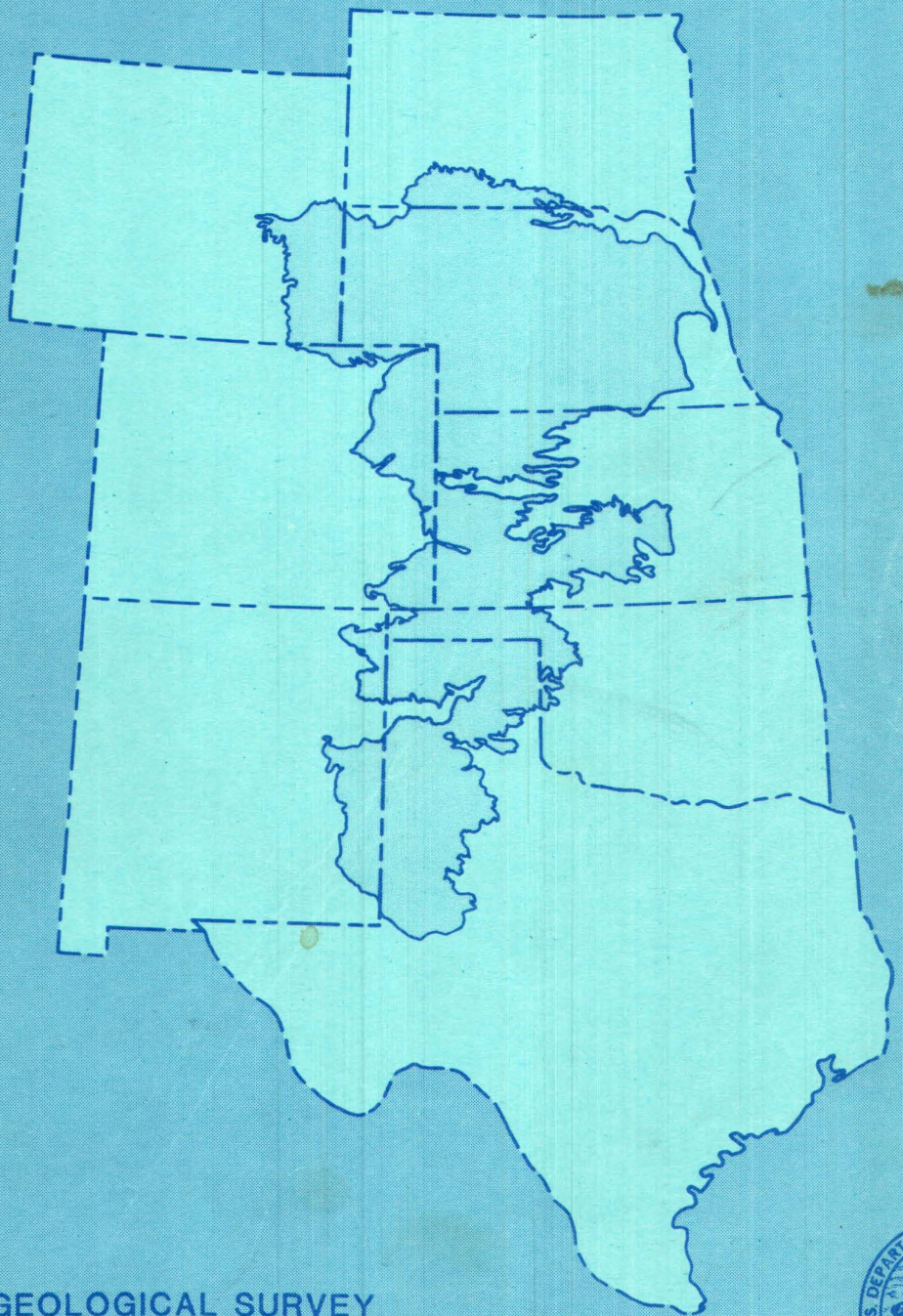
EVALUATING METHODS FOR DETERMINING WATER USE IN THE HIGH PLAINS IN PARTS OF COLORADO, KANSAS, NEBRASKA, NEW MEXICO, OKLAHOMA, SOUTH DAKOTA, TEXAS, AND WYOMING; 1979



U.S. GEOLOGICAL SURVEY
WATER RESOURCES INVESTIGATIONS 80-111

Heimes

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONVERSION TABLE

Multiply inch/pound units	By	To obtain metric unit
inch	25.40	millimeter
mile	1.609	kilometer
acre	0.4047	square hectometer
acre-foot	1,233	cubic meter
square mile	2.590	square kilometer
horsepower	745.7	joule per second
cubic foot per minute	0.4719	liter per second
gallon per minute	0.06309	liter per second

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ABSTRACT

The volume and areal distribution of ground-water pumpage (withdrawals) for irrigation during 1980 are required for the High Plains Regional Aquifer-System Analysis. During 1979, approaches and instrumentation that might be suitable for application to 1980 water-use determinations were tested. Pumpage was sampled by monitoring time of operation and discharge of irrigation wells during the growing season. The total volume pumped during the irrigation season was compared to the crop and acreage irrigated. This comparison provided a means of extending sampled pumpage information to unmonitored areas using irrigated-cropland maps.

A transient-time flowmeter proved to be reliable for providing discharge data and a vibration-sensitive timing device for providing time of operation information. Statistical analysis of comparisons between pumpage and irrigated cropland indicated that significant differences existed in the amounts of water applied between flood- and sprinkler-irrigation systems. However, statistical analyses of differences in amounts of water applied for various crop types and for selected climatic factors were inconclusive.

A variety of approaches were tested to develop the irrigated-cropland maps needed to extend sampled-pumpage data. Of the methods tested, only Landsat imagery proved to be cost effective for application to an area as large as the High Plains. The results obtained during the 1979 evaluation of instrumentation and pumpage-sampling approaches have been used to formulate a strategy for monitoring irrigation-water use in the High Plains during 1980.

INTRODUCTION

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide the hydrologic information needed for the development of computer models to evaluate the aquifer's response to ground-water management alternatives. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report describes the approaches and instrumentation that were tested for sampling ground-water pumpage (withdrawal) in parts of the High Plains during 1979. These tests were conducted to define the most suitable techniques for determining ground-water use for irrigation in the High Plains region during 1980.

Collection and analysis of data for this effort required the cooperation of U.S. Geological Survey, National Aeronautics and Space Administration, State, and local employees, and individual irrigators. Without their support this study could not have been conducted.

High Plains Description

The High Plains aquifer underlies an area of approximately 177,000 square miles, including parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming (fig. 1). This aquifer, which is composed of saturated gravel, sand, silt and clay, is the only source of irrigation water for most of the area. The flat to gently rolling terrain that characterizes the High Plains region is extensively cultivated and the area has undergone rapid development for irrigation in recent years.

Mean annual precipitation in the region ranges from about 14 to 30 inches with about 75 percent falling during the growing season. However, persistent winds and hot summer temperatures cause large rates of evaporation in the High Plains. Class A pan evaporation ranges from about 60 inches per year in northern Nebraska to 100 inches per year in western Texas. Because of the small amounts of precipitation and the large evaporative demand, little precipitation is available to recharge the ground-water system. A detailed discussion of the physiography and climate of the High Plains region is contained in Gutentag and Weeks, 1980.

Water Use

Prior to 1930, agriculture on the High Plains consisted primarily of dry-land farming and cattle grazing. Ground-water irrigation developed rapidly after the "Dust Bowl" days with the availability of inexpensive energy and technical advances in drilling and pumping techniques. During 1952, about 26,000 wells were used to pump 3.0 million acre-feet of water on 2.7 million acres of land (Lohman, 1953) and by 1977, 168,000 wells were used to pump 30 million acre-feet of water on 16 million acres of land (Gutentag and Weeks,

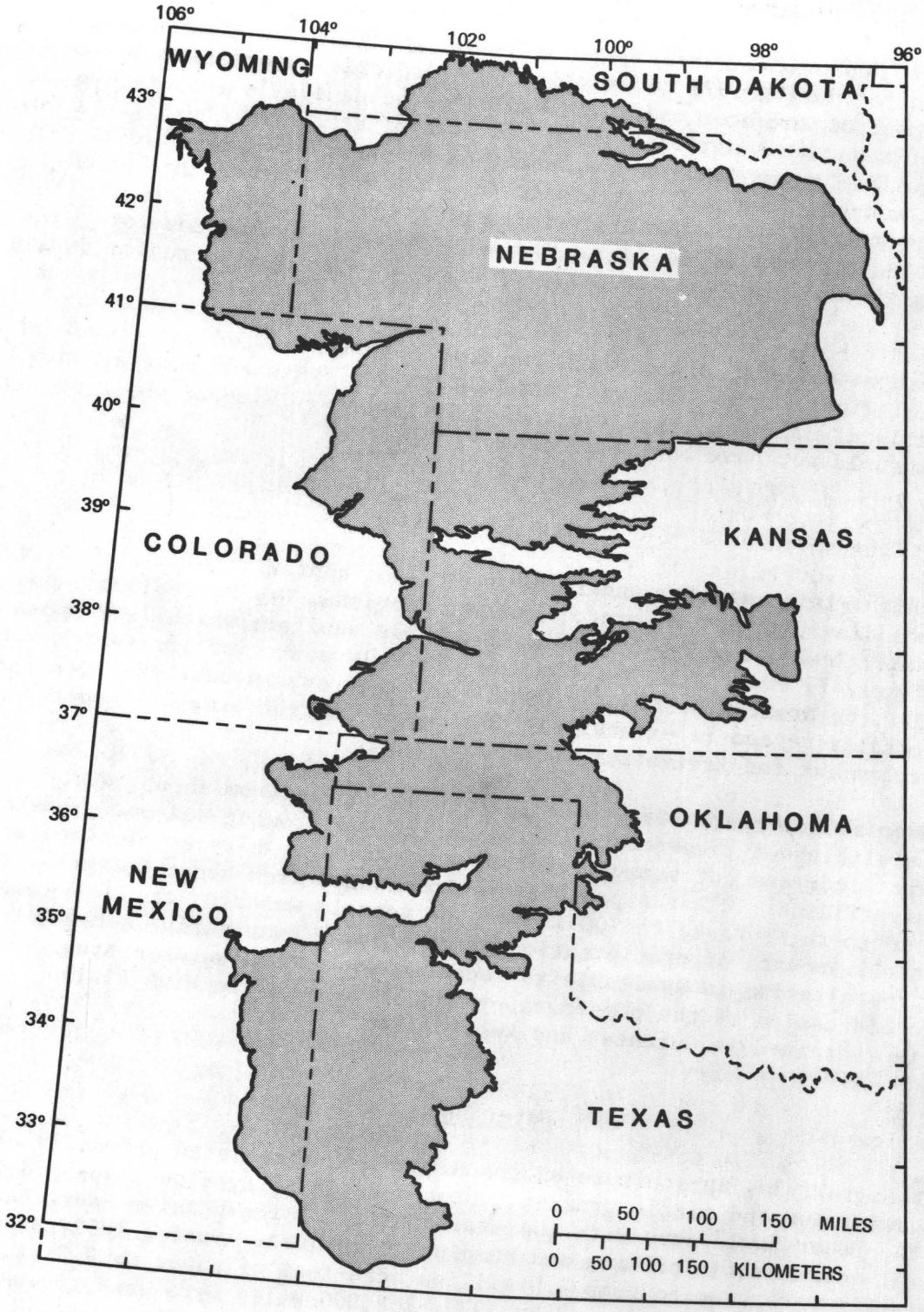

Figure 1.—Location of High Plains aquifer (shaded).

1980). Estimates of acreage and the number of wells by States in the High Plains during 1977 are summarized in table 1. The acreage currently irrigated by the High Plains aquifer represents approximately 23 percent of the irrigated land within the United States. During 1977, about 35 percent of the area of the High Plains was cropland, and about 14 percent of the area was irrigated.

Based on 1977 crop statistics compiled by the U.S. Department of Agriculture, about 15 percent of the corn, 70 percent of the grain sorghum, and 23 percent of the upland cotton produced in the United States were grown in the High Plains States. Receipts from irrigated crops and related beef cattle production in this region exceed 12 billion dollars annually according to recent estimates (Grubb, 1978). Consequently, significant changes in the amount or distribution of irrigated cropland could affect the economy of the High Plains region dramatically.

Extensive development of the ground-water system for irrigation, combined with the small rate of recharge has resulted in large water-table declines in many areas of the High Plains. Various approaches have been suggested to control the declining water levels in the High Plains region. These approaches include: Increased use of conservation techniques, importation of water to augment existing supplies, and artificially increasing available water within the region through weather modification or changes in land-management techniques. To evaluate these or other management approaches, reliable and accurate water-use information is needed.

Sampled pumpage cannot be extrapolated directly to unmeasured wells and it is impossible to monitor ground-water pumpage at each of the approximately 170,000 irrigation wells located in the High Plains region. However, ground-water pumpage for irrigation is related to crop acreage irrigated. By establishing the relationships between irrigated acreage and ground-water pumpage, estimates of pumpage could be compiled for large areas using cropland maps combined with sampled pumpage information.

APPROACH

Two test areas (fig. 2) were selected to develop methods and test instrumentation for determining ground-water use for irrigation in the High Plains. The eight county test area located in the northern High Plains region included three counties (Phillips, Yuma, and Kit Carson) in Colorado, two counties (Cheyenne and Sherman) in Kansas, and three counties (Chase, Perkins, and Dundy) in Nebraska. The two-county test area located in the southern High Plains included Hockley and Lamb Counties in Texas. The approach for determining water use included: (1) Developing a statistical approach to sample ground-water pumpage for irrigation, (2) testing instrumentation, (3) developing suitable procedures for measuring the annual volume of ground water pumped from selected irrigation wells, (4) developing relationships between the annual volume of ground water pumped and the acreage irrigated, and (5) determining a suitable approach to mapping irrigated cropland for the entire High Plains region.

Table 1.--*Area of High Plains aquifer and estimated acreage irrigated by ground water, 1977 (from Gutentag and Weeks, 1980)*

State	Area of State within High Plains		Area of High Plains within State (percent)	Estimated irrigated acres[1]	Estimated number of wells
	(square miles)	(percent)			
Colorado---------	14,870	14	8	585,000	4,300
Kansas----------	31,050	38	18	3,250,000	23,000
Nebraska---------	64,400	83	36	5,560,000	59,300
New Mexico-------	9,710	8	6	480,000	6,000
Oklahoma---------	7,350	11	4	225,000	2,200
South Dakota-----	5,290	7	3	20,000	160
Texas------------	36,080	13	20	6,000,000	72,000
Wyoming----------	8,190	8	5	90,000	1,140
TOTALS---------	176,940	--	100	16,210,000	168,000

[1]The data were obtained from State and Federal agencies and adjusted to include only the areas irrigated by ground water.

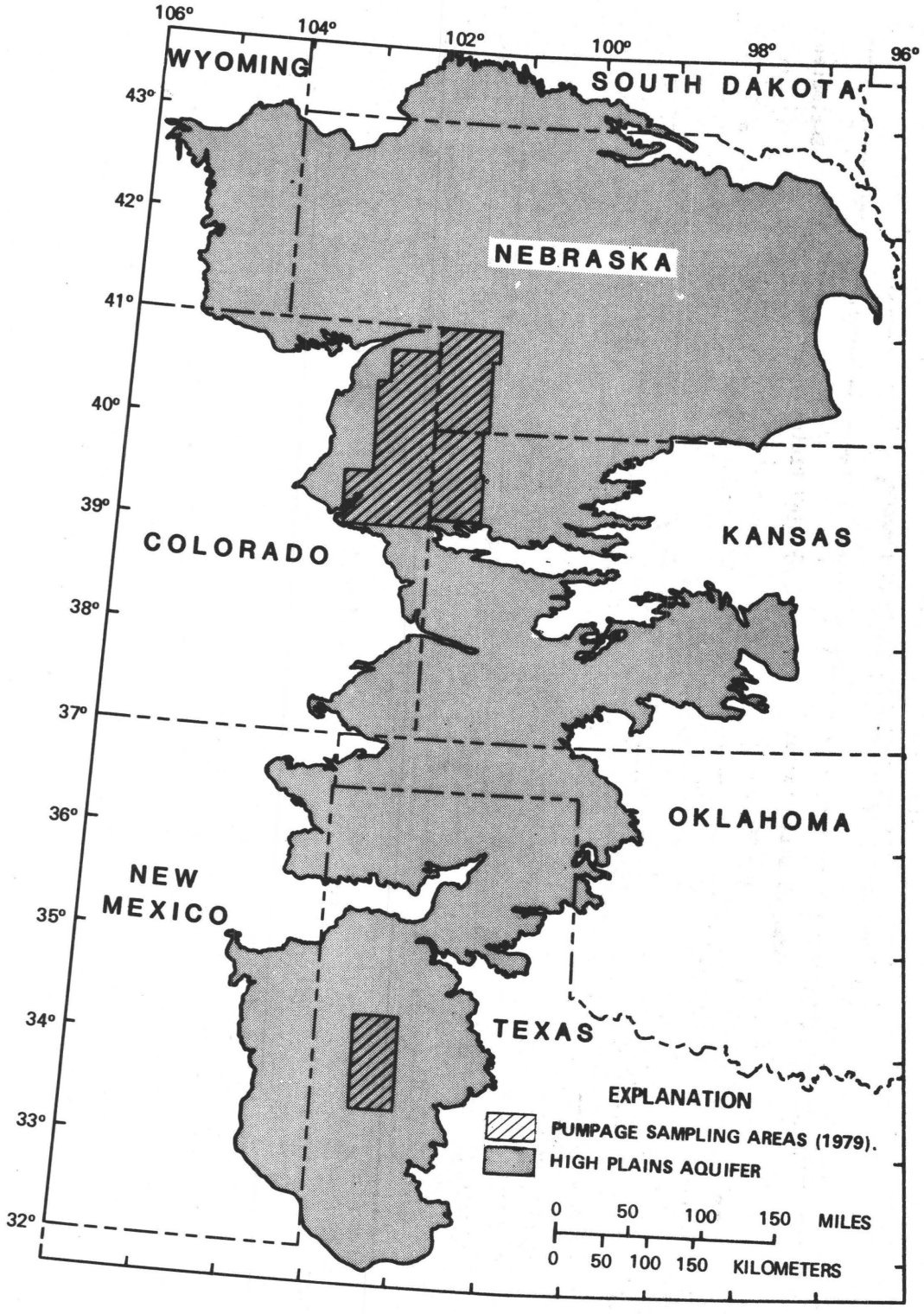

Figure 2.— Location of 1979 pumpage sampling areas.

The annual volume of ground water pumped was measured at about 250 irrigation wells. The annual volume pumped was computed by multiplying the pumping rate by the total time of pumping. Several types of portable flowmeters for measuring pumping rate, and one timing device to monitor total time of pumping, were tested for suitability and accuracy. The depth of water applied (volume pumped divided by the acreage irrigated) was calculated for various crop types, irrigation system types, and climatic zones to determine which of these factors may be important in estimating and extending sampled pumpage to other areas of the High Plains.

In order to provide maps for extending sampled pumpage data, various approaches for mapping irrigated cropland were evaluated in the northern eight-county test area. The five mapping approaches tested included: (1) Reported data, (2) physical inventory, (3) large scale aerial photography, (4) a combination of small scale aerial photography and Landsat images, and (5) Landsat imagery alone.

These five techniques were selected because each potentially could provide maps depicting the areal distribution of irrigated cropland on a seasonal basis. Each approach was evaluated for relative accuracy and suitability for application to large areas.

DATA COLLECTION AND ANALYSIS

Pumpage Sampling

Pumpage-data collection and analysis consisted of three phases: (1) Developing a sampling strategy and selecting sites in the two test areas; (2) conducting measurements and testing instruments for determining total time of operation, discharge, and the crop type and acreage being irrigated at each site; and (3) statistical analysis of pumpage data to determine significant relationships.

Sampling Strategy

A stratified random sampling procedure was used to select the 250 sites to be monitored during the 1979 irrigation season. Sampling sites were defined as individual irrigation wells or groups of irrigation wells that were combined to form a single irrigation unit. Two hundred sampling sites were selected in the northern test area and 50 sites were selected in the southern test area using lists of all irrigation wells located within each area. Sites were stratified by crops to investigate potential differences in pumpage between crop types, and by area to investigate climatic effects on pumpage.

Crop-type stratifications included the major irrigated crops in the two test areas: Corn, alfalfa, and mixed crops in the northern test area and cotton in the southern test area. The number of sites selected for each crop was based on the relative proportion of that crop to other irrigated crops in

the area. One hundred forty sites that irrigated corn, 40 sites that irrigated alfalfa, and 20 sites that irrigated mixed crops were defined in the northern test area. Because of the small size of alfalfa fields in the area, it was difficult to locate sites that irrigated solely alfalfa; consequently, during the final selection process some sites designated for alfalfa actually ended up to be mixed crop sites. All 50 sites in the southern test area irrigated cotton.

The northern test area also was subdivided (stratified) into four quadrants (fig. 3), with each containing 50 sampling sites. The quadrants were selected to investigate the effects of variations in precipitation and potential evapotranspiration on pumpage.

Instrument Testing and Measurements

An instrument was developed for the National Water-Use Data program of the U.S. Geological Survey to measure the time of operation of irrigation systems. This device is referred to as a Vibration Time Totalizer (VTT); it is about 1 1/2 inches X 1 inch X 3/4 inch and is attached to the pump base or the discharge pipe. The VTT records the elapsed time that it is subjected to vibration. Virtually all of the irrigation systems in use in the High Plains region generate enough vibration while operating to activate the VTT units.

All of the VTT units used during the 1979 irrigation season were handmade and thus subject to large variations in quality. Part of the testing process during 1979 was to determine the accuracy and durability of the VTT units. One VTT was placed at each of the sites that were used to sample pumpage. The VTT units were placed on the pump or discharge pipe in an area that would provide sufficient vibration while affording some protection from heat and water.

In order to evaluate the reliability and accuracy of the VTT units, an independent determination of time of operation also was attempted at many of the sampling sites. The most common and reliable alternative source of time of operation was the energy meters. Electric meters provided the most reliable alternative measure of time of operation for the irrigation wells in the High Plains. Gas meters also provide a measure of time of operation, but the reliability of gas meter calculations is much less than for electric meters because the rate of gas consumption by a pumping plant is much more variable than the rate of electric consumption.

Other independent methods of determining the total time of operation, including engine-hour meters and records kept by irrigators, also were used to record time of operation when possible. Engine-hour meters generally are accurate but quite susceptible to mechanical problems. The accuracy of records kept by irrigators need to be determined on an individual basis.

