Legislative Research Department July 16, 1975

SPECIAL COMMITTEE ON ENERGY AND NATURAL RESOURCES

June 24 and 25, 1975

Members Present

Senator Vincent Moore, Chairman
Representative Ansel Tobias, Vice-Chairman
Senator Dan Bromley
Senator Don Christy
Senator Leslie Droge
Representative Kenneth Althaus
Representative Gus Bogina
Representative Theo Cribbs
Representative Donald Mainey
Representative W. Edgar Moore
Representative Irving Niles
Representative Rip Reeves
Representative Fred Rosenau

Staff Present

Doug Crandall, Legislative Research Department
Don Hayward, Revisor of Statute's Office

Others Present - June 24, 1975

Roy Frost, Kansas Petroleum Council, Topeka
Bud Mayberry, Kansas City Power and Light, Kansas City
Bob Marin, Kansas Power and Light, Topeka
Sister M. Noel Walter, Kansas Catholic Conference, Atchison
Clark Stocking, State Department of Agriculture, Topeka
Guy Gibson, State Department of Agriculture, Division of Water Resources, Topeka
John Halepaska, Kansas Geological Survey, Lawrence
Howard O'Connor, Kansas Geological Survey, Lawrence
Mrs. E. Nunley, Kansas League of Women Voters
R. H. Trossel, Southwest Kansas Irrigators Association, Johnson
Charles Bredahl, State Conservation Commission, Topeka
Wilbur Ringler, Cooperative Extension Service, Kansas State University

Others Present - June 25, 1975

J. Ross Martin, Kansas Chapter, American Institute of Architects, Topeka
Howard Paul, Kansas Chapter American Institute of Architects, Topeka
George Eicholtz, American Institute of Architects, Topeka
Floyd Wolfenbarger, American Institute of Architects, Manhattan
Louis Krueger, State Architect, Topeka
F. R. Applegate, Architectural Services, Topeka
Chris McKenzie, Division of Planning and Research, Topeka
Sister M. Noel Walter, Kansas Catholic Conference, Atchison
Roy Frost, Kansas Petroleum Council, Topeka
Bill Woellhof, Kansas Power and Light, Topeka
Bud Mayberry, Kansas City Power and Light, Kansas City
Charles Carey, Jr., Mechanical Contractors Association, Topeka
Jack R. Bradley, American Institute of Architects, Topeka
E. F. Cassing, ASHRAE, Kansas City, Missouri

June 24, 1975

Morning Session

Proposal No. 14 - Groundwater Usage

The Chairman called the meeting to order at approximately 10:15 a.m. and informed the Committee that the subject of study for the first day was groundwater usage. John Halepaska, Chief of Water Resources, State Geological Survey, was introduced to the Committee as the first conferee (Attachment I). Mr. Halepaska told the Committee that he would attempt to give a general overview of the irrigation system in Kansas and neighboring states and indicate the type of demand that will be made upon fuel for irrigators. Mr. Halepaska informed the Committee that the two chief features known about the present irrigation system is the volume of water that is currently stored and the number of wells that are contained within each region. He said the unknown features about the system include the amount of fluid that is being pumped from the wells, future development rate, future weather conditions, recharge rates, and the possible impact of the energy shortage in the future upon the amount of water pumped and the development rate. Mr. Halepaska told the Committee that Kansas is contained within the Ogallala formation in the Great Plains area and that Kansas makes up some 17% of the area involved in that formation. Mr. Halepaska stated that the area involved in Kansas is approximately 151,000 square miles. Based upon the different saturated thicknesses within the system, there is between 150 billion acre-feet and 966 million acre-feet

of water stored in the total system. Mr. Halepaska told the Committee that based upon the assumption that 3/4 of the system is yet to be developed, and that at total development one well will exist for each square mile, it is estimated that the development cost of the total system will range from $2 billion to $4½ billion. He showed the Committee graphs on four regions in Kansas (see Attachment No. 1), which showed the assumed rainfall variation, amount of water to be pumped, electric energy requirements, volume of gas required for the Great Bend area, Southwest Kansas, West Central Kansas and Northwest Kansas.

In conclusion, Mr. Halepaska told the Committee that chief among the considerations that should be made by the people directly involved in the irrigation community are the following:

1. Over what time span do the people in the individual irrigation regions want the water to last;

2. Based upon the water in place and the period of time that the people want the water to last, a definite ceiling should be placed upon the quantity of water to be produced each year;

3. How much water should be left in the system to meet emergency needs for the municipal and irrigation purposes in the event of a drought.

The legislature, Mr. Halepaska said, should consider the following:

1. Is the present law and the present regulatory system adequate to meet the challenge that obviously will come in the near future concerning depleting ground water supplies in Western Kansas;

2. Should the system that is currently in place to regulate future development be markedly altered;

3. Should people that choose not to develop irrigation systems or not to pump water be compensated for their efforts to conserve and promote the overall longivity of the system;

4. What action, if any, should the legislature take to encourage income tax relief along the lines of a depletion allowance.

In response to a question, Mr. Halepaska told the Committee that the West Central Kansas Region would probably be the first of the four regions to have large scale water problems. He further stated that he felt a ceiling should be placed on the quantity of water that can be produced each year.

Mr. Halepaska was asked what effect the depletion of the western water reserves will have on the eastern part of the state. Mr. Halepaska responded by saying that as water is pumped there is no doubt a change in the amount of water that is going to be available. He said, however, that in the long run it is not yet known what effect the decreased water supply in Western Kansas will have on the eastern part of the state.

Mr. Keith Krause, Executive Director and Chief Engineer, Water Resources Board was the next conferee to appear before the Committee (Attachment II). Mr. Krause told the Committee that he had done a study on six counties in Kansas concerning the economic aspects of irrigation. He stated that since 1966 they had noted that an average annual rate of 130,000 acres per year have come under irrigation. Mr. Krause noted that Kansas presently has approximately 2¼ million acres of land being irrigated. Of the 36 million acres of cropland in Kansas, Mr. Krause contended that approximately 16 million acres are amenable to irrigation.

In response to a question, Mr. Krause noted that increased income, as a result of irrigation in the six counties studied, was nearly $120 million in gross product. Mr. Krause then distributed to the Committee a publication by the Kansas Water Resources Board entitled High-Plains Underground Water Reservoir (Attachment No. III). Also distributed to the Committee was a pilot study report published by the Kansas Water Resources Board, entitled "Economic Implications of Irrigation" (Attachment IV).

Dr. Herman Lujan, Director, Division of State Planning and Research, was the next conferee (Attachment V). Dr. Lujan stated that groundwater stored below the surface is the major source of water for western Kansas. The future supply of such water is very much in doubt, he said, and the demand for groundwater in western Kansas has been increasing dramatically in the past few decades as the use of irrigation has increased. Dr. Lujan continued that without the introduction of new technology and changing water management practices, given current water supply and usage conditions in the state, the groundwater supply in western Kansas will last only about 45 years. Should this happen, said Dr. Lujan, the impact would be drastic; not only would agricultural production be seriously curtailed but the business and revenue normally generated by the agricultural sector would be lost.

Dr. Lujan stated that it is estimated that there are approximately 500 million acre-feet of water in storage underneath the surface of the state. He stated further that experts feel that, at most, 50% of this supply would be available for immediate utilization. Approximately 65% of this groundwater is available in the western third of the state. Dr. Lujan said that this groundwater supply is dwindling at about 1 foot per year depletion rate which gives us the average life expectancy of groundwater supplies of 45 years. Given the present situation, Dr. Lujan said that we have several short and long range options available. The short range options include:

1. Review and strengthen, if necessary, the groundwater management districts established by the 1972 Legislature;

2. Recognize water as a scarce resource with serious consideration given to the development of a progressive state system of groundwater user fees which would charge most groundwater users at a rate commensurate with the level of their usage;

3. Determine whether the special district approach to water management provides for the effective coordination of efforts to conserve and better manage our dwindling groundwater resources;

4. Consider developing policies and standards requiring the preparation and approval by the Chief Engineer of the Division of Water Resources of groundwater impact statements by large scale public and private groundwater users;

5. Implementation of a concerted state research program which would endeavor to fund ways to: (a) cut water losses due to evapotranspiration; (b) artificial recharging and storage of groundwater; (c) weather modification; (d) dissolving of brines in water; (e) water recycling and reclamation, and (f) importation or interbasin transfer of water;

6. Ways need to be developed to decrease waste in the use of existing groundwater resources; and

7. Research into saline water irrigation.

Dr. Lujan noted that the long-range options include:

1. Development of methods by which state and local governments can adjust economic activity to water use so as to reduce water depletion where supplies are low;

2. Development of long range plans for changes in agricultural and other economic practices in case short term options do not solve the western Kansas water problem;

3. Defining the state role for maintaining the economies of various regions of the state by providing directly new water resources or supporting communities that must develop new economies if water supplies run out.

Afternoon Session

Mr. Guy Gibson, Chief Engineer, Water Resources Division, State Board of Agriculture was the first afternoon conferee (Attachment VI). Mr. Gibson introduced Clark Stocking, Engineer, Water Rights Section, Water Resources Division, State Board of Agriculture who was along to help answer technical questions. Mr. Gibson explained the procedure for acquiring the right for the use of groundwater according to the Water Appropriation Act of 1945. Mr. Gibson told the Committee that as of December 31, 1974, a total of 23,552 applications for permits to appropriate water for beneficial use had been filed in the Office of the Chief Engineer. Of this total 19,661 applications were for the appropriation of groundwater including 18,547 for irrigation use. He told the Committee the major portions of these applications are located in the western one-third of Kansas, because this area is underlaid with the states major groundwater aquafier and has the least amount of precipitation. Mr. Gibson went on to tell the Committee that irrigation has increased at a rapid pace during the last ten years. He stated that the figures show a possible increase in the use of groundwater for irrigation purposes of nearly 170% during the last ten years. Mr. Gibson told the Committee that the Kansas Geological Survey has published water level changes in northwestern Kansas for the period of 1950-1973. He stated that this information shows the number of irrigation wells in the six northwest counties has increased from about 100 to 2,550 during the period 1950 to 1972 and that annual withdrawals of groundwater in this area are estimated to have increased from 15,000 to 500,000 acre feet during that same period. Mr. Gibson said that there are an estimated 7,000 irrigation wells in 12 counties in southwestern Kansas and 13,000 irrigation wells located in the 23 counties of western Kansas.

Mr. Gibson told the Committee that as of June 16, 1975 there had been petitions filed with the Chief Engineer to organize five groundwater management districts. He said that of these five applications, two have completed organization and the other three are anticipated to be completed in the near future. He said that if all five districts are eventually organized they will essentially include most of the areas in Kansas which overlay the major aquafier systems.

Mr. Gibson told the Committee that the Water Appropriation Act presently provides that any application for a permit to appropriate water for beneficial use may be filed before or after the commencement of any work in connection with the construction of any works for diversion and use of water. He said further that there is no penalty provided in the Act for failure to obtain the approval of the Chief Engineer before withdrawing or diverting water. Mr. Gibson told the Committee that in order for the Division of Water Resources and the groundwater management districts to effectively regulate the withdrawal of groundwater within the districts, it will be necessary that before any person withdraws or diverts any waters of the state for any purpose other than domestic use, and except those holding vested rights, an approval of an application for beneficial use must first be obtained from the Chief Engineer. Mr. Gibson said this would require changes in the Water Appropriation Act.

In response to a question, Mr. Gibson told the Committee that the Division of Water Resources has turned down applications in the past, but they usually try to talk to the party concerned and change the location. When asked whether the Division of Water Resources could deny a water right and make it stick in court, Mr. Gibson responded there had never been a case tested in court.

Proposal No. 15 - Soil and Sediment Control

The Committee next turned its attention to interim study Proposal No. 15, relating to soil and sediment control. Staff was asked to briefly review for the Committee the legislative background of 1975 S.B. 12. A member of the staff informed the Committee that S.B. 12 was ultimately an outgrowth of the National Symposium on State Environmental Legislation which was held in Washington, D.C. in March, 1972. Coming from the Workshop on Soil Erosion of that conference was a suggestion to draft a model law for consideration by the Council of State Governments. This was done and a Model State Act for Soil Erosion and Sediment Control was approved by the Committee on Suggested State Legislation of the Council of State Governments and transmitted to the states in Volume XXXII of the 1973

Suggested State Legislation. Subsequently, the Governor of Kansas, with cooperation from the State Conservation Commission and the Kansas Association of Conservation Districts, sponosred a conference in Salina in August, 1972 to discuss the Model State Act. The conference agreed to recruit a task force to make further study of and recommendations on the model act.

Thirty-four persons representing a broad cross section of interested agencies and organizations with local, state and/or national status made up the task force. The task force met in February, 1973, elected officers and agreed to divide into three groups for study and preliminary recommendations. Following the study of a draft report prepared by the leadership, the task force met in September, 1973 and agreed in principal on the report. After more study and revision of the Model State Act, the task force met in January, 1974 and adopted the report.

The Model Act and task force recommendations were studied by both 1973 and 1974 interim committees of the legislature. S.B. 12 was introduced by the 1974 Special Committee on Conservation and Natural Resources and basically represents the Kansas task force recommended modifications of the Model Act. In general, the 1974 interim Committee introduced S.B. 12 as the presentation of principals for disucssion rather than as a finished proposal.

In general, the proposed act would provide for the establishment of a statewide, comprehensive soil and sediment control program adapted to different types of soil conditions and land use. Primary responsibility for administration of the regulatory program would be placed with the 105 conservation districts of the state.

The proposed act would require the State Conservation Commission to adopt state wide guidelines, including conservation standards, for the control of erosion and sediment resulting from land disturbing activities. The individual conservation districts would then be required to establish and adopt soil and sediment control programs and locally developed district standards consistent with the state guidelines.

Most land disturbing activities would be prohibited under the proposed act unless they were conducted in accordance with soil erosion and sediment control plans approved by a district supervisor or, in some instances, the State Conservation Commission. Persons implementing or maintaining a farm or ranch conservation plan approved by the district would be deemed in conformance with the requirements of the act. Agricultural land owners or operators would not be considered to be in violation of the act for failing to implement conservation treatment plans if a recommended level of state or federal cost sharing were not available.

Mr. Charles Bredahl, Secretary, State Conservation Commission was the first conferee to appear before the Committee relative to soil and sediment control. Mr. Bredahl distributed copies of an Environmental Protection Agency water strategy paper entitled "Nonpoint Source Pollution Management" (Attachment VII). Mr. Bredahl told the Committee that in general the public appears to support S.B. 12 with certain modifications. He said he has found that a majority of the conservation districts and the Kansas public favor a combination of voluntary actions with some state regulation to control sediment and erosion. The following refinements of S.B. 12 were reported as being desirable (Attachment VIII):

1. Cost sharing amounts should be spelled out in precise figures;

2. Land owners should not be held liable for violation resulting from acts of God;

3. Liability penalties should be softened;

4. "Conservation plan" should be defined and what is construed to be "carrying out the plan";

5. There should be a clarification of the exemptions granted to land owners having no plan but who are conforming to the standards;

6. Extend and identify the time table for application;

7. Provide for hardship cases;

8. Identify by name the local entities other than conservation districts having administrative authority.

Mr. Bredahl informed the Committee that a liaison group had been formed to meet and talk to key organizations throughout the state and identify and discuss any misconceptions of S.B. 12. In response to a question Mr. Bredahl replied that they had received no federal funds specifically for this educational activity. When asked if the funds for the cost sharing program will come from the federal government, Mr. Bredahl replied that he felt that the funds might come from either the federal government, state government, or local government. Mr. Bredahl was asked if he had done any research to ascertain how much a program, as established by S.B. 12, would actually cost. Mr. Bredahl replied that the total bill cost would be around $1 billion.

Mr. Wilbur Ringler, Assistant Director of Extension, Kansas State University, was the next conferee to appear before the Committee (Attachment IX). Mr. Ringler told the Committee that the Extension Service was asked to develop and provide leadership for an educational program on the public policy issue. He stated that an education committee was formed, background material prepared, and training sessions scheduled and held. He stated that one state and five area meetings were scheduled. Mr. Ringler said that the purpose of the meetings was to inform area and county leaders on the erosion and sedimentation problem, national legislation on water quality, suggested model legislation, and alternatives for citizen action. Mr. Ringler further stated that most counties had reported at least one or more meetings had been held on the erosion and sedimentation issue. An estimated total of 22,000 people were involved in the sessions.

Mr. Ringler told the Committee that farm audiences generally were sympathetic to the problem of erosion and sedimentation and felt that clean water legislation was desirable. However, he said, they would like to solve the problem through voluntary action and thus avoid governmental intervention. Mr. Ringler said there was a general consensus on several items. He said that if a new state policy on erosion and sedimentation abatement is necessary to comply with federal laws, three overall priorities were usually agreed upon and suggested for inclusion into any new sediment abatement policy:

1. Cost sharing on permanent conservation practices;
2. Local control of the program; and
3. Flexibility.

Mr. Ringler indicated that most citizens felt that the National Water Quality bill of zero discharge of pollutants (sediment) is not feasible because of the complexities of controlling erosion. He further stated that most people also felt the time table established by federal guidelines for getting erosion under control was not realistic. Continued use of the voluntary program for another four to eight years seems desirable from a landowners point of view. Mr. Ringler noted several legislative options the Committee may wish to consider:

1. Holding landowners responsible for sediment but providing cost sharing for permanent conservation measures at 75%;

2. Assigning the Kansas Conservation Commission leadership of the erosion sediment abatement program at the state level;

3. Recognizing that an individual was not responsible for pollution caused by a natural disaster such as a heavy downpour or long periods of drought;

4. Containing all land under provisions of a new sediment abatement program.

Mr. Ringler told the Committee that general public reaction to S.B. 12 seems to be that it contains many desirable provisions (i.e., local control, an informal appeal procedure, a realistic time schedule to get the program implemented, and penalties for persons who continue to abuse or misuse land).

June 25, 1975
Morning Session

Proposal No. 62 - Insulation and Energy Consumption Standards

The first order of business was a staff review of recent state energy actions. Staff informed the Committee that the 1973 interim Special Committee on the Energy Crisis was established by the Legislative Coordinating Council to study:

1. The possibility of authorizing the Corporation Commission to require new production of natural gas to be offered first to Kansas users, and

2. The sales, operations, and marketing practices of vendors and producers of motor fuels and petroleum products.

In regard to 1973 S.B. 46, which would have authorized the Corporation Commission to require that new production of natural gas in Kansas be first offered to intrastate users, the Committee recognized that the preponderance of testimony presented raised grave doubts about the constitutionality of the bill. However, a majority of the members were in favor of recommending that S.B. 46 be enacted even if such legislation were to be found unconstitutional. The Committee believed its passage by the Kansas Legislature would call attention to the need to reconsider longstanding federal policies relating to natural gas. Staff noted that S.B. 46 was not successful in passing the 1974 Legislature.

As an adjunct to its study, the 1973 interim Special Committee on the Energy Crisis heard testimony and reviewed recommendations relating to the energy crisis in general. As a result, the Committee recommended that the 1974 Legislature act favorably on S.B. 658 and S.B. 659. S.B. 659 would have amended existing statutes to require that the Kansas Department of Economic Development carry out a continuing inventory of current and future energy needs and resources, collecting and compiling information, projections and recommendations relating thereto, and report its findings and recommendations to the Governor and the Legislature. S.B. 658 would have empowered the Governor to proclaim that an energy emergency existed. The Corporation Commission would have been required to adopt regulations providing priorities for curtailment and/or allocation of energy sources in an emergency. Upon such a declaration of emergency the Kansas Corporation Commission would have enforced rules and regulations which would be in effect during such emergency. Staff also pointed out that neither S.B. 658 nor S.B. 659 was successful in passing the 1974 Legislature.

The Legislative Coordinating Council assigned as a 1974 interim legislative study the monitoring of actions and problems relating to the conservation of energy to the Special Committee on Conservation and Natural Resources. The Committee decided to focus primarily on two sectors of the energy front: (1) insulation and energy usage standards; and (2) helium conservation.

Staff noted that as a result of its study the Committee recommended that the 1975 Legislature take favorable action on SCR 2 directing the Director of Architectural Services to make the proper studies for developing design and evaluation criteria for building insulation and energy consumption standards. The report and the findings, with recommendations, was to be filed by August 1, 1975 with the Legislative Coordinating Council. SCR 2 was not favorably acted upon by the 1975 Legislature.

As a result of its study and in view of the critical helium situation, the Committee also recommended that the 1975 Kansas Legislature take favorable action on SCR 1. This resolution urged the Energy Resource and Development Administration, Federal Energy Administration, Congress and the Division of Helium of the United States Bureau of Mines to take whatever action was necessary to allow the resumption of the purchase and storage of helium under the provisions of the National Helium Act of 1960. The resolution also called on the federal government to allow producers to deduct, for federal income tax purposes, the cost of production, transportation, transmission and storage of helium for future sale. Staff pointed out that SCR 1 also was not acted upon favorably by the 1975 Kansas Legislature.

As an adjunct to its study, the Committee heard and reviewed recommendations relating to the energy crisis in general. The Committee urged the 1975 Kansas Legislature to act favorably on S.B. 13. Ultimately, S.B. 13 was acted upon favorably by the 1975 Kansas Legislature.

S.B. 13 created a Kansas Energy Office to be administered by a Director appointed by the Governor with the approval of the Senate. The new office is to be attached to the Governor's office or to a division designated by the Governor. An Advisory Council on Energy, to be appointed by the Governor and to serve at his pleasure, was also created by S.B. 13.

Under the provisions of S.B. 13, the Director of the Kansas Energy Office is to serve as Kansas' administrator for federal programs; act as liaison between state and federal agencies, political subdivisions, industry and the public on energy matters; initiate requests for and assist other agencies and political subdivisions in requests for federal funds; mediate the allocation of federal funds between political subdivisions on request; collect information relating to energy resources; and develop and promote educational programs for energy resource conservation. The Director is also mandated to adopt rules and regulations establishing a system of priorities for the allocation of energy resources and the curtailment of consumption during an energy emergency.

S.B. 13 also authorized the Governor, subject to approval by six members of the Finance Council, to proclaim an energy emergency whenever it appears that energy resources in the state are inadequate to meet the demand and a threat to the public health, safety and welfare exists. During an energy emergency the system of priorities for the allocation of available energy resources and/or the curtailment of energy consumption, previously adopted by rule and regulation, may be imposed in all or a portion of the state.

Staff also noted that the Fuel Allocation Office was established on November 23, 1973. The Fuel Allocation Office was a result of a Presidential Order from President Nixon to Governor Docking. The Fuel Allocation Office continued in existence until June 17, 1975 when the Kansas Energy Office, created by S.B. 13, came into existence. Staff noted that there also exists a 21 member Governor's Advisory Council on Energy and Natural Resources.

Mr. Louis Krueger, Director, Architectural Services Division, Department of Administration, was introduced to the Committee. Mr. Krueger told the Committee that there was a great deal of insulation work to be done on existing buildings. He said there was a problem of incentive and that it was very difficult to get the average citizen to invest money to improve energy conservation unless it is profitable. Mr. Krueger told the Committee that he would like to be able to allow flexibility and still achieve the end result beyond what might be considered a minimum. He stated that different types of building occupants would need to have different standards.

In response to a question, Mr. Krueger stated that he did not feel that the problem was with new structures but that it was with older buildings. Mr. Krueger informed the Committee that an Advisory Committee on Statewide Building Codes had been formed and that a code would be before the Legislature next year. Mr. Krueger said, in response to a question, that one of the problems is that a statewide code would mean additional expense for the state in providing additional building inspectors.

Mr. Charles Carey, Jr., Executive Director, Mechanical Contractors Association, was the next conferee to appear before the Committee (Attachment X). Mr. Carey told the Committee that since his organization's members install energy consuming sheeting and cooling systems they are automatically involved and concerned in energy conservation. Mr. Carey said that approximately 30% of the total energy consumed in the United States is used for heating, cooling and operation of equipment in buildings, and that 25% to 50% of energy usage in most buildings is wasted. He said that some examples of wasted energy are excessive exhausting of air from buildings, skimpy thermostatic or zone control of temperatures which forces occupants to set thermostats to provide heat to the coldest room in winter and the hottest room in summer, causing excess energy to be wasted by some rooms being over heated or under cooled, by leaking steam traps and heat exchangers, etc. Mr. Carey also noted that up to now, comfort has been the prime design objective and that now engineers must give highest priority to minimum energy consumption. Mr. Carey told the Committee that the Mechanical Contractors Association of America is urging Congress to pass legislation in four areas:

1. Investment tax credit and/or rapid depreciation for capital improvements that will increase the energy conserving performance of mechanical systems in new and existing buildings;

2. Payment of premiums for excessive use of energy and credit for reduction in energy use of buildings through conservation;

3. Incorporation of industry developed national consensus standards for energy conservation into building codes and regulations by reference, to be given broad application by professionals qualified in this field; and

4. Financial support of research programs to accelerate use of commercially feasible alternative sources of energy.

Mr. Carey told the Committee that the Mechanical Contractors Association of America urges that state legislation be delayed until ASHRAE 90-P is completed. Then, those standards should be incorporated by reference.

Mr. E. F. Cassing, Energy Conservation Committee, ASHRAE, was the next conferee introduced to the Committee. Mr. Cassing urged the Committee to avoid specifics in legislation. He said he felt that insulation legislation should be left flexible to enable the professionals to decide what system would be best. He said that he felt that ASHRAE 90-P would give a general guideline to follow that could be updated as research into new methods is done. He said that research is being done now in many areas that should help to eliminate this problem. Mr. Cassing indicated that as soon as the ASHRAE 90-P publication is published, he will make it available to the Committee.

Mr. Ross Martin, American Institute of Architects was the next conferee to appear before the Committee. Mr. Martin furnished the Committee with two reports, entitled "Energy Conservation and the Built Environment" and "A Nation of Energy Efficient Buildings by 1990" (on file in the Legislative Research Department). Mr. Martin also distributed a packet of information (on file in the Legislative Research Department) and a written statement (Attachment XI).

Mr. Martin said that it is potentially possible to reduce energy consumption in buildings on a national scale by 12.5 million barrels of oil per day. He told the Committee that at the state level his organization has begun a serious effort to bring their own professionals up to date on the latest design approaches and conservation techniques for conserving energy in buildings. Mr. Martin told the Committee that present studies indicate that a savings of 40% can be accomplished in existing buildings and 60% or more in new structures.

Mr. Martin told the Committee that the American Institute of Architects feels the incorporation of even the ASHRAE standards into legislation is ill-advised at this time. He stated that the American Institute of Architects supports legislation which provides for broad incentives to conserve energy in buildings and that they do not feel that prescriptive standards of energy conservation should be legislatively defined and would advise against such efforts. He stated that careful attention must be given to weighing long range considerations as well as short term interim measures. Mr. Martin further stated that he does not feel that the legislation that has come out of Congress gives enough incentive to people to get them to take the necessary steps.

In response to a question, Mr. Martin said that he was not saying that there was no need for standards of any kind, but not to tie it up with standards so that they do not come up with other solutions. He stated that he felt that it would make more sense for each state to set its own standards.

Following Mr. Martin's presentation the Committee recessed for lunch.

Afternoon Session

After general Committee deliberation the Chairman announced that the next meeting of the Committee was scheduled for July 28 and 29. The Committee then proceeded to establish the following meeting schedule:

August 28 and 29

September 22, 23 and 24 (field hearings - soil and sediment control)

October 22 and 23

It was the consensus of the Committee that the September field meetings with respect to soil and sediment control (S.B. 12) would be held with the Committee meeting as a whole in Chanute, Holton, Garden City, Wichita, Beloit and Olathe. Following discussion of future Committee meetings, the meeting adjourned.

Prepared by Doug Crandall

Approved by Committee on:

_____

Date

Attachment I

A General Overview of the Use of Water and the Longevity of Irrigation Systems in Western Kansas

Presented to

Legislative Research Committee on Water Use

June 24, 1975

by

John C. Halepaska

INTRODUCTION

Irrigation in Western Kansas is perhaps one of the newest and most prolific industries in the state of Kansas. In this brief paper, an effort will be made to get a general overview of the entire system as it exists, not only in the state of Kansas, but in the neighboring states as well. This general overview will be included to indicate the type of demand that will be made upon fuel for irrigators in the entire system. And, in addition, an effort will be made to identify discreet parts of the system in Kansas, the total volume of fluid that exists in each system, the total number of wells that exist in each system, and, based upon a simplified model and a large number of assumptions, predictions concerning the longevity of each of the systems will be included.

KNOWN AND UNKNOWN FEATURES OF THE IRRIGATION SYSTEMS

Since very little is actually known about the systems in Western Kansas, I will begin by discussing the features that are known. Chief amongst the known features of the major systems, is the volume of water that is currently stored in the system. The next known feature is the number of wells that are contained within each region of the system.

Unknown features about the system include the following: the amount of fluid that is currently pumped from the wells, future development rate, future weather, recharge rates, and the possible impact of energy shortages in the future upon quantity of water pumped and the development rate.

With few things actually known, and a multiplicity of factors that are unknown, it is obviously quite precarious to make projections concerning future use of water and the longevity of the basic systems. However, since the consequences of not attempting to define these two major factors loom quite large, the icy plunge follows.

AN OVERVIEW

Figure 1 shows the distribution of the Ogallala Formation in the Great Plains area. From this figure one can see the overall extent of irrigation in surrounding states. One is immediately struck with the size and geographical immensity of the system. It is of interest to note that Kansas has some 17 percent of the area involved in the Ogallala Formation.

