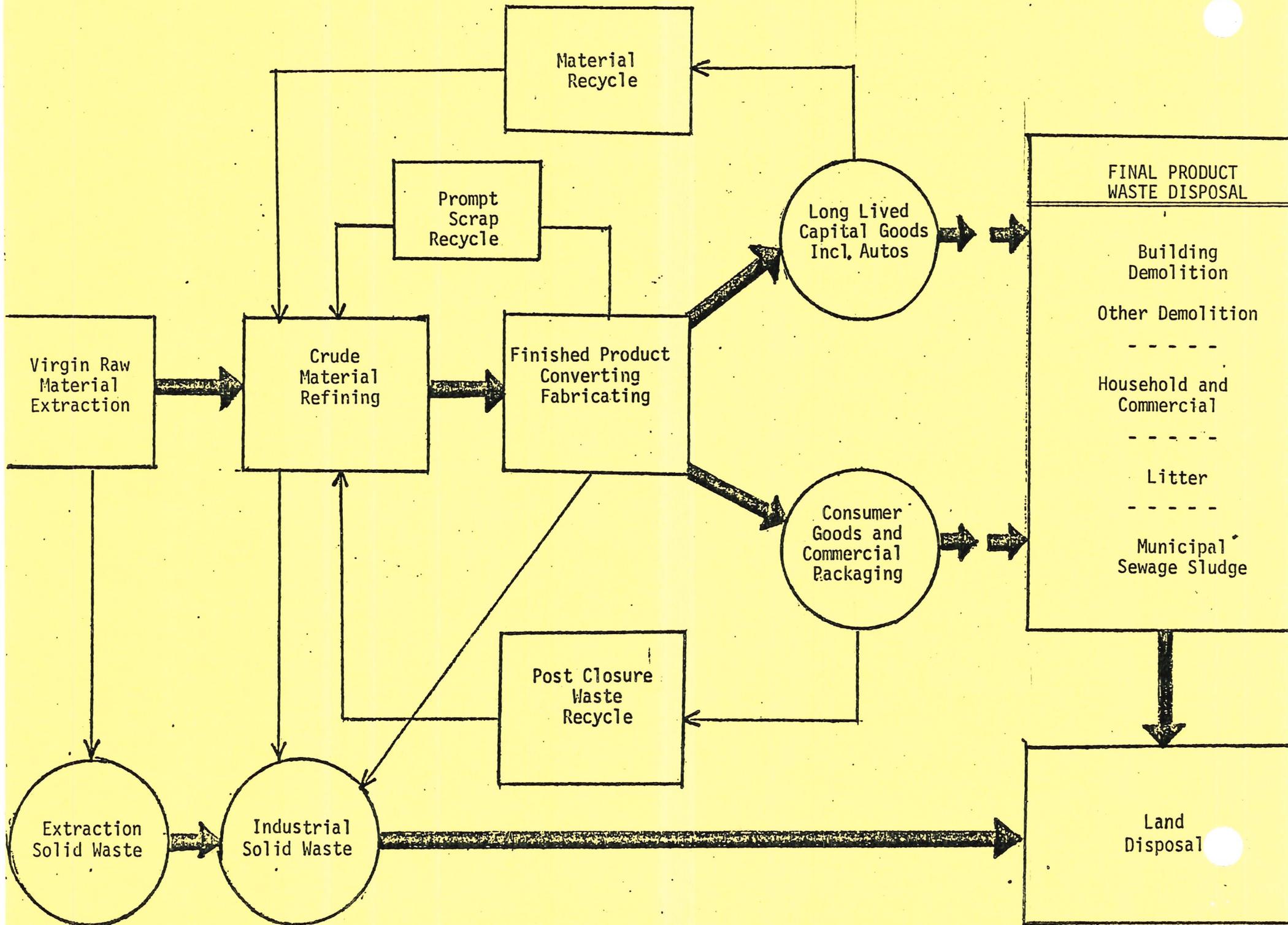
In certain industries, particularly the metal working and paper product converting industries, a very large percentage (possibly over 90 percent) of the scrap waste generated is recycled as so called "prompt" or "new industrial" scrap. Recent estimates place scrap metal recycling from this sector at over 20 million tons, and paper and paperboard converting scrap recycling at over 5 million tons per year.⁵

Most solid wastes from these activities enter the community solid waste management system by private solid waste service companies.

Final "consumption". Households, business firms, and government agencies are all purchasers of final products. In physical terms, by far the greatest volumes of final products are in the form of long-lived capital goods: industrial plant and equipment, transportation systems (highways, railways, bridges) and equipment, military requirements, homes, and office buildings. There is very little accurate or comprehensive data on average lifetimes and ultimate disposition of capital goods. As a practical matter, some last "forever" (monuments, shrines) and some are simply abandoned to decay. Most are eventually subject to demolition, either for systematic salvaging of valuable materials or to clear space for new construction or equipment. Current estimates of "old scrap" consumption indicate that about 26 million tons of metals (over 90 percent ferrous) are recovered from salvaging capital goods, including junked autos and other transportation equipment, railroad rails, and other structures and equipment.⁵

Durable and nondurable household consumer goods, office supplies, and packaging materials together currently account for about 115 million tons of the economy's final product, non-food output.

Figure 1. MATERIAL FLOWS IN THE NATIONAL ECONOMY



Correspondingly, 1978 household, commercial, and government office activities together generated about 100 million tons of post-consumer product solid waste, of which about 11 million tons is currently recovered for material recycling and another small fraction burned for energy recovery.⁵

In addition to the material flow system there is a similar and related energy flow system, supplying direct (fuel) and indirect (electrical) energy for heat, light, and power for all the sectors of the economy. In 1978, the U.S. economy consumed, as energy sources, 618 million tons of coal, 1,120 million tons of petroleum, and 434 million tons of natural gas. All of this fossil fuel material, together with the air combined in combustion, became waste in the form of fly and bottom ash, air-borne particulates, and gaseous emissions from industrial and powerplant boilers, homes and office buildings, and from auto, truck, and other transportation uses. In addition, the total energy value of this fuel - almost 72 quadrillion Btu's in 1978 - ultimately resulted in the generation of waste heat, after performing its useful energy functions. Of the total primary energy consumed, about 36 percent is currently used in the industrial sectors, 38 percent for residential and commercial heat and light, and 26 percent for transportation in all forms.⁵

In summary, virgin raw materials and fuels enter the economy through the extractive industries. Some of the material is accumulated in the economy in the form of long-lived durable goods and as an inventory of periodically recycled scrap materials. Aside from these stock accumulations, most of the original raw material leaves the economic system in the form of solid, liquid, and gaseous waste which is disposed of into the land, water, and atmosphere.

ENVIRONMENTAL EFFECTS OF LAND DISPOSAL OF SOLID WASTES

As can be seen, the principal method of waste disposal practiced through the materials cycle is land disposal. Several techniques for managing wastes by disposal are available but the principal method used is some variation of land burial commonly known as landfilling. Although proper landfilling is a controlled method of land disposal, adverse environmental safeguards, and maintenance of high quality daily operations are ongoing concerns. The major problems associated with improper landfilling that need to be addressed are possible groundwater pollution, air pollution, surface water pollution and public health and safety hazards.

As solid wastes in a landfill degrade, chemical and biological reactions produce a variety of solid, liquid, and gaseous products. Biological activity within a landfill generally begins with aerobic degradation and produces carbon dioxide, water, sulfates, nitrates, and a broad mix of organic and inorganic compounds. When the available oxygen supply is depleted, anaerobic microorganisms predominate; and, consequently, generate methane, carbon dioxide, alcohols and organic acids, and a variety of other substances. Significant amounts of these inorganic and organic substances and microbial agents can be leached from decomposing refuse by moisture produced in and/or infiltrating through the landfill. The resulting liquid solution, consisting of dissolved and suspended solids, is called leachate.

Groundwater and surface water pollution can result from landfill leachate percolating into subsurface soil and water systems. The composition and quantity of leachate produced is important in determining the effect on resultant water quality. Leachate characteristics vary with the solid waste composition and time as decomposition reactions proceed. The quantity of leachate also varies with time, waste type, incident precipitation, and operational controls. In order to minimize or control water pollution from landfill sites, it is advisable to reduce the production of leachate and to prevent or minimize the movement of contaminants away from the landfill sites.

A fraction of waste decomposition product includes a gaseous mixture composed of methane and carbon dioxide, with traces of nitrogen, oxygen, and hydrogen sulfide. The level of gas production depends primarily on the amount and type of organic material in the wastes, moisture content, and temperature variations in the landfill. In the early stages of aerobic degradation, carbon dioxide is the most commonly produced gas with only small amounts of methane being generated. Concentrations of carbon dioxide decrease when anaerobic degradation begins to dominate the decomposition process, resulting in increasing amounts of methane production.

These gases are important considerations in evaluating the environmental effects of a landfill because they migrate outward from the site, and can travel short distances laterally through permeable soils. Methane represents a pollution and safety hazard because it is explosive when present in air at concentrations between 5 and 15 percent. In addition, damage to surrounding vegetation can be caused by low oxygen concentrations in the root zone when CO₂ and other gases replace the oxygen normally occupying the interstices of soil.

Another potential source of water pollution from landfill sites is surface runoff. Direct runoff from the active face and uncontrolled runoff from incident precipitation may erode the soil cover and entrain solid wastes, as well as other suspended or dissolved solid matter. These contaminants may ultimately be received by adjacent surface water systems.

An improperly constructed or inadequately maintained landfill can pose additional health and safety hazards. If decomposing solid wastes are left accessible, they can attract rodents, flies, and other carriers capable of transmitting pathogens. Other safety considerations which may affect site employees and visitors include explosion and fire hazards.⁶

At its best the sanitary landfill as designed and operated by state of the art procedures is a containment device, widely dependent on the climatic and geological conditions surrounding the facility. Given a sufficient amount of time and sufficient precipitation to exceed the field capacity of the stored solid wastes release of the decomposition

products contained in the solid waste is inevitable. Having decided what degree of release is tolerable, society is then faced with the task of designing an infrastructure to provide that degree of containment. These are factors that have not yet caught the eye of technical professions in comparing the costs of land disposal vs resource recovery.

A common argument is that regardless of the method of resource recovery chosen, land disposal methods will still be needed. This is an undisputed fact. However, a wide spread movement toward resource recovery could reduce the dependence on land disposal by at least one order of magnitude when the effects are carried back through the materials flow cycle.

CHOICES - WHO MAKES THEM AND WHAT ARE THEY?

Everyone involved in the functioning of an economic system has a variety of choices which are made both as individuals, acting alone, and as individuals making up various groups within the economy.

As individuals, we purchase and use a huge array of products packaged in a wide variety of ways. Most of the packaging is discarded immediately and when the product is used only a small fraction is set aside for recycling or reuse. Although individuals do have opportunities to change this pattern through selective buying, reuse and increased recycling, these opportunities are generally limited unless the individual lives in a community where private groups have made the services available. Recovery decisions are made solely by individual choice and few incentives are made to encourage those prorecovery options.