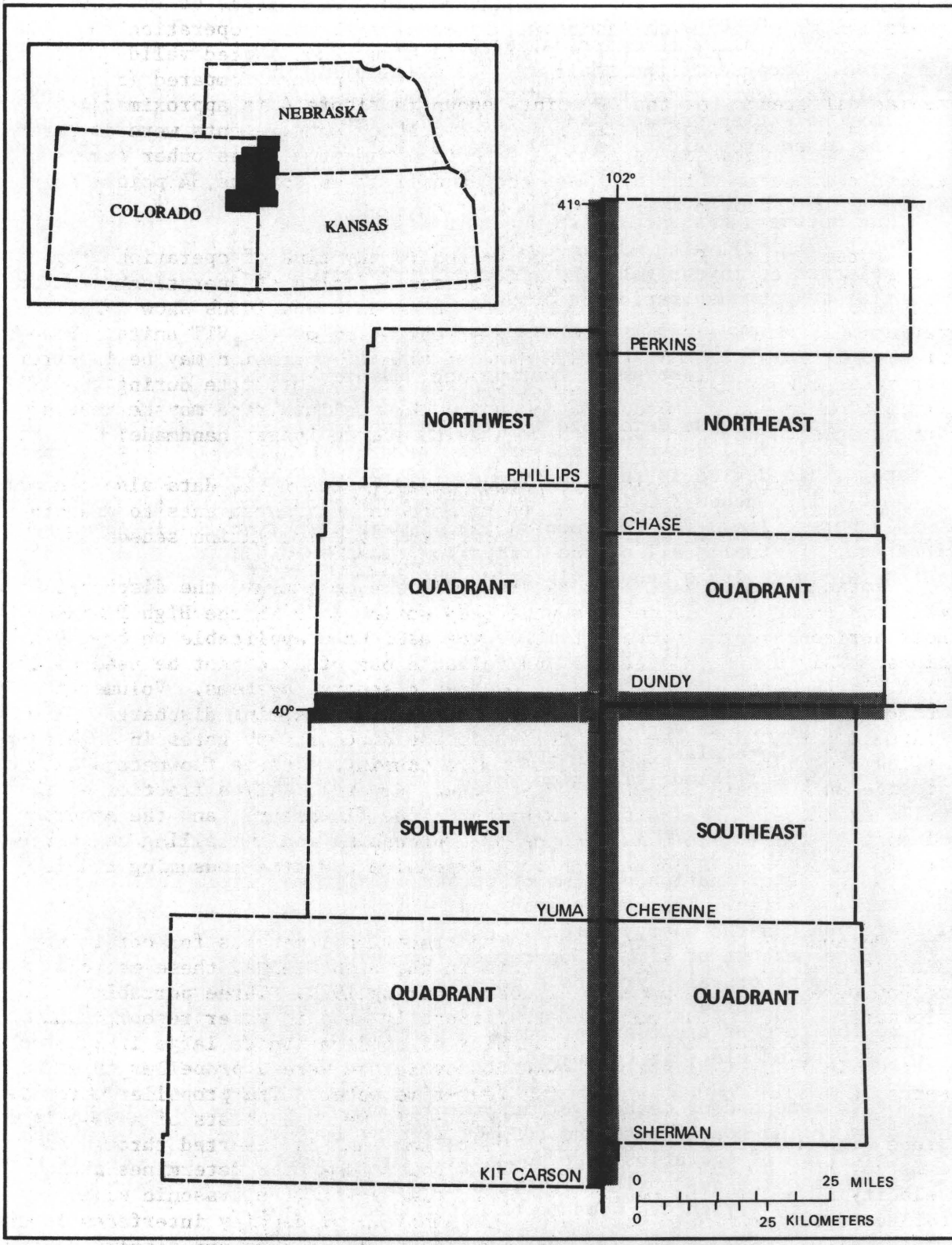

Figure 3.--Location of four quadrants used for evaluation of climate efforts.

At the end of the 1979 irrigation season, comparisons of VTT time of operation were made with independently acquired time of operation for all sites where independent time determinations were considered valid. A total of 40 VTT and electrical meter times of operation were compared (fig. 4). The median difference for the 40 points shown in figure 4 is approximately 5 percent. A total of 34 VTT time-of-operation measurements were compared with time of operation determined from independent sources other than electrical meters (fig. 5). The median difference for the 34 points shown in figure 5 is approximately 13 percent.

Three of the VTT units failed to record any time of operation (figs. 4 and 5) when other sources indicated substantial time of operation (greater than 250 hours). Another six time-of-operation comparisons show large variations, which may indicate improper operation of the VTT units. However, it also is possible that the independent time of operation may be in error for these comparisons. An estimate of the VTT failure rate during the 1979 irrigation season was about 10 percent. This failure rate may be reduced during subsequent years when the VTT units are no longer handmade.

To determine the volume of water pumped by the well, data also are needed on the discharge of the well. Several methods and instruments to measure discharge of the well were tested during the 1979 irrigation season.

Various traditional methods are available to measure the discharge of a well and some of these methods were used during 1979 in the High Plains. The Hoff horizontal-axis propeller meter was used when applicable on open discharge pipes. This meter is accurate and reliable but often cannot be used on the High Plains because there are so few open discharge systems. Volumetric methods also are simple and accurate methods of measuring discharge. The volumetric method can be used to sample the discharge of gates in a gated pipe

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of most of these meters is unchecked. Purchasing and installing inline flowmeters would be both very expensive and time consuming beyond the resources of this project.

Because of the limitations of the traditional methods for ob discharge on large irrigation systems in the High Plains, these m seldom were used for sampling discharge during 1979. Three porta flowmeters, which have not been traditionally used in water resou studies, were evaluated for suitability of application to large i systems in 1979. The three flowmeters evaluated were a propeller meter, a Doppler meter, and a transient-time meter. The propelle designed for use in gated-pipe systems. This meter consists of a probe with horizontal axis turbine propeller that is inserted thr existing hole in the gated pipe. The Doppler flowmeter determine velocity of a fluid by measuring the Doppler shift of ultrasonic reflected off entrained particles, air bubbles, or density interf fluid stream. This meter has the advantage that it does not requ

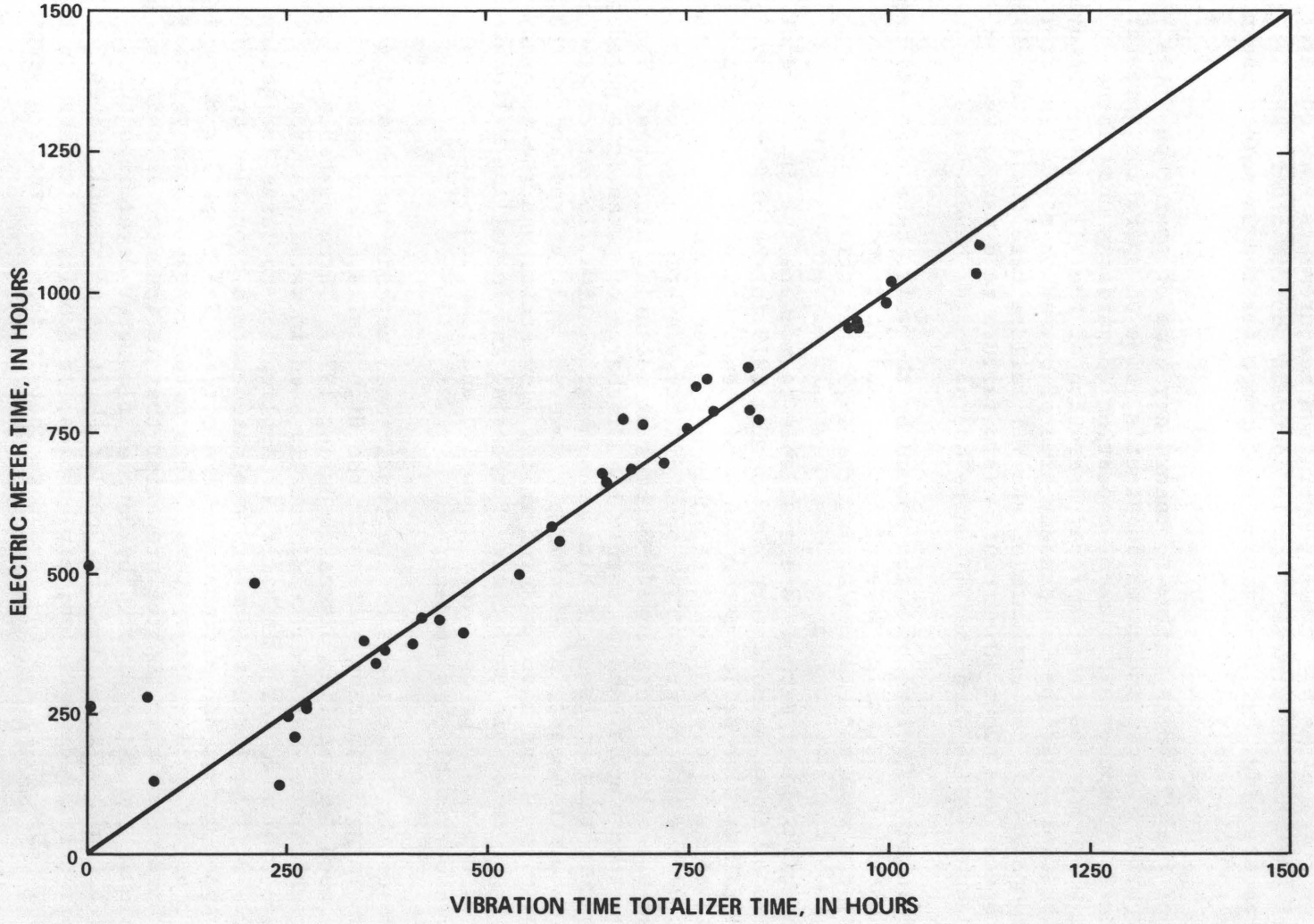

Figure 4.—Comparison of Vibration Time Totalizer time of operation with time of operation determined from electric meter sources.

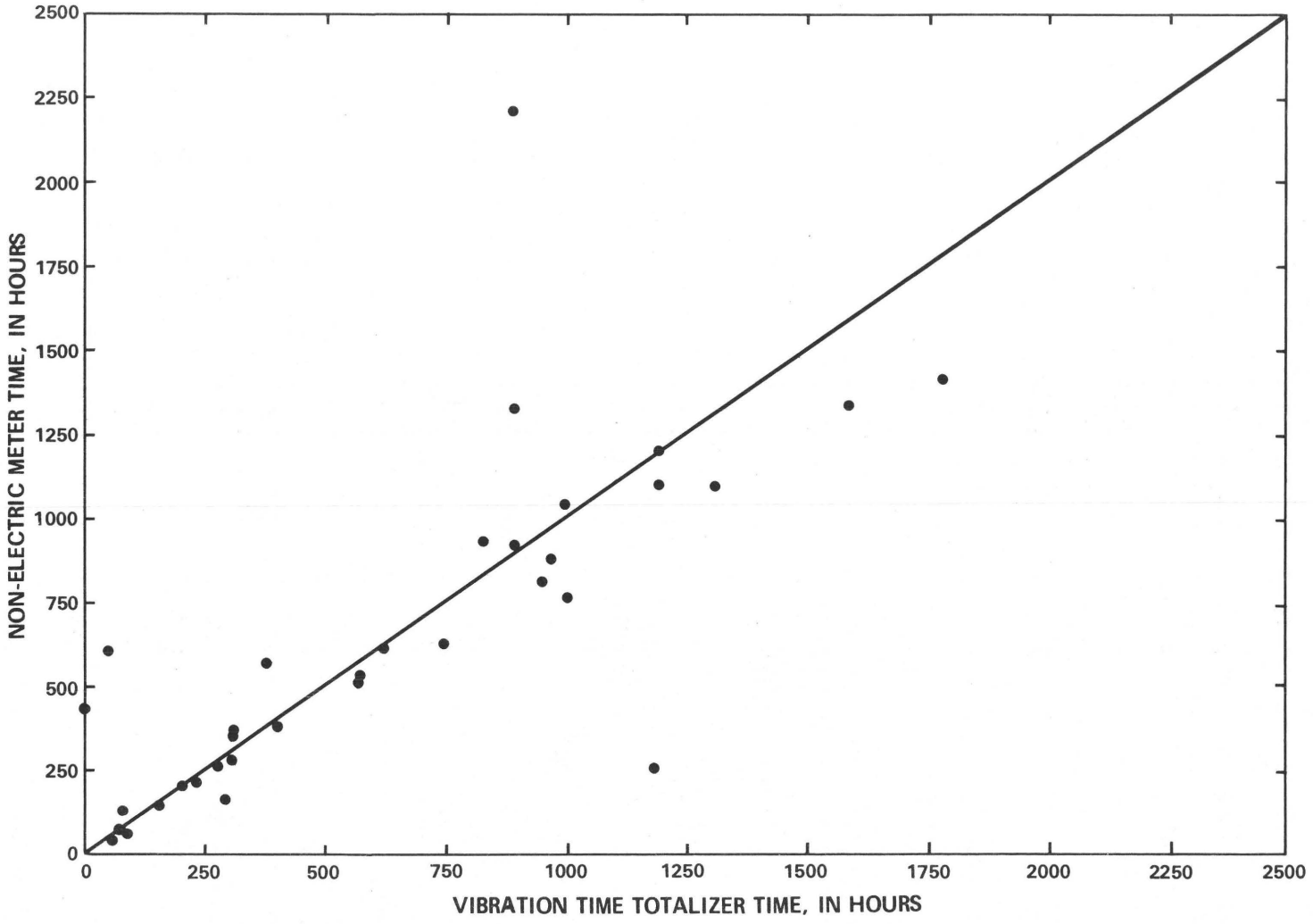

Figure 5.—Comparison of Vibration Time Totalizer time of operation with time of operation determined from non-electric meter sources.

to the fluid stream to obtain a measurement of discharge. The transient-time flowmeter, like the Doppler flowmeter, uses ultrasonic waves to measure the fluid flow and also does not require access to the fluid stream. However, the principal used in this type of meter does not require entrained particles, air bubbles or density interfaces to operate properly.

Detailed testing of all three instruments was done under both laboratory and field conditions during 1979. All three instruments were tested on a variety of pipe sizes and materials commonly found in irrigation systems on the High Plains. A brief description of the results of this testing is presented here; detailed information is reported by Luckey, Heimes, and Gaggiani (1980).

The propeller meter was found to be a rugged instrument but is difficult to use on systems that are under pressure. It requires a considerable amount of time and skill to operate effectively, as well as a willingness on the part of the operator to get wet and muddy. This meter also is very sensitive to particulate matter in the water and must be cleaned and lubricated frequently. The propeller meter gave consistently smaller than actual velocity readings both in field and laboratory tests.

The Doppler meter was the easiest meter to use under field conditions. A velocity reading generally could be obtained on aluminum pipe of as much as 8 inches in diameter; however, velocity readings seldom could be obtained on 6-inch or larger diameter steel pipe. Even when the instrument appeared to be operating properly, velocity readings frequently were not reliable.

The transient-time meter was not designed to be a portable field instrument and was somewhat awkward to use under field conditions. It is fairly bulky and requires an external 110 volt a-c electrical current. However, with practice, a measurement using the transient-time meter can be made in 15 to 30 minutes. The transient-time meter was tested and calibrated on 17 different kinds and sizes of pipe under laboratory conditions and was found to give extremely reliable results. A separate calibration is needed for each kind and size of pipe encountered. This meter was the only one of the three meters tested that consistently provided reliable results in measuring discharge on the wide variety of pipes that are in use in High Plains irrigation systems.

To compute the depth of water applied at each site, the annual volume of water pumped (average discharge multiplied by time of operation) is divided by the irrigated acreage. Irrigated crop type and acreage at each sampling site generally were determined by one of the following methods: Physical measurement of field dimensions, reported and verified crop acreage information obtained from local Agricultural Stabilization and Conservation Service offices, or information provided by individual irrigators.

Pumpage Relationships

The data collected during the 1979 irrigation season are tabulated in the supplemental section of this report. This supplement lists all of the discharge and time of operation measurements that were collected at the sampling sites, even though many of these measurements were made using instruments or techniques that later proved to be unreliable. These measurements are shown, not because they are thought to represent accurate values of discharge and time, but because these measurements document the reliability of the instruments and techniques that were evaluated. The data shown in this supplement are experimental data and as such, any particular measurement may be subject to large errors. The 1979 pumpage-sampling program was designed to test techniques and instrumentation, and as the data in the supplement clearly indicate, some of the techniques and instruments tested were not appropriate.

Although some of the individual measurements listed in the supplement may have errors associated with them, aggregate information is of sufficient quality to determine suitable approaches and instrumentation for collecting water-use data on the entire High Plains during 1980.

The total volume of water pumped at each site and the depth of water applied to the field were calculated where adequate discharge, time of operation, and crop acreage data were available. These calculations were made using the best estimates of discharge and total time of operation. The data were analyzed statistically with summaries by crop type, irrigation system type, and geographical area. No statistical entries were made in the tables when the total number of data points within any group was less than 10.

A comparison of the depth of water applied by crop and type of irrigation system is shown in table 2. The information on cotton is from the southern test area; all other information is from the northern test area.

The mean application is the arithmetic mean of the application of all the data points in a group. The mean application multiplied by the total acreage in a group gives an estimate of the total pumpage for a group. The standard deviation is a measure of the dispersion of the data about the mean. The relatively large standard deviation associated with most of the groups indicates that there is considerable scatter in the individual data points. The standard error of the mean is a measure of the reliability of the sample mean as an estimator of the true population mean. There is about a 95 percent chance that the true mean is within two standard errors of the calculated mean. The sample size is the total number of sample sites within each category that were included in this analysis.

Analysis of the information in table 2 indicates that sprinkler systems tend to apply less water than flood systems. This hypothesis was found to be statistically significant at the 95 percent confidence level. The difference between water applied to corn and alfalfa was found to be significant at the 95 percent confidence level for sprinkler systems but was

Table 2.--*Summary of water applied in all areas separated by crop type and irrigation system*

[Data on cotton are from the southern area; all other data are from the northern area]

	Mean application (inches)			Standard deviation (inches)			Standard error of the mean (inches)			Sample size		
	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems
Corn	13.6	23.5	15.3	5.8	7.8	7.3	0.7	2.2	0.8	63	13	76
Alfalfa	18.2	----	18.2	8.2	---	8.0	2.0	---	1.9	17	1	18
Mixed crops	----	----	16.8	---	---	5.7	---	---	1.7	3	8	11
All crops except cotton	14.6	21.0	15.9	6.6	7.6	7.3	0.7	1 6	0.7	83	22	105
Cotton	----	2.5	2.3	---	2.8	2.6	---	0.6	0.5	6	24	30

not statistically significant when both types of systems were combined in the analysis. This lack of significance may be due to the increased variability when data from the two types of systems are combined.

A comparison of depth of water applied in the northern test area separated by type of irrigation system and quadrant is shown in table 3. The difference in the depth of water applied between irrigation system types is statistically significant at the 95 percent confidence level for each of the four comparisons where data are shown from both sprinkler irrigation systems and flood irrigation systems.

The standard deviations shown in table 3 are smaller for sprinkler irrigation systems than they are for flood irrigation systems. This would indicate that there is less variability in water use among individual sprinkler irrigation systems than there is among individual flood irrigation systems. However, the data do not prove such a hypothesis at the 95 percent confidence level.

There is no significant difference (95 percent confidence level) between the amount of water applied between quadrants or pairs of quadrants. Such a difference might be expected because of the difference in precipitation among the quadrants (table 4). However, there are obviously many factors other than total annual precipitation that govern the amount of irrigation water applied.

The data collected during 1979 could be used to calculate total water use for irrigation in the northern area. Because data were not collected by system type or crop type on the total irrigated acreage in the test area, the mean application for all crops and systems would have to be used to calculate total water use. This mean application (15.9 inches) has a standard error of 0.7 inch. The 95 percent confidence limits on the mean application for all crops and systems in the northern areas is 15.9 $\pm$ 1.4 inches. However, there may be other measuring errors that exist that are not part of this calculated sampling error. If total irrigation water use was calculated for the northern test area, all of these errors would need to be quantified to determine the accuracy of these calculations.

Cropland Mapping

The mapping approaches evaluated for suitability in depicting the areal distribution of irrigated cropland were conducted concurrently with pumpage sampling in the eight-county northern test area.

Reported data from the Agricultural Stabilization and Conservation Service (ASCS) were used to map crop and rangeland in Kit Carson, Phillips, and Yuma Counties in Colorado. Physical inventory was used to map irrigated cropland in Cheyenne and Sherman Counties in Kansas. Color infrared aerial photographs at a scale of 1:24,000 were visually interpreted to map cropland along transects in Phillips and Yuma Counties in Colorado, Chase and Dundy Counties in Nebraska, and Cheyenne County in Kansas. Color infrared aerial photographs

Table 3.--*Summary of water applied in the northern area separated by quadrant and irrigation system*

[Data from all crops are aggregated]

Quadrant	Mean application (inches)			Standard deviation (inches)			Standard error of the mean (inches)			Sample size		
	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems	Sprinkler systems	Flood systems	All systems
Northeast quadrant	13.5	----	14.9	6.0	----	7.2	1.1	---	1.3	28	3	31
Northwest quadrant	16.4	----	16.8	7.7	----	8.0	1.3	---	1.3	35	1	36
Southeast quadrant	12.5	18.4	15.7	3.3	5.8	5.6	1.0	1.6	1.2	11	13	24
Southwest quadrant	----	----	16.5	---	---	8.0	---	---	2.2	9	5	14
Eastern quadrants	13.3	20.1	15.2	5.4	6.7	6.6	0.9	1.7	0.9	39	16	55
Western quadrants	15.8	----	16.7	7.3	---	8.0	1.1	---	1.1	44	6	50
Northern quadrants	15.1	----	15.9	7.2	---	7.7	0.9	---	0.9	63	4	67
Southern quadrants	12.9	19.5	16.0	4.0	7.3	6.6	0.9	1.7	1.1	20	18	38
All quadrants	14.6	21.0	15.9	6.6	7.6	7.3	0.7	1.6	0.7	83	22	105

Table 4.--*Normal precipitation and actual precipitation from November 1978 through October 1979 in the test areas*

Station name	County and State	Normal annual precipitation (inches)	Quadrant	November 1978 through October 1979	
				Total precipitation (inches)	Deviation from normal (inches)
Imperial	Chase Co., Nebr.	19.15	Northeast	16.33	-2.82
Holyoke	Phillips Co., Colo.	18.40	Northwest	20.84	+2.44
Goodland WSO AF	Sherman Co., Kans.	16.65	Southeast	25.19	+8.54
Burlington	Kit Carson Co., Colo.	16.85	Southwest	18.44	+1.59
Littlefield no. 2	Lamb Co., Tex.	18.04	---------	24.15	+6.11

at a scale of 1:80,000 were used in conjunction with 1979 Landsat images to interpret visually cropland categories in Chase, Dundy, and Perkins Counties in Nebraska. Visual and digital interpretation techniques were used to map irrigated cropland from 1978 Landsat imagery in Phillips and Yuma Counties in Colorado. The parts of the eight-county test area that were used for each mapping approach are shown in figure 6.

Reported Data

Data reported by participants in the ASCS Feed Grain and Wheat program were used to map cropland in Kit Carson, Phillips, and Yuma Counties in Colorado. These data were obtained through a contractual arrangement with the ASCS county offices. The Feed Grain and Wheat program provides reimbursement for natural disasters that destroy crops, guarantees minimum target-price payments for crops, and makes available commodity loans to participants. Consequently, participation in the program varies from year to year in response to growing conditions and the economy. Approximately 3,400 square miles of land were mapped in the three counties. Map scale was about 7.5 inches to the mile, with one section (1 square mile) displayed on a single sheet of 8 1/2 x 11 inch paper. Maps were compiled primarily using reported crop acreages supplemented with 35-millimeter aerial photography acquired by the county offices for verification purposes.

ASCS offices verify about 25 percent of the reported information used for cropland mapping, so the reliability of cropland data obtained by this method is quite good. The ASCS data provided significant detail at an average cost of about $2.20 per square mile. However, to apply this approach over an area as large as the High Plains would be quite difficult and costly. Computations of tabular data on crop acreage would increase the cost of this approach. The degree of variability in participation in the ASCS Feed Grain and Wheat program between counties from one year to the next could result in incomplete cropland maps for many areas. Additionally the logistics of contracting with each of the ASCS county offices in the High Plains to provide crop maps would be prohibitive at the present time.

Other forms of reported data are compiled by a variety of agencies. However, the majority of these data are aggregated as acreages by county and lack information on the areal distribution of cropland. Other agencies that regularly compile agricultural data and statistics include U.S. Department of Agriculture, Crop and Livestock reporting service, and Soil Conservation Service, U.S. Department of Commerce, Bureau of Census, and various State and local agencies.