Figure 2 is a compilation of numbers, costs, volumes and expenses that will be involved in total development of the Ogallala system. First of all, the area involved is some 151,000 square miles and based upon assuming different saturated thicknesses for the system, there is between 150

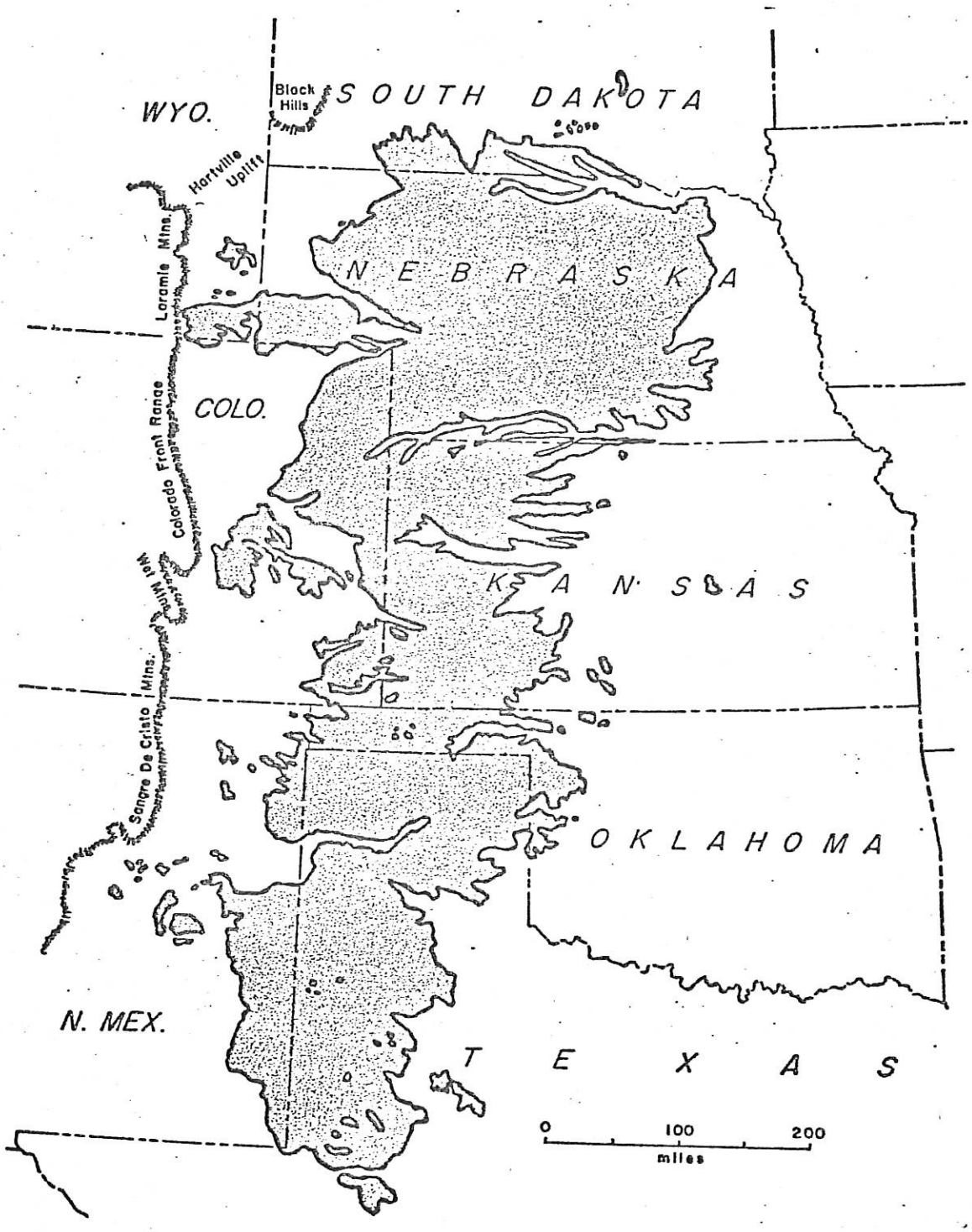


Figure 1. Distribution of Ogallala Formation in Great Plains (Merriam, 1963)

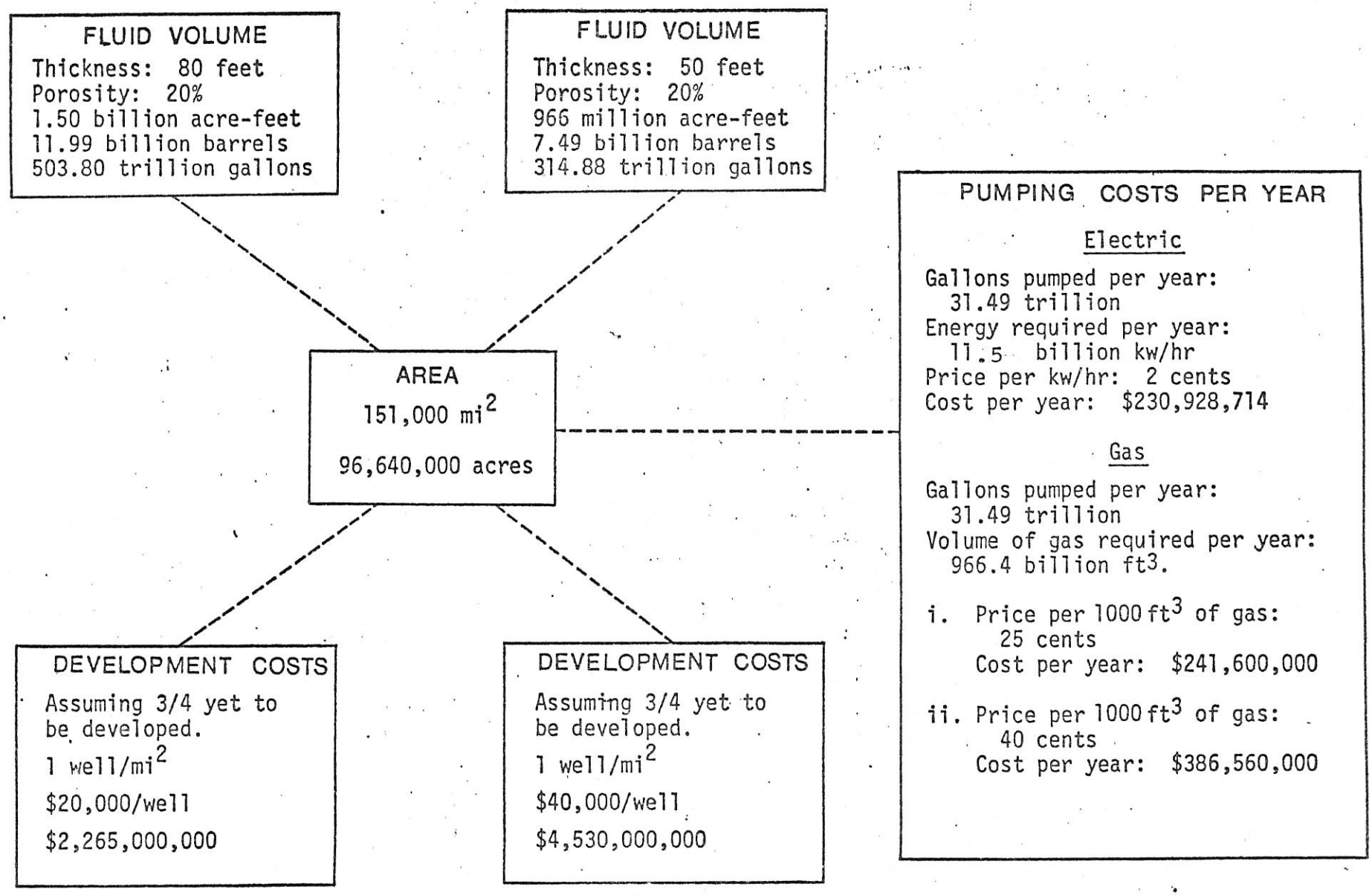


Figure 2. Basic Planning Numbers

billion acre feet and 966 million acre feet of water stored in the total system.

Based upon assuming that three-fourths of the system is yet to be developed, and that at total development one well will exist for each square mile, it is seen that development costs of the total system will range from 2-4½ billion dollars.

The cost of pumping fluids from this system with the whole system developed, are summarized in the right-hand box in Figure 2. It is seen that costs based upon the previous assumptions will range between 230 million and 380 million dollars per year. It is also of interest to note that if all wells pump, that one foot of water can be pumped over this entire surface (151,000 square miles) in as short a period of time as 20 days. This number is included to simply give an indication of the quantity of energy that conceiveably be demanded in a relatively short period of time.

REGION I - GREAT BEND PRAIRIE

Figure 3 is a composite of graphs chosen to indicate a conceivable variation in weather, total demand of pumpage, a possible production decline curve, and energy costs, both electric and natural gas. At the top of Figure 3 is a basic graph indicating a conceivable relationship between the weather and pumping practices in the Great Bend area. This top graph indicates a total demand of 36 inches of water are necessary to satisfy the total demand for whatever farming practice is taking place. The sinusoidal function drawn on this graph is simply a representation of how much water natural rainfall may provide and what quantity of water will be necessary from irrigation wells to satisfy a total demand of 36 inches. The second graph on Figure 3 shows the amount of water necessarily pumped to satisfy the model outlined in Graph 1. Graph 2 also includes a decline curve for the volume of the entire system. Graphs 3 and 4 indicate energy requirements in both electrical energy or gas energy for the system as a whole. The above set of graphs are based upon the assumption that the area in Region I is totally developed and has a maximum of one well per square mile over 6,850 square miles. It is known that the area has only 1,200 wells, and is therefore only 18 percent developed. Since future development is unknown, it is reasonably assured that the longevity curve shown in Graph 2 of Figure 3 could be extended in time as much as five times, the extention in time will depend upon future development.

REGION II - SOUTHWEST KANSAS

Figure 4 uses the same sinusoidal weather model as used in the previous figure. Graph 2 on Figure 4 indicates the

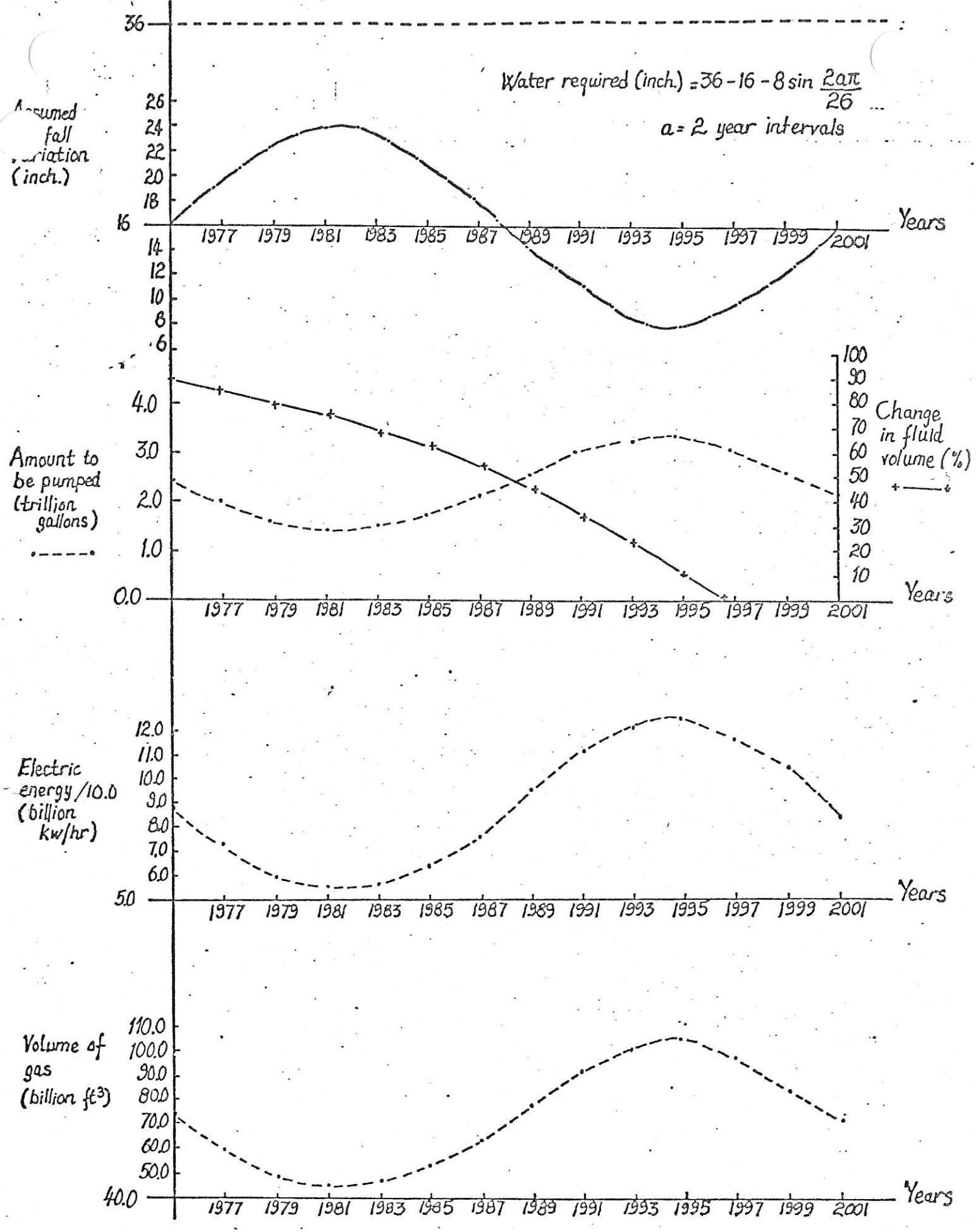


Fig. 3. Planning numbers for Great Bend Prairie

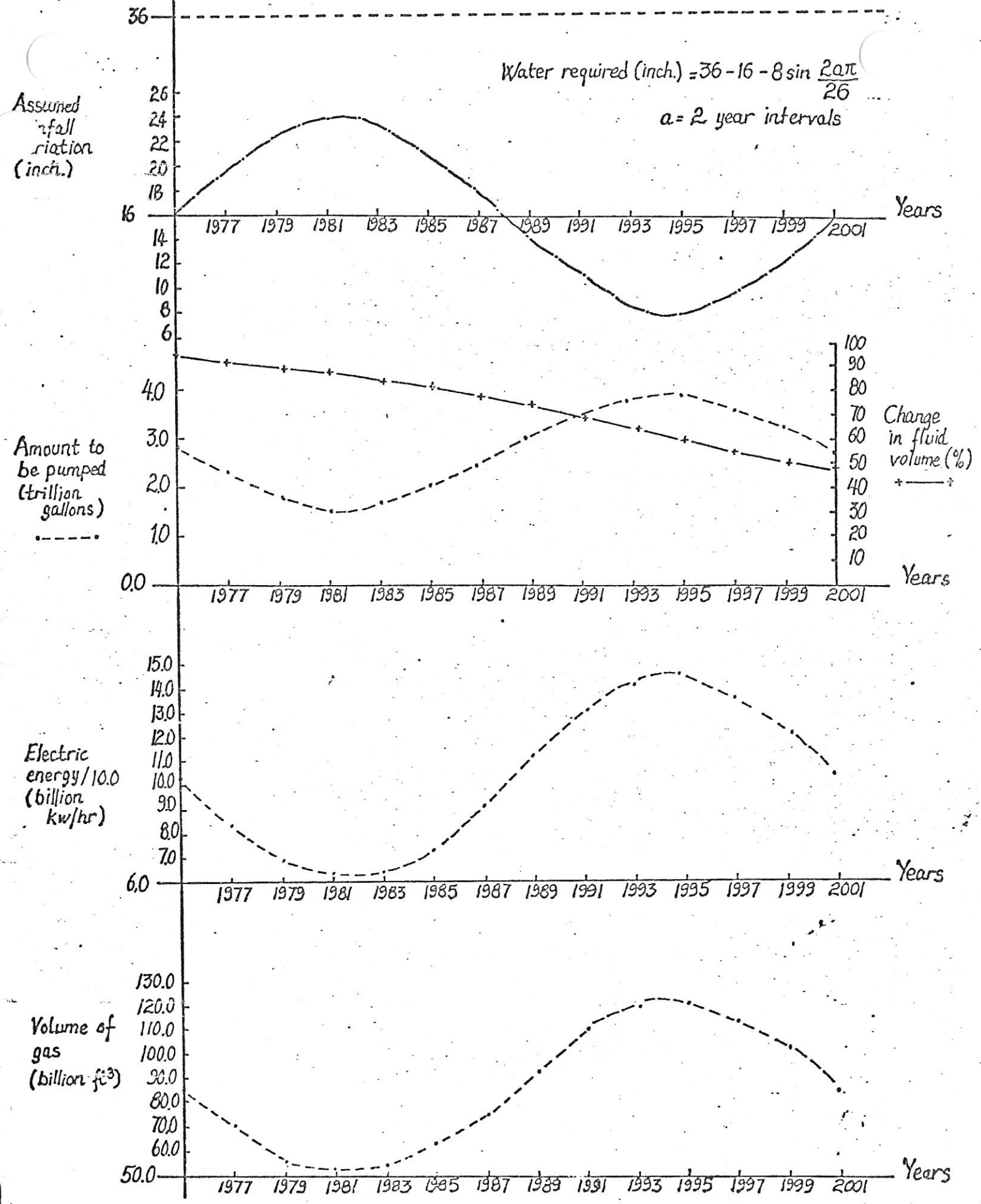


Fig. 4. Planning numbers for south west Kansas

amount to be pumped, and again includes a possible depletion curve for this system. Graph 3 and Graph 4, as in the previous figure, indicate the quantity of energy that may be required if one uses simply electrical energy or gas energy. This area contains approximately 8,170 square miles, and it contains 7,000 wells, and based upon a maximum density of one well per square mile, it is considered 86 percent developed. Clearly, if development of this system does not exceed one well per square mile, Region II will remain a viable economic community into the next century.

REGION III - WEST-CENTRAL KANSAS

Figure 5 contains the same general type of graphs as the previous figures. A sinusoidal weather function is again assumed and its effect upon total pumpage and depletion is shown.

Graph 2 indicates the amount of fluid to be pumped and a depletion curve. As in the previous graphs, Figures 3 and 4 indicate the energy required if one were to pump water using just electricity or just gas respectively. The area contained in Region III is about 2,490 square miles and presently contains about 2,500 wells. Based upon a total maximum density of one well per square mile, this system is 100 percent developed. Based upon the assumptions used, this region will clearly have problems meeting demand for irrigation within the next ten years.

REGION IV - NORTHWEST KANSAS

Figure 6, as the previous figures, has graphs indicating weather, amount to be pumped, depletion curves, and total energy requirements for the Northwestern Region. This area is 8,260 miles, and presently contains some 3,000 wells. It therefore follows that this area is approximately one-third developed, and it necessarily follows that the depletion curve shown in Graph 2 of Figure 6 could be extended by as much as three times. In the worst case, if development were to be completed very rapidly, the depletion curve shown would become more and more accurate. It appears clear that this area will probably have sufficient quantities of water into the next century.

SUMMARY & CONCLUSIONS

It is apparent from the foregoing, that a large number of sweeping grandiose conclusions could be reached. However, it is also apparent that for the most part the system as it

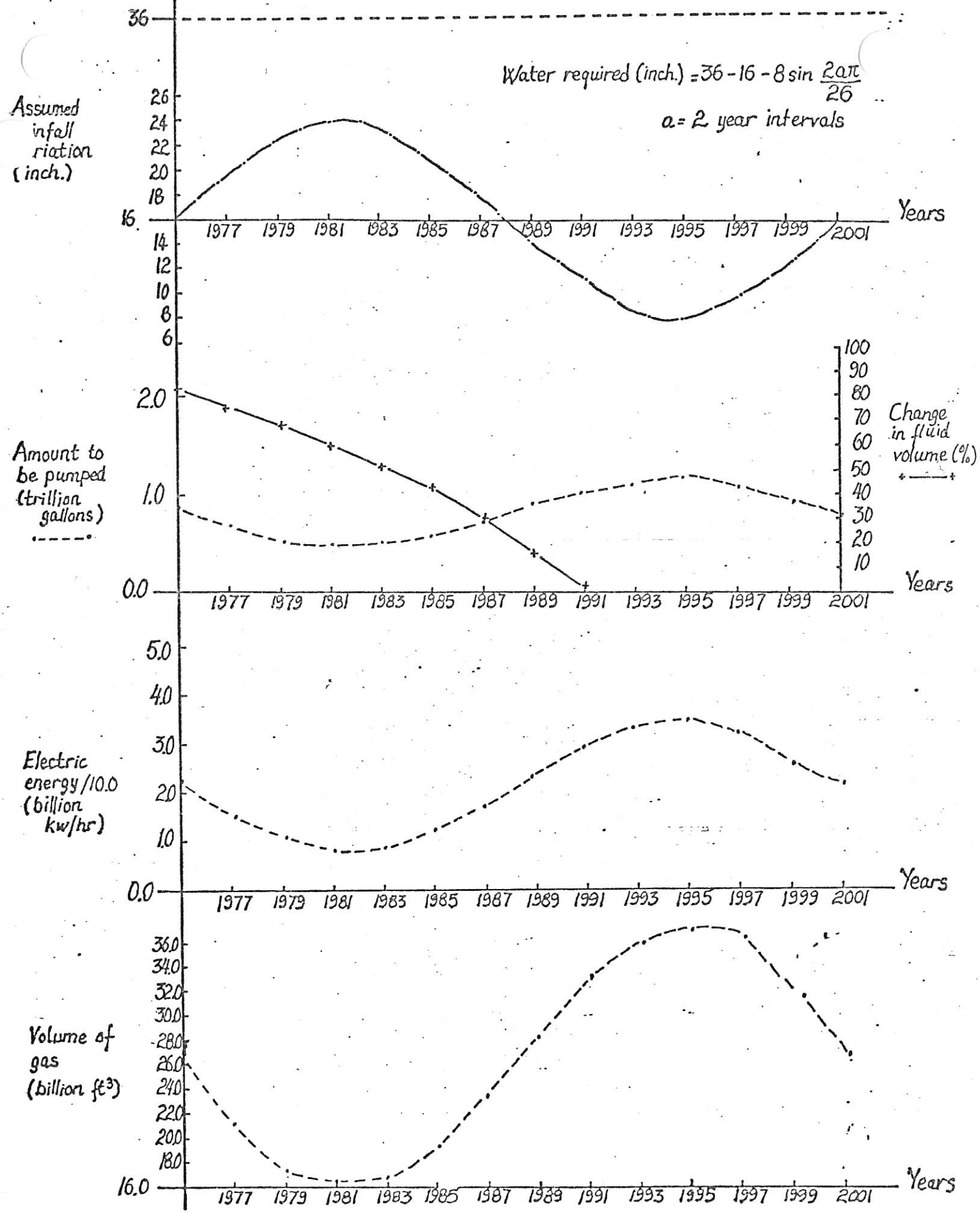


Fig. 5. Planning numbers for west central Kansas

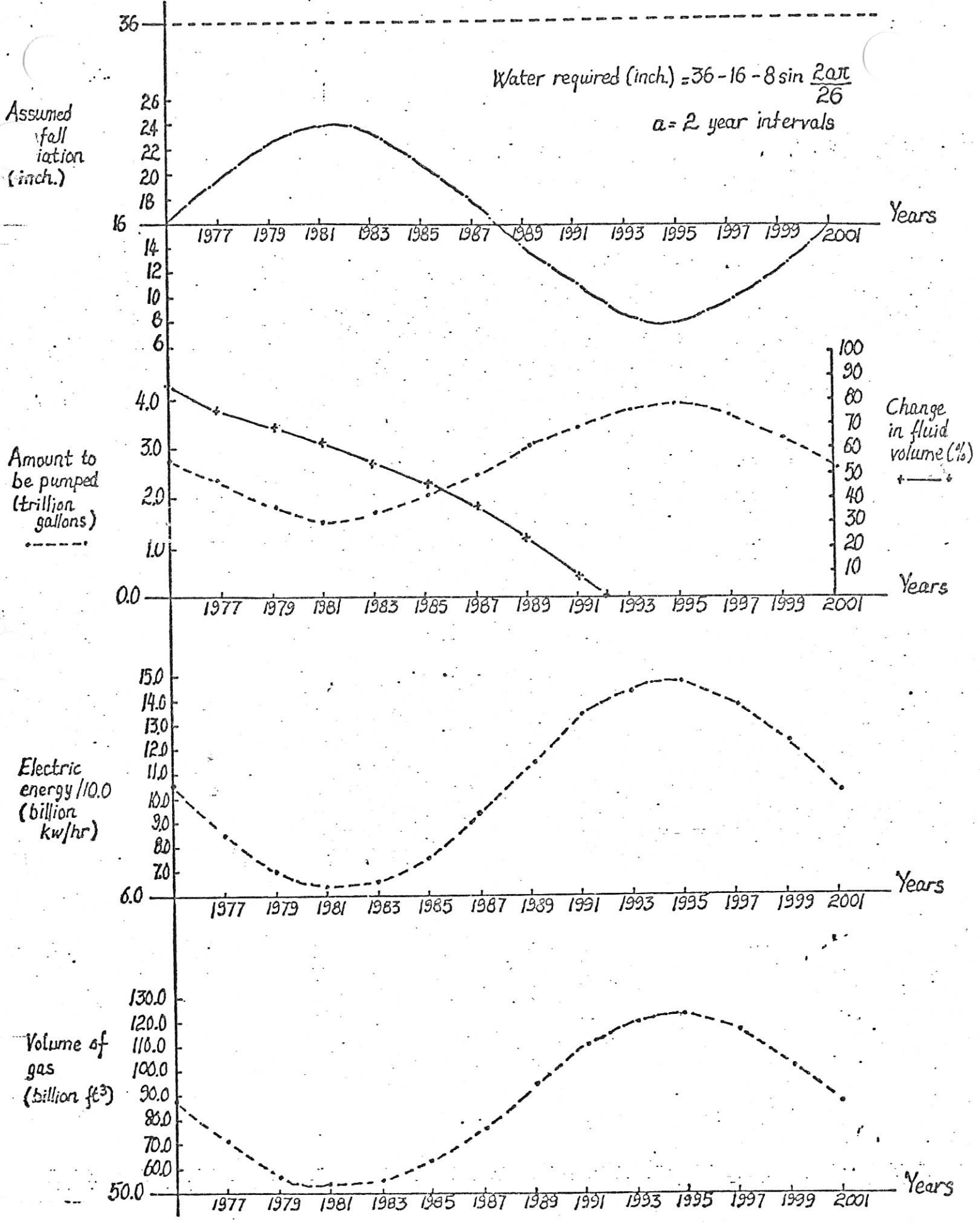


Fig. 6. Planning numbers for north west Kansas

currently exists and how it will be managed in the future, is, and will remain, the responsibility of the people of Kansas. It therefore behooves the legislature and the people involved to make every effort to understand the consequences of mining a depleting resource.

Chief amongst the considerations that should be made by the people directly involved in the irrigation community are the following:

1. Over what span of time do the people in the individual irrigation regions want the water to last?

2. Based upon the water in place and the period of time that the people want the water to last, definite ceilings should be placed upon the quantity of water to be produced each year.

3. How much water should be left in the system to strictly meet emergency needs for the municipal and irrigation purposes in the event of a drought?

Chief amongst the considerations that the legislature should make are at least the following:

1. Is the present law and the present regulatory system adequate to meet the challenge that obviously will come in the near future concerning depleting groundwater supplies in Western Kansas?

2. Should the system that is currently in place to regulate future development be markedly altered?

3. Should people that choose not to develop irrigation or not to pump be compensated for their efforts to conserve and to promote the overall longevity of the system?

4. What action should the legislature take to encourage income tax relief along the lines of a depletion allowance such as is currently accepted in the High Plains of Texas?

If the present institutions in place today are defective, these defects must be corrected prior to the onset of large scale problems. Solutions will become increasingly difficult and painful after the onset of large scale problems.

APPENDIX I

TABLES OF INFORMATION ON REGIONS I - IV

(Based on model and assumptions used in figures 3 through 6)

REGION: GREAT BEND PRAIRIE

AREA: 6,850 mi^2 4,384,000 acres

WELLS: 1,200 area 18% developed

FLUID VOLUME

Thickness: 109 feet

Specific Yield: 0.18

86.0 million acre-feet
667.3 billion barrels
28.0 trillion gallons

Year	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001
Fluid volume to be pumped (trillion gallons)	2.38	1.94	1.60	1.44	1.50	1.75	2.15	2.61	3.01	3.27	3.32	3.16	2.82	2.38
Fluid volume remaining (%)	92	85	79	74	68	62	54	45	34	23	11	--	--	--
Electric energy required (billion kw/hr)	0.87	0.71	0.59	0.53	0.55	0.64	0.79	0.96	1.10	1.20	1.22	1.16	1.03	0.87
Volume of gas required (billion ft^3)	73.04	59.60	49.07	44.13	45.88	53.77	66.04	80.07	92.34	100.23	101.89	97.01	86.48	73.04
Cost for electricity (2¢ per kw/hr) in million dollars	17.46	14.26	11.74	10.56	10.98	12.86	15.80	19.16	22.08	23.98	24.40	23.20	20.68	17.46
Cost for gas (25¢/1,000 ft^3) in million dollars	18.26	14.90	12.27	11.03	11.47	13.44	16.51	20.01	23.08	25.05	25.47	24.25	21.62	18.26

REGION: SW KANSAS

AREA: 8,170 mi^2 5,228,800 acres

WELLS: 7,000 area 86% developed

FLUID VOLUME

Thickness: 250

Specific Yield: 0.18

235.0 million acre-ft
1.83 trillion barrels
76.70 trillion gallons

Year	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001
Fluid volume to be pumped (trillion gallons)	2.84	2.32	1.91	1.72	1.78	2.09	2.57	3.11	3.59	3.90	3.96	3.77	3.36	2.84
Fluid volume remaining (%)	96	93	91	89	86	84	80	76	71	66	61	56	52	48
Electric energy required (billion kw/hr)	1.04	0.85	0.70	0.63	0.65	0.77	0.94	1.14	1.32	1.43	1.46	1.38	1.23	1.04
Volume of gas required (billion ft^3)	87.13	71.11	58.56	52.63	54.72	64.14	78.78	95.51	110.15	119.57	121.66	115.73	103.18	87.13
Cost for electricity (2¢ per kw/hr) in million dollars	20.84	17.00	14.00	12.58	13.08	15.34	18.84	22.84	26.34	28.60	29.10	27.68	24.68	20.84
Cost for gas (25¢/1,000 ft^3) in million dollars	21.78	17.77	14.64	13.15	13.68	16.03	19.69	23.87	27.53	29.89	30.41	28.93	25.79	21.78

REGION: WC KANSAS

AREA: 2,490 1,593,600 acres

WELLS: 2,500 area app. 100% developed

FLUID VOLUME

Thickness: 72

Specific Yield: 0.18

20.6 million acre-ft
160.2 billion barrels
6.73 trillion gallons

Year	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001
Fluid volume to be pumped (trillion gallons)	0.87	0.71	0.58	0.52	0.54	0.64	0.78	0.95	1.09	1.19	1.21	1.15	1.02	0.87
Fluid volume remaining (%)	87	77	68	60	52	43	31	17	1	--	--	--	--	--
Electric energy required (billion kw/hr)	0.32	0.26	0.21	0.19	0.20	0.23	0.29	0.35	0.40	0.44	0.44	0.42	0.38	0.32
Volume of gas required (billion ft^3)	26.55	21.67	17.83	16.02	16.66	19.55	24.00	29.09	33.54	36.43	37.07	35.26	31.43	26.55
Cost for electricity (2¢ per kw/hr) in million dollars	6.34	5.18	4.26	3.84	3.98	4.68	5.74	6.96	8.02	8.72	8.86	8.44	7.52	6.34
Cost for gas (25¢/1,000 ft^3) in million dollars	6.63	5.41	4.46	4.00	4.16	4.88	6.00	7.27	8.38	9.10	9.26	8.81	7.85	6.63

REGION: NW KANSAS

AREA: 8,260 mi^2 5,286,400 acres

WELLS: 3,000 area 36% developed

FLUID VOLUME

Thickness: 80

Specific Yield: 0.18

76.12 million acre-ft
590.50 billion barrels
24.8 trillion gallons

Year	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997	1999	2001
luid volume to be pumped (trillion gallons)	2.87	2.34	1.93	1.73	1.80	2.11	2.60	3.15	3.63	3.94	4.01	3.81	3.40	2.87
luid volume remaining (%)	88	79	71	64	57	48	38	25	10	--	--	--	--	--
lectric energy required (billion kw/hr)	1.05	0.86	0.71	0.64	0.66	0.78	0.95	1.16	1.33	1.45	1.47	1.40	1.25	1.05
olume of gas required (billion ft^3)	88.11	71.88	59.20	53.22	55.33	64.85	79.64	96.55	111.34	120.86	123.01	116.99	104.32	88.11
ost for electricity (2¢ per kw/hr) in million dollars	21.08	17.20	14.16	12.72	13.24	15.50	19.04	23.10	26.62	28.90	29.42	27.98	24.94	21.08
ost for gas (25¢/1,000 ft^3) in million dollars	22.02	17.97	14.80	13.30	13.83	16.21	19.91	24.13	27.83	30.21	30.75	29.24	26.08	22.02

Attachment II

Statement Before the Legislative
Interim Committee on Energy and Natural Resources
June 24, 1975

Mr. Chairman and Members of the Committee:

My statement today will be limited to the economic aspects of irrigation in Kansas. It will begin with a summary of the growth characteristics of irrigation in Kansas and end with a discussion of the impact that this transformation has had on local and state economy.