The business community generally decides what combination and quantities of materials go into their products and packaging and the ultimate disposition of material left from the manufacturing process. Prices and customer preferences dictate these choices.⁵

Local governments decide what to do with municipal solid wastes: whether materials and energy will be recovered from and how and how much the residents of the community will pay for the waste management services. Cost accounting methods, revenue sources and land use policies help determine these choices.⁵

State governments generally regulate the collection transportation and disposal of solid wastes. The regulatory climate influences resource recovery by exerting economic pressure on the disposal facilities. Resource recovery cannot compete economically with lax disposal regulation. As local governments are creatures of the state, state laws governing competitive bidding, prohibitions against cities entering into long-term contracts; the relative ease of obtained declaratory judgements, flow

control, state purchasing policies toward buying goods made from recycled materials and the general overall, climate for economic development and mechanisms such as "bottle bills", states litter taxes, all influence consumer choices.

The federal government makes decisions about taxes, trade policies, subsidies, and regulations which broadly affect the choices by individuals, private companies, and local government officials to produce, consume, recycle, and dispose of materials. The full range of national goals and objectives enter into these decisions, and tradeoffs must be made among conflicting objectives.⁵

STATE ROLES IN RESOURCE RECOVERY

There are some 17 states that now have some form of a statewide resource recovery program. These range from statewide authorities, as in Connecticut, Rhode Island, and Wisconsin to state grant or loan programs as in Minnesota, New York, Illinois, Pennsylvania, and Tennessee.

Still, the amount of waste being recovered today is small compared to the total volume of waste generated, and may not even be keeping up with the rate of increase in waste generation.

Obviously then, resource recovery is a viable concept, but there are certain barriers presently preventing its wider-scale implementation. These include, among others:

Technological barriers - or the risks of implementing new and unproven technologies for resource recovery at economical capital and operating costs;

Marketing barriers - or the risks of investing in capital-intensive systems for resource recovery with little or no guarantees that the products or outputs will be capable of being marketed; and

Institutional barriers - or the existence of those financing, legal, and organizational arrangements necessary for implementing large-scale systems for resource recovery.

Together, these barriers represent certain problem areas that must be addressed by programmatic solutions if resource recovery is ever to proceed at a more rapid rate.

With respect to technical and marketing barriers, traditionally it has been the role of the federal government to advance the state of the art and assume the risk of developing new technology. In this regard, the Environmental Protection Agency has over the years funded several demonstration projects and is now conducting evaluations of these new systems.

With respect to institutional barriers, however, while the federal government might assist in overcoming them to a limited degree, the ultimate authority and capability for resolving these barriers rests

with the states; both because local governments are creatures of the state and because the states have the ultimate authority for controlling both land use and solid waste. Hence, in summary, while the federal government has the primary responsibility for overcoming technological and marketing barriers, the states have the primary responsibility for overcoming institutional barriers limiting resource recovery.

Having defined the states role, let's take a look at specific program alternatives that a state can choose from to fulfill this role.

ALTERNATIVE STATE RESOURCE RECOVERY PROGRAMS⁷

Essentially, there are six basic program approaches that a state can pursue to fulfill its role of creating an institutional environment conducive to resource recovery. These are as follows: a statewide authority approach; a state public works approach, a state encouraged regional approach; a state grant or loan program to assist local governments; a state program of incentives and disincentives; or a state regulatory program to reduce wastefulness. Following are brief descriptions of each:

1. A statewide authority - A statewide authority is an independent state agency that is self-financing and self-governing within certain broad limits set by the state. Generally, such an authority is empowered to: (1) issue bonds; (2) acquire or condemn real property; (3) plan, design, construct, and operate facilities; and (4) charge user fees for any services it performs.

The Connecticut Resources Recovery Authority is an example of a statewide authority. Created in 1971 as a result of a plan developed by the Connecticut Department of Environmental Protection, the authority is presently carrying out the implementation of the plan which calls for the construction of ten resource recovery facilities by 1985 which will process eighty-four percent of the state's waste.

Other states with statewide authorities include: Rhode Island, Ohio, and Wisconsin.

Advantages of the statewide authority approach are that:

- a. Local governments do not have to pledge the full faith and credit of their assets to secure a resource recovery system, nor do they have to draw upon their statutory debt limits. Instead, the authority does all the long-term debt financing.
- b. The authority provides for flexible decision-making since it is independent of the state's procurement and personnel procedures. At the same time, however, the authority must still conform to all state and federal environmental regulations, including obtaining all permits.

- c. The authority provides for an integrated statewide system of resource recovery plants as opposed to an inefficient and uncoordinated system of local efforts, thus allowing for regionalization and economies of scale.

Disadvantages of the statewide authority approach, however, are that:

- a. Decision-making is removed from local governmental control.
- b. Until resource recovery is better proven, it would be difficult for an authority to secure financing, and if it were successful it would probably be at a higher interest rate than if such financing were secured through the use of state or local general obligation bonds.

2. A state public works approach - This is where a cabinet level state agency is given the power to construct and operate facilities, either mandating that local governments participate in the state program, or making such participation voluntary. Unlike a statewide authority, however, revenue bonds floated by a state agency do pledge the full faith and credit of the state, thus allowing for lower interest rates.

An example of a state public works approach is that of the commonwealth of Massachusetts. In the Massachusetts example, such implementation powers are given to the Bureau of Solid Waste Disposal, which has only recently issued a request for proposals for the construction of its first regional system in the Greater Lawrence area.

Another state pursuing this approach is the state of Michigan.

Advantages of this approach are that it utilizes a statewide systems orientation while securing financing at the best-possible interest rate.

The disadvantages, however, are that it lacks the flexibility and marketing capabilities of an independent authority while also introducing political considerations into its decision-making. In this regard, it is the opposite of a statewide authority.

3. A state encouraged regional approach - A state encouraged regional approach has several variations. One, it can either be a mandated regional approach - for example, legislation requiring county governments to implement resource recovery program. Two, it can be enabling state legislation to allow local government to establish either regional authorities or interlocal agreements. Or three, it can be a program of incentives for regionalization - as an example, a grant or loan program for regional resource recovery projects.

One example of a state encouraged regional approach is the California Solid Waste Management and Resource Recovery Act, enacted in 1972, which establishes a State Solid Waste Management Board and which requires all counties to adopt solid waste management plans to be approved by the state board and to be consistent with a state resource recovery plan. Such a plan has been adopted by the state and is now being used in the review and approval of county plans along with the preparation of additional implementing state legislation.

Other states using some variation of this approach are New York and Tennessee.

Meanwhile, advantages of this approach are that it allows a decentralization in the implementation of resource recovery while still encouraging regionalization, and that it promotes a cooperative state, local and regional solution to the problem.

Disadvantages, however, are that it does not provide a mechanism to insure that the various sub-state regions will actually implement resource recovery, nor does it guarantee local and regional cooperation.

4. A state grant or loan program to assist local governments - Perhaps the easiest approach for a state to implement without interfering with the present functions of local government is to establish a grant or loan program to financially assist local governments - assuming, of course, that the state has the funds necessary to support such a program.

One example of a state utilizing this approach is New York which has a \$175 million grant program for resource recovery. To date, \$116 million has actually been set aside for specific resource recovery projects, with actual grant awards to be made once communities have selected contractors.

Other states using this approach include: Illinois, Tennessee, California, Pennsylvania, Maryland, Minnesota, and Washington.

Advantages of this approach are that it does not pre-empt local decision-making, but instead it financially motivates local governments to implement resource recovery on their own.

A disadvantage, however, is that it does not actually improve the technical capabilities of communities to implement resource recovery.

5. A system of incentives and disincentives - Essentially, the purpose of this approach is to influence the economics of resource recovery by either providing tax incentives for resource recovery, by providing land for recovery plants, or by regulating land disposal so as to make it more expensive and comparable in cost to resource recovery.

A state that has set aside land for resource recovery and has considered various tax incentives for promoting capital investment in resource recovery is the state of Hawaii. The state of Minnesota has experimented with a disposal tax and a strong regulatory program as a disincentive to land disposal. Other states pursuing this approach includes Connecticut, New York, Illinois, and California.

Advantages of this approach are that it allows for private initiative and investment while internalizing environmental costs and requiring minimal state funding.

Disadvantages, however, are that it can lead to profit windfalls for existing resource recovery industries while not necessarily leading to an organized statewide solution.

Meanwhile, an additional aspect of this approach is the potential for a state to eliminate existing legal barriers affecting the procurement of resource recovery systems by state or local governments. As an example, in many states, laws exist which prevent government from entering into turn-key or full performance contracts. In still other states, laws exist which prohibit anything but competitive bidding - even where cost should not be the primary consideration. While there is no good example of a state pursuing this problem area, it is nonetheless an area that is constantly being brought up by those actually attempting to implement resource recovery systems.

6. A state program to encourage waste reduction - The primary purpose of this approach is to control the generation of waste so as to reduce the magnitude of the solid waste problem and to conserve energy inherent in the production and use of any goods. This can be accomplished either through a materials use tax, direct packaging controls, or voluntary industry standards for either conserving resources or utilizing recycled materials as opposed to virgin materials.

An example of a state that has implemented this approach is the state of Oregon, which has pioneered in the area of banning non-returnable bottles and cans.

Advantages of this approach are that it reduces waste generation while costing little to implement and conserving energy.

Disadvantages, however, are that it can potentially cause economic dislocations if not adopted to an area's own unique needs and problems, and it does not solve the entire solid waste problem.

THE DEPARTMENT'S ROLE IN RESOURCE RECOVERY (OUR VIEWS)⁸

Resource recovery is a basic economic activity which has functioned in one form or another since the dawn of civilization. As an economic activity, recovery cannot be achieved by environmental well-wishing. The same economic principles which govern other enterprises also govern resource recovery activities. That is, the level of recycling that can be achieved and maintained is determined by the demand for these materials as inputs for the manufacture of new products. Collection of waste products is not resource recovery. To simply recover products without regard for a market for these products is tantamount to operating in an economic vacuum. The end use of recyclable materials determines the amount that can be recovered and even determines the form in which they must be recovered.

Historically, solid waste management planning stems from the environmental concerns of government. In this context resource recovery planning should be regarded as a high form of solid waste management. We believe that the conservation ethic should be added to the environmental ethic and that resource recovery planning proceed from these two motives even though the implementation of these plans is industrial in character and scope.

At this time, resource recovery, directly from mixed municipal refuse, does not appear economically viable in any ongoing operation in this country. However, in its defense if one looks at the numbers for many pollution control facilities, one could not possibly argue the viability of a complex power plant scrubber or tertiary sewage treatment. But, the nation and the states made the decision that they would pay for clean water and clean air regardless of the cost. That same kind of decision needs to be made regarding resource recovery and until it is we will not see resource recovery. There are many imaginative ways to get resource recovery stimulated. Unfortunately though, there is a lack of courage at both state and federal levels to make it happen.

In addition to positive environmental benefits and possible economic benefits, resource recovery offers a tremendous potential for clean industrial growth. In Kansas it appears that with a very few exceptions resource recovery will have to be developed on a regional basis to have any chance of having economic success. As a consequence we feel that resource recovery needs to become a major public policy issue requiring participation from all those sectors involved in planning, developing, and operating regional enterprises.

These can best be accomplished through a statewide comprehensive resource recovery planning process carried out under a legislative mandate. The state's role should be to establish a policy, a plan to implement the policy, and an agency and/or instrumentality to implement the plan. Planning should be an interdisciplinary effort requiring equal participation from the physical and social sciences, by business

and public administration. It should address all systems and institutional elements and should be able to provide sensible rationale to concerns that arise. It must also be sensitive to intergovernmental and intersectional relationships.