Physical Inventory

Ground sampling to provide maps of irrigated cropland in Cheyenne and Sherman Counties, Kansas, was conducted by a private consulting firm. Crop types and areal extent of irrigated land were mapped at a scale of 1:250,000

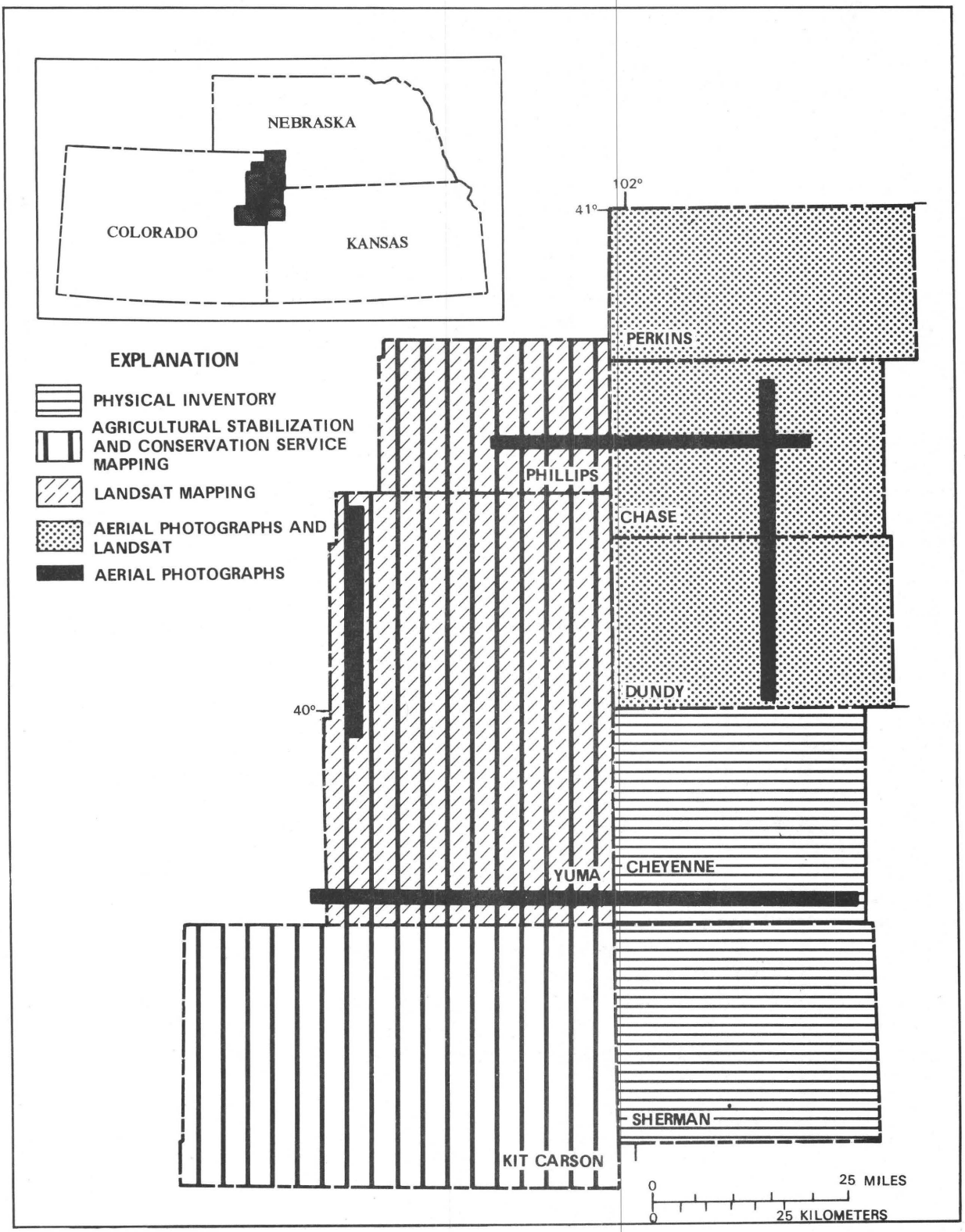

Figure 6.--Locations where cropland mapping techniques were tested during 1979.

with a minimum resolution of 40 acres. Mapping was accomplished by actual field observation supplemented with limited landowner and ASCS information. Slightly more than 200 square miles of irrigated cropland were mapped in the two counties. Acreage figures were compiled, by county, for each of the irrigated crop types.

This approach to mapping irrigated cropland provided accurate results for crop-type determination and reasonably reliable delineation of field boundaries and acreages. Comparisons of these maps compiled from ground sampling with aerial photography in parts of Cheyenne County indicate that the crop-type determinations were accurate with a few exceptions. The areal delineation of fields was excellent along access roads but tended to be less accurate in areas away from access roads. However, at a scale of 1:250,000 these variations in areal delineation are not serious and tend to average out in providing a representative acreage figure for irrigated land aggregated by counties. This survey was conducted during June when most irrigated crops were in early stages of growth or emergence. More accurate results probably could have been obtained if mapping was done during July when crop types are more easily identified and before crop height obscures field boundaries. This approach is very time consuming and is the most expensive method tested. The $25.00 per square mile cost makes it suitable only for application to localized areas requiring detailed crop information.

Aerial Photographs

Color infrared photographs at a scale of 1:24,000 were obtained for areas in Phillips and Yuma Counties in Colorado, Cheyenne County in Kansas, and Chase and Dundy Counties in Nebraska. The photographs included 190 miles of flight line covering approximately 640 square miles of land area. The photographs were obtained through an agreement with the U.S. Environmental Protection Agency and were interpreted visually by personnel of the U.S. Geological Survey at Ames Research Center, Mountain View, California.

Interpretation of these photographs provided excellent accuracy in mapping the areal distribution of cropland. Reliable crop-type mapping was obtained for irrigated cropland. Less accuracy was obtained in mapping dryland crops. Crop-type interpretations were compared with ASCS crop information for selected locations to verify the reliability of interpretations. The cost of the aerial photography was about $5.50 per square mile of coverage. Cost of interpreting cropland from this photography and transferring it to 7.5-minute quadrangles was estimated to be $1.00 per square mile. The total cost for obtaining cropland maps at 1:24,000 scale by this method including photography and interpretation was estimated to be about $6.50 per square mile. This cost is too expensive for application to very large areas and tabulation of crop acreage information would add significantly to these costs.

Aerial Photographs and Landsat Data Combined

Crop maps for Chase, Dundy, and Perkins Counties in Nebraska were compiled by the Institute of Agriculture and Natural Resources at the University of Nebraska. Cropland was mapped by visually interpreting a combination of 1:80,000 scale color infrared aerial photographs and Landsat images. The aerial photographs were obtained early in the growing season and then supplemented with Landsat images obtained later in the season. The area mapped was about 2,700 square miles. Cropland maps were compiled by individual counties at a scale of approximately 1:80,000.

Cropland maps produced using this approach were generally accurate both in boundary delineation and crop-type interpretation. A comparison was made between these maps and cropland maps interpreted from the 1:24,000 color infrared photographs discussed previously. Cropland maps compiled for the same areas using these two methods were virtually the same, both in boundary delineations and crop-type interpretations. However, this approach was very time consuming and moderately expensive ($3.00 per square mile), which would make it unsuitable for large area applications; and acreage tabulations would add significantly to these costs.

Landsat Data

Landsat data acquired July 27, 1978, were used for both visual and digital interpretation of irrigated cropland for Phillips and Yuma Counties in Colorado. A map of irrigated cropland for the same area and season was compiled from high-resolution security classified source materials. The security classified source materials map was used as a basis for evaluation of maps generated from the visual and digital interpretation of Landsat data. Security classified source materials were not considered a viable source for general mapping of the High Plains region because of the restricted availability of these materials. Interpretations of Landsat data and security classified source materials were conducted by personnel from the U.S. Geological Survey. A brief summary of the results of the Landsat mapping effort is presented here; a detailed discussion of analysis procedures used and the results obtained are reported by Thelin, Johnson, and Johnson (1980).

Visual interpretation of Landsat data in Phillips and Yuma Counties in Colorado was made using a color composite image. All fields with a significant infrared response were classified as irrigated cropland.

Landsat digital data were analyzed using computer compatible digital tapes of the same scene used in the visual interpretation. Irrigated cropland was readily identified in this analysis by the small digital values in the visible red (chlorophyll absorption) band and the large digital values in the infrared band. Non-irrigated cropland and rangeland were distinguished by other characteristic responses in the visible and infrared bands. Four major land-cover classes were identified: water, herbaceous rangeland, dryland cropland, and irrigated cropland.

Landsat-derived irrigated-cropland maps were generally accurate in delineation of field boundaries within the constraints of the small scale of the imagery. The resolution of Landsat data is about 1.1 acres. A comparison of the acreages compiled from the Landsat visual and digital interpretations, with the acreage obtained from the security classified source materials map, is presented in table 5. The combined areal estimates of irrigated cropland for Phillips and Yuma Counties, Colorado, obtained from the Landsat interpretations were within 2 percent of the irrigated cropland area mapped using security classified source materials. Available ASCS records for the 1978 irrigation season were used to evaluate specific differences between the Landsat maps and the security classified source materials map. Most of the differences between the irrigated cropland map obtained by interpretation of Landsat and the irrigated cropland map compiled using security classified source materials resulted from misclassification of non-irrigated feed grain crops and some irrigated small grain crops on the Landsat image. At the time of acquisition of the Landsat scene (July 27, 1978), small grain crops had been harvested, and therefore, would not have the typical response in the infrared band associated with irrigated cropland. The map compiled from the security classified source materials correctly identified all of the fields that were checked against ASCS records.

The cost of mapping irrigated cropland and tabulating acreage for the Landsat visual and digital interpretation is estimated to be between $1.00 and $1.50 per square mile. These cost figures include estimates of the cost of materials, manpower, and computer time required to produce map products and tabular data of irrigated cropland on a regional scale. No attempt was made during the preliminary evaluation of Landsat mapping to provide crop-type information, but some reliable crop-type information should be available from Landsat analysis especially when more than one scene covering the same area is used.

Landsat analysis alone cannot be expected to provide the detail obtained from the other mapping methods tested because of the small scale of the imagery. However, considering costs, availability of data, and time required for analysis of the methods evaluated, Landsat data appears to be the most suitable alternative for mapping irrigated cropland for an area as large as the High Plains.

SUMMARY AND CONCLUSIONS

The primary emphasis of the High Plains Regional Aquifer-System Analysis water-use program during 1979 was to develop and test methods and instrumentation to determine ground-water use for irrigated agriculture in the High Plains region. These objectives were accomplished; methods and instrumentation have been defined for determining irrigation pumpage information for the entire High Plains region during the 1980 irrigation season.

The 1979 sampling effort provided thorough testing for the VTT units and the three portable flow-measuring devices. The VTT units functioned very

Table 5.--*Irrigated cropland estimates for Phillips and Yuma Counties, Colorado, 1978*

Data source	Irrigated cropland in acres		
	Phillips County	Yuma County	Total
Security classified source materials------	66,039	243,519	309,558
Landsat visual interpretation--------	69,155	238,849	305,004
Landsat digital interpretation--------	65,035	244,430	309,465

well for recording time of operation of irrigation wells, with an overall failure rate of about 10 percent. Based on the positive results obtained with these prototype VTT units, a production model of this device has been selected as the primary method for determining time of operation of wells to be sampled during the 1980 irrigation season. All three portable flowmeters evaluated during the 1979 irrigation season were subjected to extensive field testing and varying degrees of laboratory testing. Only the transient-time flowmeter provided reliable measurements of discharge over the variety of irrigation systems in use in the High Plains. Consequently, the transient-time flowmeter has been selected as the principal flow-measuring device for use in pumpage sampling during the 1980 irrigation season.

Pumpage rates for each of the wells on which reliable time of operation and discharge values were obtained were combined with the irrigated crop acreage information to determine the annual depth of application of water. Statistical analyses of these application rates indicated that the mean application rate for all crops and systems in the two test areas could be estimated from sample data within 1.4 inches in the northern test area and within 1.0 inch in the southern test area at the 95 percent confidence level. Statistical analyses of pumpage data separated by irrigation system type indicated that there is a significant difference, at the 95 percent confidence level, in application rates between sprinkler irrigation systems and flood irrigation systems with sprinkler irrigation systems applying the lesser amount of water. Tests for significant differences in application rates for different crop types indicated significant differences occurred between corn and alfalfa for sprinkler irrigation systems, but not for flood irrigation systems. Test for climatic effects on application rates in the four quadrants of the northern test area indicated no significant differences were present.

Five methods for mapping irrigated cropland in the High Plains region were investigated. The four methods using reported data, physical inventory, and two scales of aerial photographs were found to be prohibitively expensive for mapping irrigated cropland over the entire High Plains region. A method that used only Landsat data proved to be readily adaptable to large area mapping of irrigated cropland. The small scale, low cost of analysis, and repetitive coverage of the Landsat data were all factors that contributed to the selection of Landsat as the primary data source for providing irrigated cropland maps of the High Plains region during 1980. Digital analysis will be used whenever possible because of the ease with which the interpreted data can be compiled and stored in a computerized data base.

The data collected and analyzed during 1979 and presented in this report have been used to define a pumpage sampling and cropland mapping approach to be applied to the entire High Plains region during the 1980 irrigation season. This approach is presented in the section entitled "1980 Water-Use Plan."

1980 WATER-USE PLAN

Ten pumpage monitoring areas consisting of all or parts of 14 counties located in various parts of the High Plains region have been selected for the 1980 irrigation season (fig. 7). Approximately 50 irrigation sites will be randomly selected within each of the areas. No stratification of crops or irrigation systems has been designed in the selection procedure. The distribution of the 1980 monitoring areas was designed to provide a representative cross section of irrigation systems, crop types, and physical factors such as geology, hydrology, soils, and climate that occur within the High Plains region.

The primary instrument to be used to measure discharge of wells will be the transient-time flowmeter. Additionally, one well in some of the monitoring areas will be equipped with a calibrated inline flowmeter for comparison with the transient-time meter. The discharge will be measured at each well at least one time during the irrigation season and at least 20 percent of the wells will be measured more than once. The purpose of the multiple measurements is to define any seasonal trends in discharge. Time of operation at each well site will be monitored using a production model of the VTT units. Two VTT units will be installed on each well to insure the reliability of the time measurement and to evaluate the variability among the VTT units under field conditions. Other available sources of time of operation also will be monitored. Crop type and acreage irrigated for each pumpage monitoring site will be obtained by measurement, reported information, or personal contact with individual irrigators.

Irrigated cropland maps for the entire High Plains region are currently being prepared using 1978 Landsat imagery. This extension of the 1979 effort is being conducted to define the coverage required, the ability of the Landsat system to provide crop-type information, and the suitability of Landsat images for mapping irrigated cropland in higher precipitation regions.

Thirty-eight Landsat scenes are required to provide complete coverage of the entire region (fig. 8). Two or possibly three scenes at different times of the irrigation season will be required in the southern part of the High Plains to cover the variety of crop growth cycles that result from a longer growing season in this region. Only limited crop-type information probably will be provided by Landsat analysis alone. However, regularly reported agricultural statistics should provide crop-type information at a resolution suitable for use with a regional ground-water model.

Some problems may be encountered in using Landsat data to map irrigated cropland in some of the areas in the eastern High Plains that receive greater precipitation. It may be difficult to discriminate between dryland and irrigated crops in these areas using Landsat data alone. The 1978 Landsat data will be used to evaluate the seriousness of the problem and to define areas where alternative approaches and data sources may have to be used as a supplement or in lieu of Landsat data.

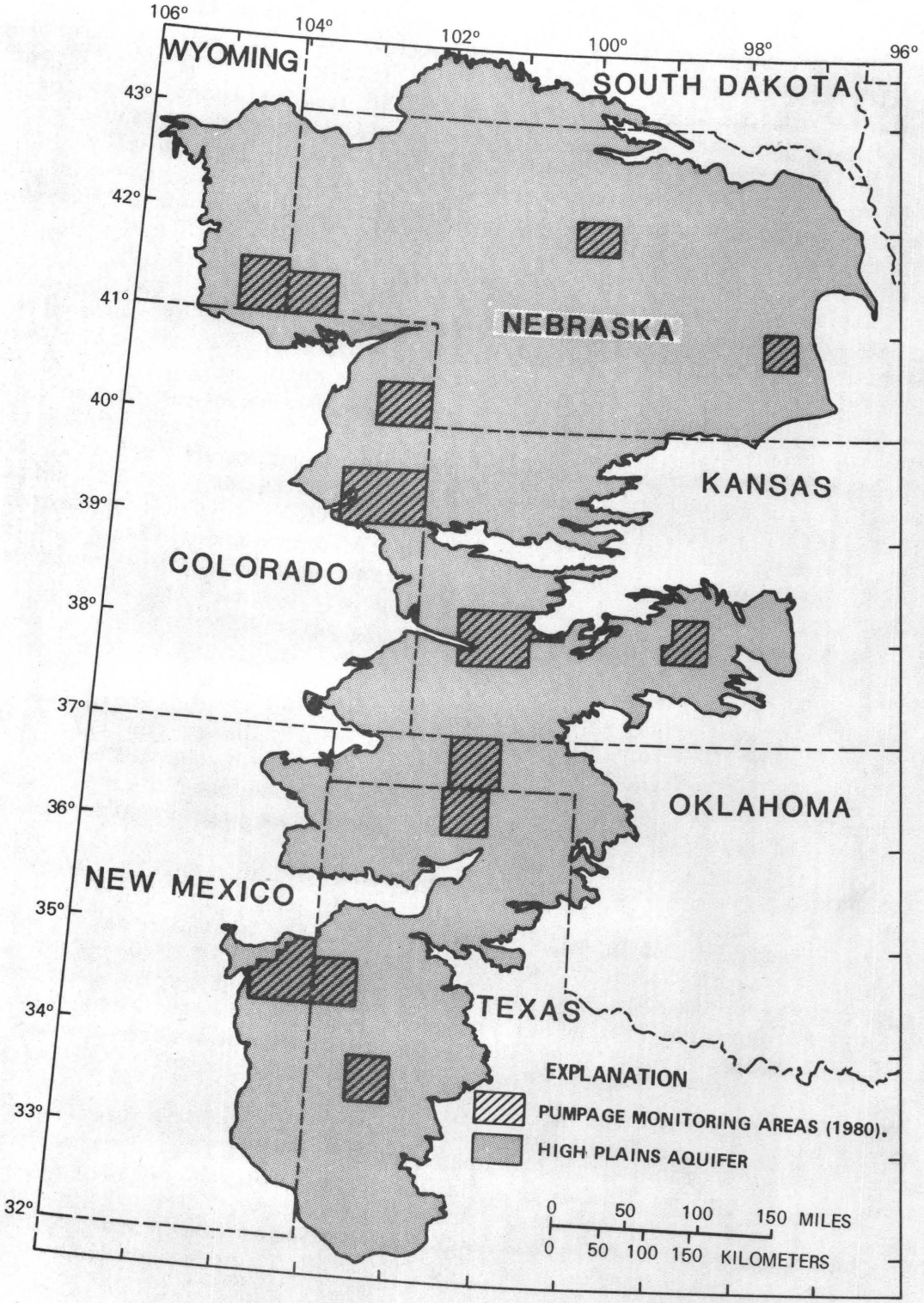

Figure 7.-- Location of 1980 pumpage monitoring areas.

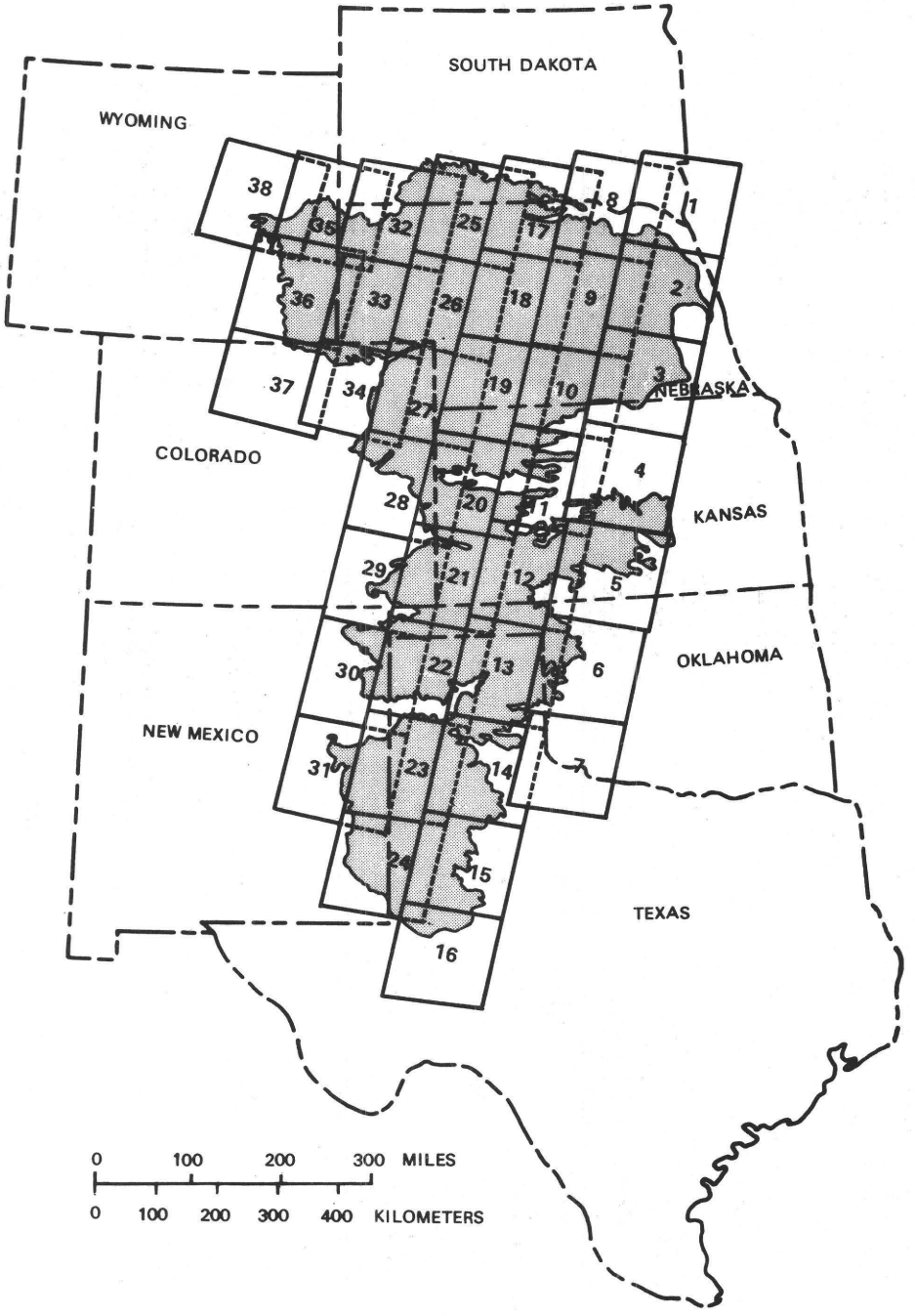

Figure 8.--Number and location of Landsat scenes required to provide coverage of the High Plains aquifer.

Based on the evaluation of the 1978 Landsat data and investigations of other data sources for mapping irrigated cropland, a composite approach will be defined for mapping irrigated cropland for the entire High Plains region during the 1980 irrigation season.

Irrigated cropland information obtained from Landsat analysis will be digitally output in grid-cell format for use with the regional data base being developed for the High Plains Regional Aquifer-System Analysis (Weeks, 1978). This irrigated acreage data will be combined with information obtained in ground sampling from the pumpage monitoring areas to provide pumpage estimates by grid-cell. The pumpage estimates will be combined in a ground-water flow model with data on aquifer properties (specific yield and hydraulic conductivity), aquifer geometry (top of aquifer, base of aquifer, and lateral boundaries), and other stresses (natural recharge, recharge from dryland cropland, recharge from irrigated cropland, and cross-boundary flow). The model will simulate historical changes in water levels and will be calibrated to obtain the best correspondence between simulated water-level changes and measured water-level changes. The model then will be used to calculate the future changes in water levels caused by different management alternatives and thus will aid in planning the future course of irrigation on the High Plains.

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SUPPLEMENTAL INFORMATION

Pumpage Data for Irrigation Sites

The measurements contained in the following tables were made during the 1979 irrigation season. These data were collected in support of an effort to determine viable techniques and instrumentation that could be used for irrigation pumpage sampling in the High Plains region during 1980.

The data shown in these tables are experimental data and as such any particular measurement may be subject to large errors. The 1979 pumpage sampling program was designed to test techniques and instrumentation and as the data in this supplement clearly indicate, some of the techniques and instruments tested were not appropriate.

Explanation of Terms for Tables 6-15

TABLE 6-15a--CROP AND WELL INFORMATION

Site Location

Local numbering system used for tables 6-13; see figure 9.
Latitude and longitude used for tables 14-15.

Station Identifier

The "station identifier" is a 15-digit number generated from the original latitude and longitude of the site in degrees, minutes, and seconds with a 2-digit sequence code at the end to locate multiple sites within a 1-second area. The station identifier is unique for each site and is not changed once it has been entered into the U.S. Geological Survey's computer files.