Irrigation has been increasing at an average rate of 130,000 acres per year since 1966. Some years have been less than the average, but in one year 200,000 acres were added. The total amount of irrigated land in Kansas is approximately 2 1/4 million acres. These statistics are, for the most part, derived from the Statistical Reporting Service of the Department of Agriculture and the State Board of Agriculture.

Kansas is well endowed with irrigable soils. Our first slide will illustrate the relationship between soils and water. --Show Slide #1-- There is in Kansas approximately 36 million acres of cropland, 16 million of which are irrigation compatible soils. Approximately 11 million acres of this irrigable land overly aquifers capable of producing 500 gallons per minute or more. The slide indicates the location of these areas which you will note are not all in western Kansas but include the area below the great bend of the Arkansas River, the Little Arkansas River Basin, and the alluvium valleys of several of the state's major streams in central and eastern Kansas.

In 1967, the Kansas Water Resources Board began studies of the impact of irrigation on the Kansas economy, selecting six of the southwestern counties as the study area. These counties included Stanton, Grant, Haskell, Morton, Stevens, and Seward. These are shown on the second slide. You will recall that all six of these counties have extensive water supplies lying beneath their

surface. The third slide shows the rate of growth of irrigated land in these six counties. There were approximately 275,000 acres irrigated in this area in 1960. By 1973, this had increased to approximately 620,000 acres. The graph indicates a steady growth pattern. Slide #4 indicates the amount of water pumped to irrigate those acres during the period 1960 through 1973. All of these numbers are approximate. While we collect water use information annually by the means of the questionnaire to all water users, 100 percent of the questionnaires are never returned. However, based upon information available to us, the amount of water pumped went from 400,000 acre-feet in 1960 to 1,140,000 acre-feet in 1973. There are ups and downs showing annual usage, indicating that more water was pumped in some years than in succeeding years even though the amount of land actually increased. This variation may be due to the increased amount of rainfall occurring in those particular years or conversely, show the effects of a dry year. Either way, fluctuations in the amount of water withdrawn for irrigation purposes would show up in the wavy line such as seen in this slide. The fifth slide portrays the increase in annual income derived from irrigated land in the six counties. This is an expression of the difference in income between what would have been derived from dryland farming and what was realized from the irrigated land. This slide reflects increased prices as well as the increased amount of land under irrigation. The increased gross income due to irrigation rose from approximately $13 million in 1960 to $120 million by 1973. Slide #6 depicts this income in relation to the number of acre-feet of water used. In studies done in 1967, 1968, and 1969, it was determined the value of an acre-foot of water was $33 while in 1973 it had arisen to $105 per acre-foot. This is an integrated figure. It does not depict in any sense the cost factors. This is the gross increase in income produced as the result of the usage of an acre-foot of water.

From this I conclude two things: (1) there is a great deal of wealth created by irrigated agriculture; and (2) the federal, state, and local

governments share a substantial portion of that wealth in the form of tax revenues.

As a result of this increase in productivity due to good soils, favorable climatic conditions, water, and increase in wealth from the usage of water, it is my expectation that irrigation in Kansas will increase to between 4 1/2 and 5 million acres by the year 2000 even with the constraints of energy shortages and cost. The 7th slide shows the water use forecasts by regions in Kansas with irrigation being by far the largest user of water.

In addition to the economic impact on Kansas, there are national and international pressures to continue to increase agricultural productivity in Kansas including irrigated agriculture. In a recent National Water Conference, Secretary of Agriculture Butz, in speaking before more than 1,000 people, stated that the nation needs to double agricultural output by 1985. Another eminent agricultural department spokesman said that we have only 27 days of food supply in the pipeline, the lowest in a very long time. Former Secretary of Agriculture Clifford Hardin stated that the United States could never produce enough food to meet the nutritional needs of the world and, therefore, must concentrate on supplying domestic requirements and the commercial markets of the world which can afford to pay for food at prices which enable American farmers to produce it.

The role of water will become an increasingly important one in the production of food and fiber in the United States. Classical irrigation as it is known in the western states today will be outstripped by supplemental irrigation. Supplemental irrigation is defined as a practice in which water is applied to crops for one or perhaps two weeks at the optimal stage of plant growth. In intensive agriculture production, the crops must have adequate moisture or failure is likely, thus agriculture is rapidly becoming water intensive over the entire nation.

With the realization in the mid-1960's that the water supplies were being drafted heavily and that sooner or later the supply would be depleted beyond economic usefulness, efforts were begun to research improved practices or possiblities for a replacement economy. Research in a number of fields was initiated as a result of appropriations by the Kansas Legislature and later assisted by federal funds. Some of the research has been completed, others are still underway. The following are among those items studied:

1. Water use efficiency has a capability of increasing productivity approximately 25 percent by present technology, the use of concrete pipe and tailwater pits are two ways in which the amount of water used per bushel of production can be reduced. Such improvements are being made on Kansas irrigated farms at the present time.

2. Artificial recharge experimentation was undertaken. It has been determined that it will work. The primary requirement is having sufficient water to implement it. In areas of low rainfall this may not be a practical means of increasing the longivity of the aquifers but in those areas that have 26 or more inches of water it appears to be a very practical means of improving the yield capability of the aquifers.

3. Saline water conversion to fresh water has been researched. It is quite expensive. One of the principle reasons for it being expensive is that of disposing of the salt extracted from the brackish or saline waters. It may have applications for municipal and industrial supplies much earlier than it may have for irrigation purposes because of these high costs and salt disposal limitations.

4. Research is being conducted at Kansas State University both on chemical suppression of evaporation and on genetic selection processes which will improve grain crops capability to produce substantially with a very limited supply of water. This is facinating research and at the moment the genetic selection research shows great promise.

5. Weather modification is being researched in Kansas for the purpose of trying to determine whether it can be sufficiently controlled to be useful as an added source of precipitation. The objective is to learn more about its costs and its effectiveness as a complimentary means of increasing the availability of water for agricultural purposes, specifically in western Kansas.

6. We have and will continue to examine the proposition of the importation of water, however, at the moment it looks to be extremely costly and there are many legal barriers to the implementation of any importation plan.

It is important that the research and experimentation in these fields be continued until definite conclusions can be drawn relative to their worth.

In closing, it may be noted that we have not brought any specific legislative proposals before the Committee today. The brevity of time to carefully think through such proposals is our principle reason for not bringing them. However, we would hope that before the Interim Committee completes its work this fall that we will have the opportunity to bring well considered proposals before the Committee and the Committee itself prepare such legislation as will promote the conservation of the resource without depreciating its value to the State of Kansas and to those who use the water in making their livelihoods.

Thank you for the opportunity to present this statement.

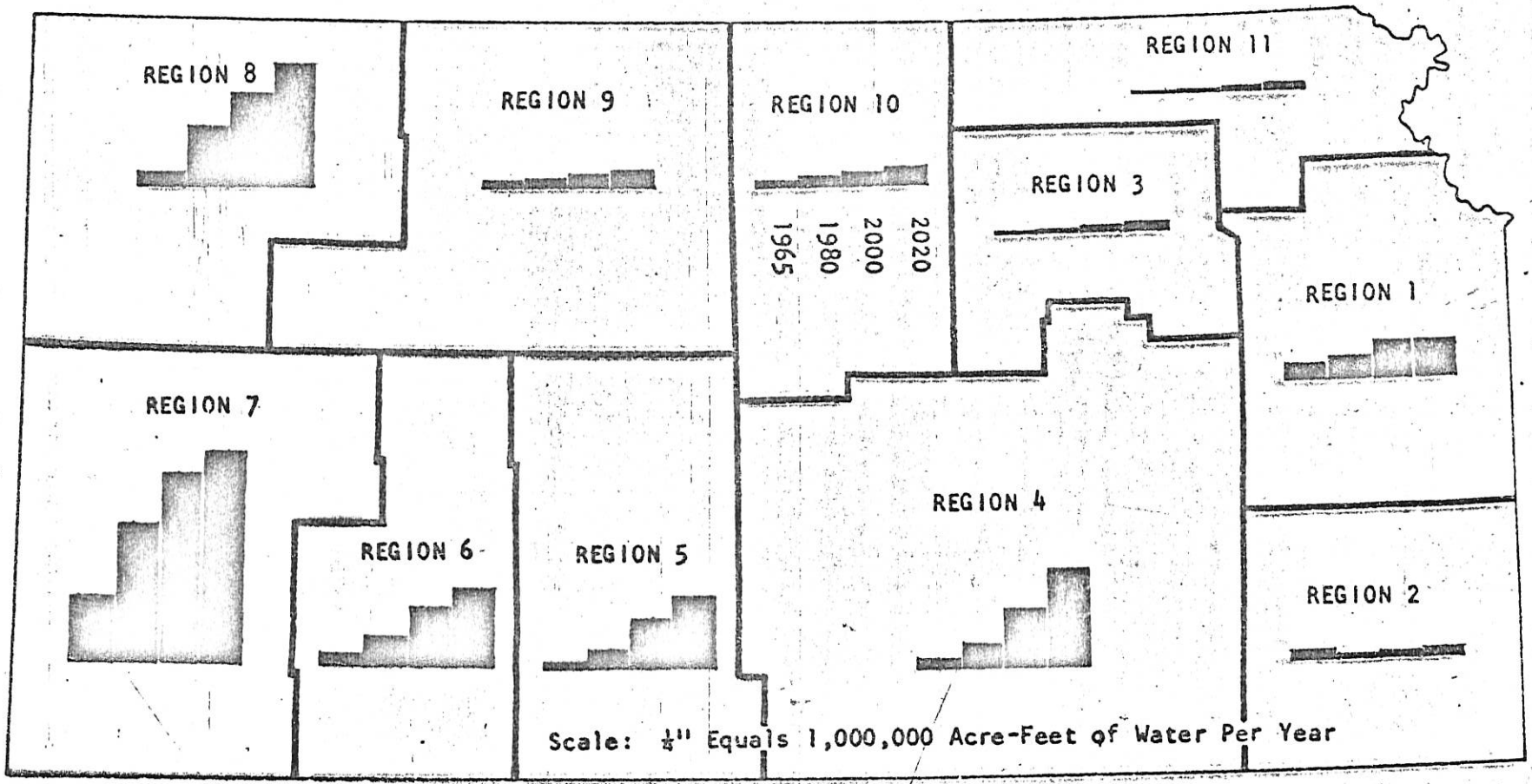
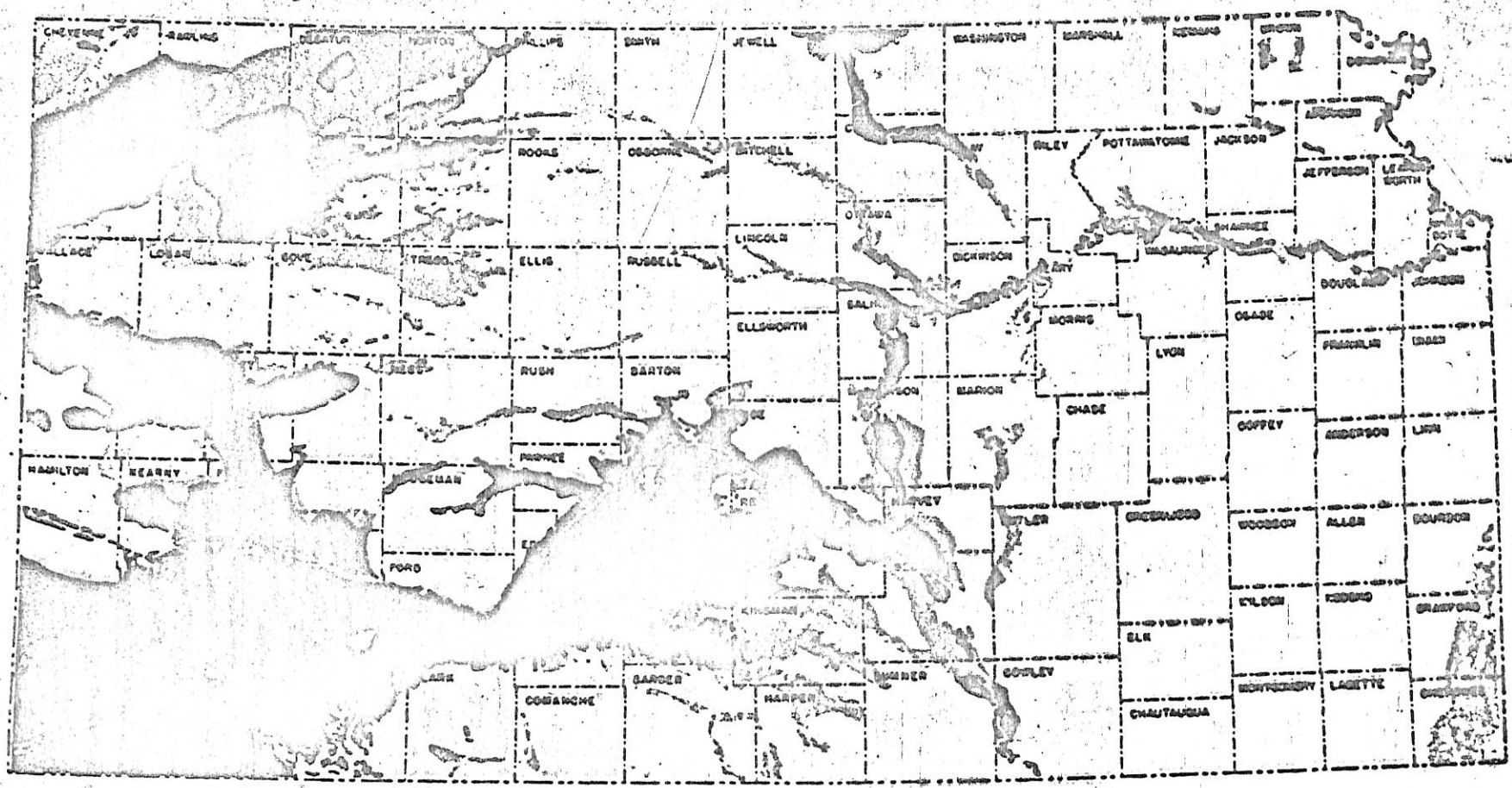


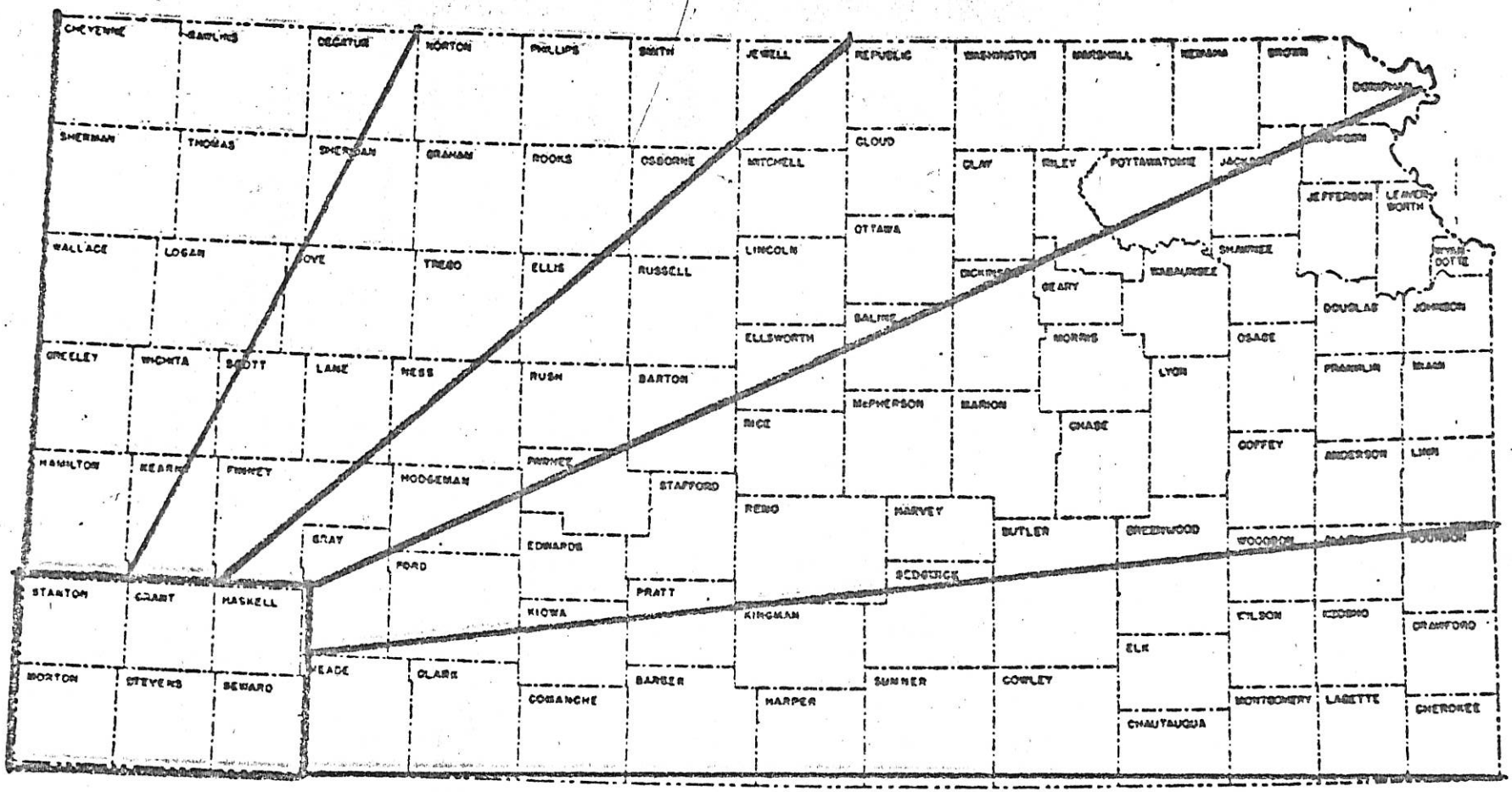
FIGURE 4-2 TOTAL WATER REQUIREMENTS

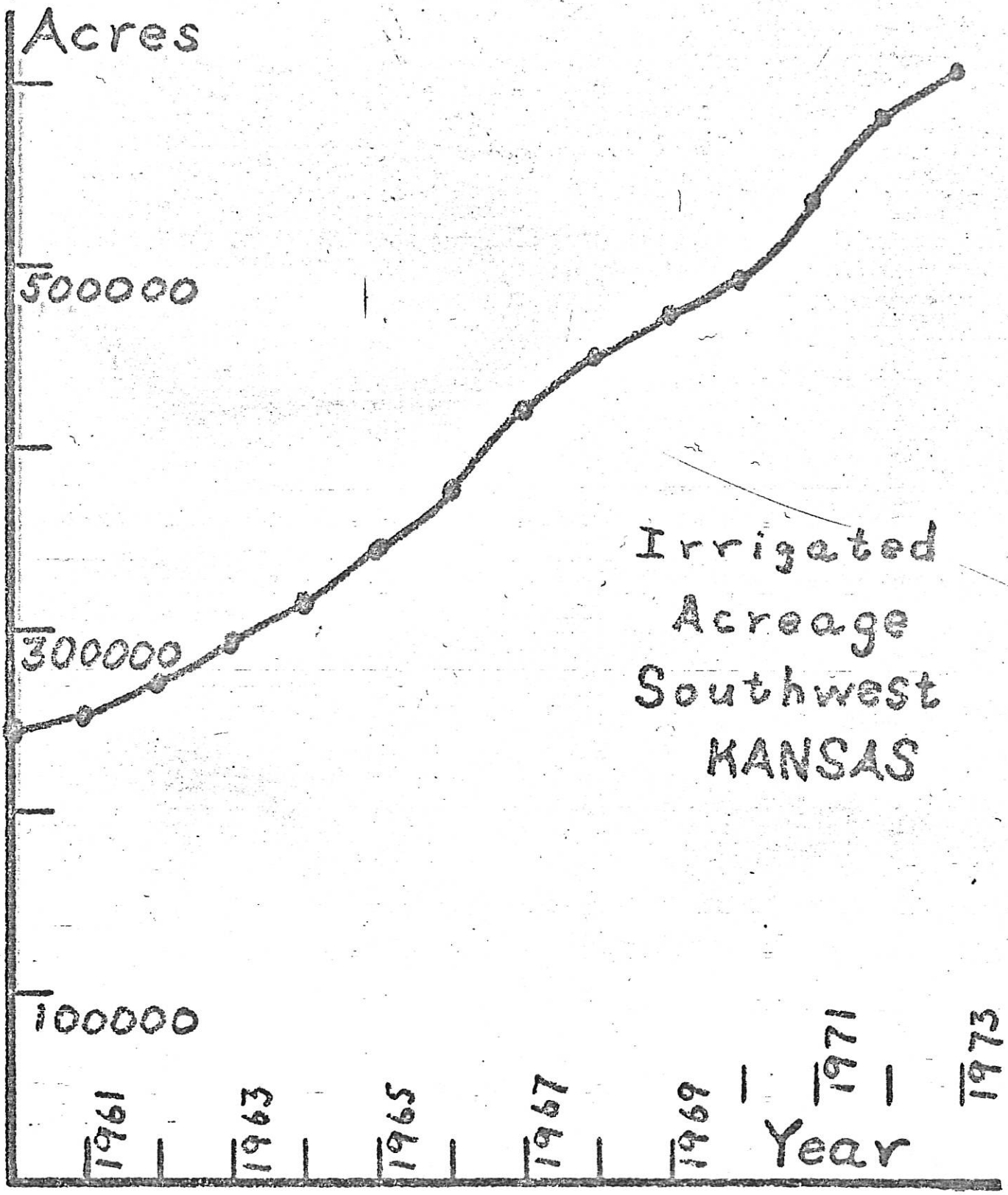


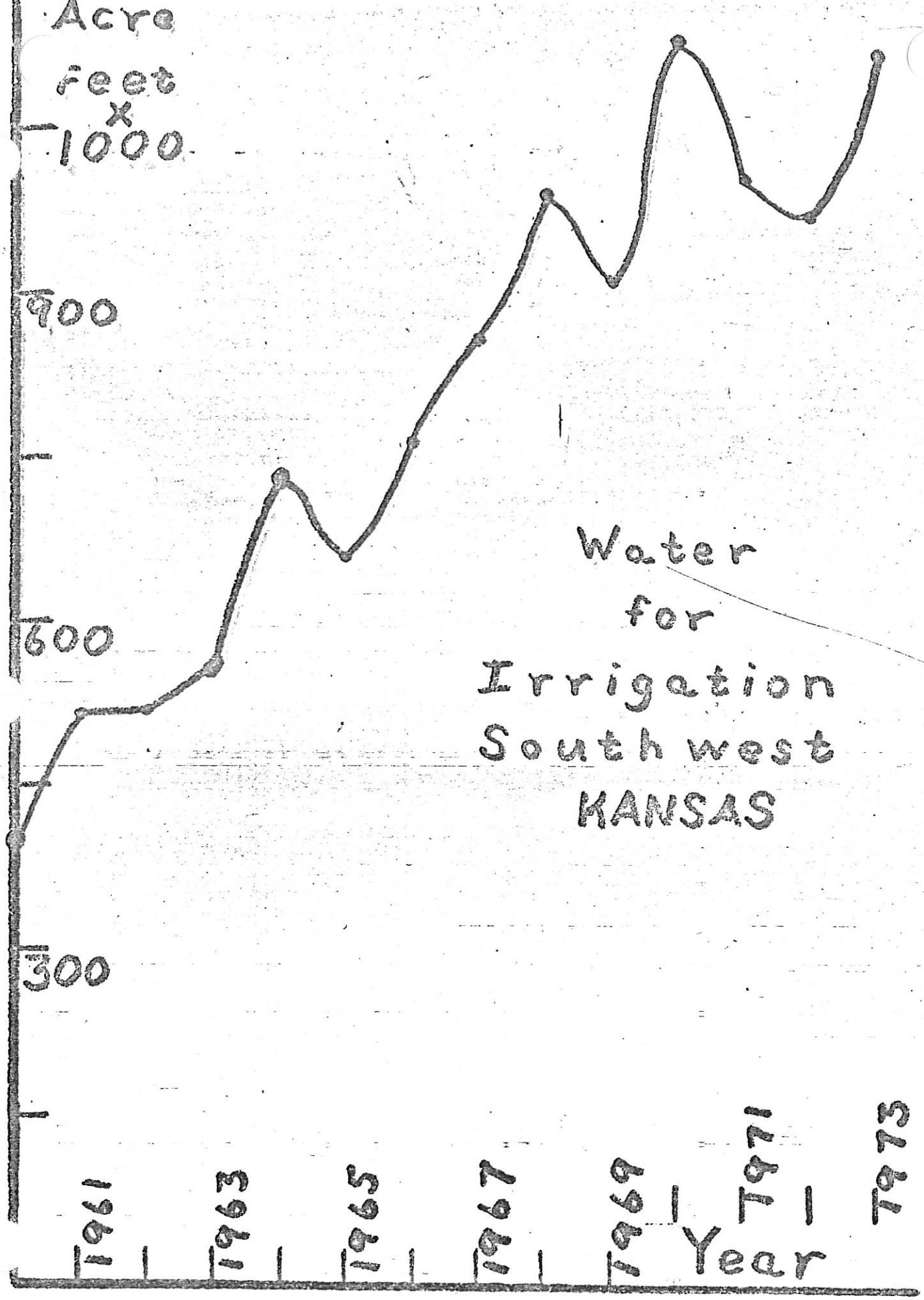
LANDS SUITABLE FOR IRRIGATION OVERLYING GROUND WATER AREAS CAPABLE OF PRODUCING YIELDS OF 100 GALLONS PER MINUTE OR MORE TO WELLS

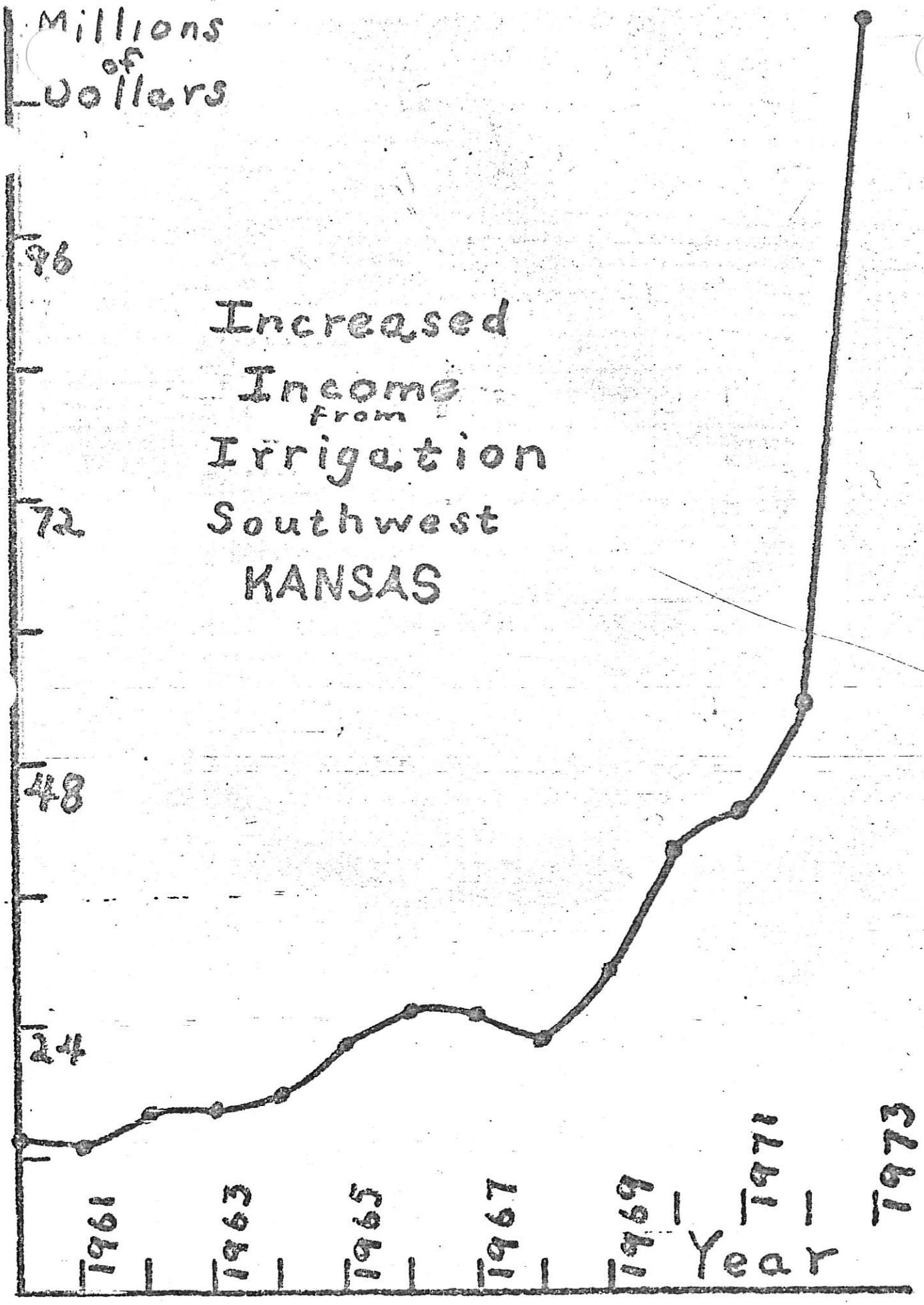
Dark area > 500 gpm

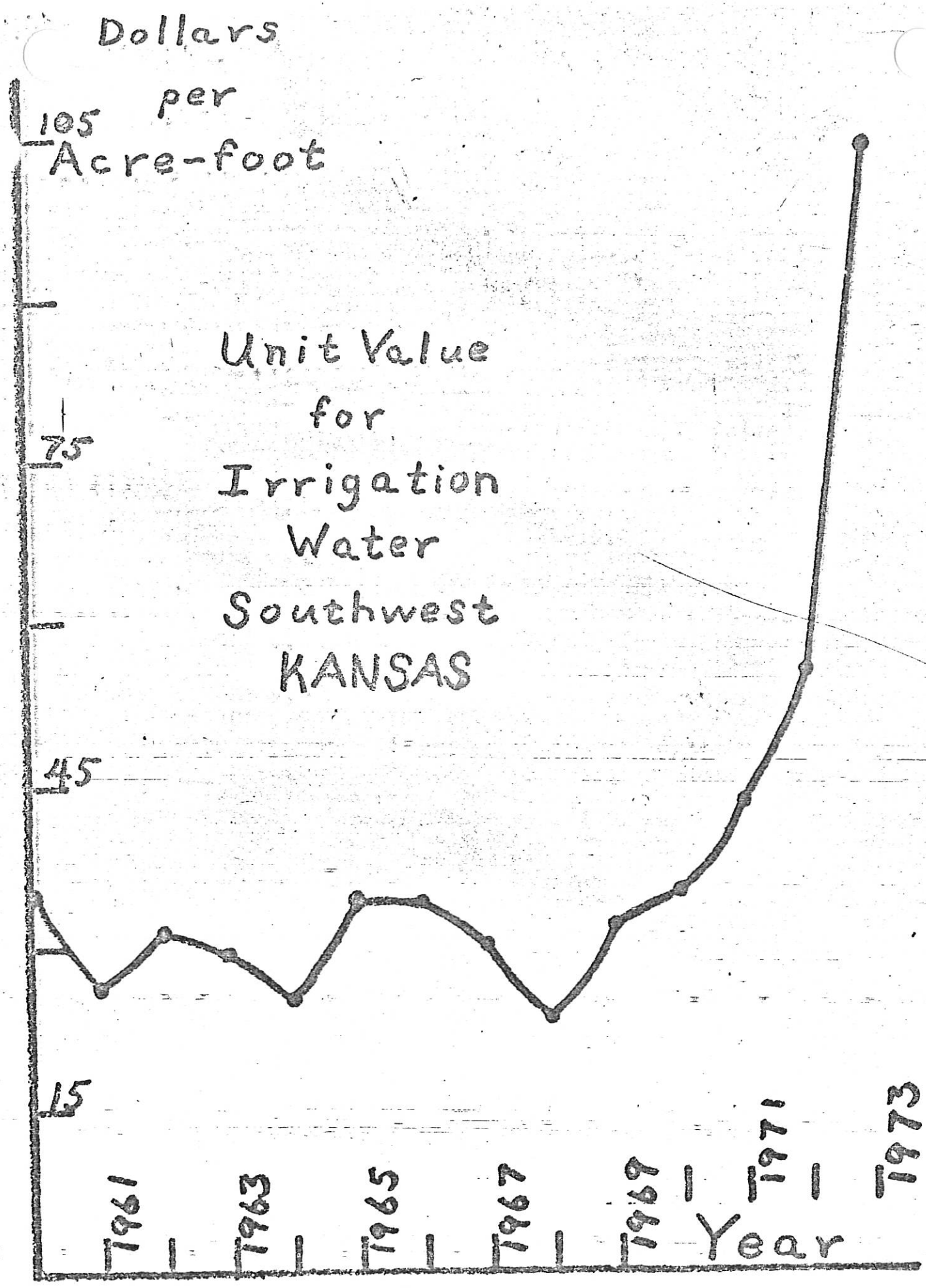
Light area > 100 gpm < 500 gpm


CHEVENNE
RAWLINS
DECATUR
NORTON
PHILLIPS
SMITH
JEWELL
REPUBLIC
WASHINGTON
MARSHALL
NEMAHA
BROWN
DONIPHAN
SHERMAN
THOMAS
SHERIDAN
GRAHAM
ROOKS
OSBORNE
MITCHELL
CLOUD
CLAY
RILEY
POTTAWATOMIE
JACKSON
JEFFERSON
LEAVENWORTH
WALLACE
LOGAN
GOVE
TREGO
ELLIS
RUSSELL
LINCOLN
OTTAWA
DICKINSON
GEARY
WABAUNSEE
SHAWNEE
DOUGLAS
JOHNSON
MIAMI
GREELEY
WICHITA
SCOTT
LANE
NESS
RUSH
BARTON
ELLSWORTH
SALINE
MORRIS
LYON
OSAGE
FRANKLIN
MIAMI
HAMILTON
KEARNY
FINNEY
HODGEMAN
PAWNEE
STAFFORD
RICE
McPHERSON
MARION
CHASE
COFFEY
ANDERSON
LINN
GRAY
FORD
EDWARDS
HARVEY
BUTLER
GREENWOOD
WOODSON
BOURBON
STANTON
GRANT
HASKELL
KIOWA
PRATT
KINGMAN
SEDGWICK
WILSON
NEOSHO
CRAWFORD
MORTON
STEVENS
SEWARD
MEADE
CLARK
COMANCHE
BARBER
HARPER
SUMNER
COWLEY
ELK
CHAUTAUQUA
MONTGOMERY
LABETTE
CHEROKEE