Legislative participation is necessary at the present time to supply the initiative necessary to begin the planning and implementation process. Even though the private sector has the technical competence necessary to do the basic system and institutional design work and can operate the system, industry cannot assume the risks. The requirement for adequate institutional arrangements to insure flow of waste into the system and market the recovered products, establishes a need that industry cannot fill.

At the present time, resource recovery planning can deal only with concepts and strategies. We really know too little about large scale resource recovery; there is little recorded experience about successful regional resource recovery systems and equally skimpy experience about the successful operation of small scale projects.

A state resource recovery plan should address the following key issues:

1. Adequate waste mobilization, waste processing and market reliability. Regional and statewide resources recovery operations require the mobilization of reliable supplies of waste in large quantities, and waste mobilization requirements usually transcend the barriers of political boundaries.
2. Cost-effectiveness, comprehensiveness, and equitability in overall programming. Because the present public liability of waste can rapidly become more of a public asset, through resource recovery, the plan should provide the motivation and means for continually increasing productivity, lowering costs and achieving greater revenues, in order to satisfy the public interest.
3. Reduction of risk and uncertainty. The utilization of practically all the ingredients of waste as raw materials is a relatively new concept. Governmental aegis and guarantees are necessary incentives for the adoption and operation of this process; government and industry are mutually involved and should mutually share the risk of the enterprise.
4. Successful harmonization of interests between levels of government and government and industry. There is need for establishing arenas in which the public and private sectors may meet in ways that will capitalize on the skills and knowledge of both while minimizing the risks to each.

Other key issues are:

1. Should there be compulsory or voluntary participation by local government in the state's program?

2. What should be the extent of public financing for resource recovery as compared to traditional disposal methods, and by who?
3. How can markets be stimulated for resource recovery?
4. How should strict disposal regulations be used to stimulate resource recovery?
5. Ultimately, who is to take the risk of implementing resource recovery?
6. How can the state not only recover its wastes, but also reduce its wastefulness?

The Department of Health and Environment should assume a leadership role in making the planning process a viable one. Legislation to mandate a resource recovery program should be prepared. In preparation for favorable consideration by the legislature, comprehensive planning guidelines for resource recovery programs should be prepared by the department.

In the preparation of this report, several solid waste management/resource recovery plans were examined. The conclusion is that in almost all cases the planners have failed to research the political economic and geographic aspects of their subject thoroughly. There seems to be an almost universal lack of concern for local attitudes, traditions, and political climates in feasibility studies. Political acceptability of resource recovery and the method of creating a regional facility or agency are major factors. Political structures vary. Some regions are more volatile than others in turnovers; some are politically stable. This kind of analysis is important background knowledge in selling the need for a resource recovery study as well as for the political ramification that can result when the study is complete.

The planner needs to be sensitive to the characteristics, demographics, and fiscal aspects when it comes down to the final steps in gaining acceptance of the plan. The usual premises of the "environment" and the "thing to do" are useful in motivating the planning, but selling the program on these ideas or its engineering aspects is not the way to go. A first priority of the planning effort can be no less than a thorough understanding of all aspects of the community if resource recovery is to become a reality and an acceptable project for design, construction, and operation.

The following is a listing of short term goals which the department should attempt to complete by 1984.

1. The department should research and develop a comprehensive resource recovery legislative package which should be ready to be considered by the Kansas Legislature in the 1983 Legislative Session. The legislation should address the concerns outlined in the proceeding section and should call for an active state role in supervising and funding the effort.

2. The department should strengthen its regulatory policies regarding land disposal of solid waste, particularly as these relate to the long-term care of closed disposal sites. The cost of long-term care of disposal sites should be reflected in the unit cost of the sites operation, we doubt that it is. Resource recovery should not have to compete with inadequately financed, poorly planned disposal.
3. The state of Kansas should work toward various waste reduction methods. One area which appears promising is beverage container legislation. As a practical matter, the contribution of beverage containers is only a percentage of the total solid waste mix; however, a principal contribution of this approach is in the form of a symbolic gesture which we believe would increase the development of a conservation ethic in our citizens. Passage of container deposits is a very difficult proposition. The beverage and container interests are well organized; have almost unlimited funds to spend to defeat "deposit" legislation; and these interests have a surprising success rate considering that a majority of Kansas citizens, as evidenced by editorial support, will admit that they think deposit legislation would be a good thing. The voluntary centers operated by the beverage distributors help, and we concede, remove many of the recyclable containers which end as litter. The non-recyclable containers lay where they are discarded until they are broken or rust away. Many containers, recyclable or otherwise, are used in commercial and residential units and our observations are that most of these end up in the landfills LOST. The goal for the 1980's should be to get them all back.
4. State government should set an example for its citizens. Resource recovery being an economic activity will not develop into a viable alternative to disposal until reliable markets for recovered materials are available. The state should focus part of its efforts toward expanding the state and local economic demand or need for these materials, which in turn will sustain growing levels of recycling. One way this could be done is by coordinated educational efforts designed to encourage the public, business, and state institutions to use more products made from recycled materials. The department should work toward an examination of state controlled purchasing specifications to see if those discriminate against products made from recycled materials. Paper products, lubricating oil, and cleaning solutions are obvious beginnings. The department has no direct influence over the selection of those products; however, it would seem entirely appropriate to encourage the governor to issue an executive order to request one or the other legislative body to enact a resolution calling for such a review.
5. The department should work with the Kansas Department of Economic Development in its industrial development efforts (traditionally conducted to lure new or expanded industrial capacity to the state) to focus a portion of its interest specifically on industries and companies to use recycled materials.

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RESOURCE RECOVERY STUDIES
FOR
THREE KANSAS COMMUNITIES

by

U.S. Environmental Protection Agency, Region VII

PEDCo

Kansas Department of Health and Environment

March 1982

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INTRODUCTION

An increasing number of cities/counties are looking at resource recovery. The primary reasons for considering resource recovery are the diminishing space in existing landfills and the revenue required to operate them. The effects of inflation on energy (fuel) and labor have made the operation of the landfill an increasingly expensive venture. Some counties, that have landfills nearing completion, are now trying to site new disposal facilities. This siting is difficult due to the negative public response about landfills. It is also costly to develop plans and operating procedures which are required by state permits. The RCRA "Open Dump Inventory" has required a more rigorous set of criteria that landfills must meet. This makes the siting and operation of an environmentally safe landfill a more difficult (and therefore a more expensive) task.

The Environmental Protection Agency (EPA) implemented the Technical Assistance Panels program to aid state and local government to investigate the possibilities of resource recovery. Under this program a local community could be helped in their study by a TA panel consisting of people with expertise in the field. These people would typically come from: EPA; EPA contractor; state agencies; local government and community leaders.

Under the Technical Assistance program the local government was aided in conducting a study to see if resource recovery was economically feasible. These studies had the following focus: review the types of resource recovery and determine which is most applicable to the specific community; estimate quantity of solid waste generated; identify potential energy customers; determine economic feasibility of resource recovery.

Studies were conducted for the following Kansas communities: Hutchinson-Reno County; Topeka-Shawnee County; Greater Southwest Regional Planning Commission (19 counties). These areas are shown in Appendix A. This report will give a summary of the results of these three studies.

The general discussion of the review of resource recovery types, the solid waste generation, the steam survey, and the economic analysis are similar for each study and will be presented as separate sections. The remaining part of the report will identify the specific aspects of solid waste generation, steam survey, and economic analysis details for each particular study.

REVIEW OF RESOURCE RECOVERY TECHNOLOGY

A. Refuse Derived Fuel

The purpose of refuse derived fuel (RDF) systems is to prepare a fuel that can be burned and which does not contain a large fraction of unburnables. Pelletized RDF or Fluff RDF are the products from this process. "RDF containing about 10 million Btu's per ton can be produced from between 55-85% of all refuse received."¹

RDF plants mechanically separate the organic fraction from the non-combustible fraction of the waste. All plants use essentially the same processes, although in different combinations. The current processes used are shown in Table 1.² A schematic of RDF facility is shown in Figure 1.³ The basic processes are: shredding (size reduction); air classification (density separation); mechanical separation. The mechanical separation can be magnetic (ferrous removal) or screening. A trommel (rotary screen) is often used prior to the initial shredding to remove bulky wastes that do not burn. Glass particles are also removed by the trommel to prevent abrasion in the process equipment. Methods of aluminum recovery and glass recovery are practiced at some plants.

The dollar/ton cost of RDF is high when compared with other technologies. The RDF process requires plants that are capital-intensive. Another disadvantage is the lack of a firm market for RDF. Companies are reluctant to use this fuel in expensive boilers due to the variability in quality, the tendency to slag, and the possibility of corrosion.

B. Mass-Burn Incineration

Mass-burn units are usually waterwall incinerators but they can be refractory lined chambers followed by a waste heat boiler. The water-wall incinerator has a combustion chamber that is lined with tubes which circulate the water as it is being heated to steam. This design of boiler is typical of that used in the electric production industry.

Solid waste is unloaded on a tipping floor where it can be inspected for large bulky items that are not suitable for combustion. A front-end loader or a crane transfers the refuse to a chute that charges the furnace. Stoker or travelling grate boilers are usually used for this type of system. A typical installation is shown in Figure 2.² The refuse is burned as it travels up the inclined travelling grate. Under-fire air is blown under and through the refuse to provide combustion air. Steam or electricity are the end products to be marketed.

The advantage of this type of resource recovery process is that electricity is an easily marketable commodity. This type of facility could be easily sited, since the major requirement would be close proximity to an electrical grid system.

TABLE 1. PROCESS STEPS USED IN PRODUCTION OF REFUSE-DERIVED FUEL^a

Process	Function
1. Trommel	Separate small, heavy objects (such as glass) from burnable portion
2. Primary shredding	Reduce feed to handleable size
3. Air classification	Separate heavies from lights
4. Magnetic separation	Remove ferrous metals
5. Screening	Separate various size fractions and classify materials (disc screens, rotating screens, etc.)
6. Secondary shredding	Reduce product to usable size
7. Pelletizing	Press or extrude RDF into usable, "coallike" pellets

^a Not all steps are used in every production plant.