Irrigated Crop Information

Type --Type of crop(s) irrigated at the site
System--Type of irrigation system used:
Flood = Ditch or gated pipe
Pivot = Center pivot
Sprinkler = Sprinklers other than the center pivot
Acres --Acreage of crop(s) irrigated at the site
Source--Source of acreage information:
Meas. = Measured acreage
Rept. = Reported acreage
Est. = Estimated

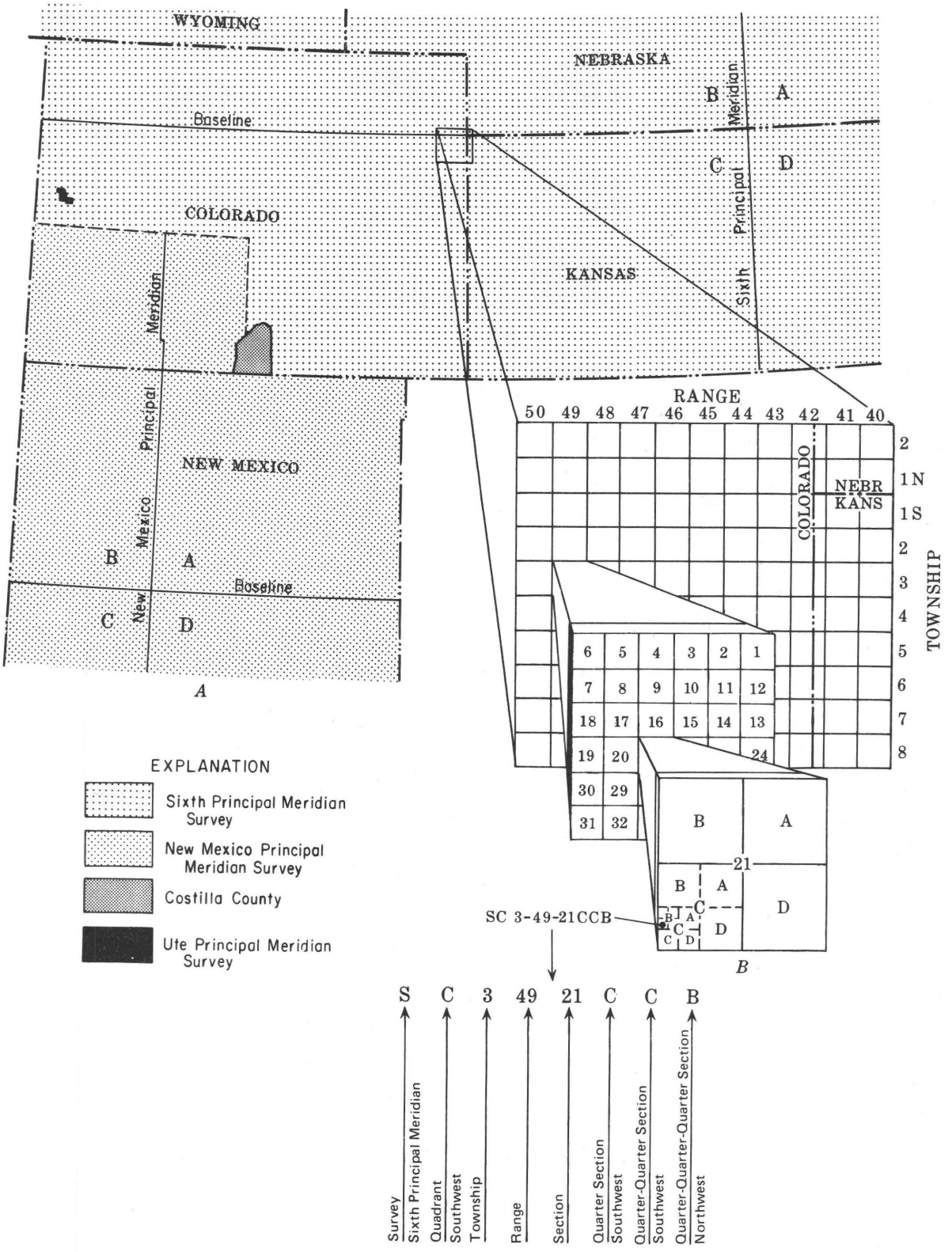

Figure 9.—— Site-location numbering system for tables 6–13.

Well Information

Depth --Depth of well, in feet below land surface
Water level --Depth to water, in feet below land surface
Diameter --Diameter of well casing, in inches
Pump H.P. --Rated pump motor horsepower from motor plate
Energy source--Pump power source:
Elec. = Electrical pump
N. gas = Natural gas engine
Diesel = Diesel engine
Energy rating--
Electric meter = Instantaneous kilowatt demand, in kilowatts
Natural gas meter = Instantaneous natural gas demand, in cubic feet per minute

TABLE 6-15b--DISCHARGE INFORMATION

Site Location

Local numbering system used for tables 6-13; see figure 9.
Latitude and longitude used for tables 14-15.

Field Person --Initials of field person(s) who collected the data

Date --Date when measurement was made

Discharge --Discharge, in gallons per minute

Method --Method used to obtain discharge:

T.T. = Transient time meter
Dop. = Doppler meter
Inl. = Inline flowmeter
Buck. = Bucket and stopwatch
Prop. = Propeller meter
Rept. = Reported
Traj. = Trajectory
Hoff = Hoff meter
Other = See remarks

TABLE 6-15c--TIME OF OPERATION

Site Location

Local numbering system used for tables 6-13; see figure 9.
Latitude and longitude used for tables 14-15.

Field Person --Initials of field person(s) who collected the data

Begin date --Beginning date of time measurement

End date --Ending date of time measurement

Sentry time[1] --Time recorded by Vibration Time Totalizer (Sentry), in hours

Energy meter --Type of meter:

Elec. = Electric meter
N. gas = Natural gas meter

Energy meter time[1] --Time computed from energy meter, in hours

Other time[1] --Time from other sources, explained in remarks

[1]Total time is listed only if the total time of operation was recorded for the irrigation season.

Table 6a.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*

Site location	Station identifier	Crop				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diameter (in)	Pump hp.	Power		
										Source	Rating	
SC-06-42-11-CAD	393201102034200	Corn	Flood	160	Meas.	320	---	16	100	Elec.	70	
SC-06-43-09-DCA	393205102123800	Corn	Pivot	120	Meas.	280	190	16	---	N. gas	---	Water-level measurement on 5/16/79.
SC-06-43-11-BAC1	393230102103201	Corn Alfalfa	Flood ---	60 10	Rept. Rept.	140	46	---	50	Elec.	40	Water-level measurement on 5/7/79.
SC-06-45-31-AAC1	392413102280401	Corn Alfalfa	Pivot Pivot	120 120	Rept. Rept.	---	---	---	100	Elec.	---	These fields also were irrigated from other wells during 1979. Site not included in statistical summary.
SC-06-46-08-DBD1	393217102334101	Corn	Pivot	120	Rept.	224	---	18	100	Elec.	---	
SC-06-50-29-CCB	392930103012000	Corn	Flood	80	Rept.	167	141	---	50	Elec.	36	Water-level measurement on 10/3/55. Pump had 40 hp. motor early in season.
SC-07-42-17-ACC	392642102064400	Alfalfa Grass	Pivot ---	120 50	Rept. Rept.	317	194	16	---	N. gas	---	Water-level measurement, 2/70
SC-07-43-23-ACA	392536102102000	Corn	Flood	80	Meas.	307	170	16	---	N. gas	---	Water-level measurement, 5/71

Table 6b.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-06-42-11-CAD	BDR	7/12/79	620	T.T.	Measurement on 8-in aluminum-gated pipe.
	NGG	7/12/79	520	Dop.	
		7/12/79	530	Prop.	
SC-06-43-09-DCA	BDR	7/17/79	1,020	Dop.	Engine noise may have affected measurement. Measurement on 8-in steel pipe.
SC-06-43-11-BAC1	BDR	8/06/79	790	T.T.	Measurement on 8-in steel tubing.
		8/06/79	270	Dop.	Field persons report this discharge "obviously too low."
SC-06-45-31-AAC1	BDR	9/12/79	620	T.T.	Measurement on 8-in steel tubing.
		9/12/79	280	Dop.	Field person reports this discharge is "way off."
SC-06-46-08-DBD1	FJH	8/19/79	470	T.T.	Measurement on 8-in steel tubing.
	CEP	8/19/79	---	Dop.	Signal strength too weak for accurate measurement.
SC-06-50-29-CCB	RGB	8/20/80	700	Dop.	Measurement on 8-in aluminum-gated pipe.
		8/20/80	470	Prop.	
		8/20/80	480	Inl.	McCrometer inline flow meter.
SC-07-42-17-ACC	BDR	7/17/79	550	T.T.	Measurement on 8-in steel pipe.
		7/17/79	460	Dop.	
SC-07-43-23-ACA	BDR	7/17/79	310	Dop.	Measurement on 8.02-in aluminum-gated pipe.

Table 6c.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*

Site location	Field person	Time of operation information: Date Begin	Date End	Sentry time (hours)	Energy meter Type	Energy meter Time (hours)	Other Source	Other Time (hours)	Remarks
SC-06-42-11-CAD	BDR	5/07/79	7/12/79	252	---	---	---	---	Sentry 339.
	NG	7/12/79	10/22/79	1,120	---	---	---	---	
			Total-----	1,372					
SC-06-43-09-DCA	BDR	5/16/79	7/17/79	166	---	---	---	---	Sentry 296.
		7/17/79	10/22/79	827	---	---	---	---	
			Total-----	993					
SC-06-43-11-BAC1	BDR	6/26/79	8/06/79	---	Elec.	270	---	---	Sentry lost.
		8/06/79	10/22/79	486	---	---	---	---	Sentries 496 and 497.
SC-06-45-31-AAC1	BDR	---	9/12/79	---	---	---	Rept.	3,480	Other time reported by owner. Sentry lost when pump pulled.
SC-06-46-08-DBD1	FJH	5/22/79	8/19/79	1,088	---	---	---	---	Sentry 315.
	BDR	8/19/79	9/20/79	298	---	---	---	---	
			Total-----	1,386					
SC-06-50-29-CCB	RGB	5/24/79	8/20/79	---	Elec.	743	Flow meter	760	Sentry 346. Sentry removed with old pump.
SC-07-42-17-ACC	BDR	---	6/20/79	---	---	---	Farmer estimate	408	Farmer time estimate based on total operation for season through 6/19/79.
		6/07/79	6/20/79	66	N. gas	70	---	---	Timer installed 6/7/79, after pump was already operating.
		6/20/79	7/17/79	213	N. gas	195	---	---	Sentry 354 installed 6/7/79, replaced by sentry 481 on 6/20/79.
		7/17/79	10/22/79	95	---	---	---	---	Farmer estimate through 6/19/79, plus sentry time from 6/20/79 to 10/22/79 = 716.
			Total-----	364					
SC-07-43-23-ACA	BDR	5/07/79	7/17/79	0	---	---	---	---	Sentry unit detached from well 5/7/79-7/17/79.
		7/17/79	8/06/79	403	N. gas	382	---	---	
		8/06/79	8/20/79	---	N. gas	233	---	---	Sentry 341.
		8/06/79	10/22/79	488	---	---	---	---	
			Total-----	891					Sentry total 7/17/79-10/22/79.

Table 6a.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Station identifier	Crop				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diameter (in)	Pump hp.	Power		
										Source	Rating	
SC-07-45-01-DAC	392752102222800	Alfalfa	Flood	160	Rept.	295	---	16	---	N. gas	---	
SC-07-45-24-CDB	392419102240900	Corn	Pivot	160	Rept.	234	111	16	---	N. gas	---	Water-level measurement on 1/16/72.
SC-08-42-03-CBC	392242102052500	Corn	Flood	160	Meas.	325	---	16	---	N. gas	---	
SC-08-45-06-ACC	392258102282500	Corn	Pivot	160	Meas.	260	195	16	150	Elec.	107	Water-level measurement on 5/15/79.
SC-08-45-30-ABC	391935102282300	Corn	Flood	240	Meas.	232	159	16	---	N. gas	---	Water-level measurement on 5/05/71.
SC-08-45-30-AAA	391942102275400	Corn	Flood	240	Meas.	232	159	16	---	N. gas	---	Two wells irrigate this site.
SC-08-46-36-CDC	-----	Corn	Flood	40	Meas.	236	---	16	---	N. gas	---	
SC-08-51-16-ABD	392120103060500	Corn	Flood	104	Rept.	118	69	16	25	Elec.	20	Water-level measurement on 1/11/71.
SC-09-43-22-CCB	391447102121000	Corn	Flood	125	Rept.	334	199	---	100	Elec.	---	Water-level measurement on 4/29/79.

Table 6b.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-07-45-01-DAC	CEP	9/07/79	760	T.T.	Measurement on 8.02-in aluminum-gated pipe.
SC-07-45-24-CDB	CEP	8/31/79	910	T.T.	Measurement on 8-in steel tubing.
SC-08-42-03-CBC	BDR	7/17/79	910	T.T.	Measurement on 8.02-in aluminum-gated pipe.
		7/17/79	820	Dop.	
		7/17/79	760	Prop.	
SC-08-45-06-ACC	BDR	7/10/79	430	T.T.	Measurement on 8-in steel tubing.
	NGG	7/10/79	540	Dop.	Measurement on 10-in pipe.
SC-08-45-30-ABC	BDR	6/19/79	980	Dop.	Measurement on 10-in aluminum-gated pipe.
SC-08-45-30-AAA	CH	6/19/79	780	Prop.	Discharge is for two wells combined.
SC-08-46-36-CDC	BDR	6/19/79	420	Dop.	Measurement on 6-in aluminum-gated pipe.
	CH	6/19/79	230	Prop.	
SC-08-51-16-ABD	BDR	8/08/79	520	Dop.	Measurement on 8-in aluminum-gated pipe.
		8/08/79	190	Prop.	
SC-09-43-22-CCB	BDR	7/12/79	530	Buck.	Measurement all gates.
	NGG	7/12/79	490	Dop.	Measurement on 8-in aluminum-gated pipe.
		8/07/79	630	T.T.	
		8/07/79	670	Dop.	

Table 6c.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-07-45-01-DAC	CEP	6/07/79	10/20/79	1,763	N. gas	---	---	---	Sentry 357.
			Total-----	1,763					
SC-07-45-24-CDB	CEP	5/16/79	10/20/79	1,491	N. gas	---	---	---	Sentry 292.
SC-08-42-03-CBC	BDR	6/20/79	7/17/79	313	N. gas	369	---	---	Sentry 342.
		7/17/79	10/22/79	762	---	---	---	---	
			Total-----	1,075					
SC-08-45-06-ACC	BDR	5/15/79	7/10/79	348	Elec.	382	---	---	Sentry 284.
	NGG	7/10/79	8/20/79	1,040	---	---	---	---	
			Total-----	1,388					
SC-08-45-30-ABC	BDR	6/06/79	6/19/79	306	N. gas	281	---	---	Sentry 377.
SC-08-45-30-AAA	CH	6/19/79	10/20/79	1,263	---	---	---	---	Both wells operate together.
			Total-----	1,569					
SC-08-46-36-CDC	BDR	5/01/79	6/19/79	567	---	---	---	---	Sentry 367. Sentry found detached from pump on 6/19/79, reattached after readout.
	CH	6/19/79	10/20/79	940	---	---	---	---	
			Total-----	1,507					
SC-08-51-16-ABD	BDR	5/24/79	8/08/79	1,006	---	---	---	---	Sentry 345.
		5/24/79	8/20/79	---	Elec.	1,042	---	---	
		8/08/79	10/22/79	408	---	---	---	---	
			Total-----	1,414					
SC-09-43-22-CCB	BDR	4/29/79	7/12/79	881	---	---	---	---	Sentry 288.
		7/12/79	8/07/79	535	---	---	---	---	
		8/07/79	10/22/79	547	---	---	---	---	
			Total-----	1,963					

Table 6a.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Station identifier	Crop				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diameter (in)	Pump hp.	Power		
										Source	Rating	
SC-09-43-29-DBC	391332102135100	Corn	Pivot	110	Rept.	335	185	30	125	Elec.	118	Water-level measurement, 5/71
SC-09-44-32-ACA	391327102201600	Alfalfa	Pivot	140	Rept.	255	---	16	---	N. gas	---	
SC-09-47-19-CDD1	391438102415301	Corn	Flood	25	Rept.	---	---	---	---	N. gas	---	
SC-10-44-10-BCC	391147102185100	Corn	Flood	250	Rept.	297	---	16	100	Elec.	89	
SC-10-48-06-AAA	391250102481000	Corn	Flood	126	Rept.	180	---	16	---	N. gas	---	
SC-10-48-06-BCC	391230102485000										---	Two wells irrigate this site.
SC-10-45-18-AAB	391109102280400	Corn	Flood	75	Meas.	292	197	16	---	N. gas	---	Water-level measurement on 6/6/79.
SC-11-47-27-ABB	390400102394000	Corn	Flood	154	Rept.	227	145	16	---	N. gas	---	Water-level measurement on 5/1/79.
SC-11-49-26-BBB1	390405102515601	Corn	Pivot	130	---	205	151	16	60	Elec.	---	Water-level measurement on 5/1/79.

Table 6b.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-09-43-29-DBC	BDR	6/18/79	950	Dop.	
	CH	6/18/79	670	T.T.	Used aluminum heads on steel pipe.
		6/18/79	910	Prop.	
SC-09-44-32-ACA	BDR	6/27/79	480	T.T.	Measurement on 8.625-in steel pipe.
	NGG	6/27/79	190	Dop.	
SC-09-47-19-CDD1	BDR	8/08/79	300	Dop.	Measurement on 6-in aluminum-gated pipe.
SC-10-44-10-BCC	BDR	6/27/79	710	Dop.	Measurement on 8-in aluminum-gated pipe.
		6/27/79	670	Prop.	
SC-10-48-06-AAA	BDR	6/22/79	510	Dop.	Measurement on 8-in aluminum-gated pipe.
SC-10-48-06-BCC	CH	6/22/79	760	Prop.	Discharge is for two wells combined.
SC-10-45-18-AAB	BDR	6/18/79	610	Dop.	Measurement on 8-in aluminum-gated pipe.
	CH	6/18/79	520	Prop.	
SC-11-47-27-ABB	BDR	7/18/79	820	Dop.	Measurement on 8-in aluminum-gated pipe.
		7/18/79	700	Prop.	
SC-11-49-26-BBB1	BDR	---	700	Rept.	Two wells operate one pivot; owner estimates combined discharge of 700 gal/min.

Table 6c.--*Pumpage data for irrigation sites in Kit Carson County, Colorado*--Continued

Site location	Field person	Time of operation information							
		Date		Sentry time (hours)	Energy meter		Other		Remarks
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-09-43-29-DBC	BDR	4/29/79	6/18/79	234	---	---	---	---	Sentry 289.
	CH	6/18/79	10/22/79	921	---	---	---	---	
			Total-----	1,155					
SC-09-44-32-ACA	BDR	6/07/79	6/27/79	78	---	---	Owner	132	Sentry 353 replaced with Sentry 483 on
		6/27/79	10/22/79	1,338	---	---	estimate	---	6/27/79.
			Total-----	1,416					
SC-09-47-19-CDD1	BDR	5/01/79	6/21/79	0	---	---	---	---	Sentry 333 replaced with Sentry 482 on
		6/21/79	8/08/79	492	---	---	---	---	6/21/79. Well was running prior to
		8/08/79	9/20/79	373	---	---	---	---	6/21/79.
			Total-----	865					
SC-10-44-10-BCC	BDR	4/29/79	6/27/79	242	Elec.	125	---	---	Sentry 312.
		6/27/79	9/20/79	2,044	---	---	---	---	
			Total-----	2,286					
SC-10-48-06-AAA	BDR	5/01/79	6/22/79	598	---	---	---	---	Sentry 335.
SC-10-48-06-BCC	CH	6/22/79	9/20/79	2,029	---	---	---	---	Both wells operate together.
			Total-----	2,627					
SC-10-45-18-AAB	BDR	6/06/79	6/18/79	87	N. gas	65	---	---	Sentry 369.
	CH	6/18/79	9/20/79	1,234	---	---	---	---	
			Total-----	1,321					
SC-11-47-27-ABB	BDR	5/01/79	7/18/79	420	---	---	---	---	Sentry 302.
		7/18/79	9/20/79	1,393	---	---	---	---	
			Total-----	1,813					
SC-11-49-26-BBB1	BDR	5/01/79	9/20/79	514	---	---	---	---	Sentry 297.
			Total-----	514					

Table 7a.--*Pumpage data for irrigation sites in Phillips County, Colorado*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-06-42-07-BAB	403050102052000	Alfalfa	Flood	150	Rept.	260	64	18	40	Elec.	---	Water-level measurement on 1/13/79.
SB-06-43-32-CBA	402640102102501	Corn	Pivot	---	---	354	92	16	75	Elec.	---	Water-level measurement on 3/8/79.
SB-06-45-11-DBA1	403018102204201	Corn	Pivot	125	Rept.	285	160	16	100	Elec.	86	Water-level measurement on 3/8/79.
SB-06-45-28-BDB	402800102231000	Mixed	Pivot	120	Rept.	351	---	18	100	Elec.	---	
SB-08-46-12-BCA	404059102265900	Corn	Pivot	130	Rept.	288	142	16	100	Elec.	64	Water-level measurement on 4/25/79.
SB-08-47-15-DDB	403937102353400	Corn	Pivot	140	Rept.	262	123	16	110	N. gas	.147	Water-level measurement on 4/25/79.
SB-08-47-22-ACA1	403910102353601	Mixed	Pivot	125	Meas.	263	---	16	100	Elec.	---	
SB-09-43-22-AAC	404446102075700	Alfalfa	Pivot	140	Rept.	312	168	16	100	Elec.	---	Water-level measurement on 4/25/79.

Table 7b.--*Pumpage data for irrigation sites in Phillips County, Colorado*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-06-42-07-BAB	---	---	---	---	No discharge measurement made during 1979.
SB-06-43-32-CBA	CEP	8/01/79	970	T.T.	Measurement on 8-in steel tubing.
	RAP	8/01/79	1,000	Inl.	McCrometer inline flow meter.
SB-06-45-11-DBA1	JLP	7/25/79	1,090	T.T.	Measurement on 8-in steel pipe.
	CEP	7/25/79	340	Dop.	
SB-06-45-28-BDB	---	---	---	---	No discharge measurement made during 1979.
SB-08-46-12-BCA	JLP	7/25/79	560	T.T.	Measurement on 8-in steel pipe.
		7/25/79	790	Dop.	
SB-08-47-15-DDB	JLP	7/25/79	740	T.T.	Measurement on 8-in steel pipe.
		7/25/79	730	Dop.	
SB-08-47-22-ACA1	JLP	8/08/79	800	T.T.	Measurement on 8-in steel pipe.
		8/08/79	1,740	Dop.	
SB-09-43-22-AAC	JLP	7/24/79	930	T.T.	Measurement on 8-in steel pipe.
		7/24/79	470	Dop.	
		7/24/79	850	Inl.	McCrometer inline flow meter.