Acres
500000
300000
100000
Irrigated
Acreage
Southwest
KANSAS
1961
1963
1965
1967
1969
1971
1973
Year


Acre
feet
x
1000
900
600
300
Water
for
Irrigation
Southwest
KANSAS
1961
1963
1965
1967
1969
1971
1973
Year


Millions of Dollars
96
72
48
24
Increased Income from Irrigation Southwest KANSAS
1961
1963
1965
1967
1969
1971
1973
Year


Dollars per Acre-foot
105
75
45
15
Unit Value for Irrigation Water Southwest KANSAS
1961
1963
1965
1967
1969
1971
1973
Year

DKC

High Plains Underground Water Reservoir

Water depletion trends developed over the past 25-35 years clearly indicate the direction of future change in the major irrigated parts of the Kansas High Plains. Water levels are declining in all parts of the High Plains where waters have been developed to any great extent. The declines have been persistent in the older and more heavily developed areas of Grant, Stanton, Haskell, Finney, Wichita, Scott, and Sherman counties. The continuing decline in static water level is a cause of growing concern among landowners, farm operators, and associated business interests in this portion of the High Plains. The decline, which began shortly after irrigation was developed on a significant scale, differs from year to year depending on the amount of pumping in particular years. The decline also differs from place to place in individual years, depending likewise on the amount of water extracted locally. The total amount of decline since significant development took place ranges from less than 10 feet on the peripheries, where only a small amount of irrigation has been developed to more than 100 feet in some of the older developed areas where irrigation is concentrated.

Groundwater Level Measurement

This article is intended to provide timely information on water level changes in western Kansas. The results of water level measurements made each January are compiled and reports are published successively on the areas of northwest Kansas, west-central Kansas, and southwest Kansas. In this way, a report on water level changes in part of western Kansas will be published every year, and a report on a given area will be published every third year. Those published are: "Water Level Changes in Northwestern Kansas 1950-1973," October, 1973; "Water Level Changes in West-Central Kansas 1950-1974," October, 1974; "Water Level Changes in Southwestern Kansas 1940-1975," in preparation.

This work is done as a part of a cooperative program between the Kansas Geological Survey and the U.S. Geological Survey with data and support by the Division of Water Resources of the Kansas State Board of Agriculture. A companion series of reports that results from this same cooperative program, contains information on water level changes throughout the state and is published every five years. Copies of both series may be obtained from the Kansas Geologial Survey, 1930 Avenue A, Campus West, University of Kansas, Lawrence, Kansas, 66045.

The depth of water below land surface is measured each January in about 950 observation wells. Measurements are made in January when pumping is minimal and water levels have recovered from the effects of pumpage during the previous irrigation season. Pumping for municipal, industrial, and domestic uses is continuous, but the quantity is only a fraction of the total withdrawal. Thus, water level declines near cities or industrial centers may be somewhat misleading in part, by pumping during the measurement period. Pumping for

pre-irrigation of winter wheat, which is a very small part of the annual withdrawal, was virtually nonexistent in January of 1966 and recent years owing to above normal precipitation during the preceding years. Thus, most water level information on irrigation wells is reasonably accurate.

The information collected annually is valuable to irrigators and to those engaged in business related to irrigation; it is essential for wise planning and management of the resource.

Summary of Geohydrology

Most of the water used in Kansas is withdrawn by wells screened in the Ogallala Formation of Pliocene age, the upland aquifer of the High Plains. The Ogallala consists primarily of sand and gravel that contains lenses of clay and silt. Many zones are cemented locally. A relatively minor amount of water is withdrawn from wells in alluvial sand, gravel, silt, and clay of Pleistocene age that underlies the principal stream valleys.

Water enters the Ogallala by infiltration from precipitation on the area, by inflow of groundwater from Colorado, and by seepage losses from some of the streams that cross the area. Water is discharged from the Ogallala by some streams that are natural drains of the aquifer, by evapotranspiration where the aquifer is exposed along stream valleys and by wells. Recharge to and discharge from the alluvium occurs in much the same manner.

The seemingly uniformity of the High Plains is misleading. Area to area differs in such important physical characteristics as "climate," which affects crop adaption; "soils," which affects crop adaption, crop yields, production practices, and dry-land alternatives; "thickness of the zone of water saturated materials," which affects the total available water supply; "permeability of saturated materials," which affects well yields and "depth to water," which affects the investment and operation costs to pump water. Each physical condition exerts its particular influence on irrigated farm operations.

In this article, water depletion trends will be depicted by decline in water levels, change in thickness of saturated materials, and rate of water level decline in the last 10 years. The decline in water levels reflects the amount of water extracted from storage. The total quantity of water that can be physically extracted in a given situation is generally dependent on the thickness and permeability of underlying saturated materials. The change in thickness of saturated materials will be depicted as a percent change since significant irrigation took place. Finally, the annual rate of decline over the last 10 years provides an indication of possible future trends in the major irrigated parts of the Kansas High Plains.

Groundwater Situation

Groundwater is being mined in many parts of western Kansas. That is, more water is removed annually from storage than is replaced naturally through recharge. Data collected by the U.S. Geological Survey and the Kansas Geological Survey during previous studies show that the development of groundwater was relatively small prior to the 1950's in the northwest and west-central parts and small prior to the 1940's in the southwest. Therefore, these dates were selected as base from which changes can be noted. Each of the three areas will be discussed separately.

Northwest

A Kansas Geological Survey publication covering this area noted approximately 2,250 irrigation wells existed in 1973. Maximum declines of 42 feet have occurred near Goodland where the effects of municipal and industrial pumpage are superimposed on the effects of large irrigation withdrawals. In several areas where there is little or no pumping, the water table is higher than in 1950. The higher water levels were found in the northwest part of Thomas County and northeast Sheridan County.

Most of Sherman County had over 100 feet of saturated material underlying the county as shown in Figure 1. In the two areas in the county where the water level decline since 1950 has been over 25 feet (Figure 2), the saturated thickness originally was 160 feet. The 25-foot decline area covers about 50 square miles.

Figure 3 indicates that in an area extending south and west from Goodland, the change in saturated material has been over 10 percent since 1950. However, at several key observation wells in the area of greatest decline, the change has ranged from 19 to 27 percent.

Perhaps the significance of percent decline with respect to saturated thickness should be elaborated upon. It should be noted, for example, that a water level decline of 10 feet in an area where the original (1950) saturated thickness was 30 feet would represent a change of 33 percent. Wells in such an area probably would yield noticeably less water than they did in 1950. However, a decline of 10 feet in an area where the original saturated thickness was 200 feet represents a change of only five percent. This smaller percent change is much less significant because the effect on well yield would be small and probably of little concern to the irrigator. Even though water level declines greater than 25 feet have occurred in small areas in northwestern Kansas, the saturated thickness of the aquifer in those areas generally has changed less than 25 percent since 1950. Over much of this same area the average annual rate of water level decline in the last 10 years has been one to three feet, except in a small area near the Colorado state line where the rate has averaged three feet per year.

West-Central

Irrigation in the area began in a modest way as early as 1888. By 1950, an estimated 6,000 acres of land were irrigated in Wichita County. In 1973, this acreage had increased to 130,000 acres. It was reported by the Kansas Geological Survey in its publication for 1974 that 2,300 wells were in operation. As a result of this large development, the water level in a key observation well has declined as much as 57 feet in Wichita County west of Leoti. An area east of Leoti and another in southern Scott County indicate water level declines of greater than 50 feet (Figure 2). Back in 1950, these areas had anywhere from 90 to 130 feet of saturated material and the depth to water was 48 to 85 feet. The mining of water has increased the depth to water now to 100 feet in Scott County and 130 to 145 feet in Wichita County.

Data are particularly significant in parts of the area where saturated material is small because changes in saturated material are directly related to changes in well yield. Four areas in Wichita and Scott counties show more than 50 percent of the saturated material has been depleted since 1950 (Figure 3). Decreased well yields have been observed where the saturated thickness has declined as much as 50 percent. A key observation well in Wichita County has experienced a change of 63 percent since 1950.

Four isolated areas have experienced an average annual rate of water level decline in excess of three feet per year. For example, one key observation well had 111 feet of saturated material in 1950. Information collected in January 1975 indicated the saturated material had been reduced to 57 feet or a lowering of 54 feet. A pump would have had to lift water 90 feet from the static water level in 1950, but now that lift has increased by 54 feet or 144 feet. In 10 years, or 1985, if the same rate of water level decline (3.0 feet per year) were to persist, the saturated material would be reduced to 27 feet or a percent change of 76 percent since 1950. The lift would then be 174 feet.

In portions of Wallace, Wichita, Logan, and Scott counties on the peripheries of the thicker saturated material have experienced significant water level declines since 1950 and the situation can be classified as approaching critical. However, the decline in the static water level usually is accomplished by changes in farm practices such as would occur when full farm water supply cannot be maintained or when operation costs become prohibitive. The dewatering of the aquifer results in such changes as lowering pumps, installing additional wells, altering crop production practices, and perhaps the final step, reverting back to dryland farming.

Southwest Kansas

Recent figures indicate there are about 7,000 irrigation wells in the 11 southwest Kansas counties. The High Plains aquifer system in this area has experienced some of the highest declines in the state; however, it should be noted that much of this area also has the greatest saturated thickness found in Kansas. For example, in an area bounded by southern Kearny, southwest Finney, western Haskell, western Seward, eastern Morton, and eastern Stanton counties and includes most of Grant and Stevens counties, the saturated thickness is not less than 350 feet. Nearly 700 feet of saturated material has been logged in southeast Stevens County.

Figure 2 illustrates some of the extremes in water level declines being experienced in southwest Kansas. This figure depicts that eastern Stanton, extreme southwest Kearny, nearly all of Grant, a small part of west-central Haskell, a small portion of northeast Morton, and a small area in northwest Stevens County all have had from 50 to 100 feet of water level decline. A small area in western Grant and northwest Stanton counties had greater than 100 feet of decline since 1940.

Since 1940, the greatest percent of ground-water depletion has occurred in northeast Stanton, extreme southeast Kearny, and northwest Grant counties, as well as a small area in northern Morton County. Thirty to 50 percent of the aquifer has been used up in these areas. An elongated area in northwest Finney extending into northeast Kearny County also has 30 to 50 percent of the aquifer depleted. Most of Stanton, Grant, west-central Haskell, and all of Morton County (except the southeast corner) have 10 to 30 percent of the aquifer depleted.

Caution should be exercised when evaluating information from select areas on Figure 2 that do not show decline inasmuch as only limited water resources may be available and irrigation has not developed. However, lack of water is not the case south of the Cimarron River in Morton, Stevens, and Seward counties. In these areas, decline has not been prominent and some areas actually show a rise since 1940. Lack of irrigation development is the major cause of the zero water level decline; however, a recharge from the Cimarron River is also a consideration.

Recent water level information on observation wells in southwest Kansas, released by the Kansas Geological Survey, indicated over a wide area, an average decline from 1966 to 1975 of three feet or more. At the rate of 30 to 50 feet of decline over large areas every 10 years, one cannot accept anything less than a short-lived aquifer. To compound the problem, the rate of decline may increase, predicated on more irrigation wells, thus more pumpage and only a slight aquifer recharge.

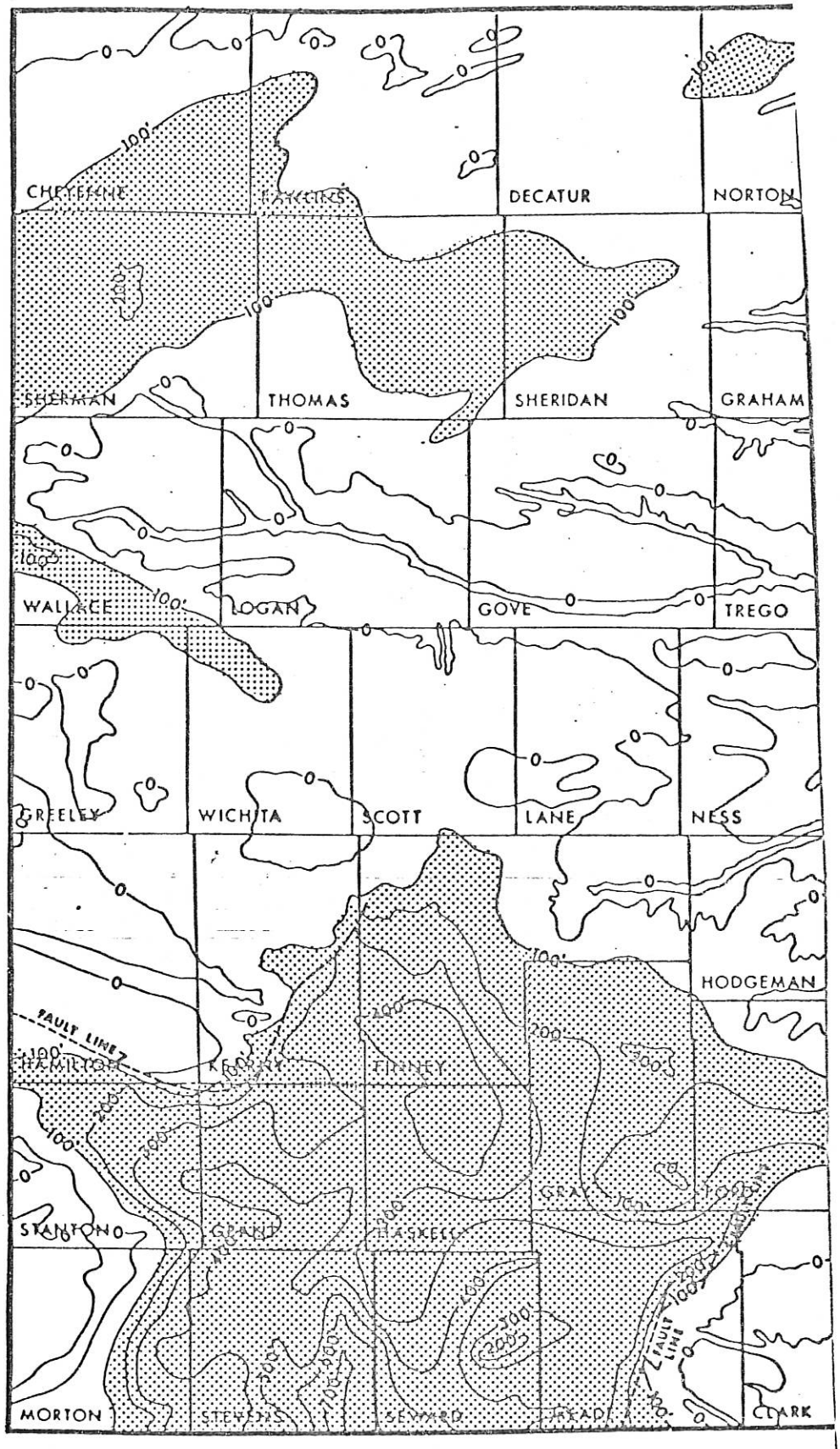


Figure 1. Saturated Thickness of the Unconsolidated Deposits, in Feet

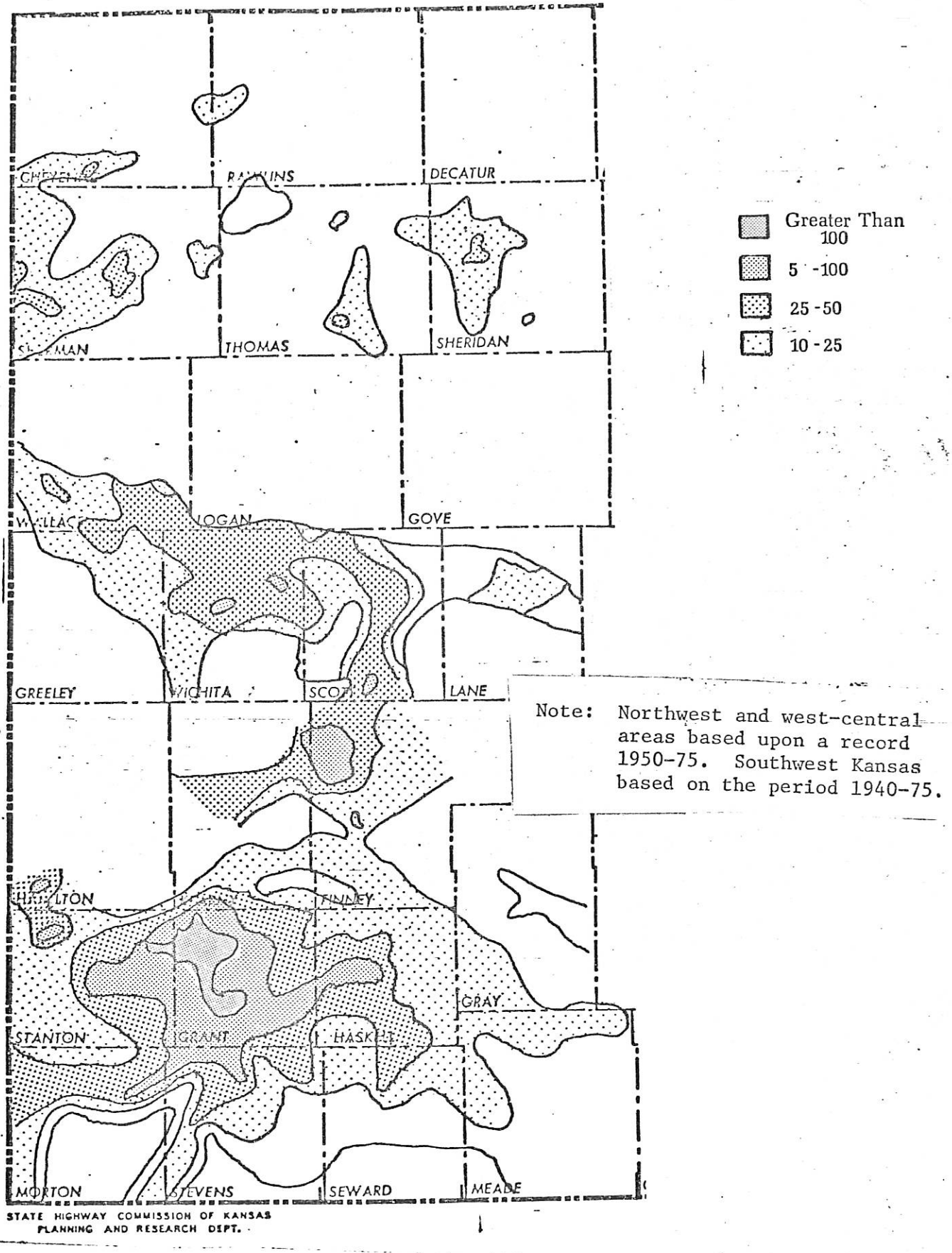


Figure 2. Water Level Decline in Feet for Western Kansas.

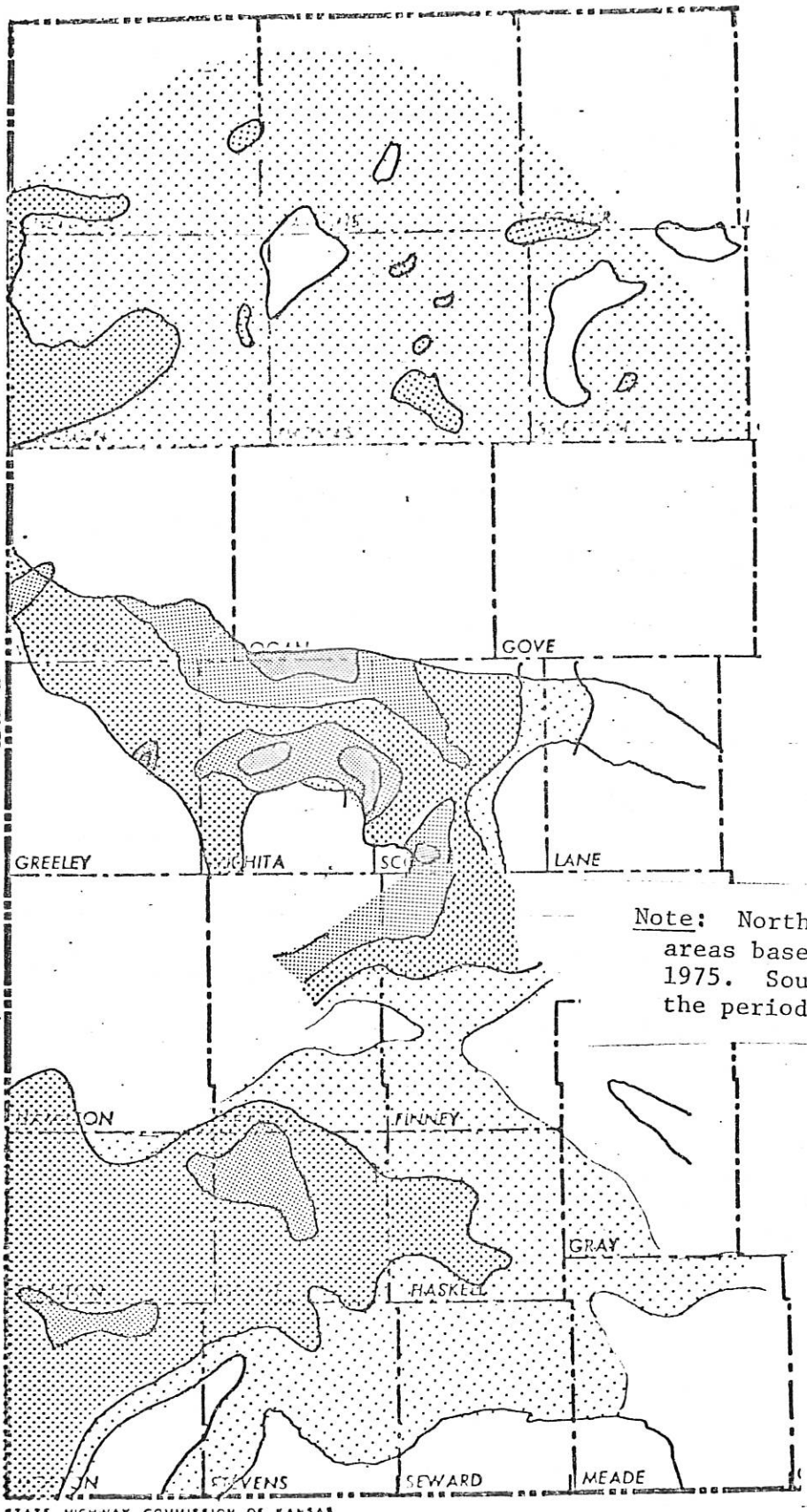


Figure 3. Percent change in water level based upon depth of water at beginning of base period.

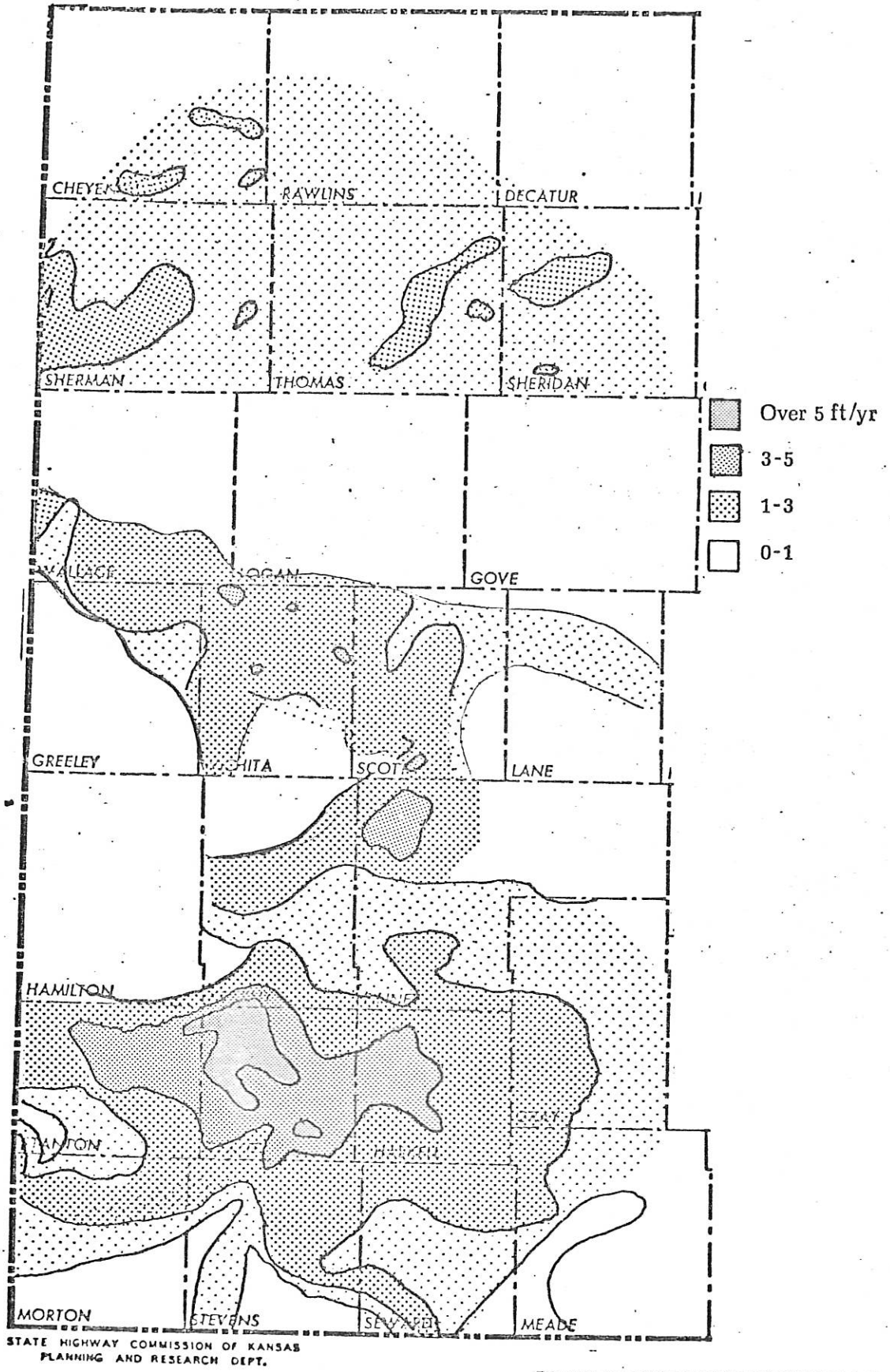


Figure 4. Annual rate of water level decline in feet per year for the period 1966-1975.