Reference 2

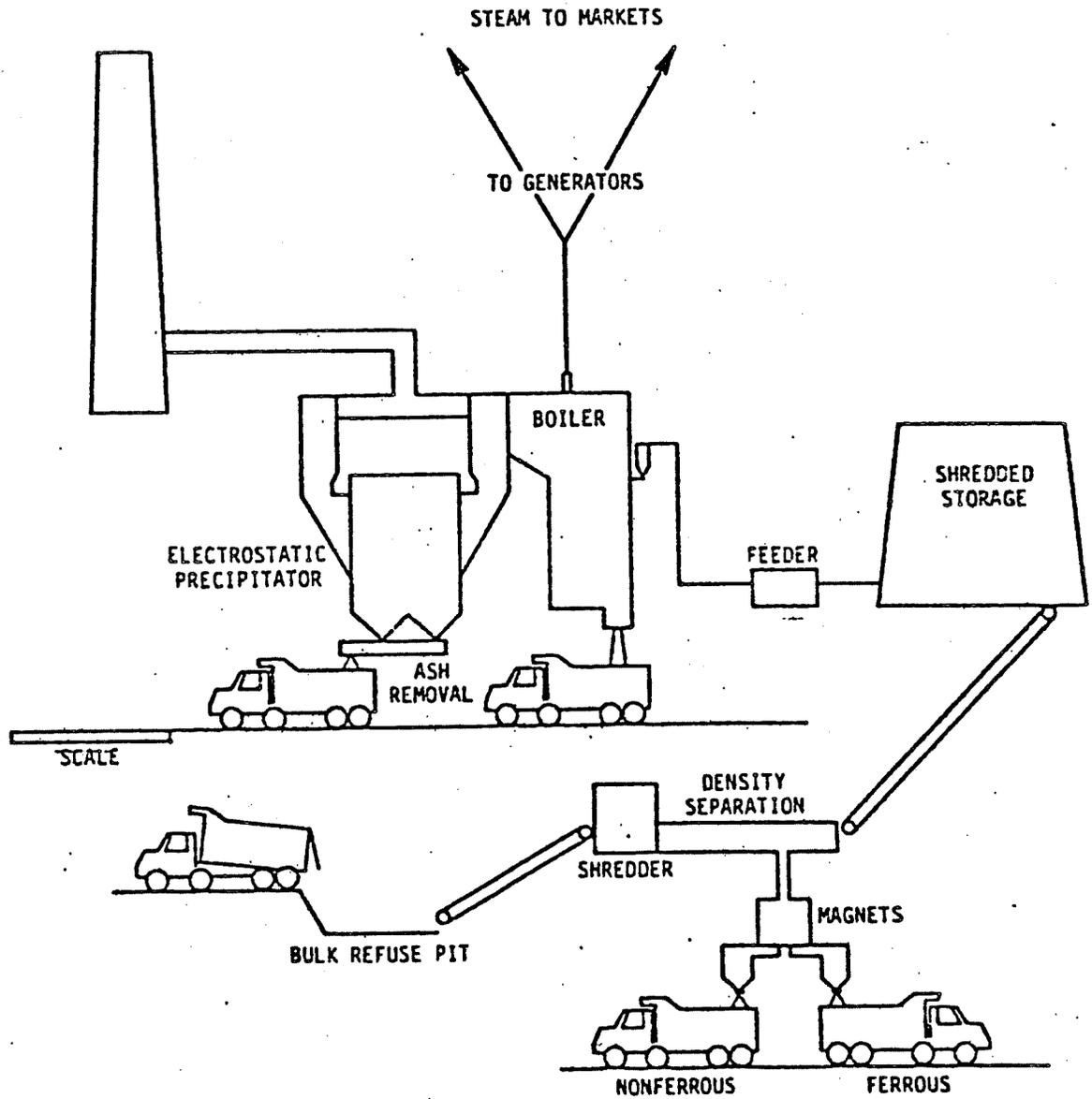


Figure 1. Schematic of a refuse-derived fuel (RDF) facility.

Reference 3

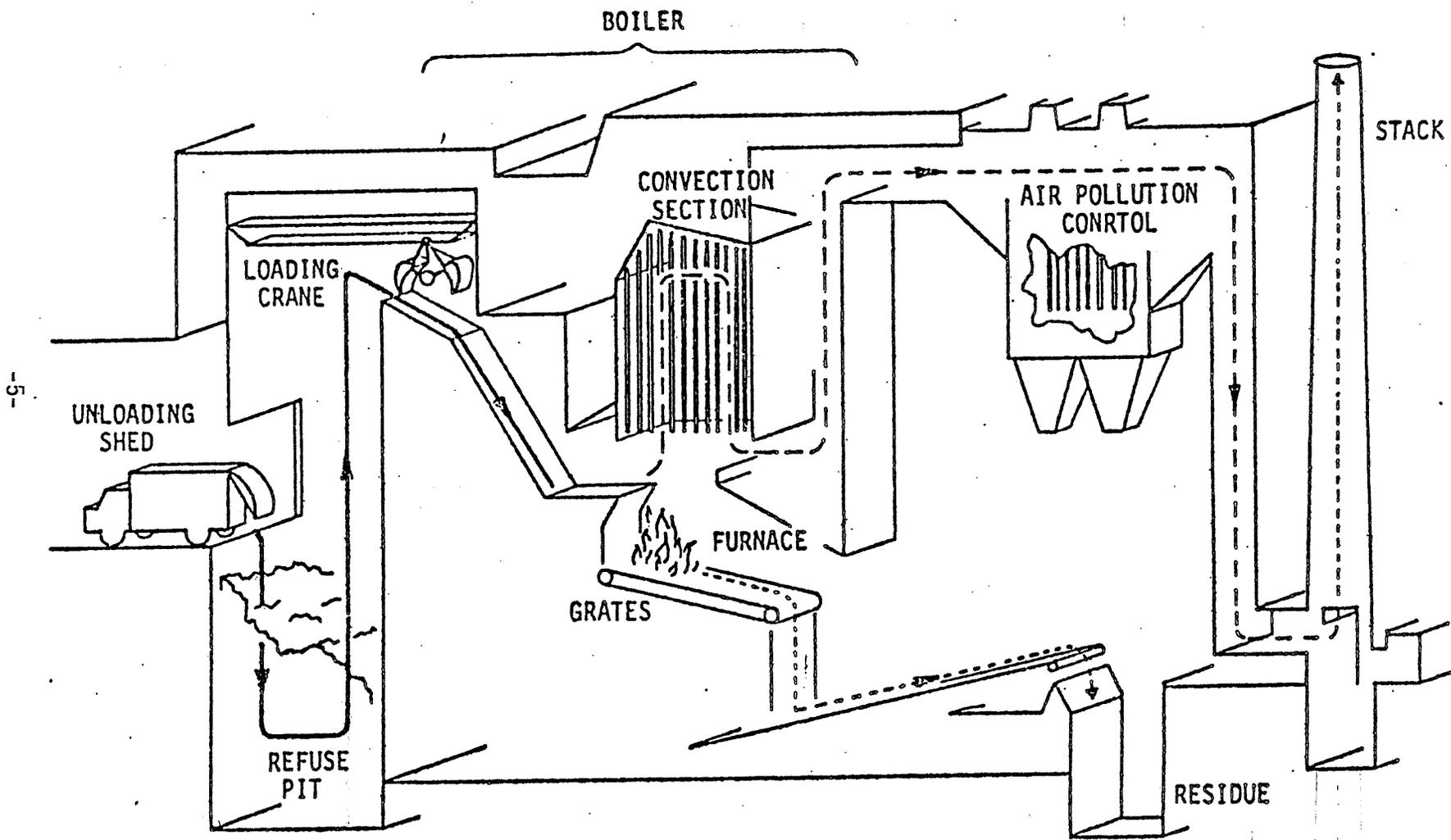


Figure 2. Typical waterwall furnace for unprocessed solid waste.

The disadvantage of this type of resource recovery is that these boiler systems are capital intensive. The dollar/ton cost of processing is high when compared with other refuse disposal options. Two major installations have an average capital cost of \$50,000/ ton/day capacity.⁴

C. Pyrolysis, Codisposal, Composting

Pyrolysis is a form of starved air incineration that involves the distillation of the carbonaceous matter of solid waste into char, liquids, gases, and ash. The pyrolytic (oxygen deficient) reaction produces products that have a heating value. Whereas, solid waste that is combusted with sufficient air produces carbon dioxide, water vapor, and sulfur dioxide.

The pyrolysis process technology has not reached a state of operational reliability. Capital costs are high when compared to mass burning systems.³

Codisposal involves the landfilling or incineration of solid waste that has been mixed with sewage sludge. This process is in the experimental stage and is not a proven technology.³

Composting is the aerobic or anaerobic decomposition of solid waste. Aerobic systems are usually used to control odors. Solid waste is mixed with a bulking agent (woodchips, etc.) and windrowed. The waste material biologically degrades to a humus material that can be used as a soil conditioner.

The composting technology has been established. The major disadvantage of composting is establishing a market for the product. The lack of adequate financial market makes the dollar/ton cost higher than other disposal options.

D. Modular Incineration

A modular combustion unit is a self contained incinerator designed to handle small quantities of waste. These units are usually used for small scale energy recovery while waterwall incinerators are used for large scale projects. Modular incinerator modules range in size from 10 tons/day to 100 tons/day. Several of these modules can be grouped together in order to obtain the required disposal capacity for the plant. A grouping together of smaller modules to obtain a design capacity is often used. This results in a redundancy that provides a built in back-up system. If one of the modules is in need of maintenance, other modules can continue to process the waste.

Municipal solid waste is dumped onto a tipping floor so that large bulky items can be separated. A small skid-steer front-end loader pushes the waste into a loading hopper. As the waste is burned in the incinerator, the heavy unburned fraction settles to the bottom. Most incinerators have an automatic ash conveying system. The ash is conveyed through a water quench and is discharged to a hopper for disposal. The remaining ash is 10-20% of the original volume and 25-40% of the original weight of the incoming refuse.

A typical modular incinerator is shown in Figure 3.² The incinerator has two combustion chambers which control the air-to-fuel mixture (sub-stoichiometric). The gases and unburned organics rise to the secondary combustion chamber. The secondary chamber combusts the gases and particulates in an excess air condition. This chamber usually has a burner which insures that complete combustion takes place.

This type of double chambered incinerator has the effect of limiting the particulate emissions in the exhaust gases. Since the primary chamber is operated in a lean air-to-fuel mode, it has a low air velocity which does not cause turbulence. This lack of turbulence reduces the number of particulates that would be entrained in the exhaust gases. The secondary chamber is operated with excess air for combustion. This complete combustion burns all of the organic particulates and reduces the particulate emissions in the exhaust gas.

Auxiliary fuel is used in the primary chamber to initially ignite the waste; it is usually not needed during operation. Auxiliary fuel is used as needed in the secondary chamber to maintain complete combustion. This is usually ascertained by monitoring the exhaust gas for emissions.

Energy is recovered by passing the hot exhaust gases through a heat exchanger which is located after the secondary chamber. The recovered energy is usually in the form of steam, but can also be hot water or hot air. The typical system is equipped with a dump stack that by-passes the heat exchanger. This allows the incinerator to be operated if steam is not needed or if the heat exchanger is in need of maintenance.

The disadvantages of a modular incinerator is the unproven technology. Most manufacturers claim a 20 year life expectancy; however, these units have not been in operation long enough to have a proven track record.

The advantages to modular incineration is the capital cost. This form of resource recovery has the lowest initial cost. Capital cost is the primary criteria used by most governmental units. The availability of a market for the energy is usually not difficult, but it is an important part of the feasibility study.