Table 7c.--*Pumpage data for irrigation sites in Phillips County, Colorado*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-06-42-07-BAB	---	4/27/79	5/09/79	---	---	---	Rept.	300	Time reported by irrigator.
		5/09/79	10/31/79	2,096	---	---	---	---	Sentry 240.
SB-06-43-32-CBA	CEP RAP	4/12/79	8/01/79	334	---	---	---	---	Sentry 027. Sentry not recovered at end of season.
SB-06-45-11-DBA1	JLP CEP	4/24/79	7/25/79	274	Elec.	273	---	---	Sentry 057. No final time reading for Sentry.
SB-06-45-28-BDB	---	5/09/79	10/31/79	655	---	---	---	---	Sentry 218.
SB-08-46-12-BCA	JLP	4/25/79	7/25/79	670	Elec.	778	---	---	Sentry 073.
		7/25/79	10/21/79	864	---	---	---	---	
			Total-----	1,534					
SB-08-47-15-DDB	JLP	4/25/79	7/25/79	638	---	---	---	---	Sentry 075.
		7/25/79	10/31/79	838	---	---	---	---	
			Total-----	1,476					
SB-08-47-22-ACA1	JLP	5/03/79	8/08/79	492	---	---	---	---	Sentry 285.
		8/08/79	10/31/80	564	---	---	---	---	
			Total-----	1,056					
SB-09-43-22-AAC	JLP	4/25/79	7/24/79	590	Elec.	560	---	---	Sentry 064.
		7/24/79	10/31/79	547	---	---	---	---	
			Total-----	1,137					

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-01-45-06-ACA	400504102263000	Corn	Pivot	160	Rept.	338	63	16	100	N. gas	---	Water-level measurement on 2/16/79.
SB-01-45-14-ABD	400327102215600	Corn	Pivot	135	Rept.	270	122	16	100	N. gas	---	Water-level measurement on 3/2/79.
SB-01-46-25-BBD	400143102281400	Alfalfa	Pivot	125	Est.	260	67	16	75	Elec.	---	Water-level measurement on 5/11/79.
SB-01-46-29-BBD1	400142102323601	Corn	Pivot	130	Rept.	180	77	16	75	Elec.	---	Water-level measurement on 4/5/79.
SB-01-47-04-CAC	400450102381000	Corn	Flood	177	Rept.	314	121	16	70	N. gas	---	Water-level measurement on 2/28/79.
SB-01-47-08-CBD	400350102393000	Corn	Pivot	130	Rept.	312	139	16	125	N. gas	0.22	Water-level measurement on 5/4/79.
SB-02-43-10-ADA1	400929102090601	Corn	Pivot	130	Rept.	242	53	16	75	Elec.	68	Water-level measurement on 3/1/79.
SB-02-46-26-DBD	400640102283000	Corn	Pivot	127	Meas.	300	---	16	150	N. gas	---	
SB-02-47-09-ADC	400925102375000	Corn	Pivot	135	Meas.	335	133	16	125	N. gas	---	Water-level measurement on 2/28/79.
SB-02-47-10-ADB	400940102363000	Corn	Pivot	130	Rept.	360	121	22	100	Elec.	---	Water-level measurement on 4/4/79.
SB-03-43-32-AAB1	401128102113801	Alfalfa	Pivot	130	Meas.	326	---	16	100	Elec.	71	

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-01-45-06-ACA	CEP	8/08/79	480	T.T.	Measurement on 8-in steel pipe. Engine vibrations present. Type of meter not noted.
	RAP	8/08/79	620	Inl.	
SB-01-45-14-ABD	CEP	9/07/79	810	T.T.	Measurement on 8-in steel tubing.
SB-01-46-25-BBD	---	---	---	---	No discharge measurement made during 1979.
SB-01-46-29-BBD1	JLP	8/03/79	1,140	T.T.	Measurement on 8-in steel pipe.
		8/03/79	630	Dop.	
SB-01-47-04-CAC	JLP	8/01/79	1,500	T.T.	Measurement on 10-in aluminum-gated pipe. Estimated the slope correction to be 1.1.
		8/01/79	1,190	Prop.	
SB-01-47-08-CBD	JLP	8/06/79	670	T.T.	Measurement on 8-in steel tubing.
		8/06/79	610	Dop.	
SB-02-43-10-ADA1	JLP	7/25/79	1,030	T.T.	Measurement on 8-in steel pipe.
SB-02-46-26-DBD	CEP	8/06/79	770	T.T.	Measurement on 8-in steel pipe.
	RAP	8/06/79	730	R.G.	Average of 0.73 in. of water caught in rain gages.
SB-02-47-09-ADC	CEP	9/05/79	1,060	T.T.	Measurement on 8-in steel tubing.
SB-02-47-10-ADB	CEP	9/05/79	1,010	T.T.	Measurement on 8-in steel tubing.
SB-03-43-32-AAB1	JLP	7/25/79	1,070	T.T.	Measurement on 8-in steel pipe.
		7/25/79	1,030	Dop.	

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-01-45-06-ACA	CEP	3/20/80	7/31/79	1,868	---	---	---	---	Sentry 011.
	RAP	7/31/79	10/22/79	742	---	---	---	---	
			Total-----	2,610					
SB-01-45-14-ABD	---	4/05/79	10/22/79	1,075	---	---	---	---	Sentry 032.
SB-01-46-25-BBD	---	5/11/79	10/31/79	1,436	---	---	---	---	Sentry 324.
SB-01-46-29-BBD1	JLP	4/05/79	8/03/79	634	---	---	---	---	Sentry 010.
		8/03/79	10/31/79	151	---	---	---	---	
			Total-----	785					
SB-01-47-04-CAC	JLP	5/04/79	8/01/79	766	---	---	---	---	Sentry 015.
		8/01/79	10/31/79	864	---	---	---	---	
			Total-----	1,630					
SB-01-47-08-CBD	JLP	5/04/79	8/06/79	512	---	---	---	---	Sentry 287.
		8/06/79	10/31/79	488	---	---	---	---	
			Total-----	1,000					
SB-02-43-10-ADA1	JLP	4/06/79	7/25/79	260	---	---	---	---	Sentry 021.
		7/25/79	10/17/79	280	---	---	---	---	
			Total-----	540					
SB-02-46-26-DBD	CEP	3/02/79	7/31/79	432	---	---	---	---	Sentry 030.
	RAP	7/31/79	10/31/79	460	---	---	---	---	
			Total-----	892					
SB-02-47-09-ADC	---	4/04/79	10/31/79	1,366	---	---	---	---	Sentry 006.
SB-02-47-10-ADB	---	4/04/79	10/31/79	1,307	---	---	---	---	Sentry 009.
SB-03-43-32-AAB1	---	---	5/22/79	---	---	---	Rept.	318	Owner reported time.
	JLP	5/22/79	7/15/79	774	Elec.	851	---	---	Sentry 329.
		7/15/79	10/31/79	1,025	---	---	---	---	Season total is 2,017 hours.

Table 8a--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-03-43-33-ACA1	401116102103101	Corn	Pivot	130	Rept.	327	43	16	75	Elec.	63	Water-level measurement on 2/15/79.
SB-03-44-06-ABD1	401537102193201	Alfalfa	Pivot	125	Est.	300	65	16	100	Elec.	---	Water-level measurement on 5/11/79.
SB-03-44-08-ACA1	401445102182401	Corn	Pivot	130	Rept.	340	---	16	100	Elec.	71	
SB-03-44-15-ACA	401350102160000	Corn	Pivot	130 116	Rept. Meas.	280	56	16	75	Elec.	69	Water-level measurement on 4/12/79. Acreage calculated using vehicle odometer.
SB-03-44-23-ACA	401310102150000	Alfalfa	Pivot	200	Rept.	325	47	16	100	Elec.	---	Water-level measurement on 5/10/79.
SB-03-46-15-CAC	401340102301000	Corn	Pivot	130	Est.	384	112	16	100	Elec.	---	Water-level measurement on 3/20/79.
SB-03-46-18-DBD	401330102331000	Corn	Pivot	140 116	Rept. Meas.	380	122	22	100	Elec.	---	Water-level measurement on 5/4/79. Acreage calculated using vehicle odometer.
SB-03-47-19-CDB	401240102403000	Corn	Pivot	260	Rept.	293	164	---	---	N. gas	---	Water-level measurement on 2/26/79.
SB-03-47-25-AAC	401210102341000	Corn	Pivot	130	Est.	345	124	22	100	Elec.	76	Water-level measurement on 4/5/79.
SB-03-48-21-CBD	401230102450000	Corn	Pivot	130	Rept.	328	190	16	110	N. gas	---	Water-level measurement on 2/26/79.

Table 8b--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-03-43-33-ACA1	JLP	7/25/79	1,180	T.T.	Measurement on 8-in steel tubing.
SB-03-44-06-ABD1	---	---	---	---	No discharge measurement made during 1979.
SB-03-44-08-ACA1	CEP	8/08/79	620	T.T.	Measurement on 8-in steel tubing.
SB-03-44-15-ACA	CEP	8/08/79	570	T.T.	Measurement on 8-in steel tubing.
	KRW	8/23/79	990	T.T.	
SB-03-44-23-ACA	JLP	7/25/79	1,090	T.T.	Measurement on 8-in steel tubing.
SB-03-46-15-CAC	---	---	---	---	No discharge measurement made during 1979.
SB-03-46-18-DBD	CEP	7/31/79	820	T.T.	Measurement on 8-in steel tubing.
	JLP	8/01/79	920	T.T.	
		8/01/79	340	Dop.	
	CEP	8/18/79	550	---	
	RRL				
SB-03-47-19-CDB	CEP	7/31/79	1,020	T.T.	Combined discharge of two pivots that were measured separately.
		7/31/79	1,460	Inl.	
SB-03-47-25-AAC	CEP	7/31/79	830	T.T.	Measurement on 8-in steel tubing.
	RAP				
SB-03-48-21-CBD	CEP	7/31/79	580	T.T.	Measurement on 8-in steel tubing.
	RAP				

Table 8c--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-03-43-33-ACA1	JLP	4/06/79	7/25/79	308	---	---	---	---	Sentry 017.
		7/25/79	---	60	---	---	---	---	
			Total-----	368					
SB-03-44-06-ABD1	---	5/11/79	10/31/79	865	---	---	---	---	Sentry 320.
SB-03-44-08-ACA1	CEP	4/11/79	8/08/79	955	---	---	---	---	Sentry 019.
		8/08/79	10/31/79	241	---	---	---	---	
			Total-----	1,196					
SB-03-44-15-ACA	CEP	4/12/79	8/08/79	518	---	---	---	---	Sentry 028.
	RRL	8/08/79	8/18/79	84	Elec.	132	---	---	
		8/18/79	10/31/79	255	---	---	---	---	
			Total-----	857					
SB-03-44-23-ACA	JLP	5/10/79	7/25/79	605	---	---	---	---	Sentry 261.
		7/25/79	10/31/79	250	---	---	---	---	
			Total-----	855					
SB-03-46-15-CAC	---	3/20/79	10/31/79	1,033	---	---	---	---	Sentry 055.
SB-03-46-18-DBD	CEP	5/04/79	7/31/79	623	---	---	---	---	
		7/31/79	8/01/79	13	---	---	---	---	
		8/01/79	8/18/79	270	---	---	---	---	
		8/18/79	10/31/79	237	---	---	---	---	
			Total-----	1,143					
SB-03-47-19-CDB	CEP	4/04/79	10/31/79	636	---	---	---	---	Sentry 003.
SB-03-47-25-AAC	CEP	4/05/79	7/31/79	512	---	---	---	---	Sentry 016.
	RAP	7/31/79	10/31/79	635	---	---	---	---	
			Total-----	1,147					
SB-03-48-21-CBD	CEP	4/04/79	7/31/79	434	---	---	---	---	Sentry 002.
	RAP	7/31/79	10/31/79	392	---	---	---	---	
			Total-----	826					

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-04-43-05-AAD1	402052102111801	Corn	Pivot	240	Rept.	345	65	16	125	Elec.	116.8	Water-level measurement on 4/13/79.
SB-04-43-09-DBD1	401933102102801	Alfalfa	Pivot	90	Rept.	330	61	16	100	Elec.	---	Water-level measurement on 5/10/79.
SB-04-43-26-DDB	401705102081000	Corn	Pivot	170	Rept.	380	17	22	100	Elec.	---	Water-level measurement on 7/24/69.
SB-04-43-27-ADB	401730102092000	Corn	Pivot	185	Rept.	365	40	22	100	Elec.	---	Water-level measurement on 6/13/69.
SB-04-43-29-AAC1	401721102113101	Alfalfa Pasture	Pivot	65 65	Rept.	305	42	16	---	Diesel	---	Water-level measurement on 5/3/79.
SB-04-44-35-ACA	401630102150000	Corn Pasture	Sprink-ler	75 75	Rept.	355	63	16	100	Elec.	90.9	Water-level measurement on 5/5/79.
SB-04-45-18-AAC1	401914102261601	Alfalfa	Pivot	130	Rept.	290	129	16	100	Elec.	---	Water-level measurement on 11/9/74.
SB-04-46-33-DCA1	401607102305001	Corn	Pivot Flood	130 150	Rept.	410	130	16	---	N. gas	---	Water-level measurement on 4/9/79.

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-04-43-05-AAD1	JLP	8/08/79 8/08/79	1,585 510	T.T. Dop.	Measurement on 8-in steel pipe.
SB-04-43-09-DBD1	JLP	8/08/79 8/08/79	1,130 380	T.T. Dop.	Measurement on 8-in steel pipe.
SB-04-43-26-DDB	CEP	8/08/79	715	T.T.	Measurement on 8-in steel tubing.
SB-04-43-27-ADB	CEP	8/08/79 8/08/79	790 970	T.T. Inl.	Measurement on 8-in steel pipe.
SB-04-43-29-AAC1	CEP	8/08/79	790	T.T.	Measurement on 8-in steel tubing.
SB-04-44-35-ACA	CEP RAP	8/01/79	1,065	T.T.	Measurement on 8-in steel pipe.
SB-04-45-18-AAC1	JLP	8/06/79 8/06/79	960 550	T.T. Dop.	Measurement on 8-in steel tubing.
SB-04-46-33-DCA1	KRW KRW	8/22/79 8/23/79	650 720	Buck T.T.	Measurement on 8-in aluminum-gated pipe. Measurement on 8-in steel tubing for pivot.

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-04-43-05-AAD1	JLP	4/13/79	8/08/79	695	Elec.	767	---	---	Sentry 033.
		8/08/79	10/31/79	243	---	---	---	---	
			Total-----	938					
SB-04-43-09-DBD1	JLP	---	5/10/79	---	Elec.	---	Farmer	48	Sentry 295.
		5/10/79	8/08/79	703	---	---	---	---	
		8/08/79	10/31/79	464	---	---	---	---	
			Total-----	1,167	---	---	---	---	Season total is 1,215 hours.
SB-04-43-26-DDB	CEP	4/13/79	8/08/79	166	Elec.	---	---	---	Sentry 029.
		8/08/79	10/31/79	11	---	---	---	---	Time seems very low.
			Total-----	177					
SB-04-43-27-ADB	CEP	4/13/79	8/08/79	178	Elec.	---	---	---	Sentry 031.
		8/08/79	10/23/79	53	---	---	---	---	Time seems very low.
			Total-----	231					
SB-04-43-29-AAC1	CEP	4/27/79	8/08/79	584	---	---	---	---	Sentry 216.
		8/08/79	10/22/79	715	---	---	---	---	
			Total-----	1,299					
SB-04-44-35-ACA	CEP	5/03/79	8/01/79	686	---	---	---	---	Sentry 301.
	RAP	8/01/79	10/31/79	604	---	---	---	---	
			Total-----	1,290					
SB-04-45-18-AAC1	JLP	4/27/79	8/06/79	1,083	---	---	---	---	Sentry 281.
		8/06/79	10/31/79	353	---	---	---	---	
			Total-----	1,436					
SB-04-46-33-DCA1	KRW	5/18/79	8/22/79	1,193	N. gas	1,203	---	---	Sentry 307.
		8/22/79	9/20/79	494	---	---	---	---	
			Total-----	1,687					

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-05-42-06-CDB1	402543102050301	Corn	Pivot	130	Rept.	349	36	16	60	Elec.	55.7	Water-level measurement on 4/12/79.
SB-05-42-18-BBD1	402428102050501	Corn	Pivot	130	Rept.	325	58	16	75	Elec.	54.4	Water-level measurement on 2/14/79.
SB-05-42-32-BCA	402150102041000	Corn	Pivot	130	Rept.	300	41	12.5	60	Elec.	48.22	Water-level measurement on 2/14/79.
SB-05-43-36-ACA	402140102054000	Corn	Pivot	130	Rept.	333	33	18	75	Elec.	59.6	Water-level measurement on 5/3/79.
SB-05-44-29-DDC1	402204102170101	Alfalfa	Pivot	220	Rept.	355	95	16	200	Elec.	---	Water-level measurement on 4/26/76.
SB-05-44-35-DAC1	402121102133801	Grass	Pivot	94	Rept.	304	92	16	100	Elec.	81.5	Water-level measurement on 4/11/79.
SB-05-45-23-CAB1	402313102210401	Corn	Pivot	311	Rept.	370	120	16	200	Elec.	---	Water-level measurement on 3/24/77.
SB-05-45-36-AAC1	402152102192201	Corn	Pivot	130	Rept.	290	107	16	125	Elec.	---	Water-level measurement on 2/15/79.
SB-05-46-21-ADC	402310102294500	Alfalfa	Pivot	260	Rept.	386	161	16	125	Elec.	---	Water-level measurement on 9/26/70.

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-05-42-06-CDB1	CEP RAP	8/01/79	880	T.T.	Measurement on 8-in steel tubing.
SB-05-42-18-BBD1	CEP	7/25/79	1,075	T.T.	Measurement on 8-in steel tubing.
SB-05-42-32-BCA	CEP	7/25/79	960	T.T.	Measurement on 8-in aluminum pipe.
SB-05-43-36-ACA	CEP	7/25/79	1,070	T.T.	Measurement on 8-in aluminum pipe.
SB-05-44-29-DDC1	JLP	8/08/79 8/08/79	1,345 455	T.T. Dop.	Measurement on 8-in steel tubing.
SB-05-44-35-DAC1	JLP	8/08/79 8/08/79	1,165 470	T.T. Dop.	Measurement on 8-in steel tubing.
SB-05-45-23-CAB1	JLP	8/06/79 8/06/79	1,570 970	T.T. Dop.	Measurement on 8-in steel tubing.
SB-05-45-36-AAC1	JLP	8/06/79 8/06/79	1,100 550	T.T. Dop.	Measurement on 8-in steel tubing.
SB-05-46-21-ADC	JLP	8/08/79 8/08/79	1,115 550	T.T. Dop.	Measurement on 8-in steel pipe.

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-05-42-06-CDB1	CEP	4/12/79	8/01/79	---	---	---	---	---	Sentry 025 found removed from pump on
	RAP	8/01/79	10/31/79	640	---	---	---	---	8/1/79; 670 hours logged from 4/12/79 to date that sentry was removed.
SB-05-42-18-BBD1	CEP	4/12/79	7/25/79	644	Elec.	682	---	---	Sentry 024.
		7/25/79	10/31/79	696	---	---	---	---	
			Total-----	1,340					
SB-05-42-32-BCA	CEP	4/12/79	7/25/79	5.5	Elec.	265	---	---	Sentry 022. Sentry bad; not replaced.
		7/25/79	10/31/79	97	---	---	---	---	
SB-05-43-36-ACA	CEP	5/03/79	7/25/79	581	Elec.	587	---	---	Sentry 283.
		7/25/79	10/31/79	667	---	---	---	---	
			Total-----	1,248					
SB-05-44-29-DDC1	JLP	4/26/79	8/08/79	975	Elec.	---	---	---	Sentry 213.
		8/08/79	10/31/79	325	---	---	---	---	
			Total-----	1,300					
SB-05-44-35-DAC1	JLP	---	5/11/79	---	---	---	Farmer	35	Sentry 316.
		5/11/79	8/08/79	210	Elec.	486	---	---	Sentry time appears low.
		8/08/79	10/31/79	407	---	---	---	---	
			Total	617					Season total 652 hours.
SB-05-45-23-CAB1	JLP	4/26/79	8/06/79	1,051	---	---	---	---	Sentry 202.
		8/06/79	10/31/79	864	---	---	---	---	
			Total-----	1,915					
SB-05-45-36-AAC1	JLP	4/11/79	8/06/79	1,120	---	---	---	---	Sentry 001.
		8/06/79	10/31/79	415	---	---	---	---	
			Total-----	1,535					
SB-05-46-21-ADC	JLP	4/27/79	8/08/79	402	---	---	---	---	Sentry 230.
		8/08/79	10/31/79	159	---	---	---	---	Sentry time seems very low.
			Total-----	561					

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-05-46-34-DBC	402120102290000	Corn	Pivot Flood	130 90	Rept. Rept.	360	162	16	150	Elec.	123.4	Water-level measurement on 3/7/79.
SB-05-47-21-DBB1	402310102365701	Corn	Pivot Flood	130 70	Rept. Rept.	379	258	16	200	Elec.	---	Water-level measurement on 3/9/79.
SB-05-48-35-BCA	402140102420000	Corn	Pivot	130	Rept.	320	226	18	125	Elec.	---	Water-level measurement on 3/7/79.
SC-01-42-33-ACC	395541102042400	Alfalfa	Pivot	140	Rept.	---	---	---	---	---	---	
SC-01-44-18-AAC	395827102205000	Corn	Flood	---	---	304	---	16	---	N. gas	---	No acreage information in the well folder.
SC-01-45-34-DBD	395521102234800	Corn	Pivot	180	Rept.	160	---	22	100	Elec.	---	
SC-01-46-31-DDB1	395523102334301	Corn	Pivot	120	Rept.	---	103	---	100	Elec.	---	Water-level measurement on 5/23/79.
SC-01-47-25-DDB	395612102344800	Corn	Pivot	130	Rept.	301	109	18	100	Elec.	---	Water-level measurement on 5/23/79.
SC-01-48-08-BCA1	395906102464801	Corn	Pivot	160	Rept.	300	156	---	---	Elec.	---	Water-level measurement on 7/17/73.

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-05-46-34-DBC	JLP	8/06/79	850	T.T.	Measurement on 10-in aluminum pipe.
		8/06/79	2,840	Prop.	
		8/06/79	1,050	Dop.	
		8/06/79	700	T.T.	Measurement on 8-in aluminum pipe at pivot.
SB-05-47-21-DBB1	JLP	8/03/79	1,400	Inl.	Measurement on 8-in aluminum pipe.
		8/03/79	1,310	Prop.	
SB-05-48-35-BCA	JLP	8/02/79	615	T.T.	Measurement on 8-in steel pipe.
SC-01-42-33-ACC	JLP	---	---	---	No discharge measurement made during 1979.
SC-01-44-18-AAC	CEP	8/02/79	715	Dop.	Measurement on 8-in aluminum-gated pipe.
	RAP	8/02/79	610	Prop.	
SC-01-45-34-DBD	CEP	7/29/79	785	T.T.	Measurement on 8-in steel tubing.
SC-01-46-31-DDB1	CEP	9/06/79	260	T.T.	Field person felt this measurement was in error. Measurement on 7-in steel pipe.
SC-01-47-25-DDB	CEP	9/05/79	780	T.T.	Measurement on 8-in steel tubing.
SC-01-48-08-BCA1	CEP	---	---	---	No discharge measurement made during 1979.

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-05-46-34-DBC	JLP	4/24/79	8/06/79	829	Elec.	796	---	---	Sentry 053.
		8/06/79	10/31/79	534	---	---	---	---	
			Total-----	1,363					
SB-05-47-21-DBB1	JLP	4/24/79	8/03/79	109	---	---	---	---	Sentry 050. Sentry time very low.
		8/03/79	10/31/79	124	---	---	---	---	
			Total-----	233					
SB-05-48-35-BCA	JLP	4/24/79	8/02/79	1,049	---	---	---	---	Sentry 045.
		8/02/79	10/31/79	953	---	---	---	---	
			Total-----	2,002					
SC-01-42-33-ACC	JLP	5/08/79	10/22/79	1,479	---	---	---	---	Sentry 368.
			Total-----	1,479					
SC-01-44-18-AAC	CEP	5/08/79	8/02/79	818	---	---	---	---	Sentry 355.
	RAP	8/02/79	9/18/79	769	---	---	---	---	
			Total-----	1,587					
SC-01-45-34-DBD	CEP	5/08/79	7/29/79	680	---	---	---	---	Generator failed during readout of sentry; some time may have been lost. Sentry 375.
		7/29/79	10/22/79	241	---	---	---	---	
			Total-----	1,121					
SC-01-46-31-DDB1	CEP	5/23/79	10/22/79	1,013	Elec.	---	---	---	Sentry 323.
			Total-----	1,013					
SC-01-47-25-DDB	CEP	5/23/79	10/22/79	1,453	Elec.	---	---	---	Sentry 321.
			Total-----	1,453					
SC-01-48-08-BCA1	CEP	6/07/79	---	---	Elec.	---	---	---	Sentry 378. No final sentry readout.