Attachment IV
D

THE STATE OF KANSAS

BULLETIN NUMBER 9

ECONOMIC IMPLICATION OF IRRIGATION
A PILOT STUDY

by

David D. Darling
Resource Economist
Kansas Water Resources Board

December 1968

Published by the
State of Kansas

THE STATE OF KANSAS

WATER RESOURCES BOARD
1134-S STATE OFFICE BUILDING
Phone 296-3185
TOPEKA, KANSAS 66612

To: The Governor of Kansas and Members of the Legislature

Gentlemen:

The fertile plains of Kansas have made agriculture the basic source of livelihood for many generations of Kansans. The capricious conditions imposed by nature have made the obtaining of a good living from the soil a continuous battle.

In the case of the six southwestern counties covered by this study, irrigation has provided a way of reducing the risks assumed by the farming community and has, at the same time, greatly enhanced its productivity. Not only does the region benefit through irrigation, but the state, by way of established taxing systems, also gains from the impact of this type of increased productivity.

However, a problem exists when the source of water for irrigation is limited. Local and regional income and state revenues tied to an exhausting water supply will decline materially unless proper recognition of the situation is made and appropriate action taken.

This report provides a picture from which the citizens of the state can visualize the effects of an exhausted water supply in the six-county area and suggests several alternative courses of action for discussion and consideration which we hope will lead to very important policy decisions relative to irrigated agriculture in western Kansas.

Sincerely,

Keith S. Krause

Keith S. Krause
Executive Director

ABSTRACT

The practice of irrigation has grown in the last decade and a half and can be expected to increase in Kansas because of its obvious economic benefits to the individual. The effects of overdraft on ground-water supplies are already being felt in some local areas of southwestern Kansas. A six-county area in southwestern Kansas where irrigation from ground water has developed rapidly was studied. The report examines the tax revenue derived from the existing tax structure which can be attributed directly to this irrigation. This study shows, for three varying rates of irrigation development, the rates of collection and revenue which would be necessary to maintain into perpetuity the present level of income from irrigation after the ground-water source is exhausted. The report does not attempt to suggest state policy, but raises a question to stimulate constructive thought.

ECONOMIC IMPLICATIONS OF IRRIGATION FROM GROUND WATER
(Southwest Kansas)

Irrigation has increased markedly in Kansas over the past 20 years with much of the water obtained from ground-water resources. Indications are that irrigation will continue to expand in the state. One of the primary irrigation areas is southwest Kansas, an area in which there is very little recharge from natural sources. Because of the continuing reduction in water supplies which can be expected to be created by water use in an area of limited recharge, the water resources of the southwestern Kansas area have been studied more intensely than probably any comparable area in the state.

The development of irrigation and the resulting prosperity of Grant, Haskell, Morton, Seward, Stanton, and Stevens counties in southwest Kansas have been affected by the existence of several important natural resources including excellent soil, generous ground-water supplies, and natural gas for fuel. The low cost of natural gas has stimulated the pumping of irrigation water from underground sources. "Irrigation in Kansas," a recent report prepared by the Water Resources Board, shows that out of the over 2.4 million acres of land in farms in this six-county area, 2.3 million are suitable for irrigation, and they are underlain by a ground-water reservoir with an estimated 74.25 million acre-feet of available water. This water supply of over 500 gallons per minute can be generally expected from properly located and constructed wells.

In Grant and Stanton counties, only four wells were used for irrigation in 1939, but by 1965 this number had increased to 740. In some areas, the removal of water as the result of irrigation development has raised the question as to the effect of possible future exhaustion of the water supply on the economy of the area. This study deals only with the economic implication of depletion of ground-water reservoirs by continued use of water for irrigation. While it is recognized that there is some ground-water recharge taking place in this area, this quantity is relatively small and for the purposes of this report the recharge rate is assumed to be zero.

The depletion of ground water raises several questions:

1. At what point in time will exhaustion probably occur?

2. What will happen to the economy of the area with the loss of irrigation income?

3. What will happen to the economy of the state as the result of local income loss?

4. Should the state have any direct interest in the problem?

5. Can anything be done to alleviate the economic problems created?

In this study, three levels of irrigation are examined as to economic significance. In the first condition, it is assumed that no additional irrigation land will be developed, the second assumed that growth will continue at the same rate as has been experienced in the last several years and finally the present growth is assumed to continue for 14 more years and then is held constant. Each case is examined as to the probable time to exhaustion of the water supply, the farm income derived from irrigation and the amount of investment required to yield an annual income equal to that produced by irrigation at the time of exhaustion in order to maintain the economy of the area.

Level I--No Future Irrigation Expansion

Irrigation grain sorghum in southwest Kansas will be expected to produce about 60 bushels per acre more than would be produced under dry-land farming. It is found that by taking the yield differential between crops grown on irrigated and nonirrigated land, that each acre-foot of water used increased income by about $33 in 1966. Since the use of water for irrigation leads to increased income, it is anticipated that irrigation will continue as long as water is economically available or until the water in storage is exhausted.

In 1966, irrigation was practiced on 379,000 acres in the six-county study area using 768,000 acre-feet of water which was withdrawn from the ground-water reservoir. If no additional land was irrigated and the same amount of water was used in each subsequent year, the expected life of the ground-water supply in storage would be about 98 years. (Figure 1)

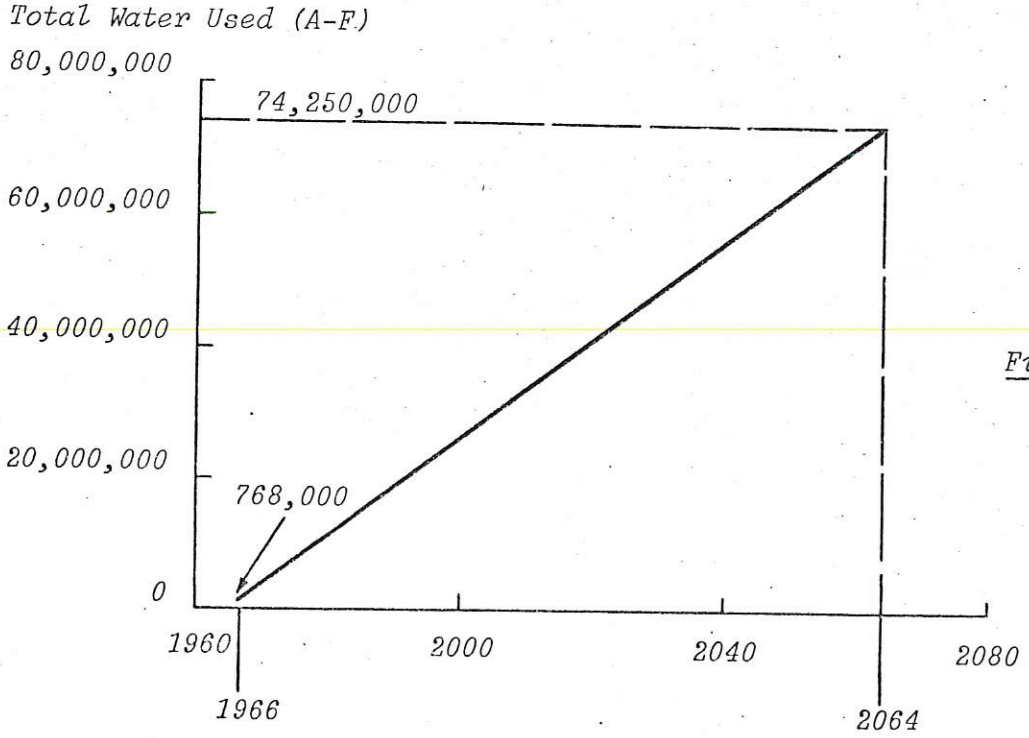


Figure 1

Since each acre-foot of water used develops about $33 of income, the total amount of farm income attributable to irrigation in any one year for the 768,000 acre-feet would be about $26,000,000. This figure represents money or farm income above that amount which would be expected with dry-land farming only.

Additional farm income due to the irrigation of crops results in additional tax receipts to the state. An estimate indicates that an additional dollar to gross farm income by irrigation induces a five dollar increase of income within the state. From tax records, it has been determined that each additional dollar of income results in six cents in income and sales tax receipts to the state. In other words, the state receives at least $10 for every acre-foot of water used. If irrigation were to be stopped this year, farm income in the six-county area would drop $26 million and tax revenue to the state by about $8 million.

Within this economic concept, ground water can be viewed as an asset which through use adds appreciably to the income of the area and the state. Consequently, the question must be asked, "How should the state view the value of this exhausting asset?" If this resource was owned by a private firm, it would set aside a certain portion of its revenue each year such that the total savings (including interest) would either buy a new resource or allow movement by the firm into a new area of business and thus maintain its income level. The state, through similar reasoning, might consider some method of setting aside a portion of the present tax revenue as a depreciation charge at interest which might be utilized for research, development or importation of water, or otherwise replacing the economy presently supported by the exhausting resource. This statement raises the question of selecting criteria for depreciation.

The idea of depreciation implies replacement of the asset (i.e. replacement of the ground water). This approach would maintain the present $26,000,000 level of income due to irrigation by permitting irrigation to continue. Instead of replacement of ground water, an alternative method would accept exhaustion of the aquifer and accumulate a sum of money sufficient to yield interest of $26,000,000 annually. The sum required at 5 percent would be $520,000,000. To obtain this capital, some portion of state revenues from the area might be set aside, based on acre-foot usage, over the life of the ground-water supply. The amount required would be approximately 30 cents per acre-foot.

The investment of $231,000 in each year (30 cents x 768,000 acre-feet) from 1966 to 2064 (the estimated life of the aquifer) at 5 percent would yield (annual capital plus accumulated interest) $520,000,000. (Figure 2) The interest from the investment of this sum accumulated over 98 years would be sufficient to yield $26,000,000 annually. Therefore, if irrigation expansion is restricted at the current level, to maintain the gross income attributed to irrigation in the year of exhaustion, 30 cents per acre-foot would be invested to "replace" the asset.

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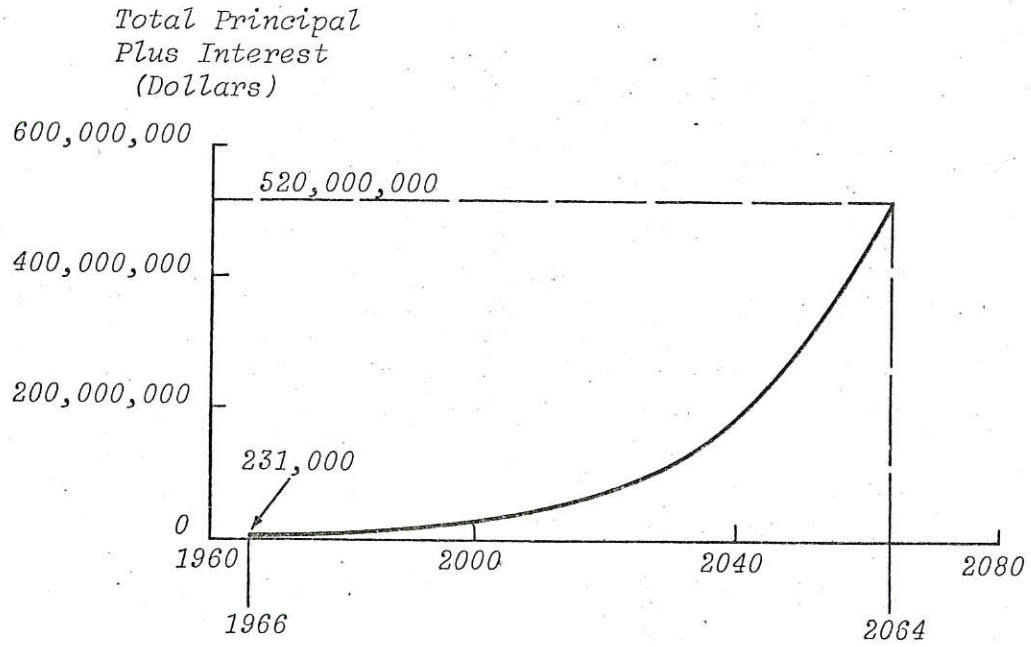

Figure 2

Level II--Future Irrigation Expansion at Historic Rate

In view of the large blocks of farmland underlain by the ground-water reservoir and the increasingly large number of irrigators, it would be unreasonable to hold irrigation at its current level. Kansas' law recognizes that the first in time is the first in right. In actuality, the day-to-day procedure is first come first served until water becomes critical. No one can reserve a portion of the ground water in storage for his own use at a future date. Thus, the costs of depreciation are inclined to go unnoticed by the farm. Consequently, the matter of depreciation charges becomes the state's problem by default. The apparent abundance of resources has encouraged rapid development. Increased development leads to increasingly larger amounts of water being used. The net result is to shorten both the period of time to exhaustion of the water supply and the amount of time for the accumulation of the income fund. (Figure 3) This section examines the case of irrigation continuing to expand at recent historic rates.

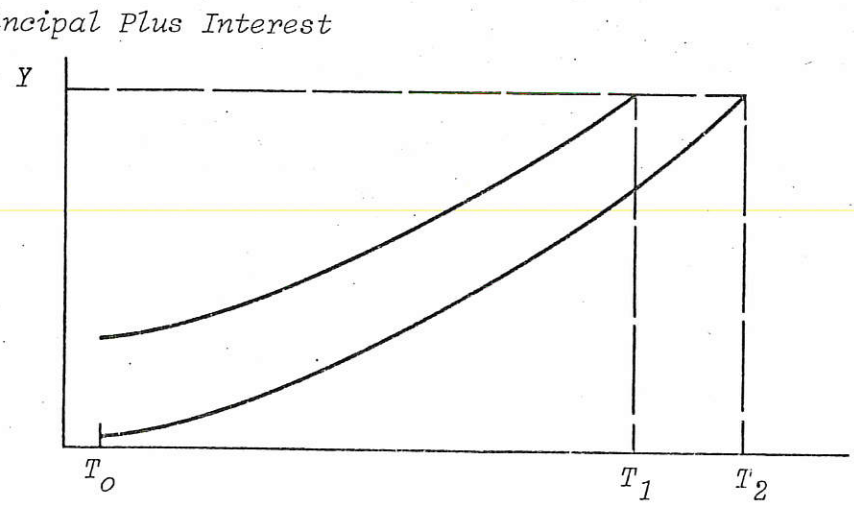

Figure 3

This figure illustrates the greater than proportional increased rate of collection necessary to reach a specified goal in relation to a shortened period of time.

Looking at the historic development of irrigation in the six-county region, it is noted that an average of 20,707 acres of land has been brought under irrigation each year. At the present rate of growth, all land suitable for irrigation would be irrigated by 2066. (Figure 4) However, the water supply would not last that long in the face of continually expanding use.

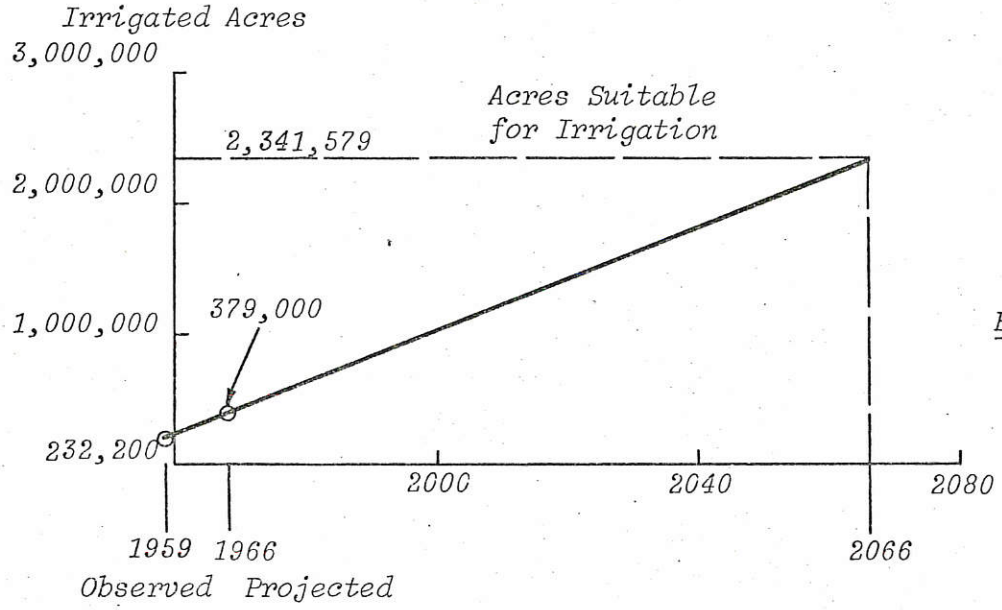

Figure 4

From reported use figures, the amount of water needed per acre of land averages about two acre-feet per acre irrigated. Therefore, water use in a year is equal to the amount of irrigated land in the same year multiplied by two. Hence, if 379,000 acres are to be irrigated, it will require on an average 758,000 acre-feet of water per year. Also, since an additional 20,707 acres of land would be added to the irrigated total each year, there must be an additional 41,414 acre-feet of water applied each year plus enough water to irrigate all the land already under irrigation. (Figure 5)

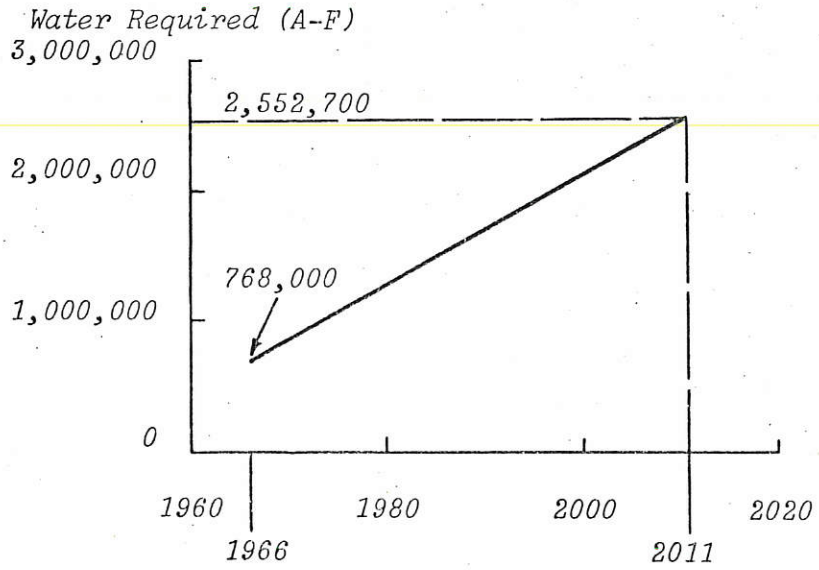

Figure 5

If the present rate of growth in irrigated acreage continues, the total ground-water supply of 74,250,000 acre-feet would be exhausted after approximately 45 years of use. (Figure 6)

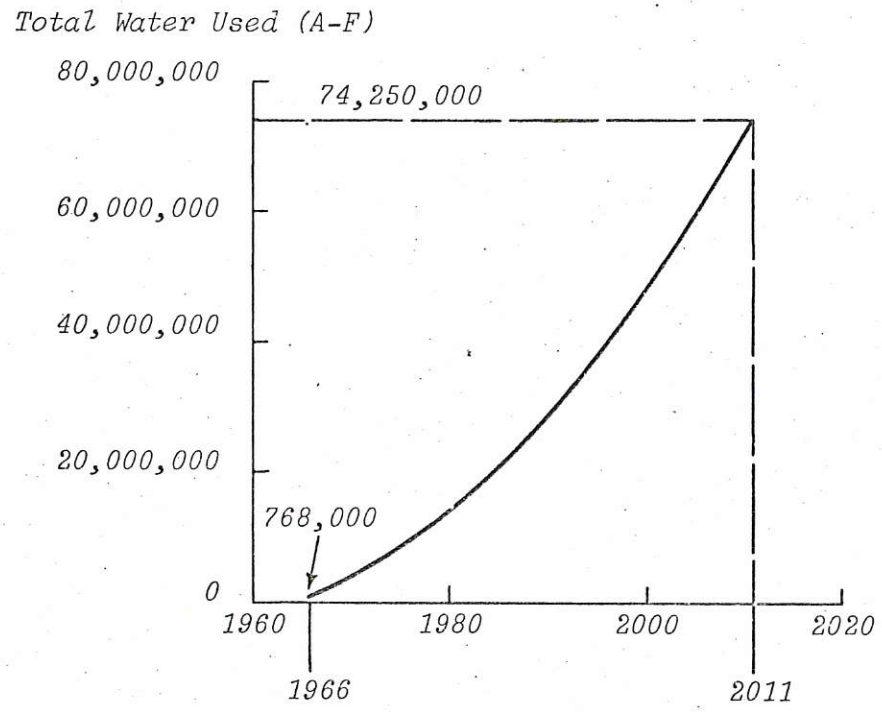

Figure 6

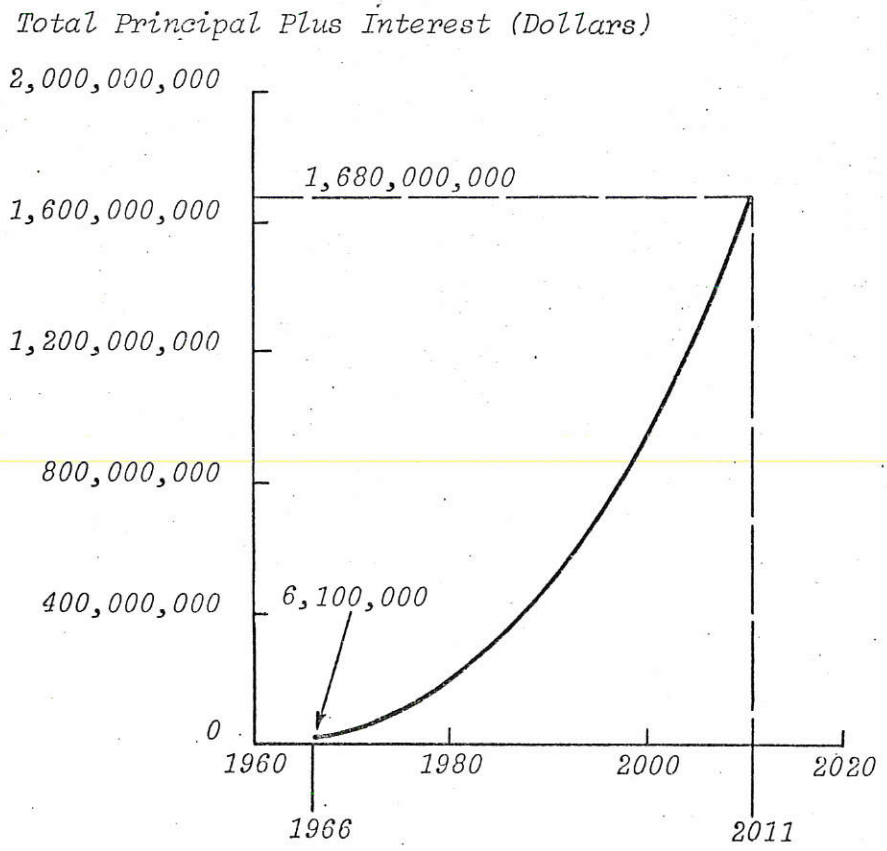

Figure 7

Under this unrestricted pattern of development, irrigation would come to an end before all the land suitable for irrigation could be irrigated.

Using the 1966 figure of $33 of additional income per acre-foot of water used, projected annual income in the year of exhaustion due to the use of ground water for irrigation under this type of development would be $84,240,000. Under conditions similar to the first approach, the principal sum required to be invested at 5 percent, to give $84,240,000 would be $1.68 billion. The rate of collection per acre-foot of water used needed to obtain that principal is about $7.95 per acre-foot. (Figure 7)

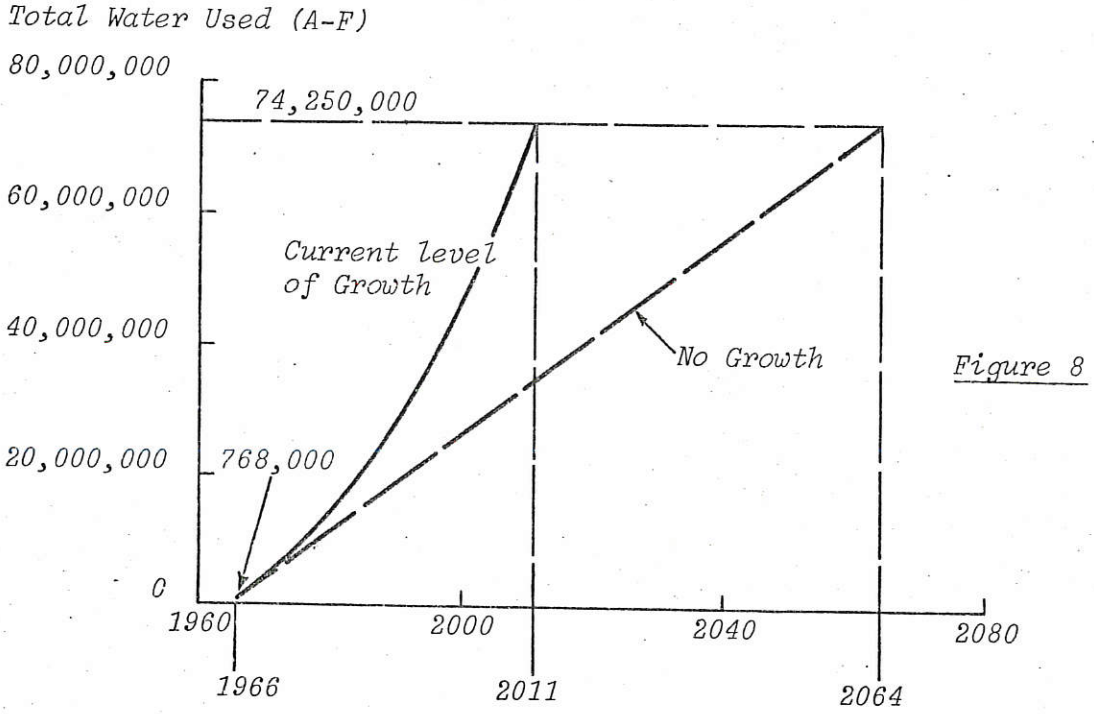

Figure 8

In the two cases examined, the first being where irrigation use was held at the present level and the second where irrigation was allowed to expand at the present rate of growth of irrigated acreage, the most obvious result was the tremendous jump in the required rate of collection from $.30/A.F. to $7.95/A.F. The reason for the increase is twofold: First, more money needs to be collected in the latter case since the level of income at exhaustion is much greater; and second, less time is allowed for that collection.

The relationship of the annual rate of water use to the total available quantity in storage is shown in Figure 8. The relative per acre-foot assessment for the two assumed conditions is shown in Figure 9.

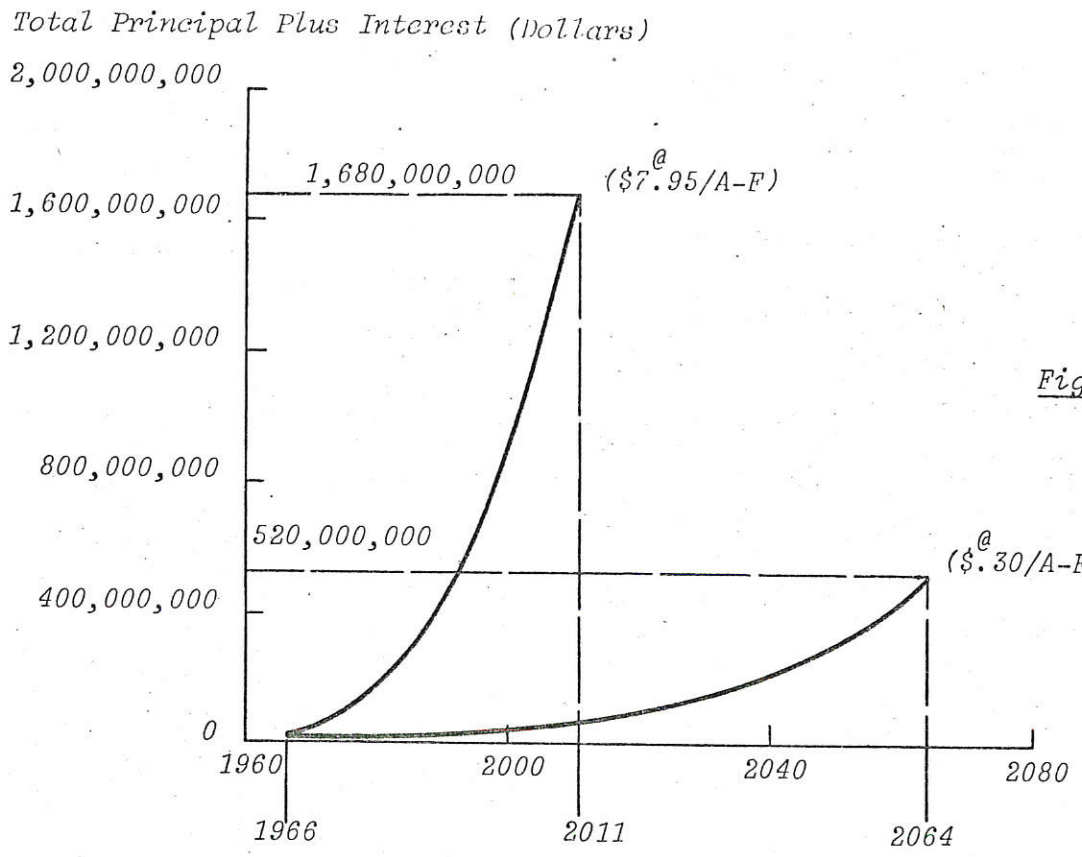

Figure 9

Level III--Future Irrigation Growth Modified

The two previous examples were used to illustrate two assumed conditions of growth. They are not limiting in that growth rates can be higher or lower than those assumed. If irrigation expands more rapidly than historic trends would indicate, the time required to exhaust the ground water would be shortened and the rate of collection would need to be higher. Because of the interest in greater gross farm income and lack of legal or other constraints, it can be expected that more land will be farmed, and consequently, it is most unlikely that irrigated acreage will be limited to the 1966 level.

Consequently, a third case is examined which is perhaps more likely to occur, yet confines itself within the above conditions. In this case, it is assumed that the present growth would continue through the next 14 years (1980) and the hold constant after that time. What then would be the expected life of the ground water? Computations reveal that the time to exhaustion would be about 60 years (Figure 10) and that the level of income in the final year would be $43,240,000. The amount of principal plus accumulated interest required to support this level of income to the area, at 5 percent, would be $865,000,000. (Figure 11) The rate of collection required would be about $2.20 per acre-foot of water. (Present tax revenues are estimated to be greater than this amount.)