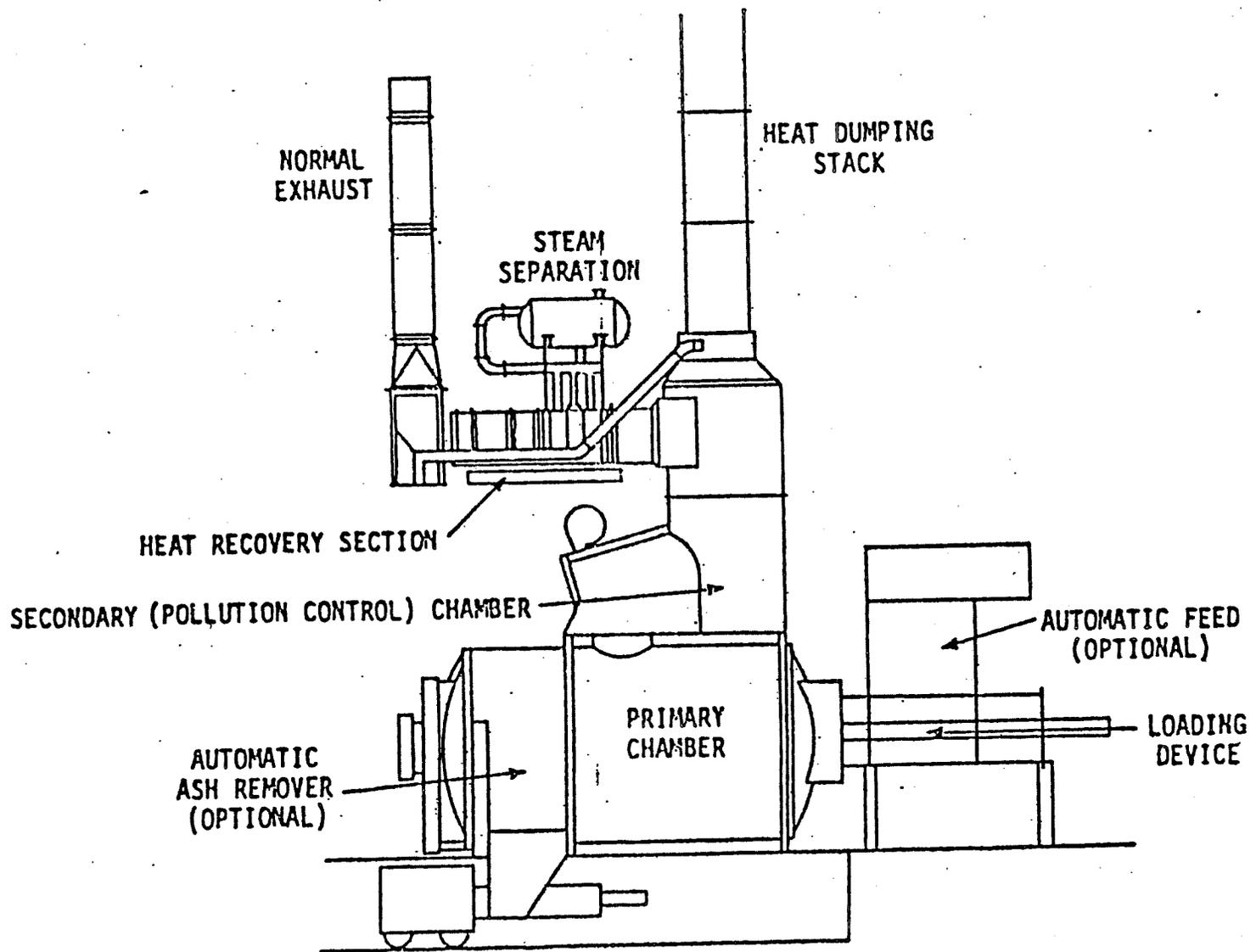


Figure 3. Typical modular incinerator with heat recovery.

Modular incinerators usually comply with air quality regulations without needing pollution control devices.

E. Summary of Technologies

Table 2³ shows the relationship between population, MSW, and energy recovered from various types of resource recovery systems.

Table 3² shows the cost associated with various solid waste disposal or resource recovery options.

Refuse Derived Fuel systems are capital intensive and the technology is not yet reliable. It is difficult to develop a market for the fuel. Pyrolysis systems are capital intensive and the technology is not reliable. Composting has not proven successful in this country due to problems in establishing a market for the product. These types of systems are not recommended for the Kansas studies.

"Waterwall and modular incineration are the two most cost effective and most proven technologies."³ Waterwall incinerators are more capital intensive than modular incinerators. They are usually proposed for communities that will have 500 tons per day or larger solid waste volumes.

Modular incinerators are the most cost effective form of resource recovery for communities generating between 50-300 tons per day.⁵ Therefore, the modular incinerator technology was used as the resource recovery option for the studies undertaken in Kansas.

TABLE 2. ENERGY RECOVERY FROM MUNICIPAL SOLID WASTE

Population (1000)	MSW generated assuming 3.5 lb/person/day (tons/day)	Steam ^a produced by mass burn incinerator (lb/hr)	RDF ^b produced from MSW (tons/day)	TPD feed ^c rate of co-fired boiler RDF/coal	Co-fired ^d steam production lb/hr	Co-fired ^e boiler size (MW)
20	35	7,300	25	25/59	44,000	4
40	70	14,600	49	49/118	87,900	9
60	105	21,900	74	74/176	131,900	13
80	140	29,200	98	98/235	175,800	18
100	175	36,500	123	123/294	219,800	22
120	210	43,800	147	147/353	263,700	26
140	245	51,100	172	172/412	307,700	31
160	280	58,400	196	196/470	351,600	35
180	315	65,800	221	221/530	395,600	40
200	350	73,100	245	245/588	439,500	44
220	385	80,400	270	270/647	483,500	48
240	420	87,700	294	294/706	527,500	53
260	455	95,000	319	319/764	571,400	57
280	490	102,300	343	343/823	615,400	62
300	525	109,600	368	368/882	659,300	66
320	560	116,900	392	392/941	703,300	70
340	595	124,200	417	417/1000	747,200	75
360	630	131,500	441	441/1058	791,200	79
380	665	138,800	466	466/1117	835,100	84
400	700	146,100	490	490/1176	879,100	88
420	735	153,400	515	515/1235	923,000	92
440	770	160,700	539	539/1294	967,000	97
460	805	168,000	564	564/1352	1,010,900	101
480	840	175,300	588	588/1411	1,054,900	105
500	875	182,600	613	613/1470	1,098,900	110

^a 150 psig sat. steam with feedwater return at 60°F

• 4500 Btu/lb heating value for MSW

• Thermal efficiency of 65 percent

• 24-hr/day operation

^b 70 percent of MSW is recovered as RDF.

^c Total Btu input is 20 percent by RDF and 80 percent by coal

• 6000 Btu/lb heating value for RDF

• 10,000 Btu/lb heating value for coal

^d 850 psia superheated steam with turbine recycle supplying feedwater at 349°F

• Thermal efficiency of 75 percent

• 24-hr/day operation

^e 1MWe = 10,000 lb/hr steam.

Reference 2

TABLE 3.

OVERVIEW OF SOLID WASTE DISPOSAL OPTIONS

Option	Reliability	Waste volume reduction	Time required for implementation (years)	Applicable size range (TPD)	Approximate cost/ton (net \$)
Resource recovery					
Mass burn	High	High	2-4	200-3000	\$15-30 ^{1,2}
Production of RDF	Low-medium	High	3-5	200-3000	\$17-35 ^{1,2}
Modular incineration	High	High	1-2	5-50 in modules	\$12-30 ^{1,2}
Source separator					
Paper	Medium	Medium	1	25-250	\$8-15 ³
Metals	Medium	Medium	1	35-250	\$8-15 ³
Baling	High	Low-medium	1	50+	\$5-12 ² plus landfilling
Transfer stations	High	Low	1	all ^a	\$4 ^{b,4} plus landfilling
Landfilling	High	Low	1	all	\$6-20 ²

^a Transfer stations are applicable in situations of long round trips for collection trucks to landfill sites.

^b Additional cost of transfer station operation and transportation to disposal site - this does not include savings to collection trucks using the transfer station.

References

1. Small-scale and Low Technology Resource Recovery In Municipal Solid Waste: Resource Recovery Proceedings of the Fifth Annual Symposium. EPA-600/9-79-023b. August 1979.
2. Solid Wastes Management. August 1979.
3. Weighing Small-Scale Resource Recovery. Waste Age. March 1979.
4. Solid Waste Collection Practice. American Public Works Association, 1975.

ENERGY RECOVERY FROM MODULAR INCINERATORS

"Steam can be produced at pressures from 15 to 400 psig."⁵ The standard modular heat exchanger produces steam at 150 psi and at saturated conditions. Any higher pressures required by a user would necessitate special equipment which increases the cost of the system. Steam customers requiring 150 psi or less were the primary contacts when conducting the market survey.

The quantity of steam produced from a modular incinerator ranges from 1 to 3 pounds of steam per pound of municipal solid waste burned. Table 4⁵ shows the relationship between population, MSW generated, and steam produced from a modular incinerator. The table assumes 2 lb stm/lb MSW and 4,500 BTU/lb heating value for the solid waste.

The relative heating values of some common fuels are listed in Table 7⁵ in Appendix B. Table 8⁶ in Appendix B shows the lower heating values of various products.

Some manufacturers rate the modular incinerators according to the type of waste to be burned. Reference 5 rates incinerators for municipal waste (4,500 BTU/lb) and for industrial waste (7,000 BTU/ lb).

TABLE 4. STEAM PRODUCTION FROM MODULAR
INCINERATOR BURNING MUNICIPAL SOLID WASTE

Population	MSW generated (based on 3.5 lb daily per capita), tons/day	Steam production, ^a lb/day
20,000	35	140,000
40,000	70	280,000
60,000	105	420,000
80,000	140	560,000
100,000	175	700,000
120,000	210	840,000
140,000	245	980,000
160,000	280	1,120,000
180,000	315	1,260,000
200,000	350	1,400,000

^a Based on production rate of 2 lb of saturated steam per pound of MSW at 150 psig, with 75% condensate return at 180°F.

Reference 5

SOLID WASTE GENERATION

An important aspect of the study is the need to know the quantity of fuel available for use in the modular incinerator. This requires a knowledge of the quantity of refuse produced and the composition of the waste. As seen in the modular incinerator section, the steam generator rating capacity is based on the BTU/lb quality of the waste that is burned. Figure 4 shows an analysis of solid waste and the relationship to recovered resources and fuel. The composition of a typical municipal solid waste that would produce 4,500 BTU/lb is shown in Table 9,⁵ Appendix C.

It is also important to know exactly how much solid waste is generated and available for use in the incinerator. The Kansas Department of Health and Environment requires (Regulation 28-29-23)⁸ each sanitary landfill to provide an annual estimate of the solid waste disposed. This information is compiled in KDHE Bulletin 4.10.⁹

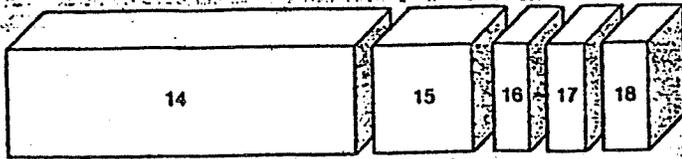
These quantities are usually estimates and are not necessarily accurate. Some landfill operators have estimated the number of trucks and their size. An estimate of the compaction ratio must be made in order to arrive at a weight of refuse. Solid waste texts give average figures for compaction ratios. Typical values are listed in Appendix C, Table 10.¹⁰ At other landfills the operator estimates the volume of landfill space that was used. There is an error associated with the judgment of the volume used (usually not surveyed). Again, an estimate of the compaction ratio of the refuse in the landfill must be used. These values are reported in solid wastes texts (see Appendix C), however each landfill is different due to the operation.