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-01-48-18-DAC1	395753102471501	Alfalfa	Pivot	130	Rept.	270	165	---	---	Elec.	---	Water-level measurement, 1976
SC-02-45-10-BBB	395416102243200	Corn	Pivot	---	---	135	43	16	75	Elec.	---	Water-level measurement, 8/57. No acreage information.
SC-02-46-20-AAC	395218102323500	Corn	Pivot	129	Rept.	365	---	16	100	Elec.	---	
SC-02-48-07-BDB	395355102475000	Corn	Pivot	130	Rept.	271	151	16	100	Elec.	---	Water-level measurement on 7/28/72 from observation well 50 ft southwest of this well.
SC-02-48-13-BAA	395320102415000	Alfalfa	Pivot	170	Rept.	227	160	16	75	Elec.	---	Water-level measurement on 11/21/71.
SC-04-45-21-ACD	394138102243801	Corn	Flood	90	Rept.	339	203	16	150	Elec.	123.4	Water-level measurement on 5/22/73..
SC-04-47-30-CBD	394027102405900	Corn	Pivot	130	Rept.	245	95	16	100	Elec.	---	Water-level measurement, 1/70.
SC-05-42-05-ADB1	393922102051101	Alfalfa	Pivot	85	Rept.	80	---	18	60	Elec.	38.8	
SC-05-43-18-CBB	393720102135500	Alfalfa	Pivot	112	Meas.	112	37	16	---	Elec.	32.9	Water-level measurement on 5/15/56.
SC-05-43-07-CBD	393810102135000	Alfalfa	Flood	90	Rept.	240	---	16	50	Elec.	---	

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-01-48-18-DAC1	CEP	---	---	---	No discharge measurement made during 1979.
SC-02-45-10-BBB	CEP	---	---	---	No discharge measurement made during 1979.
SC-02-46-20-AAC	CEP	---	---	---	No discharge measurement made during 1979.
SC-02-48-07-BDB	CEP	---	---	---	No discharge measurement made during 1979.
SC-02-48-13-BAA	CEP	9/05/79	510	T.T.	Measurement on 8-in steel tubing.
SC-04-45-21-ACD	FJH	8/17/79	1,410	T.T.	Measurements on 10-in aluminum-gated pipe; spacing 9 on clampitron.
	RGB	8/17/79	1,390	Dop.	
SC-04-47-30-CBD	CEP	9/06/79	---	T.T.	Could not get averaged reading on clampitron for 7-in steel pipe.
SC-05-42-05-ADB1	FJH	8/19/79	280	T.T.	Measurement on 8-in steel pipe.
	CEP	8/19/79	215	Dop.	
SC-05-43-18-CBB	CEP	8/19/79	310	T.T.	Measurement on 6-in steel pipe.
	FJH	8/19/79	330	Dop.	Measurement on 8-in steel tubing.
		8/19/79	375	Inl.	
SC-05-43-07-CBD	CEP	9/07/79	225	T.T.	Measurement on 6-in aluminum-gated pipe.

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-01-48-18-DAC1	CEP	6/07/79	---	---	Elec.	---	---	---	Sentry 359. No final sentry readout.
SC-02-45-10-BBB	CEP	5/08/79	9/20/79	567	---	---	---	---	Sentry 343.
			Total-----	567					
SC-02-46-20-AAC	CEP	5/23/79	9/20/79	724	---	---	---	---	Sentry 325.
			Total-----	724					
SC-02-48-07-BDB	CEP	5/23/79	9/20/79	994	---	---	---	---	Sentry 336.
			Total-----	994					
SC-02-48-13-BAA	CEP	---	6/07/79	---	---	---	Farmer	48	Sentry 352.
		6/07/79	---	---	---	---	---	---	No sentry readout.
SC-04-45-21-ACD	FJH	5/22/79	8/17/79	1,110	Elec.	1,038	---	---	Sentry 314.
	RGB	8/17/79	9/20/79	58	---	---	---	---	
			Total-----	1,168					
SC-04-47-30-CBD	CEP	5/23/79	10/22/79	1,193	---	---	---	---	Sentry 344.
			Total-----	1,193					
SC-05-42-05-ADB1	FJH	5/24/79	8/19/79	681	Elec.	692	---	---	Sentry 350.
	CEP	8/19/79	10/22/79	599	---	---	---	---	
			Total-----	1,280					
SC-05-43-18-CBB	CEP	---	6/06/79	---	---	---	Farmer	600	600 hours accumulated prior to sentry installation. Sentry 370.
	FJH	6/06/79	8/19/79	1,016	---	---	---	---	
		8/19/79	10/22/79	343	---	---	---	---	
			Total-----	1,359	---	---	---	---	Season total 1,959 hours.
SC-05-43-07-CBD	CEP	5/17/79	9/18/79	1,243	---	---	---	---	Sentry 300.
			Total-----	1,243					

Table 8a.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-05-46-35-CBB	393440102294300	Corn	Pivot	160	Rept.	206	114	---	100	Elec.	---	Water-level measurement on 5/17/79.
SC-05-48-04-CDB	393840102450000	Corn	Pivot	120	Rept.	234	129	---	125	Elec.	---	Water-level measurement on 5/18/79.

Table 8b.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-05-46-35-CBB	CEP	---	---	---	No discharge measurement made during 1979.
SC-05-48-04-CDB	CEP	---	---	---	No discharge measurement made during 1979.

Table 8c.--*Pumpage data for irrigation sites in Yuma County, Colorado*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-05-46-35-CBB	CEP	5/17/79	9/18/79	1,242	---	---	---	---	Sentry 305.
			Total-----	1,242					
SC-05-48-04-CDB	CEP	5/18/79	9/19/79	1,174	---	---	---	---	Sentry 311.
			Total-----	1,174					

Table 9a.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-01-38-01-BBC	-----	Alfalfa	Sprink-ler	70	Rept.	---	---	---	25	Elec.	15.4	
SC-02-40-25-ADA	395112101450302	Corn	Flood	55	Meas.	---	---	---	30	Elec.	---	
SC-02-41-27-BBD	-----	Alfalfa Corn	Flood	10 58	Rept. Rept.	---	---	---	60	Elec.	28	
SC-03-37-24-ACC	-----	Corn	Pivot	130	Meas.	---	---	---	---	N. gas	---	
SC-03-39-24-DAB	394639101383401	Corn	Flood	33	Rept.	---	---	---	---	N. gas	---	
SC-03-40-29-ABC	394607101500101	Alfalfa	Sprink-ler	26	Rept.	---	---	---	---	Elec.	---	
SC-03-42-33-CCB	394442102024701	Corn Alfalfa	Sprink-ler	32 50	Rept. Rept.	---	---	---	---	N. gas	---	
SC-04-37-23-CCB	-----	Corn Alfalfa	Flood	48 12	Meas.	---	---	---	---	N. gas	---	
SC-04-38-21-ADC	-----	Corn	Flood	108	Meas.	---	---	---	---	N. gas	---	

Table 9b.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-01-38-01-BBC	JLP	7/17/79	565	Dop.	Measurement on 6-in aluminum pipe.
		7/17/79	405	Dop.	Polysonics meter.
SC-02-40-25-ADA	FJH	8/18/79	340	T.T.	Measurement on 6-in steel pipe.
	RGB	8/18/79	340	Dop.	Measurement on 6-in aluminum-gated pipe.
SC-02-41-27-BBD	FJH	8/18/79	305	T.T.	Measurement on 6-in steel pipe.
	RGB	8/18/79	200	Dop.	
		8/18/79	300	Prop.	Measurement on 6-in aluminum-gated pipe.
SC-03-37-24-ACC	FJH	8/18/79	355	T.T.	Measurement on 8-in steel tubing.
	RGB	8/18/79	280	Dop.	
SC-03-39-24-DAB	BDR	---	---	---	No discharge measurement.
SC-03-40-29-ABC	BDR	9/11/79	110	Dop.	Measurement on 4-in aluminum pipe.
SC-03-42-33-CCB	BDR	9/11/79	155	T.T.	Measurement on 6-in steel pipe.
		9/11/79	195	Dop.	
SC-04-37-23-CCB	BDR	8/26/79	405	T.T.	Measurement on 8-in aluminum-gated pipe.
		8/26/79	345	Prop.	
SC-04-38-21-ADC	BDR	---	---	---	No discharge measurement made during 1979.

Table 9c.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-01-38-01-BBC	JLP	---	6/08/79	---	---	---	Rept.	713	Sentry 491. Farmer estimated well pumped 713 hours prior to sentry installation on 6/8/79. Season total 1,474 hours.
		6/08/79	7/17/79	331	Elec.	292	---	---	
		7/17/79	10/16/79	430	Elec.	546	---	---	
SC-02-40-25-ADA	FJH	5/17/79	8/18/79	783	---	---	---	---	Sentry 247.
	RGB	8/18/79	10/16/79	370	---	---	---	---	
			Total-----	1,153					
SC-02-41-27-BBD	FJH	6/26/79	8/18/79	935	Elec.	931	---	---	Sentry 270.
	RGB	8/18/79	9/16/79	69	Elec.	91	---	---	
			Total-----	1,004		1,022			
SC-03-37-24-ACC	FJH	6/07/79	7/31/79	688	---	---	---	---	Sentry 493.
	RGB	7/31/79	10/16/79	860	---	---	---	---	
	BDR								
			Total-----	1,548					
SC-03-39-24-DAB	BDR	5/16/79	10/16/79	394	---	---	---	---	Sentry 260. Time seems low.
			Total-----	394					
SC-03-40-29-ABC	BDR	---	5/17/79	---	---	---	Rept.	84	Sentry 253.
		5/17/79	9/11/79	568	---	---	---	---	
		9/11/79	10/16/79	149	---	---	---	---	Sentry badly blistered. Season total 801 hours.
SC-03-42-33-CCB	BDR	---	5/17/79	---	---	---	Rept.	360	Sentry 238.
		5/17/79	9/11/79	1,468	---	---	---	---	
		9/11/79	10/16/79	604	---	---	---	---	
									Season total 2,432 hours.
SC-04-37-23-CCB	BDR	6/07/79	8/26/79	1,174	---	---	---	---	Sentry 373.
		8/26/79	10/16/79	473	---	---	---	---	
			Total-----	1,647					
SC-04-38-21-ADC	BDR	6/07/79	10/16/79	1,053	---	---	---	---	Sentry 495.
			Total-----	1,053					

Table 9a.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-05-38-20-DAA	393612101361601	Corn	Flood	25	Rept.	---	---	---	50	Elec.	---	
SC-05-41-22-CC	-----	Corn	Flood	160	Rept.	---	---	---	---	N. gas	---	

Table 9b.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-05-38-20-DAA	BDR	---	600	Rept.	Owner estimate.
SC-05-41-22-CC	BDR	6/20/79	810	T.T.	Measurement on 8-in aluminum pipe.
	CH	6/20/79	675	Dop.	

Table 9c.--*Pumpage data for irrigation sites in Cheyenne County, Kansas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-05-38-20-DAA	BDR	5/16/79	10/16/79	668	---	---	---	---	Sentry 258.
			Total-----	668					
SC-05-41-22-CC	BDR	5/16/79	6/20/79	605	---	---	---	---	Sentry 239.
	CH	6/20/79	10/17/79	1,372	---	---	---	---	
			Total-----	1,977					

Table 10a.--*Pumpage data for irrigation sites in Sherman County, Kansas*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-06-37-02-CAC	-----	Corn	Pivot	125	Rept.	---	---	---	---	N. gas	---	
SC-06-37-14-DBC	-----	Corn	Pivot	100	Rept.	---	---	---	---	N. gas	---	
SC-06-37-16-CDD	-----	Corn Grass	Pivot	46 47	Meas. Meas.	---	---	---	---	N. gas	---	
SC-06-37-17-ACD	-----	Corn	Pivot	120	Rept.	---	---	---	---	N. gas	---	
SC-06-40-10-DBC	-----	Corn	Pivot	130	Rept.	---	---	---	100	Elec.	71.5	
SC-06-41-23-C	393040101521801	Corn	Pivot	250	Rept.	---	---	---	200	Elec.	---	
SC-06-41-27-DBD	-----	Corn	Flood	130	Rept.	---	161.5	---	---	N. gas	---	Water-level measurement on 1/3/79.
SC-07-37-10-BCA	-----	Corn	Pivot	260	Rept.	---	---	---	---	N. gas	---	
SC-07-39-17-ACC	-----	Corn	Flood	88	Rept.	---	---	---	---	N. gas	---	

Table 10b.--*Pumpage data for irrigation sites in Sherman County, Kansas*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-06-37-02-CAC	BDR	7/31/79	450	T.T.	Measurement on 8-in aluminum pipe.
		7/31/79	220	Dop.	
SC-06-37-14-DBC	JLP	7/09/79	860	Dop.	Measurement on 8-in aluminum pipe.
SC-06-37-16-CDD	JLP	7/09/79	425	Dop.	Measurement on 6-in steel pipe.
SC-06-37-17-ACD	JLP	7/09/79	1,350	Dop.	Measurement on 8-in steel tubing.
		7/09/79	1,020	Dop.	Polysonics meter.
SC-06-40-10-DBC	JLP	7/09/79	855	Dop.	Measurement on 6-in steel pipe.
SC-06-41-23-C	JLP	7/13/79	1,160	T.T.	Measurement on 8-in steel pipe.
		7/13/79	1,635	Dop.	
SC-06-41-27-DBD	JLP	7/06/79	840	Dop.	Measurement on 9-in aluminum-gated pipe.
		7/06/79	1,195	Prop.	
SC-07-37-10-BCA	JLP	7/19/79	595	T.T.	Measurement on 8-in steel pipe.
	KRW	7/19/79	175	Dop.	
SC-07-39-17-ACC	BDR	8/26/79	350	T.T.	Measurement on 8-in aluminum-gated pipe.

Table 10c.--*Pumpage data for irrigation sites in Sherman County, Kansas*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-06-37-02-CAC	BDR	5/31/79	6/06/79	---	---	---	Rept.	96	Sentry 309.
		6/06/79	7/31/79	558	---	---	---	---	
		7/31/79	10/18/79	381	---	---	---	---	
									Season total 1,035 hours.
SC-06-37-14-DBC	JLP	5/15/79	10/18/79	1,371	---	---	---	---	Sentry 244.
			Total-----	1,371					
SC-06-37-16-CDD	JLP	6/06/79	10/18/79	24	---	---	---	---	Sentry 267 malfunctioned during season.
SC-06-37-17-ACD	JLP	5/16/79	10/18/79	1,712	---	---	---	---	Sentry 257.
			Total-----	1,712					
SC-06-40-10-DBC	JLP	5/15/79	7/09/79	---	Elec.	488	---	---	Sentry 265.
		5/15/79	10/18/79	1,582	---	---	---	---	
									Season total 2,070 hours.
SC-06-41-23-C	JLP	6/20/79	7/13/79	33	Elec.	44	---	---	Sentry 236.
		7/13/79	10/17/79	807	Elec.	734	---	---	
			Total-----	840		778			
SC-06-41-27-DBD	JLP	5/15/79	7/06/79	450	---	---	---	---	Sentry 249.
		7/06/79	10/17/79	1,351	---	---	---	---	
			Total-----	1,801					
SC-07-37-10-BCA	JLP	5/15/79	6/19/79	267	---	---	---	---	Sentry 214.
		6/19/79	10/18/79	624	---	---	---	---	
			Total-----	891			Rept.	2,210	Owner reports season total 2,210 hours.
SC-07-39-17-ACC	BDR	6/06/79	8/26/79	927	---	---	---	---	Sentry 308.
		8/26/79	10/16/79	331	---	---	---	---	
			Total-----	1,258					

Table 10a.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-07-41-01-ABD	-----	Beets Beans	Flood	55 70	Rept.	---	---	---	---	N. gas	---	
SC-07-41-32-CCD	392342101553501	Alfalfa	Pivot	120	Rept.	---	---	---	---	N. gas	0.16	
SC-07-41-33-ABA	-----	Corn	Pivot	120	Rept.	---	---	---	---	N. gas	---	
SC-08-37-04-BBB	-----	Corn	Flood	155	Rept.	---	---	---	---	N. gas	---	
SC-08-37-28-BBD	-----	Corn	Pivot	120	Rept.	---	---	---	---	N. gas	---	
SC-08-38-01-BDA	-----	Corn	Flood	150	Rept.	---	---	---	---	N. gas	---	
SC-08-38-16-BCD	-----	Corn Milo	Flood	60 130	Rept.	---	---	---	---	N. gas	---	
SC-08-38-32-BAA	-----	Corn	Flood	140	Rept.	---	---	---	---	N. gas	.32	

Table 10b.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-07-41-01-ABD	BDR	9/11/79	760	T.T.	Measurement on 8-in steel pipe.
SC-07-41-32-CCD	BDR	8/26/79	465	T.T.	Measurement on 8-in steel tubing.
SC-07-41-33-ABA	BDR	7/11/79	735	Dop.	Measurement on 6-in steel tubing.
		8/26/79	565	T.T.	
SC-08-37-04-BBB	BDR	7/30/79	810	Dop.	Measurement in 10-in aluminum-gated pipe.
		7/30/79	1,000	Rept.	Owner estimate.
SC-08-37-28-BBD	BDR	8/09/79	670	T.T.	Measurement on 8-in steel tubing.
		8/09/79	235	Dop.	
SC-08-38-01-BDA	JLP	---	---	---	No discharge information.
SC-08-38-16-BCD	BDR	8/09/79	980	T.T.	Measurement on 8-in aluminum-gated pipe.
		8/09/79	1,080	Dop.	
SC-08-38-32-BAA	FJH	8/17/79	1,240	T.T.	Measurement on 10-in aluminum-gated pipe.
	RGB	8/17/79	915	Dop.	
	BDR	8/17/79	775	Prop.	

Table 10c.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-07-41-01-ABD	BDR	6/06/79	9/11/79	433	---	---	Engine	---	Sentry 303.
		9/11/79	10/17/79	140	---	---	hours	---	
			Total-----	573			Total-----	509	
SC-07-41-32-CCD	BDR	---	5/18/79	---	---	---	Farmer	180	Sentry 277.
		5/18/79	6/20/79	236	---	---	---	---	
		6/20/79	8/20/79	714	---	---	---	---	
		8/26/79	10/17/79	417	---	---	---	---	
			Total-----	1,367					
SC-07-41-33-ABA	BDR	---	5/15/79	---	---	---	Rept.	120	Sentry 245.
		5/15/79	7/18/79	358	---	---	---	---	Sentry lost after 7/18/79.
		7/18/79	---	---	---	---	---	---	
SC-08-37-04-BBB	BDR	6/06/79	7/30/79	594	---	---	Engine	---	Sentry 272.
		7/30/79	10/18/79	1,189	---	---	hours	---	
			Total-----	1,783			Total-----	1,420	
SC-08-37-28-BBD	BDR	5/18/79	8/09/79	880	---	---	---	---	Sentry 243.
		8/09/79	10/18/79	256	---	---	---	---	
			Total-----	1,136					
SC-08-38-01-BDA	JLP	5/15/79	7/27/79	165	---	---	---	---	Sentry 197.
		7/27/79	10/18/79	464	---	---	---	---	
			Total-----	629					
SC-08-38-16-BCD	BDR	6/06/79	8/09/79	559	---	---	---	---	Sentry 299.
		8/08/79	10/18/79	574	---	---	---	---	
			Total-----	1,133					
SC-08-38-32-BAA	RGB	5/17/79	7/26/79	147	Gas	216	---	---	Sentry 268.
	FJH	7/26/79	8/17/79	234	Gas	356	---	---	
	BDR	8/17/79	10/18/79	470	---	---	---	---	
			Total-----	951					

Table 10a.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-08-39-25-CAB	-----	Corn	Flood	107	Rept.	---	---	---	---	N. gas	0.32	
SC-08-39-36-DCD	391830101371201	Alfalfa	Pivot	126	Rept.	---	---	---	---	N. gas	---	
SC-08-40-14-DCB	-----	Corn	Flood	84	Rept.	---	---	---	---	N. gas	---	
SC-08-40-29-BBB	-----	Corn	Flood	40	Rept.	---	---	---	25	Elec.	14.9	
SC-08-40-31-DAA	391849101491501	Corn	Pivot	120	Rept.	---	---	---	---	N. gas	.14	
SC-09-37-07-DDB	-----	Alfalfa	Pivot	130	Rept.	---	---	---	100	Elec.	59.1	
SC-09-39-01-DBA	391758101371201	Corn Milo	Flood	117 25	Rept.	---	---	---	---	N. gas	---	
SC-09-40-28-BAC	-----	Corn	Flood	160	Rept.	---	---	---	---	N. gas	---	
SC-09-40-28-DBA	-----	Corn	Flood	---	---	---	---	---	---	N. gas	---	

Table 10b.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-08-39-25-CAB	BDR	7/19/79	695	T.T.	Measurement on 8-in aluminum-gated pipe.
		7/19/79	1,050	Dop.	
		7/19/79	660	Prop.	
SC-08-39-36-DCD	BDR	7/19/79	530	T.T.	Measurement on 8-in aluminum pipe.
		7/19/79	565	Dop.	
SC-08-40-14-DCB	BDR	7/19/79	505	T.T.	Measurement on 8-in aluminum-gated pipe.
		7/19/79	425	Dop.	
		7/19/79	390	Prop.	
SC-08-40-29-BBB	BDR	---	260	Rept.	Owner estimate.
SC-08-40-31-DAA	FJH	8/17/79	640	T.T.	Measurement on 8-in steel tubing.
	RGB	8/17/79	625	Dop.	
SC-09-37-07-DDB	JLP	7/31/79	620	T.T.	Measurement on 8-in aluminum pipe.
SC-09-39-01-DBA	BDR	8/27/79	715	T.T.	Measurement on 8-in aluminum-gated pipe.
		8/27/79	485	Dop.	
SC-09-40-28-BAC	BDR	---	---	---	No discharge; multiple well system.
SC-09-40-28-DBA	BDR	---	---	---	No discharge; multiple well system.

Table 10c.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-08-39-25-CAB	BDR	6/06/79	7/19/79	337	---	---	---	---	Sentry 326.
		7/19/79	10/18/79	1,662	---	---	---	---	
			Total-----	1,999					
SC-08-39-36-DCD	BDR	5/14/79	7/19/79	781	---	---	---	---	Sentry 252.
		7/19/79	10/18/79	639	---	---	---	---	
			Total-----	1,420					
SC-08-40-14-DCB	BDR	6/06/79	7/19/79	577	---	---	---	---	Sentry 310.
		7/19/79	10/17/79	848	---	---	---	---	
			Total-----	1,425					
SC-08-40-29-BBB	BDR	6/06/79	9/10/79	740	Elec.	743	---	---	Sentry 364.
		9/10/79	10/17/79	41	Elec.	50	---	---	
			Total-----	781		793			
SC-08-40-31-DAA	FJH	5/09/79	5/31/79	5	---	---	Rept.	32	Sentry 236; replaced with sentry 365 on
	RGB	5/31/79	6/21/79	---	Gas	17	---	---	5/31/79.
		6/21/79	8/17/79	626	Gas	615	---	---	Sentry detached from well between
		8/17/79	10/18/79	181	Gas	753	---	---	8/17/79 and 10/18/79.
									Season total 1,417 hours.
SC-09-37-07-DDB	JLP	5/17/79	7/31/79	729	---	---	---	---	Sentry 262.
		7/31/79	10/18/79	1,171	---	---	---	---	
			Total-----	1,900					
SC-09-39-01-DBA	BDR	5/15/79	8/09/79	808	---	---	---	---	Sentry 223.
		8/09/79	10/18/79	987	---	---	---	---	
			Total-----	1,795					
SC-09-40-28-BAC	BDR	6/05/79	10/17/79	990	---	---	---	---	Sentry 328.
			Total-----	990					
SC-09-40-28-DBA	BDR	6/05/79	10/17/79	630	---	---	---	---	Sentry 290.
			Total-----	630					

Table 10a.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-09-40-30-B	391441101495701	Corn Beans	Flood	40 40	Rept.	---	---	---	---	N. gas	---	
SC-09-41-03-DAA	391756101523301	Corn Beets	Flood	51 51	Rept.	---	---	---	---	N. gas	.14	
SC-09-41-09-CDC	391645101542301	Corn	Pivot	95	Rept.	---	---	---	---	N. gas	---	
SC-09-41-12-BBC	391724101511801	Corn	Flood	150	Rept.	---	---	---	---	N. gas	.13	
SC-09-41-16-BCD	391618101543201	Corn	Pivot	125	Rept.	---	---	---	---	N. gas	---	
SC-09-42-16-DCA	391558102003801	Corn	Pivot	123	Meas.	---	---	---	---	N. gas	---	
SC-09-42-28-BCC	-----	Corn Beets Beans Alfalfa	Flood	35 36 35 36	Rept.	---	---	---	---	N. gas	---	
SC-10-37-23-ABB	-----	Corn	Flood	160	Rept.	---	---	---	---	Diesel	---	

Table 10b.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-09-40-30-B	BDR	7/11/79	515	Dop.	Measurement on 8-in aluminum-gated pipe.
		7/11/79	440	Prop.	
SC-09-41-03-DAA	BDR	7/11/79	715	Dop.	Measurement on 8-in aluminum-gated pipe.
		7/11/79	605	Prop.	
SC-09-41-09-CDC	BDR	8/23/79	410	T.T.	Measurement on 8-in steel tubing.
		8/23/79	595	Dop.	
SC-09-41-12-BBC	BDR	8/23/79	860	T.T.	Measurement on 8-in aluminum-gated pipe.
		8/23/79	755	Prop.	
		8/23/79	600	Dop.	
SC-09-41-16-BCD	BDR	8/24/79	640	Dop.	Measurement on 8-in steel pipe.
		8/24/79	575	T.T.	
SC-09-42-16-DCA	BDR	8/24/79	440	T.T.	Measurement on 8-in steel tubing.
SC-09-42-28-BCC	BDR	8/24/79	810	T.T.	Measurement on 8-in aluminum-gated pipe.
		8/24/79	765	Dop.	
		8/24/79	605	Prop.	
SC-10-37-23-ABB	JLP	7/07/79	350	Dop.	Measurement on 8-in aluminum-gated pipe; may be multiple well hookup.