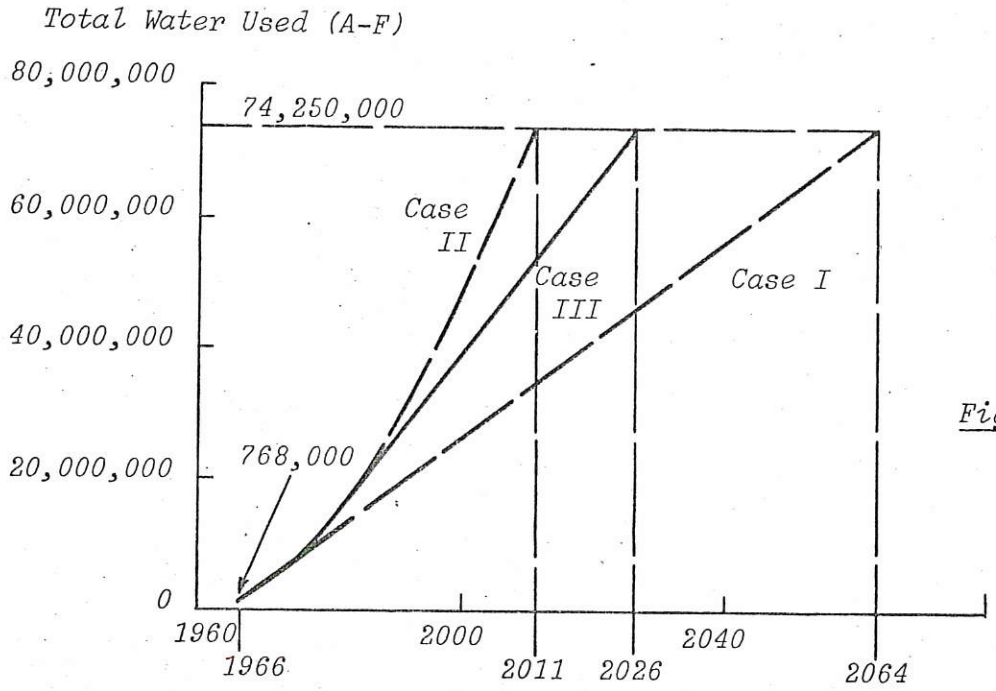

Figure 10

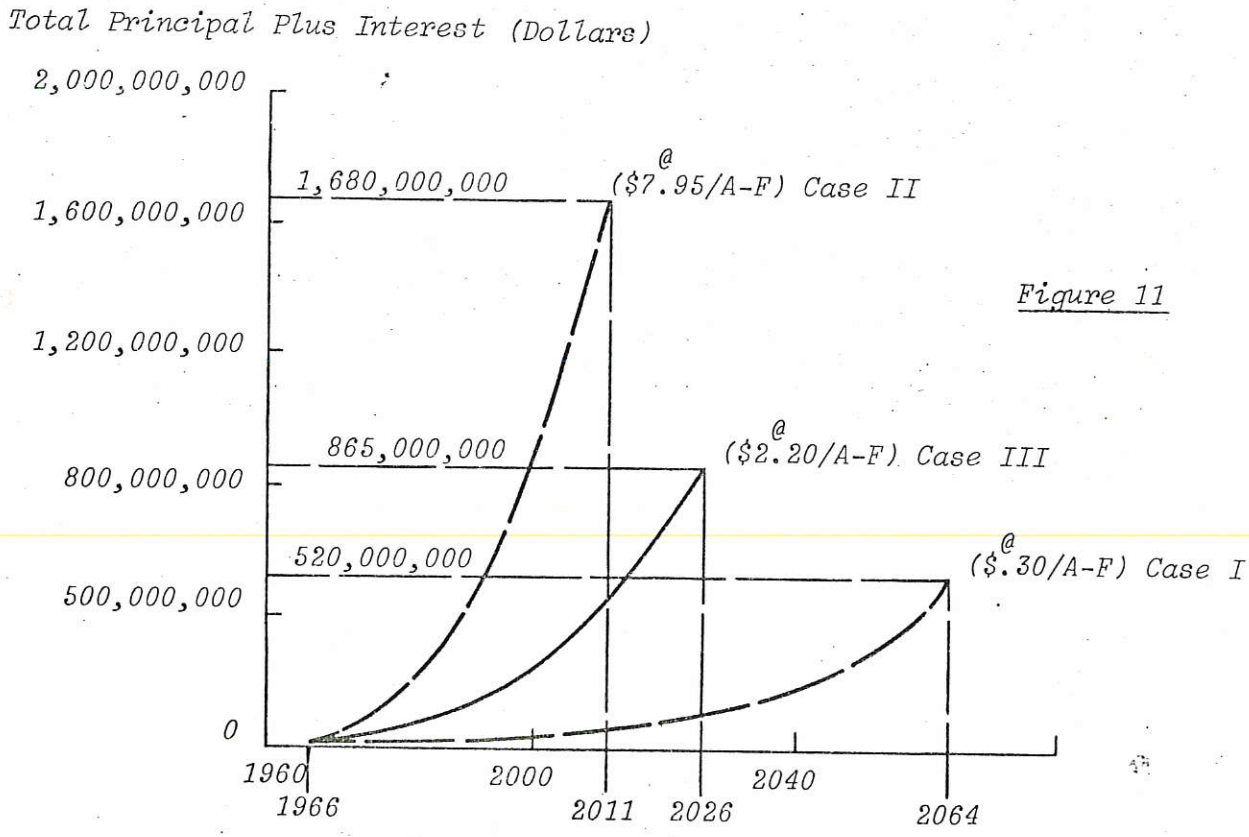

Figure 11

Summary

The area of Kansas under consideration in this study derives part of its gross income by using a resource which can be expected to be exhausted for all practical purposes at sometime in the future. The state also benefits, by income and sales tax revenue, as this resource is used. Consequently when the water is gone, both the region and the state lose a source of income. Since there is little inclination or reason under the present law for the individual in the region to depreciate the resources, it is suggested that the state give some consideration to methods of maintaining the regional economy. For the purpose of providing a method of comparison, the maintenance of that part of income attributable to irrigation was used as a criteria. The three cases previously described provide information as to the rate of collection of charges which would yield a principal such that, at a particular interest rate, the income from premiums would be equal to the income attributable to irrigation in the year of exhaustion.

At this point, it appears that the state should become involved in the region, but the degree of involvement will be the result of a policy decision. In selecting this option, the state will be faced immediately by a legal question. A choice must be made as to whether or not to restrain the growth of irrigated farming.

It should be emphasized that this report does not suggest the state levy a new tax to meet the charges put forward by this analysis. It is the intent of the report to point out that the state is already deriving part of its revenues from the activity of irrigation; and if the state wants to maintain the viability of the economy of Kansas, it would be rational to plan now for that period of time in the future when irrigation will fail.

Other alternatives to that of an investment fund need to be considered. Perhaps a more logical approach would be for the state to consider investing revenue derived from the resource in research, development, education, importing water, weather modification, or any other appropriate activity which can be justified as providing an acceptable rate of return. If, for example, research was chosen and new farming techniques discovered which would yield income equal to that income derived from irrigation, then this would be a solution. In addition, if the results of the research were accomplished with less money than the quantity allocated to the project by the analysis above, then the rate of return (interest rate) would be higher than the one specified.

It is beyond the scope of this study to evaluate these alternative plans. Any such undertaking might well involve appreciable costs. The study undertaken in this paper provides insight to reflect private and public revenue now being derived from using ground water and suggests a framework of depreciation charges. The premise used in the paper was to generate sufficient monies from state tax revenues derived from the area to maintain the irrigation economy. Is it not reasonable to consider depreciation charges as a means of "replacing" the asset?

The actual value of this ground water is dependent upon the values assigned to the conditions which surround its use as demonstrated in the text of the analysis. That is, the available factual information indicates depletion of ground water in approximately 45 years. The conclusion is, the economic impact of exhaustion of the aquifer in the six-county region is similar to the loss of a $1.68 billion asset under present growth rates and technology.

From this analysis, it is obvious that the economic impact of irrigation on both the region and the state is so large that serious consideration should be given promptly to means of minimizing the loss of this source of income due to its depletion.

le I

HISTORIC DATA FOR GRANT, HASKELL, MORTON, SEWARD, STANTON, AND STEVENS COUNTIES

Year	1959	1960	1961	1962	1963	1964	1965	1966
Total Estimated Income[1] Attributable to Irrigation 1966 Dollars (x1000)	11,600	14,050	13,544	16,304	16,801	18,375	22,214	25,816
Total Estimated Water[2] Use Acre-Feet (X1000)	449.2	402.5	514.7	519.5	566.4	733	661	768.2
Estimated Income in[3] 1966 Dollars per Acre-Foot	25.81	34.91	26.31	31.38	29.66	25.07	33.60	33.61
Total Estimated[4] Irrigated Acres (X1000)	232.2	245.5	254.9	272.2	295.7	316.5	346.2	379

1. Product, by counties, of total irrigated acres and income differential. Result is then summed by year over the counties.

2. Produce, by counties, of total irrigated acres and reported water use figures. Result is summed by year over the counties.

3. Item one divided by item two.

4. Kansas Water Resources Board estimates.

Table II

ESTIMATED RESULTS FOR GRANT, HASKELL, MORTON, SEWARD, STANTON, AND STEVENS COUNTIES, DERIVED FROM THE ANALYSIS IN THE TEXT

If Growth of Irrigation at Present Rates Stops in Year	Then Estimated Water Use in that Year is 1/ (A-F X1000)	Then Estimated Income Attributed to Irrigation in that Year is 2/ (Million Dollars)	Then Principal Required at 5% to Perpetuate Income of that Year is (Million Dollars)	Then Rate of Collection to Yield the Principal over Expected Life of Water is (Per A-F)	Then Estimated Life of Water From 1966 is 1/ (Years)	Then Estimated Year of Exhaustion is
1966	768.2	$25.8	$520	$ .30	98	2064
1970	896.2	29.57	590	.62	83	2049
1975	1103.2	36.41	730	1.30	69	2035
1980	1310.3	43.24	865	2.20	60	2026
1985	1517.4	50.07	1001	3.24	54	2020
1990	1724.4	56.90	1138	4.34	50	2016
1995	1931.5	63.74	1275	5.26	48	2014
2000	2138.6	70.57	1412	6.39	46	2012
2005	2345.6	77.40	1542	7.35	45	2011
2010	2552.7	84.24	1680	7.95	45	2011

1/ Estimate determined using present growth rate.

2/ Figures utilize the calculated estimate of $33 income per acre-foot of water.

SOURCE OF DATA AND ACKNOWLEDGEMENTS

The data used in the preparation of this report is from published and unpublished sources. These sources are:

Department of Administration (State of Kansas)
Geological Survey (Department of the Interior)
Division of Water Resources (State Board of Agriculture)
Statistical Reporting Service (Department of Agriculture)
Office of Business Economics (Department of Commerce)

Acknowledgement is made to Dr. R.G. Cummings (Montana State University) for his assistance in initiating this study.

Appreciation is also expressed for comments concerning the preliminary drafts of this report from other individuals.

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Attachment B

GROUNDWATER IN KANSAS: FUTURE PROSPECTS

Dr. Herman D. Lujan, Director
Division of State Planning and Research

Members of the Committee, Ladies and Gentlemen:

The Division of State Planning and Research has been studying long-term growth implications of the various functional areas and sectors affecting overall development of the state and its people. We recently released a report, Kansas 2000, which includes in its discussion the implications of growth for state water resources, utilizing supply and demand characteristics from now until the year 2000 as the basis for our assessment. We received excellent support and research assistance from the Kansas Water Resources Board, which I am sure will be providing this Committee with more technical, detailed information on groundwater usage in Kansas.

I will limit my remarks to overall policy issues, trends and options available from our perspective in dealing with the groundwater situation in Kansas.

The Problem:

Groundwater stored below the surface is the major source of water for Western Kansas. The supply of such water in the future is very much in doubt. The demands for such groundwater in Western Kansas have been increasing dramatically in the past two decades, as use of irrigated farming has increased. Without the introduction of new technology and changing water management practices, given current water supply and usage conditions in the state, the groundwater supply in Western Kansas will last about 45 years. Should this happen, the impact would be drastic--not only would agricultural production be seriously curtailed but the business and revenue normally generated by the agricultural sector would be lost to all Kansans throughout the state.

It has been estimated that there are approximately 500 million acre-feet of water in storage beneath the surface of the state. At most, experts feel that 50% of this supply would be available for immediate utilization. Approximately 65% of this groundwater is available in the western third of the state. But this groundwater supply is dwindling at about a one foot per year depletion rate, giving us an average life expectancy of groundwater supplies of 45 years. This assumes current usage rates and no change in the ability to reclaim reserves.

At the same time, the amount of groundwater required by irrigated agriculture continues to increase. The continuation of intensive irrigated agriculture in Western Kansas, with each passing year, will depend more and more: 1) on the development of new means of supplying water; and 2) on the development of new methods of agricultural production which minimize the demand placed on existing water supplies. In effect, the answer to groundwater shortages is not to stop irrigated agriculture but to begin now to manage and conserve this resource more effectively while finding better means for maintaining crop production with less water and/or new water resources.

Approaches to the Problem:

The Legislature in 1964 enacted a State Water Plan for the development of a well-balanced, coordinated and comprehensive water program. Phase I of this effort has been completed by the Water Resources Board. It provides a detailed examination of water supply characteristics. Phase II of this effort involves a consideration of alternatives and options available to the state in dealing with the dwindling of groundwater reserves.

Suggestions by the Geological Survey, Water Resources Board and others have been made regarding how Kansas can meet this problem. I would like to highlight several options found from our Kansas 2000 report and in other reviews, both in the short-term and long-term:

Short-range options include:

1) review and strengthening, if needed, of the groundwater management districts established by the 1972 legislature. It is my understanding that two districts have now been initially organized. If these districts prove ineffective in promoting the efficient use of groundwater resources it may be necessary to consider additional controls or better incentives relative to water management rights and water use by both public and private consumers. Financial incentives could be offered by the state to already existing groundwater management districts to improve the quality of groundwater management within the district and to water users in potential groundwater management areas.

2) Recognizing water as a scarce resource, serious consideration should be given to the development of a progressive state system of groundwater user fees which would charge most groundwater users at a rate commensurate with the level of their usage. Such a user charge system for groundwater would not only act as a deterrant to future water waste or overuse, but the revenues produced could be directly channeled into research and development concerning future groundwater problems and may spur innovation in agricultural and large scale commercial and industrial water use practices.

3) Nearly half of the almost 20 special subdivisions of government allowed in Kansas under the state statutes are directly related to the water and land resources of the state. It should be determined whether this special district approach to water management provides for the effective coordination of efforts to conserve and better manage our dwindling groundwater resources. Legislative action should be taken to eliminate any duplication of efforts which currently exist in the state's special water districts and to clarify the role of these districts in determining the future availability of needed water supplies (See attached chart).

4) Consider developing policies and standards requiring the preparation and approval by the chief engineer of the division of water resources, of groundwater impact statements by large scale public and private groundwater users. The groundwater impact statement process could be directly tied in with the appropriation permit application process in which large scale users would be required to provide detailed engineering and geologic data concerning the impact of their usage on groundwater supplies in the future. This would also necessitate the clarification and specification of engineering standards which will be used in

approving or disapproving any permit application.

5) Implementation of a concerted state research program which would endeavor to fund ways to:

--cut water losses due to evapotranspiration. Water brought to the surface by irrigation results in only 25% recharge. In contrast, 80-85% of all water withdrawn for normal municipal and industrial use is returned either to surface streams or to groundwater storage. More water is used for irrigation in Kansas than for manufacturing, electrical power generation, mining, urban and rural domestic use or livestock purposes combined. Most of the increase in water supply consumed in Kansas is being withdrawn from groundwater reservoirs of Western Kansas for agriculture irrigation. In 1968 a study was begun to find ways of reducing evapotranspiration but it is estimated to take 10-15 years to do the research, demonstration, seed production and education efforts.

--artificial recharging and storage of groundwater. In 1968, a study was begun on the artificial recharge of groundwater storage reservoirs and progress to date suggests its applicability for increasing the effective recharge to groundwater storage by nearly 100%. One difficulty with this method is that it requires ample water supply initially, a supply which does not exist in much of Western Kansas and would most likely involve extensive water importation.

--weather modification. In 1972 a study was begun on weather modification, the results are not yet fully known although this method has considerable interstate legal difficulties. Additional questions remain concerning what catchment facilities are available or needed to capture the produced runoff, the cost to produce, capture, store, and distribute new water supplies and the environmental impact of an extensive weather modification program. The possible problems range from changes in insect life to the possible eradication of large wildlife species.

--desalting of brines in water. Salts in the water attributed to earlier oil production activities affect the quality of water throughout the state. If salts can be extracted those waters would become usable. The capacities of most plants today fall between 50,000 gallons and 15 million gallons per day; the larger ones using distillation techniques on sea water and the smaller ones using electrodialysis or vapor compression processes on brackish water. Results indicate average costs somewhere in the neighborhood of $1.00 per thousand gallons, but new plants may be able to produce water at much lower costs.

--water recycling and reclamation. The reuse of treated sewage flows represents an almost untouched possibility for developing "new" water. Past experience indicates that domestic (as opposed to industrial) wastes can be reclaimed for many uses including human consumption, and that the reclaimed water is quite inexpensive in relation to its alternatives. The potentalities of water reclamation have barely been tapped and represent a significant future source of water for Western Kansas communities and agriculture.

--importation or inter-basin transfer of water.

This method has received much publicity and involves the consideration of importation of water to Western from Eastern Kansas river basins or from other states. Experts suggest, however, that at the present time the costs of water importation would be prohibitive vis-a-vis the revenues that could be obtained from agriculture production. A number of states, particularly in the Eastern U.S., have developed River Basin Commissions and entered into interstate compacts to assure meeting the water needs among participating states. Kansas has river compacts established in 1948 with Colorado (Arkansas River Compact), 1942 with Colorado and Nebraska (Republican River Compact) and in 1971 with Nebraska (Big Blue River Compact). One objective of these compacts has been to achieve an equitable apportionment of water. But since these rivers originate in other states, Kansas is somewhat at a disadvantage in obtaining additional water supplies. Canals from such rivers or pipelines into Western Kansas could be considered, should the costs become competitive in the future. Kansas should consider innovative efforts to obtain additional water supplies from other states, relying possibly on its advantageous position vis-a-vis agricultural supplies.

Consideration should be given to possible market exchanges of water in inter-basin transfer agreements with other states. The exchange of scarce natural resources is not unusual in this country. Natural gas and other minerals have been allocated by the market exchange system ever since the founding of the nation. Historically, water has been treated differently due to its relative abundance, its peculiar physical characteristics and the unique way the law developed around it. Users typically pay for the cost of storing, transporting and purifying water but rarely pay for the water itself. As a result of the recent and projected water resource shortages the market exchange concept is receiving increasing attention as a possible means of alleviating pressing water allocation problems. The state should consider means to limit excess water supplies from leaving the state, which is estimated at 11.5m. acre feet annually. Efforts might be made to work with the Federal government since few Corps of Engineers projects have accurred to date in Western Kansas. Utilization of 1974 legislation enabling the Water Resources Board to sell water, developed by state underwriting of the construction of major reservoirs needs to also be considered in meeting depleted groundwater resources in future years.

6) Ways need to be developed to decrease waste in the use of existing groundwater resources. Irrigation experts believe a 25% reduction in water use is possible by utilizing present techniques for managing water such as using pipes rather than earthen channels to transmit water, and changes in the types of crops produced to have the least drain on remaining water resources. Other methods including reducing pumpage to equal the recharge rate (with severe consequences), development of new wells, utilization of existing water sources for recharging, and voluntary reduction efforts by groundwater users might be pursued.

Considerable opportunities also exist and are currently being explored (in the Kansas Evapotranspiration Laboratory at K-State) for conserving water by adjusting presently wasteful irrigation practices. There is already sufficient evidence that excessive irrigation is frequently applied by U.S. farmers which often affect crop quality and/or yield in detrimental ways. For example, it is known that irrigation lowers the quality of winter wheat, although the yield

is increased. More favorable straw/grain ratios and higher percentages of protein were found in the wheat that received fewer applications. Increased research activity in this area is another alternative this committee may wish to consider.

7) Saline Water Irrigation

Recent experiments have shown that many plants can thrive in sandy soil when they are irrigated with water that is quite salty. Research has shown that a particular type of barley can be grown with irrigation water containing 30,000 parts per million dissolved solids. It was also found that barley, rye, alfalfa and field mustard all have high salt tolerances in sandy soil. With significant deposits of sandy soil Kansas may be a likely prospect for salt water farming in the future.

Long-Range options include:

1) Development of methods by which state and local governments can adjust economic activity to water use so as to reduce water depletion where supplies are low. This will require coordinated effort and close monitoring. It may require such actions as limiting the growth of irrigated farming, the earmarking of revenues for groundwater resource recovery, and limits and priorities to which groundwater resources are assigned.

2) Development of long range plan for changes in agricultural and other economic practices in case short-term options do not solve the Western Kansas water problem;

3) Defining of the state ~~rate~~ role for maintaining the economies of various regions of the state by providing directly new water resources or supporting communities that must develop new economies if water supplies run out.

In conclusion I would like to propose that we need to develop the state's water resources with due regard not only to state flood control goals, but to the future of Kansas groundwater supplies. One of the primary tasks facing the state in groundwater resources is to sort out the often over-lapping responsibilities of state, regional and local governments (including special districts) in dealing with anticipated groundwater shortages and the economic consequences of such shortages on local and state economics. Foremost, consideration should be given to the role local participation and support for groundwater management measures can play in the success of any state sponsored efforts in the future.

Perhaps what is most important is to avoid the "rescue project" mentality of the past. While the stated purpose of such projects often is to relieve the distress caused by "mining" groundwater, they are seldom comprehensive approaches to water management problems and usually require a future rescue project to rescue the rescue project. If anything is clear concerning approaches to the Kansas groundwater dilemma, it's that it will not be easily solved. A mixed-strategy including conservation, changes in present water-intensive agricultural practices, and the use of market mechanisms number among the measures for effectively dealing with this particular resource problem.

As long as groundwater is available in plentiful supplies the day of the shortage or crisis can be indefinately postponed and our approaches will be less comprehensive. While hydrology, law and administration all combine at times to produce greater uncertanties about groundwater, the longer the groundwater problem is postponed, the more difficult is the development of any solution. Alternative sources of water that may have been available had the problem been anticipated are often committed to other uses.

In part the groundwater problem in Western Kansas is hydrologic. However, the even greater problem facing this committee and the legislature of the state is in effectively and convincingly communicating the conclusions about hydrologic information which are currently available on rates of use and recharge and anticipated groundwater shortages in the Northwest, Southwest and Southcentral areas of the state. While facing the legal and political controversies long range planning of this sort inevitably encounters, this committee will hopefully begin to deal with the complexities and the challenges of the future of Kansas groundwater.

TABLE 2.—Authorized Activities of Special Water Districts in Kansas

Special Districts	Method of organization-petition to				Governed by			Powers[1]		Action programs									Financing					
										Flood control			Conservation and development			Pollution abatement								
	County commissioners	Elected state official	State agency	District court	Elected independent board, commission, or supervisors	Appointed board	County commissioners	Broad	Limited	Dams and reservoirs	Protection works	Land treatment	Public water supplies	Irrigation systems	General conservation through land treatment	Water purification facilities	Sewage treatment plants	Sediment control	Incur indebtedness	Issue bonds	Levy taxes	Assessments	User charges	State and county assistance
Drainage	X	X	....	X	X	....	....	.....	X	X	X	....	....	....	.....	....	....	....	X	X	X	X	....	....
Irrigation	X	....	X	....	X	....	....	.....	X	....	....	....	....	X	.....	....	....	....	X	X	....	....	X	....
Watershed	....	X	....	....	X	....	....	X	.....	X	X	X	X	X	X	....	....	X	X	X	X	X	X	X
Levee	X	....	....	....	.....	....	X	.....	X	....	X	....	....	....	.....	....	....	....	....	....	....	X	....	....
Rural Water	X	....	....	....	X	....	....	.....	X	....	....	....	X	....	.....	X	....	....	X	X	....	....	X	....
Soil Conservation	....	....	X	....	X	X	....	.....	X	....	....	....	....	....	.....	....	....	....	....	....	....	....	....	X
Sewer	....	....	....	....	.....	....	....	.....	X	....	....	....	....	....	.....	....	X	....	X	X	X	X	X	....
Water Supply	X	....	....	....	X	....	....	.....	X	....	....	....	X	....	.....	X	....	....	X	X	X	....	X	....

1. Broad powers allow undertakings for conservation and control, whereas limited powers allow undertakings for only one.

Attachment VI

STATEMENT
of
Guy E. Gibson, Kansas State Board of Agriculture
before the
1975 Interim Study Committee on Energy and Natural Resources
June 24, 1975

Mr. Chairman and members of the Committee, I am Guy E. Gibson, Chief Engineer, Division of Water Resources, Kansas State Board of Agriculture. With me is a member of the Division, Clark I. Stocking, Engineer in charge of the Water Rights Section.

The procedure for acquiring a right to the use of groundwater is set forth in the Water Appropriation Act of 1945, as amended, K.S.A. 82a-701 to 725, inclusive. This Act established the general principle that all water within the State of Kansas is dedicated to the use of the people of the State subject to the control and regulation of the State as prescribed by the Act. Other basic principles of the Water Appropriation Act provide that, subject to vested rights, all waters within the State may be appropriated for beneficial use and prescribes a procedure by which a lawful right to the use of water may be established and protected. The priority of an appropriation right to use water for any beneficial purpose except domestic purposes shall date from the time of the filing of the application in the office of the Chief Engineer. The priority of the appropriation right to use water for domestic purposes shall date from the time of the filing of an application in the office of the Chief Engineer or from the time the user makes actual use of water for domestic purposes, whichever is earlier.

Both surface and ground waters of the state may be appropriated. An appropriation right is acquired by applying the appropriated water to beneficial use. In other words, a water right relates only to the use rather than to the substance of the water. It is, nevertheless, a real property right appurtenant to and severable from the land on or in connection with which the water is used.

The Water Appropriation Act provides that the Chief Engineer, Division of Water Resources, Kansas State Board of Agriculture, shall make an Order determining the rights of all persons making beneficial use of water, other than for domestic use, on or before June 28, 1945, as to the extent of their use at that time, defining the source of supply, location of the point of diversion, quantity, maximum rate of diversion and location of the place of use. Those rights are recognized as being vested and may continue to be exercised to the same extent that they were then being used. All vested rights remain superior to any appropriation rights subsequently established.

A total of 2,175 vested rights to continue the beneficial use of water have been determined. Of this total, 1,670 were for the continued use of groundwater which includes 951 for irrigation use. These vested rights for irrigation use of groundwater cover a total of approximately 143,000 acres of land and a quantity of approximately 238,000 acre-feet of water. It should be understood that the entire acreage of land covered by vested rights was not irrigated each year. According to available information, there were actually 96,250 acres being irrigated in 1945. The majority of vested rights for irrigation use of groundwater are located in southwestern Kansas since this is the area of the State where modern irrigation was commenced.

To acquire an appropriation right, an application for permit to appropriate water for beneficial use must be filed in the office of the Chief Engineer, Division of Water Resources, Kansas State Board of Agriculture, Topeka, Kansas, with a filing fee of $50.00.

If upon examination it is found the proposed use neither will impair a use under an existing water right nor prejudicially and unreasonably affect the public interest, the Chief Engineer shall approve such application made in good faith in proper form which contemplates the utilization of water for beneficial purpose, within reasonable limitations. The approval of an application constitutes a permit to proceed to perfect a water right in accordance with the terms, conditions and limitations as set forth in the approval of application.

Upon completion of the construction of the works for diversion of water and the actual application of water to the proposed beneficial use within the time allowed, the applicant shall notify the Chief Engineer to that effect. A representative from the Division of Water Resources shall then examine and inspect the appropriation diversion works and, if it is determined that the appropriation diversion works have been completed and the appropriation right perfected, in conformity with the approved application and plans, the Chief Engineer shall issue a certificate of appropriation. The certificate of appropriation sets forth the extent of the water right. The certificate is sent to the applicant and the law requires that it be recorded with the register of deeds in the county or counties wherein the point of diversion is located as other instruments affecting real estate.

As of December 31, 1974, a total of 23,552 applications for permit to appropriate water for beneficial use had been filed in the office of the Chief Engineer. Of this total 19,661 applications were for the appropriation of groundwater including 18,547 for irrigation use.