Another method of estimating the quantity of solid waste is to use typical per capita generation rates. These rates in pound MSW/capita/day are multiplied by the community population to yield the amount of solid waste. Typical values are published as seen in Appendix C, Table 11.¹⁰

Some of the studies summarized in this report used estimated quantities of solid waste. Each of these studies served as a rough estimate or a screening process to ascertain if modular incineration was feasible. If the studies conclude that modular incineration may be feasible, then the community should conduct a more extensive evaluation of the solid waste. More accurate figures for composition and quantity of solid waste will be needed.

The only good way to quantify solid waste is to weight it at the landfill. Due to the price of scales and operational costs, only a few Kansas counties weigh at the landfill. To complete a weighing program, portable scales may be used. The proper techniques for weighing representative samples must be used.

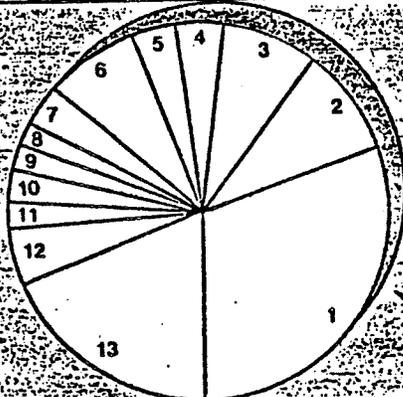
ANALYSES OF MUNICIPAL WASTE



RESOURCES RECOVERED METALS

	Percent Weight in one ton of Resources Recovered		Percent Weight in one ton of Municipal Waste	
	%	Wt.	%	Wt.
14. Ferrous Metals	60	1200	5.85	117
15. Aluminum	20	400	1.00	20
16. Other Metal	6	120	.30	6
17. Copper, Brass	4	80	.20	4
18. Non-Metals	10	200	.50	10

100% 2000 lbs 7.85% 157 lbs



RESOURCES RECOVERED FUEL COMPOSITION

	Percent Weight in one ton of Fuel		Percent Weight in one ton of Municipal Waste	
	%	Wt.	%	Wt.
1. Corrugated Paper Boxes	31.17	623.4	18.94	378.8
2. Newspaper	10.70	214.0	6.50	130.0
3. Magazines	8.48	169.6	5.15	103.0
4. Mail	4.10	82.0	2.49	49.8
5. Paper Food Cartons	3.08	61.2	1.86	37.2
6. Paper (Wrapping)	6.56	131.2	3.99	79.8
7. Tissue Paper	2.96	59.2	1.80	36.0
8. Wax Carton	1.15	23.0	.70	14.0
9. Plastic, Rubber	2.23	44.6	1.36	27.2
10. Wood	2.54	50.8	1.54	30.8
11. Textile	1.28	25.6	.77	15.4
12. Food Waste	6.25	125.0	3.80	76.0
13. Yard Waste	19.52	390.4	11.85	237.0

100.0% 2000 lbs 60.75% 1215.0 lbs

ANALYSIS OF MUNICIPAL WASTE

	Percent With Moisture	Percent Without Moisture
1. Corrugated Paper Boxes	25.80	18.94
2. Newspaper	8.86	6.50
3. Magazines	7.01	5.15
4. Mail	3.39	2.49
5. Paper Food Cartons	2.53	1.86
6. Paper (Wrapping)	5.44	3.99
7. Tissue Paper	2.45	1.80
8. Wax Carton	.95	.70
9. Plastic, Rubber	1.85	1.36
10. Wood	2.10	1.54
11. Textile	1.05	.77
12. Food Waste	5.18	3.80
13. Yard Waste	16.14	11.85
14. Ferrous Metals	5.85	5.85
15. Aluminum	1.00	1.00
16. Other Metal	.30	.30
17. Copper, Brass	.20	.20
18. Non-Metals	.50	.50
	100.00%	77.00%

60.75%

FUEL

7,300 BTU/lbs.

14,600,000 BTU/ton.

TOTAL 100%

29 lbs

139 lbs

157 lbs

460 lbs

1215 lbs

TOTAL 2,000 lbs

ROSS HOFMANN, ASSOCIATES

The composition of the solid waste can be determined by analyzing representative samples taken at the landfill. The procedures for performing this analysis are given in Reference 11.

STEAM SURVEY

The average amount of steam that could be generated was calculated by using the quantity of solid waste available and the modular incinerator specifications. A match of steam produced with steam used was investigated for the local industrial/commercial establishments.

A list of potential industrial steam users was compiled by using several sources of information. Local leaders (such as planning commission members, city-county officials) have good knowledge of the local industry. The Kansas Department of Economic Development publication of Manufacturers and Products¹² lists industry by area and by product.

The prospective industrial users were surveyed to find the quality and quantity of steam used. A sample survey sheet is shown in Appendix D. Other important information needed relates to the type of steam demand: maximum and minimum flows; continuity of flow by day/week/month/year.

After reviewing the completed forms, plant visits and interviews were scheduled. The purpose of the visits was as follows:

1. Ascertain if information on reporting form is correct.
2. Assess plant site.
3. Determine interest.

The plant site must be able to accommodate the modular incineration facility. References indicate that the maximum steam line length is one mile. The Kansas studies required plants to have adjacent property for construction of the facility. Finally, the industry must be interested in joining this venture.

The potential customer must have a process that uses steam at a temperature and pressure equal to or lower than what can be produced by a typical modular heat exchanger. The ideal process would use steam 24 hours per day for 6 to 7 days per week and not have any major swings in demand. A process that uses significantly more steam than an incinerator can provide may be the best match. The modular incinerator steam could be piped into the system of a larger boiler. The boiler's instrumentation could sense any swing in flow and adjust its firing accordingly. The larger boiler could also pick up the entire load if the modular incinerator failed and not cause the process to be curtailed. A modular incinerator providing 100% of the steam needs may pose a reliability problem. If it suffered an outage, the process boiler would need sufficient time to start up. During this time the process would be down; some process are very sensitive to unplanned down time.

ECONOMIC ANALYSIS

Using the size facility previously determined, a size or combination of modules can be selected. Vendors can be contacted to give quotes on the cost of a specific modular incinerator system. These costs should include purchase price and operational costs. Operational costs would include electricity, fuel, water, etc. A rule of thumb figure for total cost is \$35,000 per ton of capacity.⁵

The initial cost of the incinerator and the operating costs are brought to an annual cost by using economic analysis methods. The annual sale of steam is subtracted from this to yield a net annual cost. This value is divided by the quantity of solid waste which gives the disposal cost in dollar/ton.

The landfill budget can be divided by the quantity of refuse to give a dollar/ton disposal cost. Care should be taken that the budget reflects all of the costs. This may include the purchase price of a new landfill site if the present site is nearing completion.

The two disposal costs can be compared and the most economically feasible system may be chosen.

One should recognize that the analysis makes assumptions and that the results are only as good as the assumptions. Some factors that change the economic picture are the rate of inflation, price of fuel, cost of labor. These are not always easy to predict. However, these costs are usually increasing. As the landfill cost increases, the prospective resource recovery system becomes more and more attractive.

RESOURCE RECOVERY STUDIES

A. Hutchinson-Reno County

This study originally encompassed the counties of the Mid-State Regional Planning Commission, i.e. Rice, McPherson, and Reno (see Appendix A). However, due to the location of industry in Hutchinson and the cost of transporting refuse, the study focused on Reno County.

The solid waste available for the facility was estimated to be 41,000 ton/year. This was computed by assuming a 3.5 pound/capita/day generation which was multiplied by the population estimates provided by the regional planning commission. The data supplied by the landfill did not correspond with national averages and was not used. This amount of waste, when burned on a six day week, would require a 125 ton per day incinerator. This size facility could produce 22,000 pound steam/hour according to vendor information.⁶

The industries surveyed included: three salt manufacturers, a paper manufacturer, an equipment manufacturer, and four food or meat processors. The steam survey revealed that the three salt companies would be good potential customers. The salt companies use low pressure steam to evaporate brine for the production of salt. The steam demand is fairly constant over a 24 hour period and the process is operated seven days per week. The plants use considerably more steam than the amount provided by the incinerator. This would allow the solid waste incinerator to be a supplemental steam source that would fit well into the existing steam system. Each of the three potential plant sites had sufficient area to easily accommodate the construction of a modular incinerator facility.

The projected cost of disposal at the landfill for 1982 was \$11.90 per ton (current \$9.00). The economic analysis indicated that the net disposal cost (after sale of steam) for an incinerator was \$17-34 per ton. The range of values was due to different vendor and different equipment. An \$8-10 million bond would be required for the initial capital outlay. The comparison shows that the resource recovery option is not yet feasible compared to landfilling.

B. Topeka-Shawnee County

Shawnee County was originally interested in a resource recovery facility due to decreasing disposal space at the county landfill. Other interests were on supplying steam to a downtown heating loop that the local utility did not want to operate anymore.

Solid waste in Shawnee County is disposed of at a county landfill and at a private landfill. The private landfill primarily handles industrial and commercial wastes. Waste amounts are recorded by volume. The county landfill primarily handled residential refuse from the City of Topeka. The county landfill weighed all refuse prior to disposal with in-place scales.

These data indicated that the total amount of refuse available would be 115,000 tons/year. This annual amount of refuse would compute to a generation rate of 3.8 lb/c/day based on the community population. This generation rate is within the range of accepted figures that are published. A 360 ton/day modular incinerator could burn this amount of refuse on a six day/week basis. Approximately 75,000 pounds/hour of steam would be produced by this facility.

The steam survey revealed that it was not practical to use the downtown steam heating loop. The industries surveyed were: tire manufacturer, two food processors, cellophane plant, electric utility and water utility. The survey of industries indicated that only one plant used more steam and at compatible temperatures and pressures. This was the Goodyear Plant which uses process steam for the manufacture of tires. The plant used considerably more steam than the incinerator facility would produce. This would allow it to be easily tied into the existing plant steam distribution system. The existing boiler would still operate and handle variations in load. The Goodyear flow rates were usually steady but depend on tire production needs and the number of shifts working. The plant site would accommodate the installation of a refuse facility.

The Goodyear Plant also produces high BTU/pound wastes from tire production. These wastes include rubber and solvents. This waste could be included in the county incinerator study. These wastes could increase the size and steam capacity of the unit.

The projected cost of disposal at the landfill for 1982 was \$6.50 per ton. The economic analysis indicated that the net disposal cost for an incinerator was \$17-27 per ton. This includes the sale of steam at \$3.60 per thousand pounds.

The range of values was due to different vendors. A bond issue of approximately \$25 million would be required. The comparison shows that the resource recovery option is not yet feasible compared to landfilling.

C. Southwestern Counties

The original study encompassed nineteen counties (Appendix A) represented by the Greater Southwest Regional Planning Commission. The original proposal was to use solid waste to provide fuel for an electric generating plant that was being planned. The study concluded that the electric utility's plant was too far along in design to be changed. Other factors are the utilities willingness to use RDF as a fuel. The percentage of total fuel contributed by the RDF would be small and not economically feasible to alter the boiler. There are also technology problems with using RDF in a boiler.