Table 10c.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-09-40-30-B	BDR	6/05/79	7/11/79	228	---	---	---	---	Sentry 274.
		7/11/79	10/17/79	1,002	---	---	---	---	
			Total-----	1,230					
SC-09-41-03-DAA	BDR	6/06/79	7/11/79	203	Gas	208	---	---	Sentry 363.
		7/11/79	10/17/79	805	---	---	---	---	
			Total-----	1,008					
SC-09-41-09-CDC	BDR	5/08/79	6/01/79	54	---	---	---	---	Sentry 192.
		6/01/79	6/21/79	29	---	---	---	---	
		6/21/79	8/23/79	942	---	---	---	---	
		8/23/79	10/17/79	332	---	---	---	---	
			Total-----	1,357					
SC-09-41-12-BBC	BDR	5/09/79	8/23/79	830	Gas	931	---	---	Sentry 250 replaced with sentry 499
		8/23/79	10/17/79	380	---	---	---	---	on 8/23/79.
			Total-----	1,210					
SC-09-41-16-BCD	BDR	5/09/79	7/11/79	284	---	---	---	---	Sentry 276.
		7/11/79	8/24/79	786	---	---	---	---	
		8/24/79	10/17/79	368	---	---	---	---	
			Total-----	1,438					
SC-09-42-16-DCA	BDR	6/05/79	8/24/79	1,356	---	---	---	---	Sentry 372.
		8/24/79	10/17/79	254	---	---	---	---	
			Total-----	1,610					
SC-09-42-28-BCC	BDR	5/22/79	8/24/79	1,220	---	---	---	---	Sentry 266.
		8/24/79	10/17/79	762	---	---	---	---	
			Total-----	1,982					
SC-10-37-23-ABB	JLP	5/15/79	7/11/79	291	---	---	---	---	Sentry 232.
		7/11/79	10/17/79	1,458	---	---	---	---	
			Total-----	1,749					

Table 10a.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SC-10-37-23-CDC	-----	Corn	Flood	400	Rept.	---	---	---	---	Diesel	---	
SC-10-42-12-CAA	391151101573901	Corn	Flood	60	Rept.	---	---	---	---	N. gas	---	
SC-10-42-12-ABB	-----	Corn	Flood	160	Rept.	---	---	---	---	N. gas	---	
SC-10-42-17-DBD	-----	Corn	Pivot	120	Rept.	---	---	---	---	N. gas	---	

Table 10b.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-10-37-23-CDC	JLP	7/07/79	735	Dop.	Measurement on 6-in aluminum-gated pipe.
		7/07/79	510	Prop.	May be multiple well hookup.
SC-10-42-12-CAA	BDR	7/25/79	515	T.T.	Measurement on 6-in aluminum-gated pipe.
		7/25/79	655	Prop.	
		7/25/79	970	Dop.	
SC-10-42-12-ABB	BDR	7/25/79	685	Dop.	Measurement on 10-in aluminum-gated pipe.
		7/25/79	470	Prop.	
SC-10-42-17-DBD	BDR	8/27/79	640	T.T.	Measurement on 8-in steel tubing.

Table 10c.--*Pumpage data for irrigation sites in Sherman County, Kansas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SC-10-37-23-CDC	JLP	5/15/79	7/07/79	316	---	---	---	---	Sentry 222.
		7/07/79	10/17/79	1,405	---	---	---	---	
			Total-----	1,721					
SC-10-42-12-CAA	BDR	5/09/79	7/25/79	392	---	---	---	---	Sentry 227.
		7/25/79	10/17/79	667	---	---	---	---	
			Total-----	1,059					
SC-10-42-12-ABB	BDR	5/17/79	7/25/79	339	---	---	---	---	Sentry 269.
		7/25/79	10/17/79	966	---	---	---	---	
			Total-----	1,305					
SC-10-42-17-DBD	BDR	6/06/79	8/27/79	971	Gas	881	---	---	Sentry 330.
		8/27/79	10/17/79	214	---	---	---	---	
			Total-----	1,185					

Table 11a.--*Pumpage data for irrigation sites in Chase County, Nebraska*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-05-38-31-CC	402108101404901	Corn	Flood	80	Meas.	298	---	18	---	N. gas	---	
SB-05-39-08-CD	402437101462301	Alfalfa	Sprink-ler	122	Rept.	---	---	---	---	Elec.	---	
SB-05-39-21-BB	402325101452301	Corn	Pivot	127	Rept.	320	---	16	---	Diesel	---	
SB-05-40-01-C	402350101531701	Corn	Pivot	140	Rept.	---	---	---	---	Elec.	---	
SB-06-38-05-CC	-----	Alfalfa	Pivot	32	Rept.	---	---	---	---	N. gas	---	
SB-06-40-09-DA	403001101512501	Alfalfa Beans	Pivot	79 79	Meas.	---	---	---	---	Elec.	---	
SB-06-40-30-AD	402738101534301	Corn	Pivot	106	Meas.	340	---	16	---	N. gas	---	
SB-06-41-25-DD	402711101545201	Corn	Pivot	200	Rept.	315	---	16	---	N. gas	---	

Table 11b.--*Pumpage data for irrigation sites in Chase County, Nebraska*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SC-05-38-31-CC	JLP	7/23/79	2,865	Dop.	Measurement on 10-in aluminum-gated pipe.
		7/23/79	2,135	Prop.	
		7/23/79	860	Dop.	Polysonics meter.
SB-05-39-08-CD	JLP	8/09/79	765	T.T.	Measurement on 8-in steel pipe.
		8/09/79	715	Dop.	
		8/09/79	750	Inl.	
SB-05-39-21-BB	JLP	7/20/79	995	T.T.	Measurement on 8-in steel tubing.
		7/20/79	370	Dop.	
		7/20/79	950	Inl.	
SB-05-40-01-C	JLP	7/21/79	950	T.T.	Measurement on 8-in steel tubing.
		7/21/79	595	Dop.	
		7/21/79	900	Inl.	
SB-06-38-05-CC	JLP	7/19/79	280	T.T.	Measurement on 8-in aluminum pipe.
		7/19/79	350	Dop.	
SB-06-40-09-DA	CEP	6/13/79	800	T.T.	Measurement on 8-in steel tubing.
SB-06-40-30-AD	CEP	8/17/79	635	T.T.	Measurement on 6-in steel pipe.
	RRL	8/17/79	150	Dop.	
SB-06-41-25-DD	JLP	7/12/79	655	T.T.	Well discharges to 2 pipes; 8-in steel tubing, one measured with each method. Total is total discharge from well.
		7/12/79	500	Dop.	
		Total-----	1,155		
	CEP	8/17/79	665	T.T.	Same as measurement on 7/12/79, only T.T. method used on both pipes.
	RRL	8/17/79	455	T.T.	
		Total-----	1,120		

Table 11c.--*Pumpage data for irrigation sites in Chase County, Nebraska*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-05-38-31-CC	JLP	4/18/79	7/23/79	65	---	---	---	---	Sentry 199. Sentry time seems low.
		7/23/79	9/18/79	212	---	---	---	---	
			Total-----	277					
SB-05-39-08-CD	JLP	5/03/79	8/09/79	772	---	---	---	---	Sentry 196.
		8/09/79	10/22/79	494	---	---	---	---	
			Total-----	1,266					
SB-05-39-21-BB	JLP	4/09/79	7/20/79	311	---	---	---	---	Sentry 212.
		7/20/79	9/18/79	996	---	---	---	---	
			Total-----	1,307					
SB-05-40-01-C	JLP	4/20/79	7/21/79	272	---	---	---	---	Sentry 211.
		7/21/79	9/18/79	527	---	---	---	---	
			Total-----	799					
SB-06-38-05-CC	JLP	4/26/79	7/19/79	388	---	---	---	---	Sentry 190.
		7/19/79	11/02/79	855	---	---	---	---	
			Total-----	1,243					
SB-06-40-09-DA	CEP	4/27/79	6/13/79	3	---	---	---	---	Sentry 225.
		6/13/79	9/18/79	---	---	---	---	---	Sentry lost from site.
SB-06-40-30-AD	CEP	4/21/79	6/13/79	26	---	---	---	---	Sentry 194.
	RRL	6/13/79	8/17/79	441	---	---	---	---	
		8/17/79	9/18/79	110	---	---	---	---	
			Total-----	577					
SB-06-41-25-DD	JLP	4/09/79	7/12/79	219	---	---	---	---	Sentry 264. Final time may be low,
	CEP	7/12/79	8/17/79	662	---	---	---	---	but corn was cut early.
	RRL	8/17/79	9/18/79	1	---	---	---	---	
			Total-----	882					

Table 11a.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-06-41-35-CB	402632101565201	Corn	Pivot	146	Meas.	300	---	16	---	Elec.	---	
SB-07-38-31-AC	403200101401701	Alfalfa	Pivot	235	Rept.	305	---	16	150	Elec.	115.2	
SB-07-39-02-CD	403552101424901	Corn	Pivot	140	Rept.	288	---	18	---	N. gas	---	
SB-07-39-02-BB	403632101430001	Corn	Pivot	140	Rept.	232	---	16	---	N. gas	---	
SB-07-39-07-CB	403513101474001	Beets	Pivot	130	Rept.	---	---	---	75	Elec.	---	
SB-07-39-26-CC	403223101430601	Corn Beets	Flood	65 65	Rept.	235	---	---	---	Elec.	---	
SB-07-40-29-AC	403251101525101	Corn	Flood	148	Rept.	320	---	---	---	Elec.	.82	
SB-07-40-30-BA	403304101541701	Corn	Pivot	200	Rept.	---	---	---	---	Diesel	---	

Table 11b.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-06-41-35-CB	CEP	7/25/79	895	T.T.	Measurement on 8-in steel tubing.
SB-07-38-31-AC	JLP	7/18/79	1,415	T.T.	Measurement on 8-in steel pipe.
		7/18/79	875	Dop.	
		7/18/79	1,000	Inl.	
SB-07-39-02-CD	JLP	7/18/79	1,000	T.T.	Measurement on 8-in aluminum pipe.
		7/18/79	835	Dop.	
SB-07-39-02-BB	JLP	7/19/79	585	T.T.	Measurement on 8-in aluminum pipe.
		7/19/79	865	Dop.	
SB-07-39-07-CB	CEP	7/20/79	745	T.T.	Measurement on 8-in steel tubing.
SB-07-39-26-CC	JLP	7/18/79	1,355	T.T.	Measurement on 8-in aluminum pipe.
		7/18/79	1,115	Inl.	
	CEP	7/19/79	1,320	T.T.	
		7/19/79	1,120	Inl.	
SB-07-40-29-AC	CEP	7/19/79	1,935	T.T.	Measurement on 10-in steel tubing.
		7/19/79	2,150	Inl.	
SB-07-40-30-BA	CEP	8/13/79	780	T.T.	Measurement on 8-in steel pipe.

Table 11c.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-06-41-35-CB	CEP	4/19/79	6/13/79	48	---	---	---	---	Sentry 273.
		6/13/79	7/25/79	596	Elec.	476	---	---	
		7/25/79	8/18/79	229	Elec.	395	---	---	
			Total-----	873					
SB-07-38-31-AC	JLP	4/26/79	7/18/79	925	---	---	---	---	Sentry 235.
		7/18/79	10/22/79	2,613	Elec.	1,485	---	---	Sentry time 7/18/79-10/22/79 is in excess of total possible accumulated time, suspect bad readout.
			Total-----	3,588					
SB-07-39-02-CD	JLP	4/18/79	7/18/79	376	---	---	---	---	Sentry 256.
		7/18/79	9/18/79	727	---	---	---	---	
			Total-----	1,103					
SB-07-39-02-BB	JLP	4/16/79	7/19/79	346	---	---	---	---	Sentry 231.
		7/19/79	9/18/79	709	---	---	---	---	
			Total-----	1,055					
SB-07-39-07-CB	CEP	4/30/79	6/13/79	60	---	---	---	---	Sentry 263.
		6/13/79	7/20/79	84	---	---	---	---	
		7/20/79	9/18/79	676	---	---	---	---	
			Total-----	820					
SB-07-39-26-CC	JLP	4/13/76	7/18/79	169	---	---	---	---	Sentry 185.
	CEP	7/18/79	7/19/79	18	---	---	---	---	
		7/19/79	9/18/79	712	---	---	---	---	
			Total-----	899					
SB-07-40-29-AC	CEP	4/09/79	6/13/79	20	---	---	---	---	Sentry 181.
		6/13/79	7/19/79	275	Elec.	272	---	---	
		7/19/79	9/18/79	678	Elec.	671	---	---	
			Total-----	973					
SB-07-40-30-BA	CEP	4/19/79	6/13/79	0	---	---	---	---	Sentry 251; found detached from pump on 6/13/79. Sentry blistered to point of cracking on 9/18/79.
		6/13/79	9/18/79	0	---	---	---	---	

Table 11a.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-07-40-34-BB	403012101510701	Corn	Flood	50	Rept.	310	---	18	---	N. gas	---	
SB-07-41-26-AD	403257101560901	Corn	Pivot	130	Rept.	310	---	16	---	Elec.	69.7	
SB-07-41-34-C	403139101575201	Corn	Pivot	115	Rept.	282	---	18	---	N. gas	---	
SB-08-36-31-B	403721101270001	Corn	Pivot	129	Rept.	---	---	---	---	Diesel	---	
SB-08-38-06-AA	404146101464901	Corn	Pivot	125	Rept.	330	---	16	---	Diesel	---	
SB-08-38-34-AD	403713101363601	Corn	Pivot	130	Rept.	201	---	18	---	Diesel	---	
SB-08-39-07-B	404047101473201	Corn	Pivot	128	Rept.	298	---	16	125	Elec.	.69	
SB-08-41-14-CA SB-08-41-14-CC	403935101563501	Corn Beets Beans	Flood	130 130 130	Rept. Rept. Rept.	---	---	---	---	---	---	

Table 11b.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-07-40-34-BB	CEP	7/19/79	840	Other	Measurement made in ditch, 30 ft from pipe, with Pygmy meter.
SB-07-41-26-AD	JLP	7/12/79	895	T.T.	Measurement on 8-in steel tubing.
		7/12/79	1,040	Dop.	
		7/12/79	800	Inl.	
SB-07-41-34-C	CEP	6/13/79	---	T.T.	Too much turbulance for Clampitron measurement.
		8/25/79	700	---	Reported estimate.
SB-08-36-31-B	CEP	6/14/79	1,100	T.T.	Measurement on 8-in steel pipe.
SB-08-38-06-AA	CEP	8/27/79	690	T.T.	Measurement on 8-in steel pipe.
SB-08-38-34-AD	CEP	8/27/79	915	T.T.	Measurement on 8-in steel tubing.
SB-08-39-07-B	CEP	8/27/79	530	T.T.	Measurement on 8-in aluminum-gated pipe.
SB-08-41-14-CA	JLP	7/19/79	770	Traj.	Measurement on 10-in aluminum pipe.
SB-08-41-14-CC	CEP	8/18/79	700	Inl.	Discharge is for well SB-08-41-14-CA only; well SB-08-41-14-CC not measured.
		8/18/79	520	Dop.	
		8/18/79	880	Other	Other = pygmy meter used in open ditch.

Table 11c.--*Pumpage data for irrigation sites in Chase County, Nebraska*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-07-40-34-BB	CEP	4/19/79	7/19/79	---	Gas	202	---	---	Sentry 206. Time of 894 hours for period 4/19/79-9/18/79
		7/19/79	9/18/79	894	Gas	722	---	---	
			Total----	894		924			
SB-07-41-26-AD	JLP	4/13/79	7/12/79	0	---	---	---	---	Sentry 204; replaced on 7/12/79 with sentry 494.
		7/12/79	9/27/79	998	Elec.	985	---	---	
SB-07-41-34-C	CEP	4/09/79	6/13/79	0	---	---	Engine hours	0	Sentry 248.
		6/13/79	8/25/79	416	---	---	---	---	
		8/25/79	9/19/79	124	---	---	---	---	
			Total----	540					
SB-08-36-31-B	CEP	4/16/79	6/14/79	150	---	---	---	---	Sentry 226.
		6/14/79	9/19/79	510	---	---	---	---	
			Total----	660					
SB-08-38-06-AA	CEP	4/16/79	8/27/79	392	---	---	---	---	Sentry 200.
		8/27/79	9/19/79	369	---	---	---	---	
			Total----	761					
SB-08-38-34-AD	CEP	4/16/79	9/19/79	950	---	---	Engine hours	814	Sentry 229
			Total----	950			Total----	814	
SB-08-39-07-B	CEP	4/16/79	9/19/79	960	Elec.	952	---	---	Sentry 220.
			Total----	960		952			
SB-08-41-14-CA	JLP	4/30/79	7/19/79	316	---	---	---	---	Sentry 189 measured time on well SB-08-41-14-CA only; no time data collected on well SB-08-41-14-CC.
SB-08-41-14-CC		7/19/79	8/18/79	649	Elec.	665	---	---	
		8/18/79	10/22/79	726	---	---	---	---	
			Total----	1,691					

Table 12a.--*Pumpage data for irrigation sites in Dundy County, Nebraska*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-01-40-22-CA	400214101493700	Milo Alfalfa	Pivot Pivot	70 70	Meas. Meas.	---	---	---	---	Elec.	---	
SB-01-40-26-BB	400148101484601	Alfalfa	Pivot	97	Rept.	---	---	---	---	Elec.	---	
SB-02-38-34-AC	400555101354301	Corn	Sprink-ler	65	Rept.	---	---	---	---	Diesel	---	
SB-03-37-34-CB	401053101292601	Corn	Pivot	140	Rept.	210	86	15.5	---	Elec.	---	Water-level measurement on 1/11/71.
SB-03-38-17-BA	401356101381801	Alfalfa	Sprink-ler	80	Rept.	160	33	16	---	---	---	Water-level measurement on 6/11/74.
SB-03-38-29-AC	401159101380011	Corn	Pivot	127	Rept.	260	---	---	---	Elec.	---	
SB-03-39-18-CD	401325101462101	Corn	Pivot	146	Meas.	---	---	---	---	Diesel	---	
SB-03-39-30-D	401141101454701	Corn	Pivot	130	Rept.	280	---	---	---	Diesel	---	

Table 12b.--*Pumpage data for irrigation sites in Dundy County, Nebraska*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-01-40-22-CA	CEP	6/19/79	615	T.T.	Measurement on 8-in steel tubing.
SB-01-40-26-BB	CEP	6/19/79	210	T.T.	Measurement on 8-in aluminum pipe.
SB-02-38-34-AC	JLP	7/20/79	500	Dop.	Measurement on 6-in aluminum pipe.
		7/20/79	250	Dop.	Polysonics.
		7/20/79	550	Inl.	
SB-03-37-34-CB	JLP	7/17/79	735	Dop.	Measurement on 6-in steel tubing.
		7/17/79	120	Dop.	Polysonics.
SB-03-38-17-BA	JLP	7/24/79	305	Dop.	Measurement on 6-in aluminum pipe.
		7/24/79	340	Dop.	Polysonics.
		7/24/79	700	Inl.	
SB-03-38-29-AC	JLP	7/17/79	685	T.T.	Measurement on 8-in steel tubing.
		7/17/79	1,000	Inl.	
		7/17/79	670	Dop.	
SB-03-39-18-CD	CEP	6/12/79	560	T.T.	Clampitron had intermittant fault problems.
		6/12/79	700	Inl.	Measurement on 8-in steel tubing.
SB-03-39-30-D	CEP	6/12/79	520	T.T.	Measurement on 8-in steel tubing.
		---	*820	Inl.	Reported season average from In-line flowmeter.

Table 12c.--*Pumpage data for irrigation sites in Dundy County, Nebraska*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-01-40-22-CA	CEP	4/19/79	6/12/79	4	---	---	---	---	Sentry 486.
		6/12/79	10/22/79	854	---	---	---	---	Sentry found detached from pump on on 6/12/79; reinstalled.
SB-01-40-26-BB	CEP	4/19/79	6/12/79	644	---	---	---	---	Sentry 259.
		6/12/79	10/22/79	729	---	---	---	---	
			Total-----	1,373					
SB-02-38-34-AC	JLP	4/17/79	7/20/79	176	---	---	---	---	Sentry 217.
		7/20/79	9/20/79	715	---	---	---	---	
			Total-----	891					
SB-03-37-34-CB	JLP	4/19/79	7/17/79	4	---	---	---	---	Sentry 254.
		7/17/79	9/20/79	650	---	---	---	---	Sentry found detached from pump on 7/17/79; reinstalled.
SB-03-38-17-BA	JLP	---	5/03/79	---	---	---	Rept.	200	Sentry 198.
		5/03/79	7/24/79	587	---	---	---	---	
		7/24/79	10/22/79	494	---	---	---	---	
			Total-----	1,081					Season total 1,281 hours.
SB-03-38-29-AC	JLP	4/17/79	7/17/79	274	---	---	---	---	Sentry 215.
		7/17/79	9/20/79	1,179	---	---	---	---	
			Total-----	1,453					
SB-03-39-18-CD	CEP	4/17/79	6/12/79	153	---	---	Engine hours	148	Sentry 237 replaced with sentry 489 on 6/12/79.
		6/12/79	7/16/79	400	---	---	---	348	
		7/16/79	9/20/79	911	---	---	---	750	
			Total-----	1,464			Total-----	1,246	
SB-03-39-30-D	CEP	4/17/79	6/12/79	75	---	---	Engine hours	77	Sentry 195 replaced with sentry 490 on 6/12/79.
		6/12/79	9/20/79	998	---	---	---	1,042	
			Total-----	1,073			Total-----	1,119	

Table 12a.--*Pumpage data for irrigation sites in Dundy County, Nebraska*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-04-39-31-DD	401600101454701	Corn	Pivot	124	Rept.	300	---	16	---	---	---	
SB-04-40-32-CA	401607101515301	Corn	Pivot	136	Meas.	330	---	16	---	Elec.	61.5	
SB-04-41-31-CD	401555101595411	Corn	Pivot	160	Rept.	257	0.65	---	---	Elec.	---	Water-level measurement on 5/27/65.

Table 12b.--*Pumpage data for irrigation sites in Dundy County, Nebraska*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-04-39-31-DD	CEP	7/25/79	750	Inl.	Measurement on 8-in steel tubing.
SB-04-40-32-CA	CEP	7/16/79	805	T.T.	Measurement on 8-in steel tubing.
		7/16/79	790	Inl.	
SB-04-41-31-CD	CEP	6/14/79	1,030	T.T.	Measurement on 8-in steel tubing.
		6/14/79	1,035	Inl.	

