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A PROJECT REVIEW FOR THE GROUND WATER SECTION OF THE KANSAS GEOLOGICAL SURVEY FOR FISCAL YEAR 1977

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The Groundwater Section of the Kansas Geological Survey has two broad overall priorities. These two priorities are 1) in western Kansas to be aware of and as far as possible supply information sufficient to guarantee adequate answers to problems arising concerning irrigation; 2) in eastern Kansas the basic overall priority is to evaluate and review the water and resource needs as defined by people. Within these two overall guidelines, a variety of projects have been completed with a constant reassessment of priorities sufficient to stay ahead of the immediate and near future problems. To this end, the Groundwater Section plays a variety of roles within the Kansas Survey, within the University community, and within the interagency community. As such, it necessarily follows that in a variety of projects, the Groundwater Section will take the lead role in whatever studies are necessary. It also follows that in a variety of projects that the Groundwater Section will play predominently secondary or support type of role. An effort is also made within the Section to constantly upgrade the

types of projects under consideration and as far as possible to spawn activities within other sections or parts of the University and within the interagency community such that the overall best interests of the state are served.

Within the projects that will be briefly described below, two general categories will be observed. They are: 1) activities or projects that are of a continuing nature and will continue until such time as need ceases to exist. There are also projects and activities that are defined with real time limits that serve some specific purpose that are problem orientated and serve to define problems beyond the scope of individual time limited projects.

Continuing Projects

1. State wide Groundwater Observation Well Program.

This project is set up in cooperation with the U.S.G.S. and the Division of Water Resources of the State Board of Agriculture. The primary function of this activity is to maintain a set of observation wells that are periodically measured in sufficient duration to determine and evaluate changes in water level. The basic objective of this study is to record the changes in water level to the extent that problem areas can be defined and studied as a part of short-term projects. While the nature of this activity is one of surveillance, it also provides basic information for short-term projects.

As a part of this project, the Kansas Geological Survey prepares on an annual basis water level change maps for one of the three major aquifer subdivisions in western Kansas. Each of the major subdivisions is published once every three years. It is our intention to further upgrade this publication and to include not only the changes that have taken place but the amount of irrigation water consumed, the amount of acreage involved in the area, the amount of acreage that is irrigated and the changes that have taken place within these categories over the previous 3-5 years. It is our intent that this report include not only the changes, but also more and better definition of the reasons for these changes.

2. Advisory and Support Services.

Under this basic project short rapid responses are prepared for all types of requests concerning geologic and hydrologic information needed by individuals and various other entities concerning problems of a specific nature in the state. Within the scope of this activity, somewhere between 800-1,000 requests are answered in an average year. It should also be noted that this form of service is on the rise in that it is expected that within 5 years the requests will probably top 3,000-4,000 in an average year.

Also included in this project are the various support activities necessary to help projects in other parts of the Survey, other parts of the University community or other agency needs. Activities currently under way or currently

being planned include at least the following: a)basic sampling support for the project defined as geochemical sampling of irrigation waters in western Kansas; b)uranium, copper, coal and heavy oil studies undertaken by both the Geochemistry Section and the Mineral Resources Section of the Kansas Geological Survey; c)the use of aerial photography and, ERTS data to define irrigated acreage and consumptive use of irrigation waters.

3. Research on Water Systems.

Under this general program the Kansas Survey has undertaken to develop computer packages of one type or another sufficient to handle problems of the immediate and near future. This activity has taken as its prime priority the development of "on the shelf" computer software. It has also assumed responsibility for theoretical support to ongoing field projects. Requirements of this continuing project basically have been satisfied. The priority now is that of putting the basic software to use doing peripheral parametric studies and publishing the material. The software packages include but are not limited to the following: a variety of heat flow studies, groundwater flow models, groundwater quality models, transportation models, and a variety of oil and gas flow models.

4. Professional Development

It is recognized that in order for staff members to maintain an awareness of new advances in their given fields, that time to attend meetings and on ocassion to take classes

or to teach are vital ingredients in professionals remaining technically competent. In addition, professional development helps the organization as a whole to maintain a high level or morale. Within this activity professionals are therefore incouraged to seek whatever efforts and whatever activities they feel are needed to keep them adequately informed concerning changes within their chosen profession.

Projects With a Finite Time Frame

1. Hydrology of the North-Central High Plains.

This project will include 9 counties in north-central Kansas high plains over half of which have never been studied. The study area includes the following counties: Norton, Phillips, Smith, Graham, Rooks, Osborne, Trego, Ellis and Russell. The primary objectives of this study are the following: 1) to determine as nearly as possible the availability of groundwater within the area; 2) to as far as possible define the interconnection between the groundwater system and the surface water system in the area; 3) to determine the effects of groundwater development upon the surface water system and its effect upon the surface water structures that exist within this area; and 4) to determine as nearly as possible the groundwater quality problems that will increase as groundwater for irrigation purposes takes place. As a secondary or spin-off project or projects, it is intended that additional studies will be done in this area primarily from the standpoint of additional mineral

3. Groundwater Hydrology of Glacial Deposits of Northeastern Kansas.

Northeastern Kansas including all or parts of 16 counties was overridden by one or more glaciers during the Pleistocene Ice Age. The materials carried and deposited by ice, or by water associated with the melting ice, have produced geologic conditions, different from those in any other region in Kansas. The deposits associated with the Pleistocene Age includes some important aquifers, particarly those associated with glacial buried valleys and outwash valley trains. These aquifers are not found everywhere in the glaciated area and a detailed study is necessary to determine the location and extent of these aquifers and the present and future potential of the aquifers as sources of municipal, industrial and irrigation water supplies. Much addtional field work will be necessary in the area to coordinate and consolidate the basic information for public consumption.

4. Assessment of Options in Groundwater Development and Management.

High plains hydrology is basically different from hydrology in other parts of the state. It is characterized by high elevation, sparse rain fall, loess soils and hot, dry winds. Development and management options practiced currently are based on maximum current crop yield as opposed to optimum long-term profit based on a depleting resource. This project will focus on profit, management and development options based on different life spans of the groundwater system.

State water law is based on the premise of "beneficial use" and it is necessarily blind to a wide variety of practices that are not optimally beneficial in the long-term. Generally, the systems in western Kansas are not over appropriated. Large scale gross assessment is nearing completion and real concern is growing in the irrigation community concerning better water utilization and management. Therefore, it is timely to consider development and management guidelines based on the depletable resource conformable to the spirit of "long-term beneficial use".

Within the scope of this project at least the following will be done: 1)review development trends in major groundwater systems; 2)review management practices in western Kansas as compared to available management tools; 3)do computer simulation of the groundwater systems based on current development trends and management practices; 4)do computer simulation of the groundwater systems based on an optimum development capacity and an optimum management practice; 5)integrate computer simulations with economic parameters to compare long-term profits.

It is within the scope of this project that the Groundwater Section of the Kansas Geological Survey will make every effort to alert and educate the people concerned with irrigation in western Kansas to the consequences of their actions. It is also within this particular project that the Survey will provide guides and a variety of services in support of developing groundwater management districts. It

is hoped that within this particular project that the management districts will take it upon themselves to provide the additional information is necessary to do a good job of modeling the groundwater systems. This would include at least the following: a) concise information concerning where wells exist; b) the quantity of production from these wells; c) concise feedback from the irrigation community specifying a desired longevity of the system; and d) quantity of water that should be left in the system to satisfy emergency demand during periods of drought.

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