The study also concluded that it was not cost effective to use a multi-county approach. These counties covered too large an area and did not generate sufficient refuse. The study focused on the three largest city/counties: Dodge City - Ford; Garden City - Finney; Liberal - Seward. The study focused on using the refuse from a county for a facility in that county.

The amount of refuse generated in these counties was in the same range - about 22,000 tons per year. The Ford County landfill has scales installed and weighs prior to disposal. When computed on a per capita basis, this yields 4.4 lb/c/day. This figure is somewhat high when compared to other Kansas rates, but is believed to be accurate due to the scales.

Since the three counties are similar in population, this amount of refuse was used for each. A modular incinerator operating on a six day/week basis would burn approximately 75 tons/day. This size of facility would produce about 9,000 pounds steam/hour.

The industries surveyed were: electric utility, helium plant, grain and food processors, and beef processor. The steam survey concluded that the most logical candidate for the steam was the MBPXL Plant in Dodge City. This beef processing plant uses steam in their process cookers. The plant uses considerably more steam than that produced by the waste facility. This would allow the waste boiler to be tied into the existing plant steam distribution system. There was sufficient land available adjacent to the plant to allow construction of the waste facility.

The community landfill costs are summarized in Table 5¹³ below:

TABLE 5. SUMMARY OF ESTIMATED DISPOSAL COSTS BY
SANITARY LANDFILLING, 1981

<u>County</u>	<u>Net cost, \$/ton</u>
Finney	6.20
Ford	14.30
Seward	5.90

The differences are significant and the high cost at Ford County may reflect a more detailed budget. The cost of the modular incinerator was estimated to be 32-40 dollar/ton waste disposed. A bond issue of \$2-3 million would be needed to finance this facility. The landfill is the most economical disposal method.

CONCLUSION

The study indicated that in each community there was an industrial steam user interested in purchasing steam from a modular incineration facility. The price of the steam had to be competitive with that already being produced by the industry. Each industrial plant had sufficient area available to allow construction of the waste processing facility.

The results of the study, as shown in Table 6, indicate that the cost of landfilling is much lower than disposal by modular incineration. Generally, resource recovery plants cannot compete cost-wise with a properly operated landfill.¹³ The data shows that each ton of solid waste processed would have to be subsidized by about \$10.00. Communities and local government officials are not willing to finance these subsidies. The use of a modular incinerator for solid waste disposal is not economically feasible for the Kansas communities studied.

As stated earlier, the studies make assumptions in order to prepare an economic analysis. A "sensitivity study" investigates the change in the results of a study by varying the assumptions that were made. The parameters that were varied include: operating expenses; capital expenditure; operating revenues; interest rate. A sensitivity study for Topeka-Shawnee County was performed. It indicated that the cost of landfilling and the cost of modular incineration would become equal in approximately ten years.¹⁴

These results would indicate that one should monitor the critical parameters that can have an effect on the economic feasibility of resource recovery systems. These systems will become feasible in the future.

TABLE 6
KANSAS REFUSE TO ENERGY STUDIES

Item	Topeka-SN. Co.	Hutchinson-RN. Co.	Southwest
Incinerator Size (ton/day)	450	125	75
Steam Generation (lb/hr)	75,000	22,000	9,000
Net Cost For Steam (\$/1,000 lb)	3-14	4-7	—
Net Cost For SWM (\$/ton)*	11-17	17-34	34-41
Landfill Cost (\$/ton)	6.50	9.00	6-14

*Steam sale at \$3.60/1,000 pounds steam.

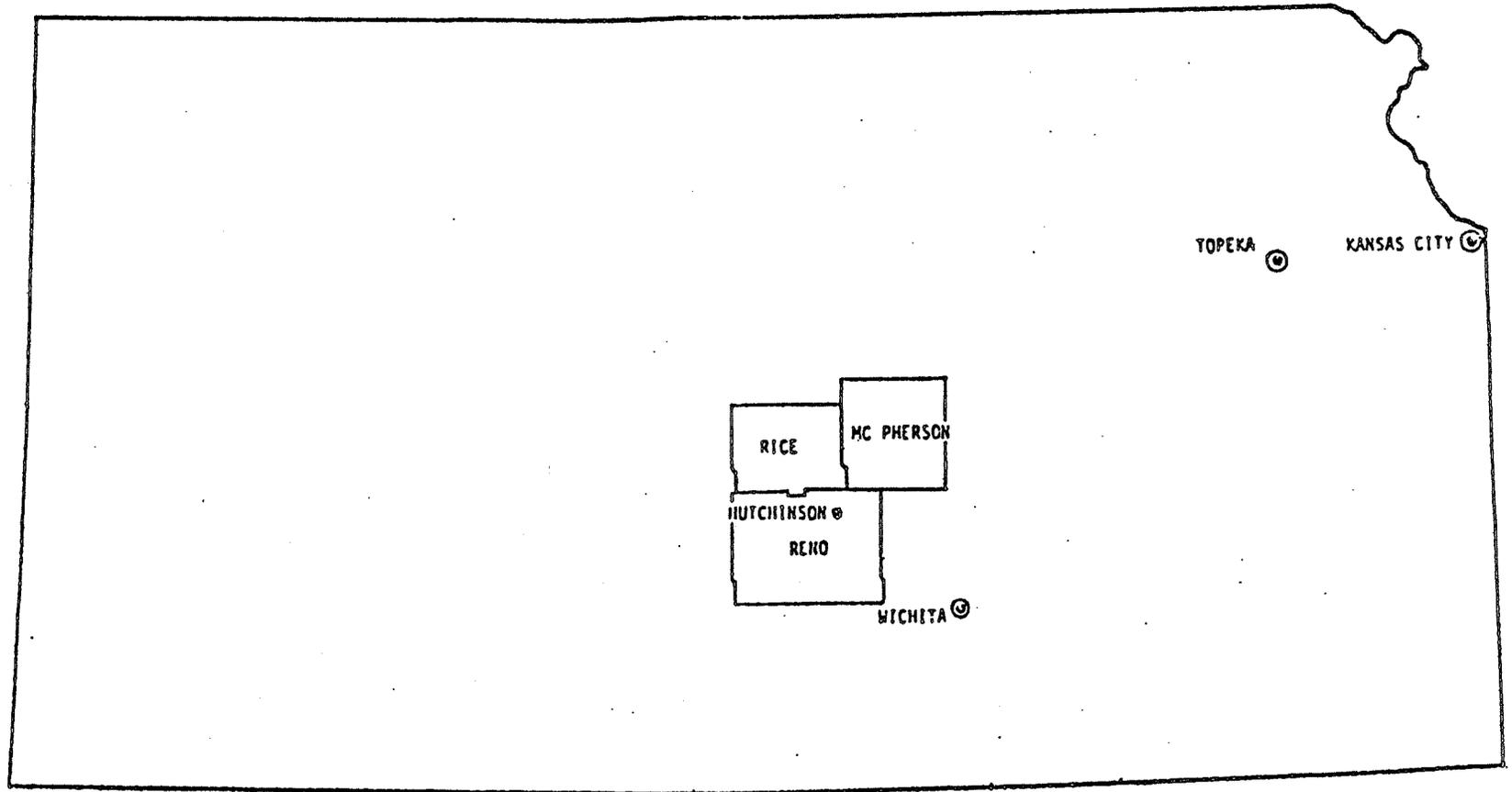


Figure 5. Reno and surrounding counties in the study area.