Table 12c.--*Pumpage data for irrigation sites in Dundy County, Nebraska*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-04-39-31-DD	CEP	4/21/79	7/25/79	337	---	---	---	---	Sentry 275.
		7/25/79	9/20/79	847	---	---	---	---	
			Total-----	1,184					
SB-04-40-32-CA	CEP	4/17/79	6/12/79	88	Elec.	---	---	---	Sentry 219; replaced with sentry 487 on 6/12/79. Sentry 487 replaced with sentry 194 on 7/16/79, because sentry 487 was defective. Season total 1,543 hours.
		6/12/79	7/16/79	2	Elec.	515	---	---	
		7/16/79	9/20/79	964	Elec.	940	---	---	
SB-04-41-31-CD	CEP	4/19/79	9/20/79	1,460	---	---	---	---	

Table 13a.--*Pumpage data for irrigation sites in Perkins County, Nebraska*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
SB-09-35-22-CC	404337101181701	Corn	2 Pivots	246	Rept.	363	---	18	---	Elec.	---	
SB-09-38-10-AA	404610101380000	Corn	Pivot	130	Rept.	400	---	16	---	Elec.	---	
SB-09-38-17-CD	404445101405801	Corn	Pivot	130	Rept.	280	---	16	---	Elec.	---	
SB-09-41-06-DC	404621102022501	Beets	Pivot	145	Rept.	---	---	---	100	Elec.	77.4	
SB-11-36-03-AB	405730101243801	Corn	Pivot	400	Rept.	363	---	18	100	Elec.	---	
SB-11-36-29-B	405353101272401	Corn	Pivot	100	Rept.	490	---	16	100	Elec.	---	
SB-11-37-25-CC	405321101294101	Corn	Pivot	130	Rept.	485	---	16	---	Diesel	---	
SB-12-38-19-DO SB-12-38-19-00	405935101210101 405948101211801	Corn	Pivot	250	Rept.	377	---	16	---	Elec.	---	2 wells operate this one pivot.

Table 13b.--*Pumpage data for irrigation sites in Perkins County, Nebraska*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
SB-09-35-22-CC	JLP	8/07/79	770	T.T.	Measurement on 8-in steel pipe and 8-in aluminum pipe.
		8/07/79	800	Inl.	McCrometer inline flowmeter.
SB-09-38-10-AA	CEP	6/14/79	640	T.T.	Measurement on 8-in steel tubing.
		6/14/79	930	Inl.	
SB-09-38-17-CD	CEP	8/07/79	620	T.T.	Measurement on 8-in steel tubing.
		8/07/79	885	Inl.	
SB-09-41-06-DC	JLP	7/24/79	775	T.T.	Measurement on 8-in steel tubing.
		7/24/79	630	Dop.	
SB-11-36-03-AB	JLP	8/09/79	895	T.T.	Measurement on 8-in aluminum pipe.
		8/09/79	1,640	Dop.	
SB-11-36-29-B	JLP	8/07/79	515	T.T.	Measurement on 8-in steel tubing.
SB-11-37-25-CC	CEP	8/07/79	650	T.T.	Measurement on 8-in steel tubing.
SB-12-38-19-DO SB-12-38-19-OO	CEP	8/07/79	1,530	T.T.	Measurement on 8-in steel tubing. Combined discharge from both wells.

Table 13c.--*Pumpage data for irrigation sites in Perkins County, Nebraska*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
SB-09-35-22-CC	JLP	4/19/79	8/07/79	498	---	---	---	---	Sentry 233.
		8/07/79	9/19/79	579	---	---	---	---	
			Total-----	1,077					
SB-09-38-10-AA	CEP	4/18/79	6/14/79	391	Elec.	419	---	---	Sentry 246.
		6/14/79	9/19/79	357	Elec.	346	---	---	
			Total-----	748		765			
SB-09-38-17-CD	CEP	4/19/79	8/07/79	368	---	---	---	---	Sentry 183.
		8/07/79	9/20/79	362	Elec.	342	---	---	
			Total-----	730					
SB-09-41-06-DC	JLP	4/30/79	7/24/79	409	---	---	---	---	Sentry 255.
		7/24/79	9/20/79	---	---	---	---	---	Sentry lost.
SB-11-36-03-AB	JLP	4/19/79	8/09/79	252	Elec.	249	---	---	Sentry 203.
		8/09/79	9/19/79	469	---	---	---	---	
			Total-----	721					
SB-11-36-29-B	JLP	4/19/79	8/07/79	1339	---	---	---	---	Season total 1,621 hours.
		8/07/79	9/19/79	75	Elec.	282	---	---	Sentry 184. Sentry reading appears low; use time from electric meter for 8/7/79-9/19/79.
SB-11-37-25-CC	CEP	4/18/79	8/07/79	561	---	---	---	---	Sentry 241.
		8/07/79	9/20/79	---	---	---	---	---	Sentry lost.
SB-12-38-19-DO	CEP	4/19/79	8/07/79	648	---	---	---	---	Sentry 191.
		8/07/79	9/19/79	602	---	---	---	---	
			Total-----	1,250					
SB-12-38-19-OO	CEP	4/19/79	8/07/79	676	---	---	---	---	
		8/07/79	9/19/79	609	---	---	---	---	Sentry 224.
			Total-----	1,285					

Table 14a.--*Pumpage data for irrigation sites in Hockley County, Texas*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
333721N1021628W	333721102162801	Cotton	Flood	80	Meas.	174	102	10	40	Elec.	27	Four wells at site.
334026N1023541W	334026102354101	Cotton	---	30	Meas.	190	137	16	---	N.Gas	---	
334336N1021417W	334336102141701	Cotton	Flood	30	Meas.	158	107	16	7.5 15	Elec.	19	Two wells at site.
334201N1023429W	334201102342901	Cotton	Pivot	540	Meas.	225	126	16	---	N.Gas	.721	Three wells at site.
334313N1022434W	334313102243401	Cotton	Sprinkler	25	Meas.	134	93	14	20	Elec.	---	
334350N1021725W	334350102172501	Cotton	---	---	Meas.	---	87	132	12	Elec.	---	Abandoned cotton crop.
333910N1022129W	333910102212901	Cotton	Sprinkler	10	Meas.	225	173	10	---	Elec.	---	Cotton not watered.
333642N1020927W	333642102092701	Cotton	Flood	102	Meas.	144	124	12	---	Elec.	650	Power rating for only 3 of 4 wells in system.
332504N1021912W	332504102191201	Cotton	Sprinkler	293	Meas.	212	152	12	10	1 Elec. and 2 N.Gas	---	
334051N1022112W	334051102211201	Cotton	Sprinkler	131	Meas.	150	101	14	7.5 15	Elec.	17	Two wells at site.
333519N1020600W	333519102060001	Cotton	Flood	75	Meas.	150	99	14	30	Elec.	---	
333152N1022604W	333152102260401	Cotton	Flood	150	Meas.	212	159	16	---	N.Gas	---	
333358N1021500W	333358102150001	Cotton	Flood	35	Meas.	136	109	12	10	Elec.	5	

Table 14b.--*Pumpage data for irrigation sites in Hockley County, Texas*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
333721N1021628W	PLR	4/05/79	250 210	Buck. Dop.	Yield of four wells.
334026N1023541W	---	---	---	---	No discharge measurements were made in 1979.
334336N1021417W	PLR WAW	4/28/79	140 140	Buck. Dop.	
334201N1023429W	WAW PLR	8/08/79	1,490	T.T.	
334313N1022434W	---	---	---	---	No discharge measurements were made in 1979.
334350N1021725W	---	---	---	---	No discharge measurements were made in 1979.
333910N1022129W	---	---	---	---	No discharge measurements were made in 1979.
333642N1020927W	PLR	4/19/79	80 230	Buck. Dop.	Three of four wells. Three of four wells.
332504N1021912W	---	---	---	---	No discharge measurements were made in 1979.
334051N1022112W	WAW	4/25/79	140	Other	Hand held Pres gage.
333519N1020600W	---	---	---	---	No discharge measurements were made in 1979.
333152N1022604W	WAW	4/28/79	530	Buck.	
333358N1021500W	WAW PLR	4/14/79 4/19/79	50 50	Buck. Buck.	

Table 14c.--*Pumpage data for irrigation sites in Hockley County, Texas*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
333721N1021628W	PLR	4/04/79	8/08/79	420	Elec.	425	---	---	Sentry 035. Sentry distorted.
334026N1023541W	WAW	---	8/20/79	6	N.Gas	6	---	---	Sentry 046.
334336N1021417W	PLR WAW	4/03/79	8/22/79	720	Elec.	700	---	---	Sentry 056.
334201N1023429W	WAW PLR	4/14/79	8/20/79	574	N.Gas	536	---	---	Sentry 034.
334313N1022434W	PLR	---	8/20/79	1	Elec.	0	---	---	Sentry 068.
334350N1021725W	PLR	---	---	---	Elec.	---	---	---	Sentry not installed in 1979.
333910N1022129W	PLR	---	---	---	Elec.	---	---	---	Sentry not installed in 1979. Subm. pump covered with sand.
333642N1020927W	PLR	4/05/79	8/21/79	540	Elec.	502	---	---	Sentry 059.
332504N1021912W	WAW	4/03/79	7/13/79	98	Elec.	145	---	---	Sentry 077. Sentry distorted.
		7/13/79	8/08/79	1	Elec.	0	---	---	Sentry 327. Energy meter time computed from estimated rating factor.
334051N1022112W	WAW	5/07/79	8/21/79	32	Elec.	0	---	---	Sentry 332. Sentry installed after irrigation season began. Used 13,100 KWH of electricity early in season.
333519N1020600W	WAW	---	8/21/79	5	Elec.	0	---	---	Sentry 337. Used 4560 KWH of electricity early in season.
333152N1022604W	WAW	4/03/79	4/21/79	370	---	---	---	---	Sentry 078. Field visits show 370 hours to be reasonable.
333358N1021500W	WAW	4/14/79	4/21/79	408	Elec.	377	---	---	Sentry 065.
	PLR	---	---	---	Elec.	---	---	---	Sentry distorted.

Table 14a.--*Pumpage data for irrigation sites in Hockley County, Texas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
333026N1021422W	333026102142201	Cotton	---	---	Meas.	239	159	16	---	N.Gas	---	Cotton crop abandoned.
333853N1023102W	333853102310201	Cotton	Sprinkler	88	Meas.	213	146	16	30	N.Gas	---	25 hp. Booster used at site.
334412N1021920W	334412102192001	Cotton	Sprinkler	40	Meas.	117	74	10	5 5	Elec.	---	Cotton not irrigated in 1979. Pumped for garden. Two wells at site.
332916N1022216W	332916102221601	Cotton	---	93	Meas.	207	158	16	---	Elec.	---	Well not used in 1979.
332942N1021922W	332942102192201	Cotton	Flood	82	Meas.	238	153	14	30	Elec.	20	
334007N1023341W	334007102334101	Cotton	---	140	Meas.	250	144	16	---	N.Gas	---	Well not used in 1979.
332915N1021328W	332915102132801	Cotton	---	---	Meas.	218	152	16	15	Elec.	---	Cotton crop abandoned.
334338N1021125W	334338102112501	Cotton	Sprinkler	52	Meas.	164	113	12	---	Elec.		
333722N1022522W	333722102252201	Cotton	Flood	94	Meas.	265	165	16	---	N.Gas	.065	Two wells at site.
333552N1021948W	333552102194801	Cotton	---	31	Meas.	200	139	16	---	N.Gas	---	Well not used in 1979.
332636N1021006W	332636102100601	Cotton	Sprinkler	10	Meas.	150	192	9	---	Elec.	---	
333157N1021751W	333157102175101	Cotton	Flood	76	Meas.	215	138	12	25 15	Elec.	29	Two wells at site.
333715N1022054W	333715102205401	Cotton	Sprinkler	181	Meas.	207	147	13	---	N.Gas	.368	Three wells at site.
334433N1021256W	334433102125601	Cotton	Flood	110	Meas.	160	107	12	7.5+ 2 + 5	Elec.	13	Three wells at site.

Table 14b.--*Pumpage data for irrigation sites in Hockley County, Texas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
333026N1021422W	---	---	---	---	No discharge measurements were made in 1979.
333853N1023102W	---	---	---	---	No discharge measurements were made in 1979.
334412N1021920W	---	---	---	---	No discharge measurements were made in 1979.
332916N1022216W	---	---	---	---	No discharge measurements were made in 1979.
332942N1021922W	PLR	4/05/79	160	Hoff	
334007N1023341W	---	---	---	---	No discharge measurements were made in 1979.
332915N1021328W	---	---	---	---	No discharge measurements were made in 1979.
334338N1021125W	---	---	---	---	No discharge measurements were made in 1979.
333722N1022522W	PLR	4/05/79	260	Hoff	Only one well running.
333552N1021948W	---	---	---	---	No discharge measurements were made in 1979.
332636N1021006W	---	---	---	---	No discharge measurements were made in 1979.
333157N1021751W	PLR	4/19/79	160 180	Buck. Dop.	
333715N1022054W	PLR	4/05/79	760	Other	Hand Pressure Gage.
334433N1021256W	PLR	4/05/79	180	Hoff	

Table 14c.--*Pumpage data for irrigation sites in Hockley County, Texas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
333026N1021422W	WAW	4/25/79	8/08/79	281	N.Gas	294	---	---	Sentry 338. Energy meter time computed from estimated rating factor.
333853N1023102W	WAW	4/03/79	8/20/79	54	N.Gas	40	---	---	Sentry 348. Energy meter time computed from estimated rating factor.
334412N1021920W	WAW	---	8/21/79	33	Elec.	78	---	---	Sentry 014. Energy meter time computed from estimated rating factor.
332916N1022216W	WAW	5/10/79	8/13/79	1	Elec.	0	---	---	Sentry 294. Electric meter never installed. Sentry distorted.
332942N1021922W	PLR	4/05/79	8/21/79	286	Elec.	576	---	---	Sentry 036. Timer installed after season started.
334007N1023341W	WAW	5/07/79	8/22/79	6	N.Gas	0	---	---	Sentry 334.
332915N1021328W	WAW	4/17/79	7/13/79	1,055	Elec.	560	---	---	Sentry 041. Sentry distorted. Energy meter time computed using estimated rating factor.
334338N1021125W	WAW	4/05/79	8/20/79	5	Elec.	0	---	---	Sentry 005. 490 KWH used before timer installed.
333722N1022522W	PLR	4/03/79	8/20/79	306	N.Gas	354	---	---	Sentry 069.
333552N1021948W	WAW	---	8/21/79	1	N.Gas	---	---	0	Sentry 047. Sentry distorted.
332636N1021006W	WAW	4/03/79	8/13/79	682	Elec.	594	---	---	Sentry 071. Sentry distorted. Energy meter time computed using estimated rating factor.
333157N1021751W	PLR	4/19/79	8/21/79	441	Elec.	423	---	---	Sentry 322.
333715N1022054W	PLR	5/07/79	8/20/79	56	N.Gas	46	---	---	Sentry 349.
334433N1021256W	PLR	4/05/79	8/22/79	373	Elec.	366	---	---	Sentry 051.

Table 15a.--*Pumpage data for irrigation sites in Lamb County, Texas*

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
335239N1020535W	335239102053501	Cotton	Flood	115	Meas.	250	162	13	---	N.Gas	0.101 .107	
335335N1021543W	335335102154301	Cotton	Flood	---	Meas.	193	104	18	---	N.Gas	---	Cotton crop abandoned.
335931N1021628W	335931102162801	Cotton	Flood	138	Meas.	210	150	16	---	N.Gas	.133	
340119N1022443W	340119102244301	Cotton	Flood	7	Meas.	225	120	10	---	N.Gas	---	Never irrigated in 1979.
340148N1022038W	340148102203801	Cotton	---	77	Meas.	245	126	16	---	N.Gas	---	Never irrigated in 1979.
335756N1022005W	335756102200501	Cotton	Flood	158	Meas.	196	107	16	---	N.Gas	.167	Two wells in system.
340014N1022137W	340014102213701	Cotton	Flood	170	Meas.	206	117	16	---	N.Gas	---	Three wells in system.
340212N1021557W	340212102155701	Cotton	Flood	40	Meas.	183	132	16	---	N.Gas	---	
340212N1021557W	340212102155701	Cotton	Flood	48	Meas.	231	106	16	---	N.Gas	.125	Never irrigated cotton in 1979 but irrigated other crops.
335348N1020646W	335348102064601	Cotton	Flood	140	Meas.	207	150	16	---	N.Gas	.137	Two wells in system.
340253N1021137W	340253102113701	Cotton	Flood	75	Meas.	215	147	14	---	N.Gas	.090	
341150N1022307W	341150102230701	Corn Cotton	Pivot	---	Meas.	245	104	16	75	Elec.	68	Corn crop was watered more than the cotton.
335403N1020805W	335403102080501	Cotton	Flood	310	Meas.	200	142	16	10	Elec.	41	Five wells in system.
335858N1021404W	335858102140401	Cotton	Flood	352	Meas.	252	150	16	---	N.Gas	---	Three wells in system.

Table 15b.--*Pumpage data for irrigation sites in Lamb County, Texas*

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
335239N1020535W	PLR	4/07/79	260	Other	Pitot tube measurement.
	WAW	8/06/79	270	Buck.	
		8/06/79	250	Dop.	
335335N1021543W	---	---	---	---	No discharge measurement made in 1979.
335931N1021628W	PLR	4/04/79	420	Hoff	
	WAW		400	Dop.	
340119N1022443W	---	---	---	---	No discharge measurement made in 1979.
340148N1022038W	---	---	---	---	No discharge measurement made in 1979.
335756N1022005W	PLR	5/14/79	200	Buck.	Well 1 of two wells.
	WAW		210	Buck.	Well 2 of two wells.
			250	Dop.	Well 2 of two wells.
340014N1022137W	---	---	---	---	No discharge measurement made in 1979.
340212N1021557W	---	---	---	---	No discharge measurement made in 1979.
340212N1021557W	PLR	5/16/79	420	Buck.	
	WAW		420	Dop.	
335348N1020646W	WAW	4/16/79	280	Hoff	
340253N1021137W	WAW	4/23/79	260	Buck.	
			240	Dop.	
341150N1022307W	WAW	6/18/79	750	Other	Rain gages.
			710	Dop.	
335403N1020805W	PLR	4/07/79	310	Buck.	
	WAW				
335858N1021404W	---	---	---	---	No discharge measurement made in 1979.

Table 15c.--*Pumpage data for irrigation sites in Lamb County, Texas*

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
335239N1020535W	PLR WAW	---	8/18/79	232	N.Gas	215	---	---	Sentry 037. Sentry distorted.
335335N1021543W	PLR WAW JEC	---	7/30/79	0	N.Gas	0	---	---	Sentry 058.
335931N1021628W	PLR WAW	4/04/79	8/18/79	747	N.Gas	629	---	---	Sentry 038. Sentry distorted.
340119N1022443W	WAW	---	8/18/79	0	N.Gas	0	---	---	Sentry 044. Sentry distorted.
340148N1022038W	WAW	5/04/79	8/18/79	0	N.Gas	0	---	---	Sentry 313.
335756N1022005W	PLR WAW	---	8/18/79	894	N.Gas	1,326	---	---	Sentry 074.
340014N1022137W	WAW	4/04/79	8/18/79	806	N.Gas	770	---	---	Sentry 043. Power time estimated indirectly.
340212N1021557W	WAW	---	8/18/79	0	N.Gas	0	---	---	Sentry 351. Timer installed late in the year. 174.1 mcf gas consumed in pre-water.
340212N1021557W	PLR WAW	4/21/79	8/18/79	291	N.Gas	166	---	---	Sentry 376.
335348N1020646W	WAW	---	8/18/79	1,196	N.Gas	1,102	---	---	Sentry 070.
340253N1021137W	WAW	---	8/18/79	50	N.Gas	607	---	---	Sentry 306. Field person indicates that sentry time is probably inaccurate.
341150N1022307W	WAW	4/12/79	8/18/79	1,113	Elec.	1,089	---	---	Sentry 052. Pumped 14.6 ac-ft on 88 acres cotton.
335403N1020805W	PLR	4/04/79	8/18/79	470	Elec.	397	---	---	Sentry 049. Sentry distorted.
335858N1021404W	WAW	5/10/79	8/18/79	0	N.Gas	0	---	---	Sentry 317. Sentry distorted. 407.3 mcf gas consumed in pre-water.

Table 15a.--*Pumpage data for irrigation sites in Lamb County, Texas*--Continued

Site location	Station identifier	Irrigated crop information				Well information						Remarks
		Type	System	Acres	Source	Depth (ft)	Water level (ft)	Diam-meter (in)	Pump hp.	Energy source	Energy rating	
335555N1021158W	335555102115801	Cotton	---	150	Meas.	265	187	13	---	N.Gas	---	Never irrigated in 1979.
335732N1020733W	335732102073301	Cotton	Flood	210	Meas.	320	147	16	---	Elec. and N.Gas	---	Four wells in system.
340024N1021607W	340024102160701	Cotton	Flood	109	Meas.	190	130	16	---	N.Gas	---	
340123N1021154W	340123102115401	Cotton	Flood	51	Meas.	173	68	14	---	N.Gas	---	
335336N1021150W	335336102115001	Cotton	Flood	145	Meas.	202	160	16	---	N.Gas	0.193	Two wells in system.
341010N1021845W	341010102184501	Cotton	Flood	231	Meas.	156	105	16	---	N.Gas	.294	Two wells in system.
340121N1022030W	340121102203001	Cotton	Sprinkler	165	Meas.	234	103	18	20	Elec.	17	
341144N1021444W	341144102144401	Cotton	Flood	---	Meas.	317	177	16	---	N.Gas	---	Three wells in system.
341747N1021634W	341747102163401	Corn	Flood	---	Meas.	252	191	16	---	N.Gas	.234	
335235N1020942W	335235102094201	---	Pivot	---	Meas.	150	110	11	55	Elec.	---	Five wells in system.
340032N1021055W	340032102105501	Cotton	Flood	134	Meas.	253	151	16	---	N.Gas	.099 .124	Two wells in system.

Table 15b.--*Pumpage data for irrigation sites in Lamb County, Texas*--Continued

Site location	Field person	Discharge information			
		Date	Discharge (gal/min)	Method	Remarks
335555N1021158W	---	---	---	---	No discharge measurement made in 1979.
335732N1020733W	WAW	4/21/79	400	Buck.	3 wells in a 4 well system.
340024N1021607W	---	---	---	---	No discharge measurement made in 1979.
340123N1021154W	---	---	---	---	No discharge measurement made in 1979.
335336N1021150W	WAW	8/09/79	330	Buck.	
341010N1021845W	WAW	6/28/79	580	Hoff	Two wells.
			610	Buck.	
	PLR		420	Dop.	
			610	Dop.	
		8/10/79	560	Hoff	One well.
			500	T.T.	
340121N1022030W	WAW	4/30/79	150	Other	Hand held Pressure gage and tables.
341144N1021444W	WAW	8/14/79	710	Hoff	
			850	T.T.	7-inch aluminum pipe.
341747N1021634W	WAW	6/19/79	550	Buck.	
			700	Dop.	
		8/01/79	600	Buck.	
			830	T.T.	6-inch aluminum pipe.
335235N1020942W	PLR	4/07/79	530	Hoff	4 wells pumping.
	WAW				
340032N1021055W	PLR	5/06/79	227	Hoff	
	WAW	8/10/79	317	Hoff	
			767	Dop.	

Table 15c.--*Pumpage data for irrigation sites in Lamb County, Texas*--Continued

Site location	Field person	Time of operation information							Remarks
		Date		Sentry time (hours)	Energy meter		Other		
		Begin	End		Type	Time (hours)	Source	Time (hours)	
335555N1021158W	PLR WAW	---	---	---	N.Gas	---	---	---	Timer never installed.
335732N1020733W	WAW	4/21/79	8/10/79	260	Elec. and N.Gas	212	---	---	Sentry 366.
340024N1021607W	WAW	5/04/79	8/18/79	1	N.Gas	39	---	---	Sentry 371. 348.4 mcf gas consumed in pre-water.
340123N1021154W	PLR WAW	5/04/79	8/18/79	3	N.Gas	3	---	---	Sentry 319. 147.4 mcf gas consumed in pre-water.
335336N1021150W	WAW	4/23/79	8/18/79	1,184	N.Gas	260	---	---	Sentry 362. Field person indicates sentry time appears too high.
341010N1021845W	WAW PLR	4/30/79	8/18/79	1,003	N.Gas	764	---	---	Sentry 340.
340121N1022030W	WAW	4/30/79	8/18/79	115	Elec.	459	---	---	Sentry 293. Sentry had fallen off during season.
341144N1021444W	WAW	---	8/18/79	419	N.Gas	---	---	---	Sentry 042.
341747N1021634W	WAW	4/06/79	8/18/79	1,586	N.Gas	1,339	---	---	Sentry 061.
335235N1020942W	PLR WAW	5/07/79	8/18/79	275	Elec.	266	---	---	Sentry 298.
340032N1021055W	PLR WAW	5/04/79	8/18/79	1	N.Gas	434 1,089	---	---	Field person said sentry appears to be bad.

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