GRAPH SHOWING QUANTITIES OF WATER REQUESTED ON APPLICATIONS FOR PERMITS TO APPROPRIATE WATER FOR BENEFICIAL USE AS FILED CALENDAR YEARS 1965 THROUGH 1974

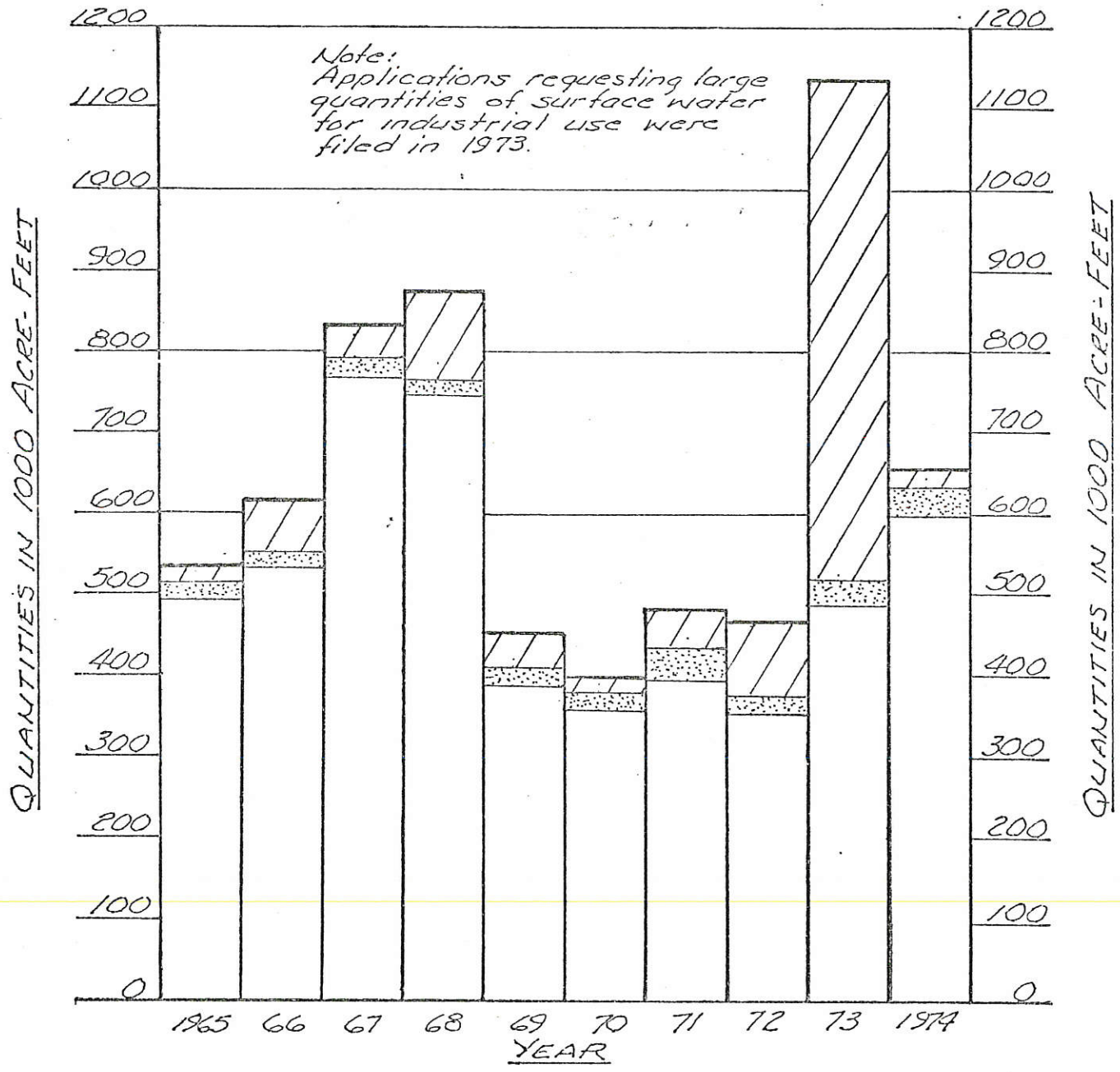


Figure 1

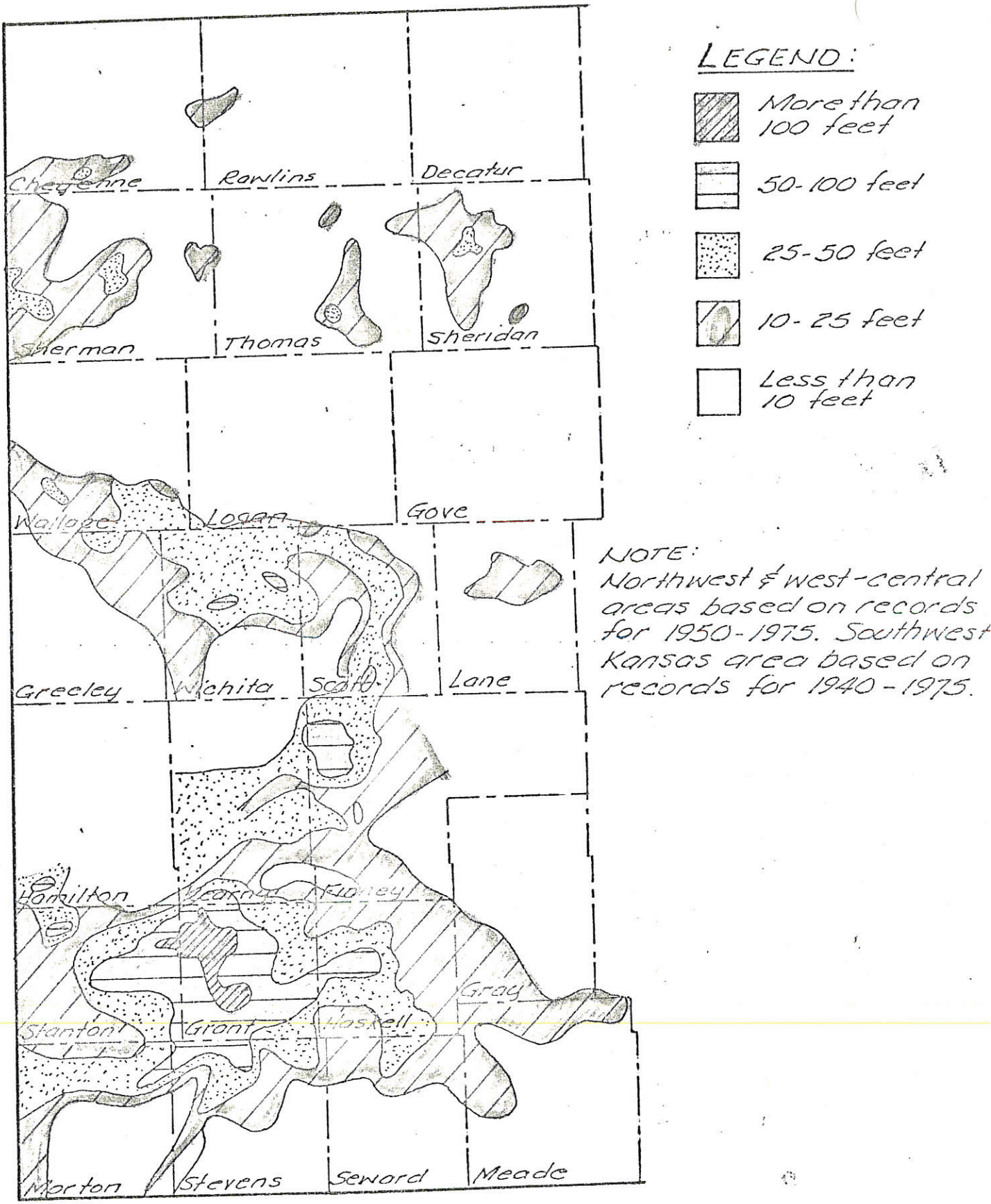
The following remarks are confined to irrigation use of groundwater since nearly 80% of the total applications received are for such use and reflect the vast majority of the water appropriation in Kansas.

The 18,547 applications for irrigation use of groundwater received to December 31, 1974, proposed the use of about 7,070,000 acre-feet of water per year for irrigation use on about 3,720,000 acres of land. The major portion of these applications are located in the western one-third of Kansas since this area is underlaid with the state's major groundwater aquifer and has the least amount of precipitation.

Irrigation has increased at a rapid pace during the last ten years. During the period of December 31, 1964 through December 31, 1974, a total of 11,757 applications proposing the use of groundwater were received of which 11,212 were for irrigation use. These applications proposed the use of approximately 4,610,000 acre-feet of groundwater per year for irrigation of about 2,426,000 acres of land. The quantities are shown by year on the attached Figure 1. Prior to December 31, 1964, a total of 7,170 applications had been received which proposed the use of about 2,737,000 acre-feet of groundwater per year for irrigation of about 1,409,000 acres of land. These figures represent a possible increase in the use of groundwater for irrigation purposes of about 170 percent during the last ten years.

Information furnished by the Extension Service, Kansas State University, shows that approximately 2,360,000 acres of land were irrigated during 1974. Of this total, it is estimated that 1,900,000 acres were irrigated with groundwater.

There has been a continuing program of groundwater investigation in Kansas for the past 35 years. In cooperation with the Geological Survey, the Division of Water Resources has been monitoring water-level changes by



WATER LEVEL DECLINE IN FEET FOR WESTERN KANSAS

FIGURE 2

Average Change in Water Levels in Feet
January 1970 to January 1975

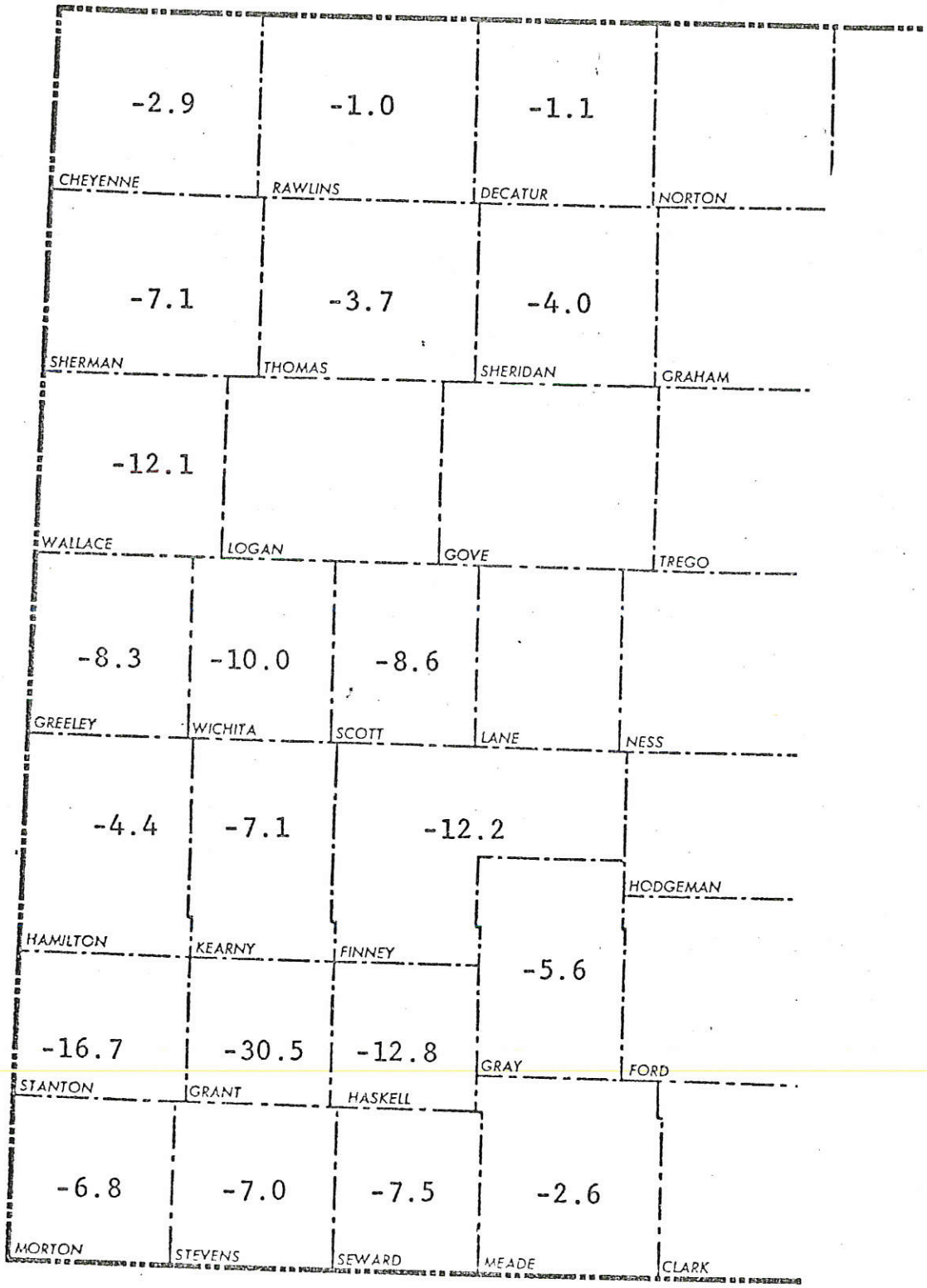


Figure 3

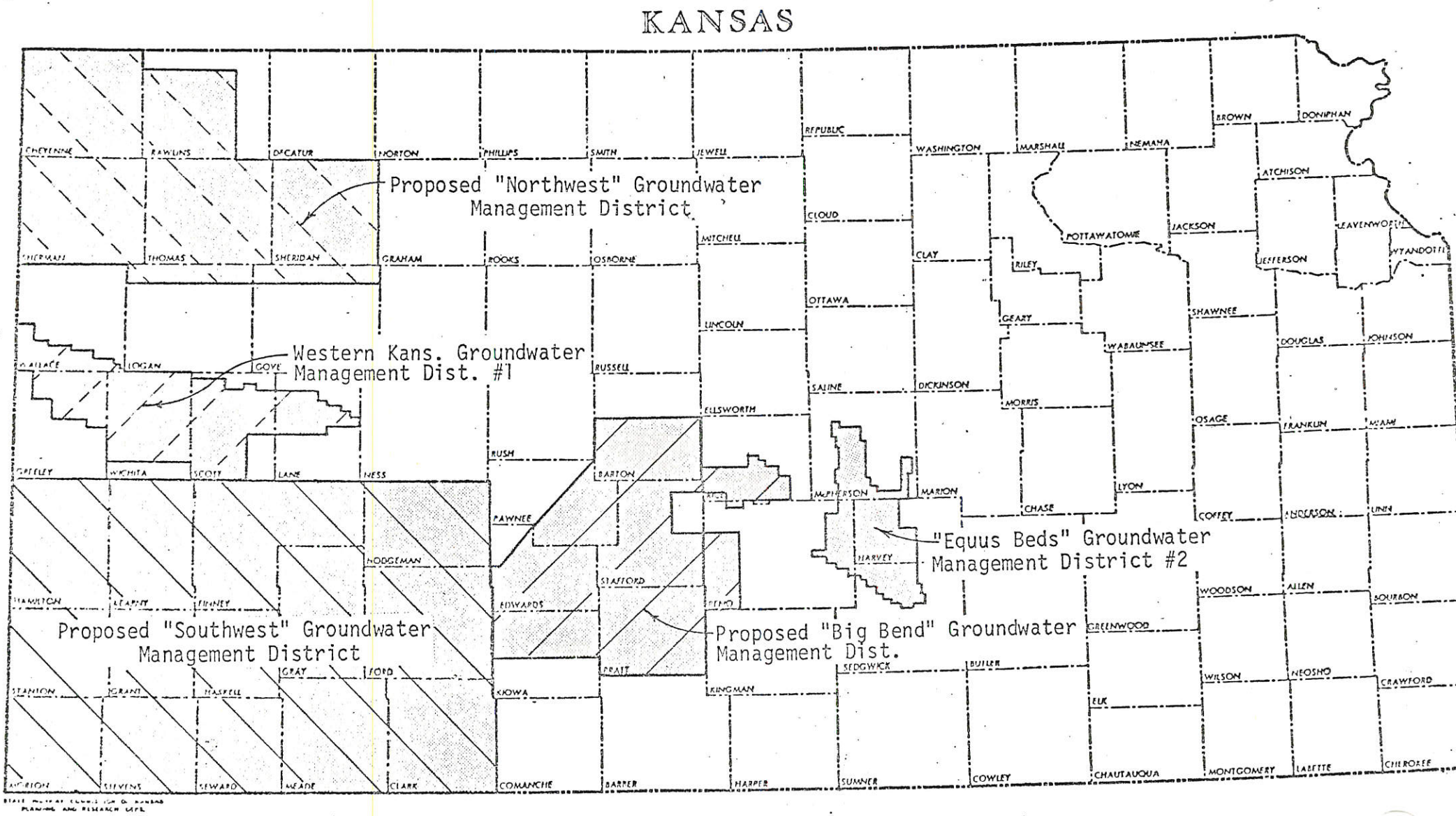
making regular water-level measurements in wells. Figure 2 shows in a generalized way the amount and extent of declines in groundwater levels experienced in southwestern Kansas during the period 1940 to 1975 and northwestern Kansas during the period 1950 to 1975. Figure 3 gives the average change in water levels by counties from 1970 to January 1975 for 21 counties in western Kansas. These figures represent information that was obtained from water level measurements.

The Kansas Geological Survey has published water-level changes in northwestern Kansas for the period of 1950 to 1973 in the Kansas Geological Survey Journal dated October 1973. Information in this publication shows the number of irrigation wells in the six northwest counties increased from about 100 to 2,550 during the period of 1950 to 1972. Annual withdrawals of groundwater in this area are estimated to have increased from 15,000 to 500,000 acre-feet during the period.

The Kansas Geological Survey has also published water-level changes in west-central Kansas for the period of 1950 to 1974 in the Kansas Geological Survey Journal dated October 1974. Information in this publication shows the number of irrigation wells in all of four counties and portions of three other counties in west-central Kansas to have increased from about 250 to 2,300 during the period 1950 to 1973. Annual withdrawals of groundwater in this area are estimated to have increased from 40,000 to 450,000 acre-feet during the period.

A report is being prepared covering water-level changes in the 12 counties of southwestern Kansas. It is estimated there were 7,000 irrigation wells in this area in 1974.

It is estimated there is presently 13,000 irrigation wells located in the 23 counties of western Kansas.



Map Showing Locations of Existing and Proposed Groundwater Management Districts

The increasing draft on groundwater supplies, which are not inexhaustible, has caused concern, and attention has been given to management and conservation of groundwater resources. The 1972 Kansas Legislature was responsive to this feeling and enacted House Bill No. 1706 which provides for the establishment and organization of groundwater management districts. The "Groundwater Management District Act" as it is commonly known, became effective on July 1, 1972.

In Kansas it has been the philosophy through the years that groundwater management is a matter of local concern. This is borne out in Section 2 of the Groundwater Management District Act which states, in part,

> "It is the policy of this act to preserve basic water use doctrine and to establish the right of local water users to determine their destiny with respect to the use of the groundwater insofar as it does not conflict with the basic laws and policies of the State of Kansas."

There has been filed with the Chief Engineer, as of June 16, 1975, petitions to organize five groundwater management districts. The locations of these districts are shown by Figure 4. Of these five, two have completed organization. The first, Western Kansas Groundwater Management District No. 1, comprises parts of five counties in west central Kansas (Wallace, Greeley, Wichita, Scott and Lane) with an area of about 1,200,000 acres. This district is now organized and in operation. The Board of Directors has undertaken active management of the district.

The second district, the Equus Beds District No. 2, essentially overlies the "Equus Beds" in parts of Sedgwick, Harvey, Reno and McPherson Counties and includes approximately 500,000 acres. This district is presently preparing a

management program and it is anticipated it will be submitted to the Chief Engineer for approval in the near future.

The three proposed districts are the "Big Bend" district, which includes about 2,400,000 acres in all or parts of Barton, Edwards, Kiowa, Pawnee, Pratt, Reno, Rice, Ford and Stafford Counties; the "Northwest Kansas" district which includes approximately 3,235,000 acres includes all or parts of Cheyenne, Rawlins, Sherman, Thomas, Sheridan, Logan and Gove Counties; and the "Southwest Kansas" district, which includes about 7.5 million acres in the 14 southwest counties of Kansas. Each of the proposed districts have submitted letters of intent to organize along with a proposed boundary map. Final boundaries have not been approved, but it is anticipated this will be done in the near future. It is also anticipated that elections to approve the three proposed districts will be held during the 1976 fiscal year. If this is done, and five districts are organized, they will essentially include most of the areas in Kansas which overlie the major aquifer systems.

The Water Appropriation Act presently provides that any application for permit to appropriate water for beneficial use may be filed before or after the commencement of any work in connection with the construction of any works for diversion and use of water. There is no penalty provided in the Act for failure of a person to obtain the approval of the Chief Engineer before withdrawing or diverting water.

In order for the Division of Water Resources and the groundwater management districts to effectively regulate the withdrawal of groundwater within the districts, it will be necessary that before any person withdraws or diverts any waters of the State for any purpose other than domestic use, and except for

those holding vested rights, an approval of an application for beneficial use must first be obtained from the Chief Engineer. This would require a change in the Water Appropriation Act.

There appears to be no decline in the rate of irrigation development in Kansas if the number of applications for permits to appropriate water for beneficial use being received in the office of the Chief Engineer is an indicator. During 1973, over 1,800 applications were received and during 1974, over 1,600 were received. At the present rate it appears that about 1,700 will be received during 1975.

Economics will be one of the governing factors. If the costs of fuel and equipment continue to increase without a corresponding increase in prices received for crops, there will probably be a decrease in the rate of irrigation growth.

Declining water levels will also govern the future rate of development in areas where water supplies are being depleted.

Attachment VII

EPA WATER STRATEGY PAPER

3rd Edition

1975

(March 17, 1975 DRAFT)

NONPOINT SOURCE POLLUTION MANAGEMENT

Introduction.

EPA is committed to the management of both point and nonpoint sources of pollution. It is already apparent in many areas that management of nonpoint sources is necessary to meet the water quality goals of P.L. 92-500. Adequate authority exists under sections 208, 209, 303(e) and 313 of P.L. 92-500 for EPA to initiate a program in conjunction with the States to manage nonpoint sources. Nonpoint sources are considered to be those sources, either individual or geographically aggregate, which have not been included within the regulatory requirements of the permit program.

The primary responsibility for nonpoint source management rests with the States. Establishment and implementation of nonpoint source management programs will be a part of the areawide planning process in designated 208 areas as well as a part of the State water quality management responsibilities in non-designated areas.

EPA's responsibility in the nonpoint source management effort will be to provide guidance to the States for initiating planning and implementation of nonpoint source management in order that the 1983 water quality goals of the Act may be reached. It will also be EPA responsibility to review and approve the management plans which the State or designated agency submits. By mid-1975 revised State water quality management regulations (40 CFR, Part 130; 131) will be issued by EPA followed by guidelines in early FY 76. These will require the States that have not already done so to begin planning for the establishment of regulatory programs for nonpoint source management.

The State's nonpoint source planning and management (from initial assessment to implementation of regulatory programs) will be carried out as an element of the State Water Quality Management process. This process is a combination of the planning and implementation efforts required under Sections 303(e) and 208(f)-(k) of P.L. 92-500.

As part of the State Water Quality Management process, States will be required to assess the magnitude and extent of their nonpoint source problems. Each State will also be required to develop needed NPS regulatory programs as

knowledge, legal authority, and resources permit. It is recognized that some States are already far along in managing nonpoint sources. EPA encourages such States to continue to expand their programs.

An Approach to Management of Nonpoint Sources.

EPA's guidance to the States and local designated agencies will strongly emphasize the value of preventive approaches to NPS management. Due to the difficulties and diseconomies involved in controlling nonpoint sources "after-the-fact" the most feasible means to deal with nonpoint source problems usually involves application of land and resource management practices which prevent the generation and run-off of pollutants to the aquatic environment. Many of these practices are already in use. Others are in the process of being developed by State, EPA, and other Federal agency research and field projects.

EPA will encourage States and designated agencies to institute "Best Management Practices". The term "Best Management Practice" refers to a practice that is determined by a State after examination of alternative practices to be practicable and most effective in preventing or reducing the amount of pollution generated by a nonpoint source to a level compatible with water quality goals. According to this approach, each State defines its own set of Best Management Practices that will be tailored to meet the specific problems and environmental conditions within that State.

Best Management Practices (BMP's) are to be determined with reference to the physical characteristics of the site (e.g., soil, rainfall, slope, vegetative cover, etc.), the kind of activity generating the pollution (e.g., agriculture, silviculture, construction, etc.) as well as the water quality needs of the basin or segment. A BMP for one source and type may not be appropriate in a similar situation. Therefore, a BMP should not be applied in an indiscriminate fashion across a State, but should be commensurate with the specific activity and the site. For instance, BMP's should reflect differences in the key variables of climate, soil, slope, vegetative cover, and type of activity. If one or more of the variables changes while the others remain constant, a different BMP may be necessary. For a State with a wide range of temperatures, rainfall, altitudes, soils and vegetation there will be a need for a comparable range of BMP's to apply. A State with fairly

uniform physiographic and climatic characteristics will have need for fewer variations in its BMP's. There may be some activities such as road-building and construction in urban or developed areas that will not require a variety of BMP's. Some States may choose to establish a State-wide uniform set of practices for such activities.

States are encouraged to consider the following general approach to establishing Best Management Practices:

- In terms of the physical conditions and activities influencing pollution generation, the State establishes categories and subcategories of nonpoint sources within the State.

- The BMP's established by the State would apply only to significant nonpoint sources, with the State defining what constitutes a significant nonpoint source and including as a minimum those nonpoint sources causing violation of water quality standards.

- Best Management Practices (BMP) are defined for each NPS category and subcategory. This approach allows each State to define its BMP for each NPS category so that it is suited to the specific conditions within that State. Accordingly, a State's definition of BMP would have two parts: a description of the management practice and a description of the physical situations within that State where that management practice is applicable.

- In defining BMP for a particular NPS category or subcategory, the State should distinguish between existing and new nonpoint source pollution-generating activities. For most new sources, the State often has more options for highly effective management measures and these more effective management practices should be considered in the selection of BMP's for new sources.

- It is important that the State encourage public participation in the establishment of definitions of significant nonpoint sources and definitions of BMP's.

- Periodically the State will reassess the adequacy of its Best Management Practices to meet water quality goals. If found to be inadequate, steps should be taken to revise BMP's to achieve a higher degree of control.

DRAFT

Accomplishment of Nonpoint Source Management Goals.

While the basic authority and responsibility for nonpoint source planning and management rests with the States, the State program should be viewed as a cooperative effort between the State (and State-designated 208 agencies) and other State and Federal agencies.

Parallel nonpoint source management efforts will be undertaken in each State within designated 208 areas (unless the State has pre-empted NPS authority there) and the nondesignated portions of the State. Coordination among those agencies responsible for planning and implementation should minimize duplication of effort and achieve consistency throughout the State.

The basic elements of the nonpoint source planning and management process in the above areas will generally be the following:

- In States where little or no evaluation of nonpoint source problems has been accomplished, an initial assessment of the nature and extent of nonpoint sources carried out through theexisting State water quality management process will be a necessary first step. States that have already completed this step and have begun to implement an NPS program will want to periodically re-assess the nature of existing nonpoint sources and monitor to determine the success of control programs. States will propose planning and ultimately management programs through their existing State Water Quality Management process and Section 106 program strategy.

- Once a problem assessment has been completed, and NPS categories and subcategories have been established, priorities should be set among the NPS categories. It is expected that priorities will vary considerably from State-to-State depending on the nature of the nonpoint source problems, the progress individual States may have already achieved in certain areas, and available resources. A State may choose to deal with one category at a time or several simultaneously. In any case, the State should set highest priority on those categories where most water quality improvement can be accomplished immediately and select to do those first, adding additional categories as rapidly as resources permit.

Report will be submitted by Mel Tracy by Aug 15, 1975

- Once priorities have been established the State should draft the definition of a significant nonpoint source for those NPS categories receiving consideration and proceed to develop inventories of all significant sources within those categories.

- The State then defines its own BMP's for the selected NPS categories, and develops regulatory programs to implement the BMP's. Where necessary, a State will define its BMP's and BMP compliance schedules through new legislation and accompanying regulations.

- In the planning and implementation of a nonpoint source management program whether in designated or nondesignated areas, existing State, local, and Federal institutions may be utilized to monitor streams and to provide technical assistance in the field. In those cases in which a State delegates actual planning, implementation or enforcement responsibility to other State or local agencies, the State will be responsible for the effectiveness and coordination of such arrangements, as well as the consistency of the management plans prepared within the State.

It should be emphasized that any State that can make more rapid and effective progress following some other process should do so and should not be constrained by the steps listed above.

In addition to the management programs carried out in designated and nondesignated areas, Federal land managing agencies will also address their nonpoint source problems and develop management programs for their controls in cooperation with the State. Activities on Federal lands are expected to be in compliance with State, interstate, and local substantive requirements respecting control and abatement of pollution to the same extent that any person is subject to such requirements according to section 313 of P.L. 92-500 and Executive Order 11752.

Disputes or conflicts between Federal agencies and State, interstate, or local agencies in matters affecting the application of or compliance with a requirement shall be mediated by EPA. In such cases, if attempted mediation is unsuccessful the matter should be referred to the Office of Management and Budget under provision of E.O. 11752.

EPA Support for NPS Management

By the beginning of FY 76, EPA will issue regulations and guidelines on which the States will base nonpoint source planning and management. Beyond this responsibility EPA will provide ongoing support in the form of written guidance and technical assistance to States and designated agencies.

Information will be provided on a continuing basis on specific control methods, results of pilot programs and research and on relevant nonpoint source management concepts that might be useful to State and designated agencies. This information will be a part of updating the information EPA provides under section 304(e) of the Act.

Information provided by EPA will be along the lines of the following broad categories:

stormwater	mining
residual wastes	construction
agriculture	ground water
silviculture	hydrological modifications

The purpose of providing information within these categories is not to impose these categories on the State, but rather simply to facilitate communication. Studies are encouraged to identify and categorize nonpoint source problems in a manner they deem to be most suitable. Examples of Best Management Practices that could be adapted to suit specific local conditions will be provided by EPA. Also, for some NPS categories EPA will develop handbooks containing technical, legal, and institutional information. EPA will also make available analytic techniques and computer models to aid in analyzing the magnitude and effects of nonpoint sources.

A working group composed of EPA personnel from the Water Planning Division and related programs, State, Federal, and designated 208 agency personnel, and members of relevant industries and conservation groups will meet periodically to assist EPA in developing appropriate guidance.

Information concerning various methods of control of NPS (including preventative practices, financial incentives, legal and institutional means, and treatment facilities) that would be of use to State programs will be continually sought from other Federal, State, Regional and local agencies and distributed on a regular basis to EPA's Regional offices for use by the States. In addition to this "clearinghouse" function, EPA will continue to provide funding for research and pilot programs.

Included in the guidance EPA will provide will be information on the results of its pilot programs. Pilot programs will be carried out in the Regions as time and resources permit. Existing pilot programs that will be continued in FY '6 are the following:

Rural Sanitation (Septic tanks)	--- Region I
Mining	--- Region III
Irrigation Return Flows	--- Region VIII
Ground Water	--- Region IX
Silviculture	--- Region X

Additional pilot programs in other problem areas are contemplated but not yet funded or initiated.

Current research is focusing on assessment techniques, loading relationships of specific nonpoint sources, and control methodologies and costs. Research efforts are being concentrated in the following four general activity areas and sub-areas:

1. Agriculture

   - animal feeding operations
   - surface or sub-surface runoff from dry land farming
   - surface or sub-surface runoff from irrigated land

2. Mining

   - active operations
   - abandoned mines

3. Hydrologic Modifications

   - land modifications
   - stream modifications

4. Silviculture

   - timber harvesting
   - road building

It is expected that from current research projects, outputs for FY 76 will include some predictive techniques as well as management practices. The development of predictive techniques to estimate the effect of nonpoint sources on water quality is important to nonpoint source management. Right now not much is available in this area of predictive techniques. Current research is attempting to remedy this deficiency. Predictive techniques will allow an existing or potential generator of a nonpoint source to estimate the magnitude of his problem given his specific set of conditions (i.e. slope, rainfall, vegetative cover, etc.). Existing preventative management practices are being studied as to their effectiveness, and new methods are being explored.

In the area of agriculture, for example, EPA in conjunction with the Department of Agriculture is preparing an extensive user's handbook of information on predictive and preventative measures. The information contained in it will be useful on a broad scale across the country; but to be applicable to specific sites, it will need to be modified.

Other Federal Agency Support.

State and designated agencies will rely to the extent possible on existing programs and expertise in other Federal agencies. At the Headquarters level, EPA will consult and coordinate with other Federal agencies during the preparation of nonpoint source guidance and will encourage other agencies to contribute ideas, examples, control methods, and any other relevant information to be issued as part of the ongoing "clearinghouse" function that EPA will perform for the benefit of States and 208 designated agencies. Any information available through Federal agencies that is not in a form readily applicable to specific problems at the local or State level will be made available to the States by EPA in a form that is useful to their planning programs.

Section 304(j) of PL 92-500 requires EPA to enter into interagency agreements with other Federal agencies for purposes of coordination. One such agreement has been signed by the Administrator and the Secretary of Agriculture. Work on management approaches is currently in progress between EPA and USDA's Soil Conservation Service and Forest Service. Similar working relationships will be established through interagency agreements with the U. S. Army Corps of Engineers and the Department of Interior.

Timing for the Nonpoint Source Management Process.

Timing in Nondesignated Areas (and designated areas for which the State has retained NPS planning and management responsibilities).

- In 1975 the State and EPA Regional Administrator will agree on a level of detail and the timing for preparation of State Water Quality Management plans.
- As planning proceeds, States will refine their NPS problem assessments which they addressed in their first 305(b) report and define their nonpoint source control needs and regulatory programs.
- Beginning in April 1976, the more specific timing of State implementing actions identified in State Water Quality Management plans will be reflected in Annual State strategies.
- Specific controls and regulatory programs are to be developed by the States on a priority basis as soon as adequate information, resources, and legal authority become available.

- All regulatory actions will be initiated in time to achieve the 1983 water quality goals.