Reference 3

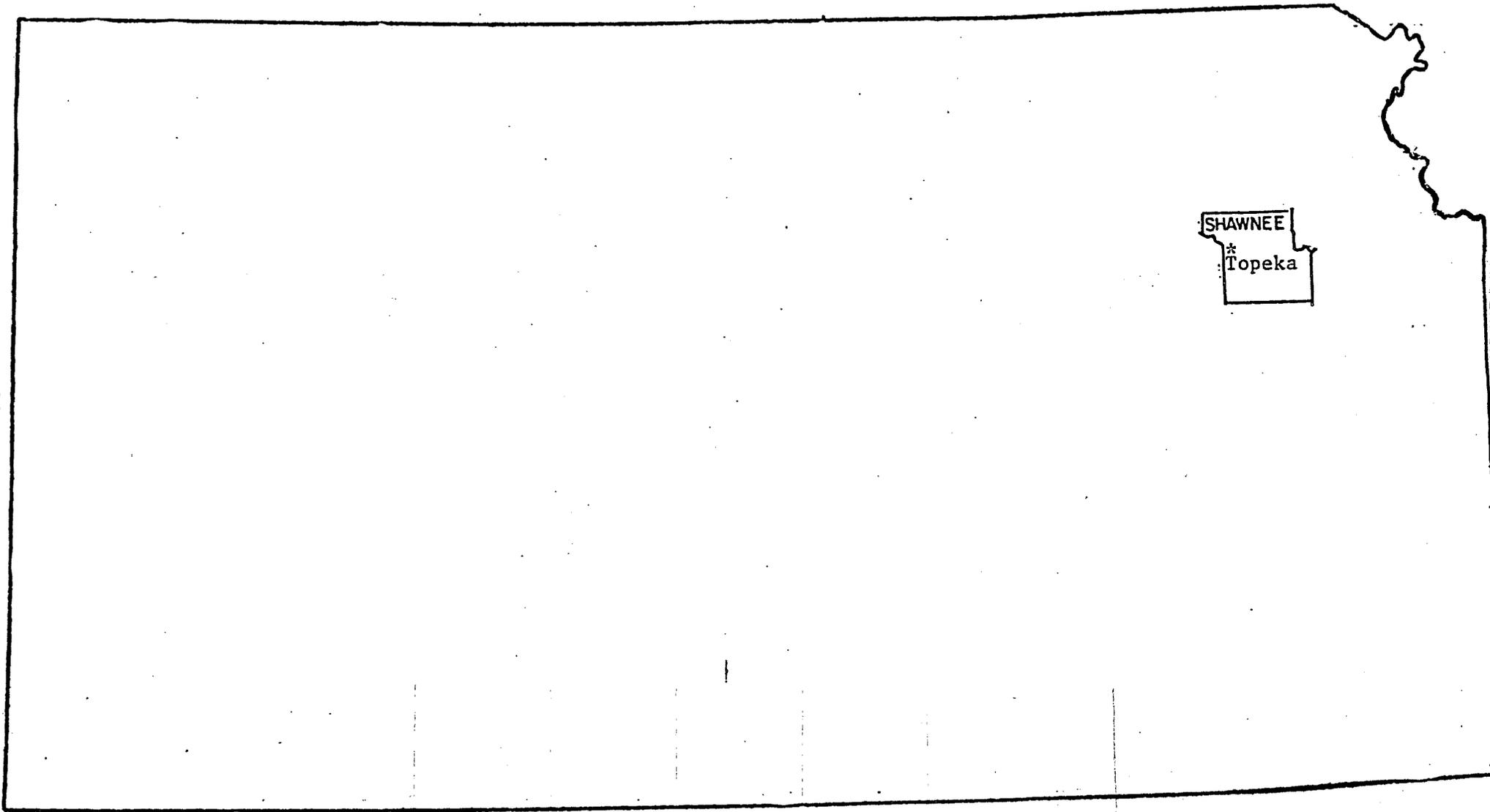


Figure 6. Topeka-Shawnee County

Reference 2

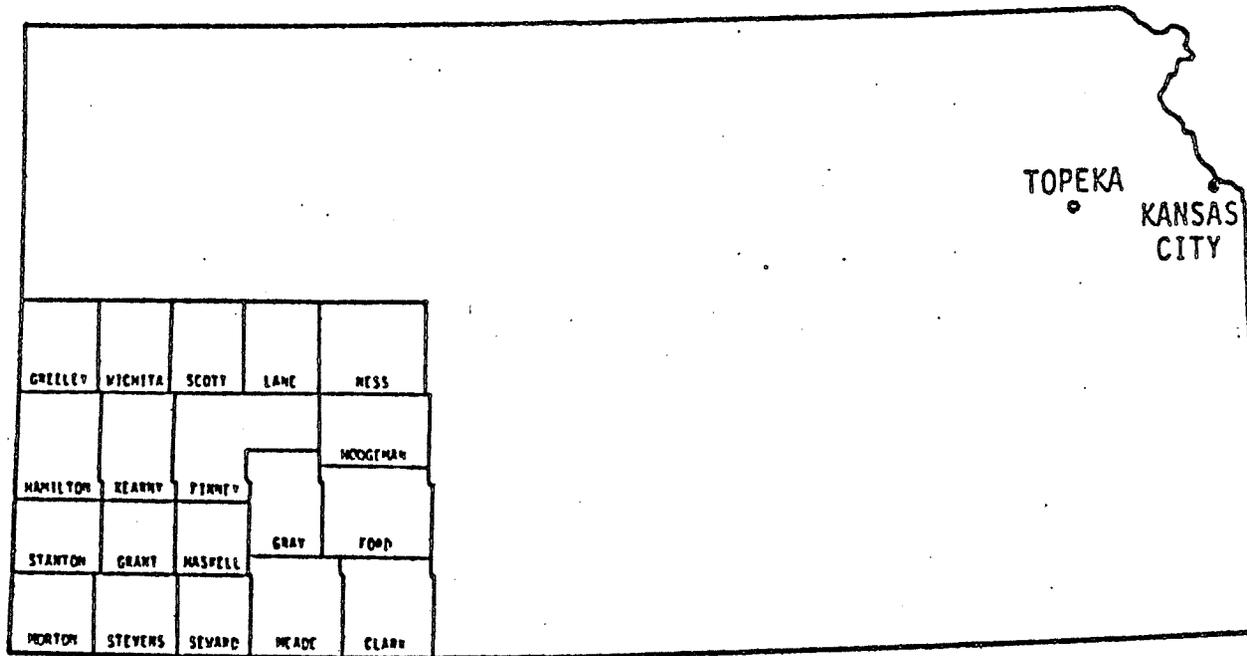


Figure 7. Counties within the Greater Southwest Regional Planning Commission area in Kansas.

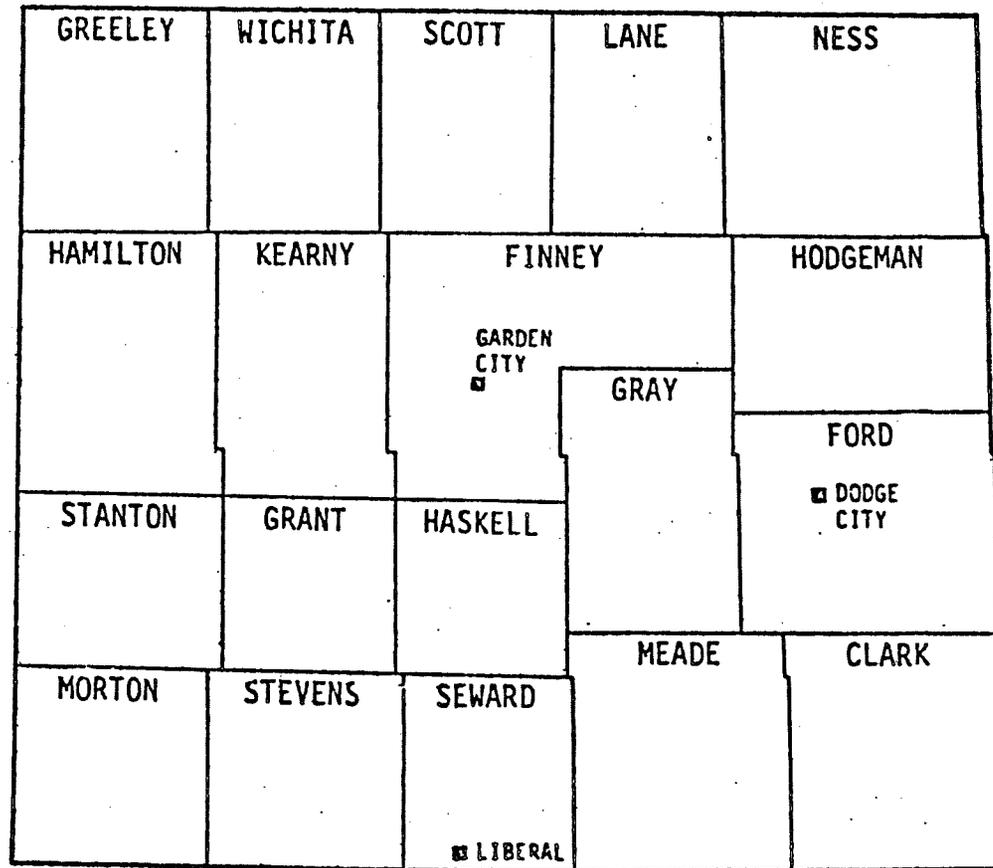


Figure 8. Sanitary landfills within the Planning Commission area.

Reference 11

APPENDIX B

TABLE 7. COMPARISON OF ENERGY PRODUCED BY BURNING
MUNICIPAL SOLID WASTE VERSUS CONVENTIONAL FUELS

Energy source	Energy value, Btu/lb
Municipal solid waste	4,500
Wood	4,690
Lignite	7,065
Subbituminous B coal	10,245
Anthracite coal	11,100
No. 6 fuel oil	18,265
No. 2 home heating oil	19,565
Methane	23,895

Reference 5

LOWER HEATING VALUES OF TYPICAL WASTES

WASTE	BTU/LB., NET
Agricultural:	
Butter	15,240
Cotton Seed Hulls	7,910
Grain	7,130
Egg Yolk	13,400
Egg White	9,440
Pecan Shells	8,100
Garbage:	
Coffee Grounds	9,800
Corn Cobs	7,540
Corn, Shelled	8,550
Fats	15,360
Food Wastes (Dry)	7,800
Paper Products:	
Brown Paper	7,090
Corrugated Boxes	6,830
Food Cartons	7,110
Magazines	4,830
Newspapers	7,800
Plastic Coated Paper	7,090
Tar Paper (30% Tar)	10,120
Waxed Milk Cartons	10,790
Plastics:	
Polyamides (Nylon)	11,960
Polyesters	11,050
Polyolefins (Polyethylene, Polypropylene, etc.)	17,500
Polystyrene	15,650
Polyurethane	10,580
Polyvinyl Chloride	7,280
Plastic Film (Mixed)	12,740
Vinyl Coated Fabric	8,200
Vinyl Coated Felt	10,170
Vinyl Scrap	10,500
Rubber Products:	
Latex	9,200
Banbury-Rubber Scrap	12,180
Raw Batch Stock	13,040
Rubber Coated Fabric	10,120
Rubber Tape	8,860
Rubber Tires	12,000
Textiles:	
Cotton Batting	6,540
Uncured Duck	8,600
Rayon and Cotton Yarn	7,138
Rags	7,390

APPENDIX B

TABLE 3 (cont.)

WASTE	BTU/LB., NET
Wood:	
Oak	7,990
Pine	8,420
Sawdust	8,000
Yard:	
Brush	7,270
Grass	7,070
Leaves	6,530
Miscellaneous:	
Paints and Oils	12,330
Leather	8,140
Linoleum	7,700
Street Sweepings	5,520
Water	(1,000) Minus

Reference 6

APPENDIX C

TABLE 9. COMPOSITION OF MUNICIPAL SOLID WASTE

Material	Percentage of total waste
Paper	30-40
Newsprint	9-15
Magazine	1-3
Corrugated	1-2
Other	19-20
Glass, beverage	7-16
Clear	4-9
Green	2-4
Brown	1-3
Glass, other	6.5-10
Clear	5-6
Green	1-3
Brown	0.5-1
Ferrous, beverage	0.5-2
Ferrous, other	3-5
Aluminum, beverage	0.1-1
Aluminum, other	0.1-1
Nonrecyclable refuse	52.8-25

Reference 5

TABLE 10

SOURCE* TYPICAL DENSITIES OF MUNICIPAL SOLID WASTES BY

Source	Density, lb/yd ³	
	Range	Typical
Residential (uncompacted)		
Rubbish†	150-300	220
Garden trimmings	100-250	175
Ashes	1,100-1,400	1,250
Residential (compacted)		
In compactor truck	300-750	500
In landfill (normally compact)	600-850	750
In landfill (well compacted)	1,000-1,250	1,000
Residential (after processing)		
Baled	1,000-1,800	1,200‡
Shredded, uncompacted	200-450	360
Shredded, compacted	1,100-1,800	1,300‡
Commercial-industrial (uncompacted)		
Food waste (wet)	800-1,600	900
Combustible rubbish	80-300	200
Noncombustible rubbish	300-600	500

* Adapted in part from Ref. 10.

† Does not include ashes.

‡ Low pressure compaction, less than 100 lb/in².Note: lb-yd³ × 0.5933 = kg/m³lb/in² × 6.895 = kN/m²

Reference 10

TABLE 11
TYPICAL PER CAPITA SOLID
WASTE GENERATION RATES

Source	Unit rate, lb/capita/day	
	Range	Typical
Municipal*	2.0-5.0	3.5
Industrial	1.0-3.5	1.9
Demolition	0.1-0.8	0.6
Other municipal†	0.1-0.6	0.4
Subtotal		6.4
Agricultural		—‡
Special wastes		—‡

* Includes residential and commercial.

† Excludes water, waste water, and industrial treatment plant wastes which must be estimated separately for each location.

‡ Must be estimated separately for each location.

Note: lb/capita/day × 0.4536 = kg/capita/day

Reference 10

DEPARTMENT OF HEALTH AND ENVIRONMENT



Joseph F. Harkins, Secretary

Forbes Field
Topeka, Kansas 66620
913-862-9360

RESOURCE RECOVERY REPORT STEAM AND ENERGY SURVEY

Organization _____

Mailing Address _____

City _____ State _____ County _____ Zip _____

Plant Location _____

Authorized Contact _____ Title _____

Industry Type _____ SIC _____

STEAM CHARACTERISTICS

Process or Use	Temp. (° F)	Pressure (psi)	FLOW RATE (lb/hr.)		
			Max.	Min.	Ave.

EXISTING STEAM GENERATION

* Boiler and Furnace Type	FUEL				Heat Output (BTU/Hr-Hp)	Steam Generation		
	Type	Amt. Burned				Temp. (° F)	Pres. (psi)	Max. Design Flow
		Max.	Min.	Ave.				

Explain steam demand cycles (annual, monthly, daily, hourly) _____

Show graphs on reverse side.

* Waterwall, Refractory, Fire-Tube, Stoker -34-

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