Timing in Designated Areas (Where the State Has Not Retained NPS Planning and Management Responsibilities)

- In designated areas program planning is to be completed in the first two years after designation. Implementation of regulatory programs is to be completed in time to achieve the 1983 water quality goals.

Program Reporting of Nonpoint Source Management Progress.

The States are to identify nonpoint source problem areas through the ongoing State water quality management process and to report yearly on their findings in the 305(b) report. Widespread participation of Federal, State and local agencies in the formulation of the 305(b) reports should be encouraged. These reports along with State program plans and Regional mid-year and end-of-the-year evaluations will be an important mechanism for judging the progress made in the nonpoint source program. The 305(b) report to the Congress can also underscore any possible financial assistance needs for carrying out the program.

Don Draper
Non-Point Source Coordinator for Region VII
Kansas City EPA

Individual reports by the Commissioners and KACD Directors indicated a majority of conservation districts and Kansas public, expressed during winter and spring meetings, favored a combination of voluntary actions with some state regulation to control sediment and erosion. The following refinements of S.B. 12 were also reported as being desirable:

SB 12 Suggestions

Spell out cost-share amounts in precise figures. 3, 4e

Protect landowners from being held liable for violation resulting from Acts of God.

Soften liability penalties. 1e

Define a "Conservation Plan" and what is construed to be "Carrying out the Plan". 4e, 6e

Clarify exemption granted to landowners having no plan but are conforming to standards. 4e

Extend and identify timetable for application. 2, 3

Provide for hardship cases.

Identify by name local entities other than conservation districts having administrative authority. 3e

Subsequent to the meeting and in accordance with the action taken therein, Messrs. Lyle Bauer and Wendell Eggerman agreed to ask Nathan Hayse, Leon Lallier, Ruth Lofgreen, Rex Denham, Glea Gillum and William (Bill) Amstein, Jr. to serve as a liaison team to visit and confer with some or all of the following suggested key organizations (and possibly others):

Kansas Farm Bureau
Kansas Livestock Association
League of Women Voters
Kansas Irrigators Association
Kansas Wheat Growers Association
Kansas Land Improvement Contractors Association
Kansas State Grange
Kansas Farmers Union
Kansas Wildlife Federation

Attachment IX

June 24, 1975

PROGRESS REPORT

ON EROSION-SEDIMENTATION EDUCATIONAL PROGRAM

1. K-State University's Extension Service Asked to Launch Educational Effort -- Directors of the Kansas Association of Conservation Districts and the State Conservation Commission asked the Director of Cooperative Extension to develop and provide leadership for an educational program on the public policy issue, "Erosion and Sedimentation, A Problem Kansans Must Face".

2. Strategy and Plan Outlined -- The plan, outlined by Harold E. Jones, Extension Specialist, Soil and Water Conservation, called for (a) a massive educational program during 1975-76, (b) the appointment of an Educational Committee to prepare needed background material, and (c) a timetable of activities to follow in carrying out the effort.

3. Educational Program Defined -- Specifically, the educational program was to provide an opportunity for the people of Kansas to understand and discuss the following:

   - Scope of erosion and sedimentation problem in Kansas.
   - Present private and public efforts toward erosion and sediment abatement.
   - Knowledge of federal and "other states" legislation designed to facilitate erosion and sediment control.
   - Alternatives for citizen action in response to national legislation.

4. Strategy for Implementing Educational Program -- The general procedure was to give:

   - Main emphasis on local citizen involvement at county-community level.
   - County committees responsibility to plan and implement the local educational activities.
   - KACD area directors, state conservation commissioners, and Kansas State University a supportive role.

   State, Area and County Committees Organized

   A. State Advisory Committee

      (1) Membership -- Lyle Bauer, State Conservation Commission; Lynn Buerki, KACD; Robert Bohannon, Extension Service; Charles Bredahl, SCC; Wilber Ringler, KSU.

      (2) Functions -- Approve educational materials, encourage district participation, and help coordinate agency involvement.

Prepared for Interim Committee on Energy and Natural Resources of the Kansas Legislature, Topeka, Kansas, June 24, 1975.

B. Five Area Advisory Committees

(1) Membership -- KACD Area Director, State Conservation Commissioner, Area Extension Director, Area Extension Specialist, and Area Conservationist.

(2) Functions -- Advise county committees, help with area training meeting, assist with public forums, act as a clearinghouse for county recommendations on needed legislation.

C. 105 County Committees

(1) Membership -- Five Soil Conservation District Supervisors, Extension Ag Council Chairman, County Agricultural Agent, District Conservationist, County Commissioner, one or more members from city or urban interests, and Clerk of District Conservation Office (Secretary to Committee).

(2) Functions -- Plan and implement an educational program to inform citizens on county sediment problem and the need for action, hold public meetings, and make recommendations on suggested action.

5. Educational Committee Appointed -- Chairman, Wilber E. Ringler, Assistant Director of Agricultural Production Programs, KSU; Barry L. Flinchbaugh, Extension Economist, KSU; Leo T. Wendling, Extension Engineer, KSU; Fred M. Parris, Extension Editor, News, KSU; Jack M. Burke, State Leader, Radio-TV-Films, KSU; John Spurling, State Conservation Commission, Fort Scott; Robert Paris, State Association of Conservation Districts, Dighton; Richard Cunningham, League of Municipalities, Topeka; Donald Robertson, Soil Conservation Service, Salina; Lester Branson, ASCS, Manhattan; Rosalie Thompson, Tuttle Creek Development, Manhattan; John Blythe, Farm Bureau, Manhattan; Joan Snyder, League of Women Voters, Salina.

6. Purpose and Assignment of Educational Committee -- State conservation leaders and other citizens felt the need for a comprehensive educational effort on the sediment-pollution issue. The Committee was asked to do three things:

- Outline, prepare, and publish background information on soil management and sediment control that would be used in an organized educational effort.
- Plan a strategy for getting the educational program into every county of Kansas.
- Arrange for training sessions for persons assigned the responsibility to teach or give leadership in the educational effort.

7. Training Sessions Scheduled and Held -- One state and five area meetings were scheduled. The purpose was to inform area and county leaders on the erosion-sediment problem, national legislation on water quality, suggested model legislation, and alternatives for citizen action. Suggestions were given on how to plan, organize and conduct a county information program.

Dates, locations, and attendance at training meetings --

State and Area Meetings

November 14, 1974	Salina (State)	42
December 10, 1974	Hoxie	162
December 11, 1974	Cimarron	194
December 12, 1974	McPherson	210
December 17, 1974	Topeka	170
December 18, 1974	Yates Center	175

8. Special Informational Kits Prepared -- County committeemen and other leaders were given a special information kit that included all fact sheets, script of the slide-tape presentation, task force report regarding state legislation and suggested news releases. There were 1,680 kits assembled and distributed.

9. Slide-Tape Presentation -- A 20-minute tape/80-slide set presentation was prepared by Ralf Graham, Office of Instructional Media, KSU, which gave an overview of the erosion-sedimentation situation, recommendations for coping with the problem, and alternatives for citizen action. Forty-one slide-tape sets were produced, 22 were sold to Conservation Districts and others at cost. Each Area Extension Office had two sets for checkout to county agents.

10. Fact Sheets Printed and Distributed

	Title	Printed	Distributed
#1	Sediment Is A Threat to Environment	32,000	28,900
#2	Organization for Education and Action	21,500	17,100
#3	Scope of Problem in Eastern Kansas	13,000	8,300
#4	Scope of Problem in Western Kansas	19,000	16,600
#5	Construction Causes Sediment	23,000	21,100
#6	Erosion Control Progress, Northeast Kansas	12,000	5,600
#7	Erosion Control Progress, Southeast Kansas	12,000	4,600
#8	Erosion Control Progress, North Central Kansas	14,000	6,500
#9	Erosion Control Progress, South Central Kansas	13,000	10,200
#10	Erosion Control Progress, Southwest Kansas	7,000	6,500
#11	Erosion Control Progress, Northwest Kansas	11,000	9,000
#12	National Water Quality Law	30,000	28,200
#13	Alternatives for Citizen Action	26,000	25,100
#14	Task Force Recommendations	26,000	24,900
#15	Questions and Answers on National Water Quality Law	38,000	31,200
#16	Your Opinion, Please (Survey)	36,000	30,500
#17	Do You Agree With These Citizens Opinions (Survey)	5,000	2,300
		338,500	276,600

11. Attendance at Educational Sessions -- Most counties reported one or more meetings held on the erosion-sedimentation issue. One county held 16 meetings with over 500 attending. Extension agents estimate that 22,000 were involved in the sessions they planned. — Dickinson

12. Citizen Reaction to Issue at Public Meetings -- Farm audiences generally were sympathetic to the problem of erosion and sedimentation and felt that "clean water legislation" was desirable. However, they would like to solve the problem through voluntary action and keep "government" from setting up more rules and regulations.

13. General Concensus on Several Items -- If a new state policy on erosion and sedimentation abatement is necessary, to comply with federal laws, three overall priorities were usually agreed upon and suggested for inclusion into any new sediment abatement policy. These include: cost sharing on permanent conservation practices, local control of the program and flexibility since what's appropriate in eastern Kansas is probably different from western Kansas.

14. Alternatives Presented at Educational Meetings -- Three major alternatives for citizen action were presented for sediment control -- (1) voluntary action, (2) state legislation, and (3) revision of federal laws. Persons participating seem to favor some parts of each.

15. Discussion of Alternatives -- Most citizens felt that the National Water Quality goal of zero discharge of pollutants (sediment) is not feasible because of the complexities of controlling erosion.

Also, the timetable established by federal guidelines for getting erosion under control is unrealistic. The present target date is 1985.

The current voluntary conservation program for ag lands has wide support, but many feel it will take state regulations to strengthen this approach in the future. Continued use of the voluntary program for another 4 to 8 years seems desirable from a landowner's point of view.

The need for state legislation was emphasized by a number of participants. Several provisions have general support. They include:

(1) Holding landowners responsible for sediment but provide cost sharing for permanent conservation measures at 75 percent.

(2) Assigning the Kansas Conservation Commission leadership of the erosion-sediment abatement program at the state level.

(3) Recognizing that an individual is not responsible for pollution caused by a natural disaster, such as a heavy downpour or long periods of drought.

(4) Containing all land under provisions of a new sediment abatement program.

16. Reaction to Senate Bill #12 -- The bill follows the recommendations made by a Kansas Task Force on erosion and sedimentation. This group was appointed by the State Conservation Commission following the Governor's Workshop on soil erosion in 1972.

General public reaction to the bill seems to be that it contains many desirable provisions--local control, an informal appeal procedure, a realistic time schedule to get the program implemented, and penalties for persons who continue to abuse or misuse land.

Changes often suggested include: 75 percent cost sharing on permanent conservation practices and excusing landowners or operators from sediment caused by acts of nature--floods, downpours, and long periods of drought.

In summary, the reaction is positive but many believe it can and should be improved.

Prepared by Wilber E. Ringler, Asst. Director
for Ag Production Programs, KSU

NUMBER OF ENERGY CONSERVATION APPLICATIONS.

M.C.A.A. IS URGING CONGRESS TO PASS LEGISLATION IN FOUR AREAS:

INVESTMENT TAX CREDIT AND/OR RAPID DEPRECIATION FOR CAPITAL IMPROVEMENTS THAT WILL INCREASE THE ENERGY CONSERVING PERFORMANCE OF MECHANICAL SYSTEMS IN NEW AND EXISTING BUILDINGS.

PAYMENT OF PREMIUMS FOR EXCESSIVE USE OF ENERGY, AND CREDIT FOR REDUCTION IN ENERGY USE IN BUILDINGS THROUGH CONSERVATION.

INCORPORATION OF INDUSTRY-DEVELOPED NATIONAL CONCENSUS STANDARDS FOR ENERGY CONSERVATION INTO BUILDING CODES AND REGULATIONS BY REFERENCE*, TO BE GIVEN BROAD APPLICATION BY PROFESSIONALS QUALIFIED IN THIS FIELD (*ASHRAE 90-P SUPERSEDED BY ASHRAE 90-75).

FINANCIAL SUPPORT OF RESEARCH PROGRAMS TO ACCELERATE USE OF COMMERCIALLY FEASIBLE, ALTERNATIVE SOURCES OF ENERGY.

AFTER I HAVE BEEN URGING ACTION, IT MAY SEEM INCONSISTENT, BUT M.C.A.A. URGES THAT STATE LEGISLATION BE DELAYED UNTIL ASHRAE 90-75 IS COMPLETED AND THEN INCORPORATED BY REFERENCE BECAUSE, UNTIL THEN, WE HAVE NO NATIONALLY RECOGNIZED GUIDELINE OR BASIC REFERENCE FOR ENERGY CONSERVATION IN CONSTRUCTION. WE COULD HAVE WIDE VARIATIONS AND CONFLICTING REQUIREMENTS IF EACH STATE DOES ITS OWN THING WITHOUT USING A COMMON GUIDELINE.

SOLAR HEAT. I ATTENDED A SOLAR HEAT SEMINAR AT THE CROWN

CENTER ON JUNE 14 PUT ON BY MIDWEST RESEARCH INSTITUTE, KANSAS CITY CHAPTER OF A.I.A., AND KANSAS CITY CHAPTER OF ASHRAE. I PERSONALLY BELIEVE THAT SOLAR HEAT IS OUR BRIGHTEST HOPE TO PARTIALLY SOLVE OUR ENERGY PROBLEM. CONVENTIONAL HEATING AND COOLING SYSTEMS ARE STILL USED EXCEPT THAT THE BOILER OR FURNACE IS REPLACED WITH VARIOUS TYPES OF SOLAR COLLECTORS, USUALLY THE FLAT PLATE TYPE, AND THE HEAT IS STORED DURING THE NIGHT OR CLOUDY DAYS IN AN INSULATED TANK OF WATER OR IN ROCKS.

PERHAPS IN KANSAS WE SHOULD FIGURE ON USING SOLAR HEAT TO DO, SAY 70% OF THE JOB ON A -10° DAY AND THEN SUPPLEMENT THE BALANCE WITH SOME UTILITY SOURCE OF HEAT ENERGY,. THE REASON BEING TO REDUCE THE COST OF COLLECTORS WHICH IS A MAJOR COST ITEM.

WE SHOULD NOT OVERLOOK THE HUGE AMOUNT OF ENERGY REQUIRED TO HEAT DOMESTIC HOT WATER THE YEAR AROUND. SOLAR HEAT COULD SUPPLY AN EXCESS AMOUNT OF ENERGY FOR THIS DURING MOST OF THE YEAR.

WE HAVE SOME FINE ENGINEERING SCHOOLS IN KANSAS, AND I WOULD SUGGEST THAT WE USE THEM IF WE CAN TO DO SOLAR HEAT RESEARCH FOR THE KANSAS LOCALITIES, BECAUSE COLLECTOR CAPACITY IS SO CLOSELY RELATED TO WEATHER THAT INFORMATION GATHERED IN COLORADO OR FLORIDA IS NOT TOTALLY APPLICABLE FOR US IN KANSAS. THREE SOLAR HEATED RESEARCH HOMES ARE BEING BUILT AT FORT COLLINS, COLORADO.

A WORD ABOUT COST. YES, THE FIRST COST IS HIGH BY PRESENT ECONOMIC STANDARDS. I SUBMIT, HOWEVER, THAT IF WE GIVE TOP PRIORITY TO ENERGY CONSERVATION, FIRST COST OF A SOLAR SYSTEM IS SECONDARY. THE COST OF FUEL IS OF LITTLE IMPORTANCE IF THERE ISN'T ANY. AMORTIZING THE COST OF A SOLAR HEATING AND COOLING SYSTEM AGAINST FUEL COST SAVINGS IS EVADING THE ISSUE OF FUEL CONSERVATION. WE, THE CONSUMERS, WILL HAVE TO FOREGO OTHER THINGS IN ORDER TO APPLY OUR PERSONAL ECONOMIC RESOURCES TO ENERGY CONSERVATION. I DON'T WANT TO GO BACK TO THE SHOVEL AND THE HOE; THAT'S A PART OF THE GOOD OLD DAYS THAT I DON'T WANT TO ENJOY AGAIN.

THE WRITING OF LEGISLATION FOR ENERGY CONSUMPTION STANDARDS THAT WOULD COVER EACH AND EVERY SITUATION SEEMS TO ME WOULD BE A PRACTICAL IMPOSSIBILITY, BECAUSE WE ARE DEALING WITH A TECHNICAL MATTER THAT HAS SO MANY VARIABLES. THEREFORE, I WOULD SUGGEST THAT THE LEGISLATION INCLUDE BY REFERENCE TECHNICAL GUIDELINES SUCH AS ASHRAE 90-75. IN OTHER WORDS, DEAL WITH PRINCIPLES INSTEAD OF A LAUNDRY LIST OF SPECIFICS.

THANK YOU.

CHARLES D. CAREY, JR.
EXECUTIVE DIRECTOR

Attachment #1

ENERGY CONSERVATION - A POSITION STATEMENT

TO: The Special Committee on Energy and Natural Resources

BY: The Kansas Chapter, American Institute of Architects

June 25, 1975

Mr. Chairman and members of the committee, my name is Ross Martin. I am Executive Director of the Kansas Chapter, American Institute of Architects, a statewide professional society for architects and a component affiliate of national AIA. On behalf of our membership, I would like to thank you for inviting our participation today as you continue your studies of the important energy issues facing Kansas.

The AIA shares with the administration and this committee the concern that it is time our state recognizes the need for a major effort to develop an energy policy. As indicated by our position paper on energy, we are advocating an emphasis on conservation as contrasted to attempts to stimulate an increase in the production of oil and gas or an increase in the capacity of electric power generation. Two major reports about how valuable it would be to this nation and by implication to this state, to have energy efficient buildings, and how economically, politically, and administratively feasible such a strategy would be, have been prepared by the American Institute of Architects. These two reports, copies of which I have for you to review, are:

(1) Energy Conservation in the Built Environment: A Gap in Current Strategies and
(2) A Nation of Energy Efficient Buildings by 1990.

These reports suggest that it is potentially possible to reduce energy consumption in buildings on a national scale by 12.5 million barrels of oil per day. They point out that if the nation were to achieve these savings or any substantial portion of them that there would be a permanent savings which would continue indefinitely. This contrasts sharply with making an equivalent investment to increase the supply of energy only to have it wasted unnecessarily in buildings which are not well adapted to energy use and subsequently are overheated, overcooled and overlighted.

About two years ago, recognizing that the energy issue was of increasing importance, the national AIA established a task force to examine the potentials of

energy conservation in buildings. The report, Energy in the Built Environment, gives a strategic evaluation of the potential for energy conservation in buildings and recommends a national program. It also outlines a basic action plan for getting underway. The AIA Board has approved the recommendation of the report as official national AIA policy and an Energy Steering Committee has been named to carry the program forward. The AIA national convention also unanimously approved a resolution calling upon the nation to develop a high priority program for energy conservation in the built environment.

From another prospective, the AIA Research Corporation under contract with the General Services Administration has developed a study of energy conservation design guidelines for office buildings. This work has been published by GSA and is available through the Government Printing Office. The AIA Research Corporation also produced a report for the Ford Foundation's Energy Policy Project, entitled, " Energy Conservation In Building Design".

Through other committees the AIA continues to explore the relationships of the nation's energy problems as they relate to the architectural and building design profession. At the state level, we in Kansas, have begun a serious effort to bring our own professionals up to date on the latest design approaches and conservation techniques for conserving energy in buildings. We intend to pursue this program within the framework of our continuing education workshops and seminars.

America stands to gain big dividends by halting waste of energy in buildings. We think Kansas does too. Studies of total energy usage in the United States indicate that buildings use about 1/3 of the total consumed. Studies show that savings of 40% can be accomplished in existing buildings and 60% or more in new structures. Conservation of this magnitude can be accomplished through a comprehensive approach starting with short range early steps, but must also include long range measures which are still in the development stage.

In terms of conserving energy in buildings, there are probably three approaches which are most often discussed. One concerns design standards, another involves an energy budget and thirdly, there is a comprehensive approach.

Design standards prescribe specific characteristics of building materials and components that must be used in the design process with the intent of optimizing

the energy efficiency of the entire building. The degree of specificity can vary. For example, thermal transmission values ("U" values) can be prescribed for any size building component (windows, entire wall system or the total building envelope). Design standards do not take into account how specific materials, components or subsystems are assembled, constructed and finally utilized in what constitutes the final total building system. Moreover, design standards currently being developed only take new buildings into account.

Energy budgets attempt to conserve energy by setting a specified amount that buildings would be permitted to consume. There are variations in this approach. One method involves establishing the allowable units of energy that can be consumed per unit of building floor area over a given period of time (i.e. BTU's per square foot per year). An advantage of this approach is that it permits greater flexibility for how specific building materials, components and subsystems are integrated into the final building as a whole. The largest task ahead with this concept is establishing the budgets themselves since energy consumption in buildings is affected by many factors including building type, size, location and operational practices among others.

Comprehensive approaches are directed toward capturing the full potential of energy savings offered by the building sector utilizing current technology. To do this, consideration is given to the kinds of energy being used and the purpose for which energy is consumed. Comprehensive approaches take into account existing as well as new buildings and recognize that buildings can generate and regenerate energy in addition to consuming it. These approaches also tend to capitalize and harmonize on economic incentives. Furthermore, they take into account the institutional factors that have a significant bearing on how energy effective techniques and technologies are applied and utilized in the total building process of design, engineering, construction and operation.

I would like now to refer to design standards and,in particular, to comment on ASHRAE Standard 90-P with which you may already be familiar. ASHRAE's draft standards 90-P contains what AIA regards as prescriptive standards for energy conservation in new buildings. Our feeling is that this draft represents a good compendium of engineering considerations for energy conservation and should be regarded as a valuable reference. It is our understanding that some states have been awaiting the ASHRAE document to incorporate it into legislation. A

few have commissions directed to develop appropriate legislation. The AIA however, continues to feel the incorporation of even the ASHRAE standards into legislation is ill-advised at this time.

We would like to go on record as offering our vigorous support to legislation which provides for broad incentives to conserve energy in buildings. Such incentives should be structured to include both new and existing buildings and should cover the full range of building types. We do not feel that prescriptive standards of energy conservation should be legislatively defined and would counsel against efforts of this nature for these reasons:

The present state of knowledge about specific opportunities for conservation, the new technological capabilities which could be spawned and the specific consequences of imposing prescriptive standards even in an interim form are such that the actions leading to code requirements are inadvisable. It is difficult to imagine a regulatory system that can remain sufficiently flexible to take advantage of rapid developments in knowledge and technology which we believe are forthcoming.

In addition, prescriptive standards do not treat the basic cause of energy waste, namely that existing financial and tax processes actually provide more economic incentive to waste energy than to save it! Prescriptive standards would not be as effective as a more positive approach which makes it in the self interest of the developer or the building owner to conserve energy.

Also, present technology is at best grossly below its full potential. Statewide standards would tend to stabilize this technology. Manufacturers would redesign to these standards and make capital investments in equipment to produce systems which just meet these requirements. Once the investments are made, the cost of adopting alternative manufacturing systems becomes high. This would institutionalize existing technology and depress innovation.

The legal status of prescriptive standards appears somewhat ambiguous since they do not deal with clear threats to the health or safety of the individual or to the public welfare. For example, many attempts to restrict development by moratorium have fallen when challenged in the courts. It is also questionable that a capability exists within the state and local governments to admin-

Attachment L

MECHANICAL CONTRACTORS Association of Kansas, Inc.

PHONE 913/354-1130 • 325 FIRST NATIONAL BANK TOWER • ONE TOWNSITE PLAZA • TOPEKA, KANSAS 66603

25 June 1975

TO: INTERIM SPECIAL COMMITTEE ON ENERGY AND NATURAL RESOURCES OF THE KANSAS LEGISLATURE

RE: PROPOSAL NO. 62

THANK YOU FOR THIS OPPORTUNITY TO CONTRIBUTE TO THE SOLUTION OF OUR COLOSSAL ENERGY PROBLEM, MADE BIGGER BY PUBLIC APATHY AND SKEPTICISM.

THE MECHANICAL CONTRACTORS ASSOCIATION OF KANSAS IS A NON-PROFIT CORPORATION WHOSE PURPOSE IS TO PROMOTE THE GENERAL WELFARE AND PROSPERITY OF THE MECHANICAL CONTRACTING INDUSTRY, INCLUDING THE PUBLIC'S HEALTH AND COMFORT. OUR MEMBERS INSTALL PLUMBING, HEATING AND COOLING SYSTEMS, AND PROCESS PIPING.

SINCE OUR MEMBERS INSTALL ENERGY CONSUMING HEATING AND COOLING SYSTEMS, OUR INDUSTRY IS AUTOMATICALLY INVOLVED AND CONCERNED ABOUT ENERGY CONSERVATION. WE STAND READY TO COOPERATE AND HELP BY APPLYING PRACTICAL KNOWLEDGE AND SKILLS.

AFTER HAVING SEEN THE FILM "ENERGY - CRITICAL CHOICES AHEAD," SHOWN BY THE FEDERAL ENERGY AGENCY AND MADE BY THE

DEPARTMENT OF COMMERCE, ALONG WITH OTHER STATEMENTS AND REPORTS, GRAPHS AND CHARTS SHOWING THAT FOR YEARS ENERGY CONSUMPTION HAS BEEN INCREASING FASTER THAN OTHER RELATED CRITERIA, AND AFTER ATTENDING THE H.E.W. ENERGY CONFERENCE ON JUNE 13 IN KANSAS CITY, MISSOURI, I BELIEVE THAT WE HAVE A REAL ENERGY PROBLEM.

IF WE HOPE TO RETAIN ANY SEMBLANCE OF OUR PRESENT LIFE STYLE, WE MUST ACT BY APPLYING SOUND ENGINEERING PRINCIPLES.

THE MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA INFORMS THAT 30% OF THE TOTAL ENERGY CONSUMED IN THE UNITED STATES IS USED FOR HEATING, COOLING AND OPERATION OF EQUIPMENT IN BUILDINGS, THAT THERE ARE 24 BILLION SQUARE FEET OF BUILDING AND OFFICE SPACE AND THAT 25 - 50% ENERGY IS WASTED IN MOST BUILDINGS.

SOME EXAMPLES OF WASTED ENERGY IS EXCESSIVE EXHAUSTING OF AIR FROM BUILDINGS, SKIMPY THERMOSTATIC OR ZONE CONTROL OF TEMPERATURES WHICH FORCES OCCUPANTS TO SET THERMOSTATS TO PROVIDE HEAT TO THE COLDEST ROOM IN WINTER AND THE HOTTEST ROOM IN SUMMER, CAUSING EXCESS ENERGY TO BE WASTED BY SOME ROOMS BEING OVERHEATED OR UNDERCOOLED, BY LEAKING STEAM TRAPS AND HEAT EXCHANGERS, ETC.

HOW DO YOU ELIMINATE THESE ENERGY WASTING CONDITIONS? I WOULD SUGGEST THAT THE ONLY PRACTICAL SOLUTION WILL BE TO ENLIST THE SERVICES OF A COMPETENT ENGINEERING FIRM TO MONITOR AND RECORD EACH AND EVERY ENERGY CONSUMING DEVICE IN A BUILDING, THEN ANALYZE

THIS INFORMATION CRITICALLY, TO SEE IF APPROXIMATELY THE SAME RESULTS CANNOT BE ACHIEVED BY AN ALTERNATE METHOD WHICH WOULD CONSUME MUCH LESS ENERGY. QUITE LIKELY, THE ALTERNATE SYSTEM WILL NOT GIVE THE MAXIMUM IN COMFORT. WE MAY HAVE TO COMPROMISE A LITTLE WITH COMFORT TO SAVE ENERGY. WE CAN'T HAVE OUR CAKE AND EAT IT, TOO.

YOU MIGHT ASK IF AN ENGINEER DESIGNED THIS ENERGY WASTING SYSTEM, WHY GO BACK TO HIM OR ANOTHER ENGINEER? I WOULD SUBMIT THAT UP TO NOW COMFORT HAS BEEN THE PRIME DESIGN OBJECTIVE. NOW, OUR ENGINEERS MUST GIVE HIGHEST PRIORITY TO MINIMUM ENERGY CONSUMPTION.

I WOULD SUGGEST THAT THE STATE OF KANSAS LEAD AND LIGHT THE WAY FOR THE PRIVATE SECTOR BY APPLYING ENERGY CONSERVATION MAINTENANCE AND REDESIGN AND ALTERATION OF EXISTING ENERGY WASTING SYSTEMS IN THEIR BUILDINGS. YOU HAVE A KNOWLEDGABLE ENGINEER IN THE STATE ARCHITECT'S OFFICE BY THE NAME OF FRANK APPLEGATE. I URGE YOU TO TAP HIS KNOWLEDGE SOON IN THIS REGARD.

ONE STATISTIC THAT I WANT TO SHARE WITH YOU IS "GAS PILOTS CONSUME MORE THAN 223 BILLION CUBIC FEET OF NATURAL GAS PER YEAR IN MORE THAN 30 MILLION GAS HEATED HOMES IN THE UNITED STATES." IT IS SUGGESTED THAT ELECTRICALLY IGNITED PILOTS COULD ELIMINATE THIS ENERGY LOSS. THE ELECTRICAL ENERGY REQUIRED WOULD ONLY BE MOMENTARY DURING IGNITION. THIS, I THINK, DRAMATIZES THE MAGNITUDE OF OUR TOTAL ENERGY CONSUMPTION AND, AT THE SAME TIME, INDICATES THAT NO ONE THING IS THE SOLUTION BUT RATHER THE SUMMATION OF A LARGE

ister such standards effectively. It is important also to note that the strategy of prescriptive standards applies only to new construction. The emphasis should be on the kind of broader strategies that encourage energy savings in existing buildings as well. And finally, it is by no means clear that prescriptive standards will produce long term energy conservation since so much depends upon how the systems are maintained and operated.

Energy conservation in buildings can only be significantly achieved through a comprehensive multi-faceted approach which considers the larger perspective of total energy utilization, not stopping short with the building alone.

In summary, Mr. chairman and members of the committee, the Kansas Chapter, AIA urges the adoption of a comprehensive plan for conserving energy in Kansas. We urge the earliest development of such a plan together with appropriate guidelines and positive economic incentives to conserve energy. Again, it is our position that prescriptive standards are at best a short sighted approach as they do not treat a basic cause of energy waste. That is because existing financial and tax processes actually provide incentives to waste energy, not conserve it.

We feel Kansas can take the lead through its governmental capabilities and professional resources. We believe there are indeed big dividends in halting the waste of energy in buildings. This is especially so because there also exists in our near future an impending shortage of the necessary capital to expand energy generation facilities.

Kansas can assume a leadership position by exploring all of the solutions. Careful attention must, however, be given to weighing long range considerations as well as short term and interim measures. Much more is involved than merely adding more insulation and using fewer lights. Regenerative energy sources - the sun-- wind currents--waste recycling--must all be made a part of our energy conservation strategy.

The architectural profession stands ready to help. We have offered the Kansas Chapter's assistance to the governor, to the Director of Architectural Services and to you, the members of the Kansas legislature. That offer is renewed again today because we feel we have a solemn obligation to help prepare the way for the future.