Quality of Surface Waters of the United States 1957

Parts 5 and 6. Hudson Bay and Upper Mississippi River Basins, and Missouri River Basin

---

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1521

Prepared in cooperation with the States of Iowa, Kansas, Minnesota, South Dakota, Wisconsin, and Wyoming, and with other agencies

Quality of Surface Waters of the United States 1957

Parts 5 and 6. Hudson Bay and Upper Mississippi River Basins, and Missouri River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1521

Prepared in cooperation with the States of Iowa, Kansas, Minnesota, South Dakota, Wisconsin, and Wyoming, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1961

UNITED STATES DEPARTMENT OF THE INTERIOR

STEWART L. UDALL, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C.

PREFACE

This report was prepared by the Geological Survey in cooperation with the States of Iowa, Kansas, Minnesota, South Dakota, Wisconsin, and Wyoming, and with other agencies by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydraulic engineer, and S. K. Love, chief, Quality of Water Branch. The data were collected and computed under the supervision of the following engineers or district chemists:

P. C. Benedict, succeeded by D. M. Culbertson Lincoln, Nebr.
T. F. Hanly ..... Worland, Wyo.
G. W. Whetstone ..... Columbus, Ohio

CONTENTS

ILLUSTRATION

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1957

PARTS 5 and 6

INTRODUCTION

The quality-of-water investigations of the United States Geological Survey are concerned with chemical and physical characteristics of the surface and ground water supplies of the Nation. Most of the investigations carried on in cooperation with States and other Federal agencies deal with the amounts of matter in solution and in suspension in streams.

The records of chemical analysis, suspended sediment, and temperature for surface waters given in this volume serve as a basis for determining the suitability of the waters examined for industrial, agricultural, and domestic uses insofar as such use is affected by the dissolved or suspended mineral matter in the waters. The discharge of a stream and, to a lesser extent, the chemical quality are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected during the periods of high flow than during periods of low flow. The concentration in some streams may change materially with relatively small variations in flow, whereas for other streams the quality may remain relatively uniform throughout large ranges in discharge. The quantities of suspended sediment carried by streams are also related to discharge, and during flood periods the sediment concentrations in many streams vary over wide ranges.

Publication of annual records of chemical analyses, suspended sediment, and water temperature was begun by the Geological Survey in 1941. The records prior to 1948 were published each year in a single volume for the entire country. Beginning in 1948, the records were published in two volumes, and beginning in 1950, in four volumes, covering the drainage basins shown in Figure 1. The samples for which data are given in this volume were collected from October 1, 1956, to September 30, 1957. The records are arranged by drainage basins according to Geological Survey practice in reporting records of streamflow: Stations on tributary

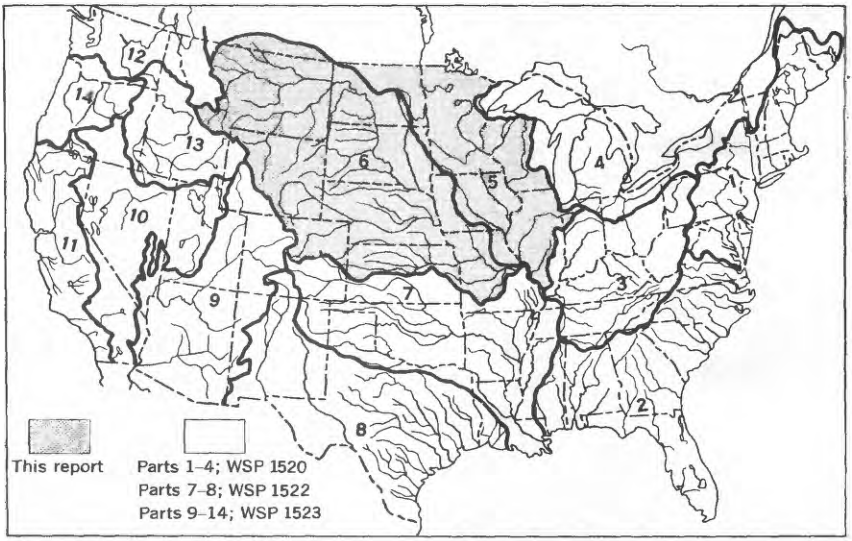

Figure 1.--Map of the United States showing basins covered by the four water-supply papers on quality of surface waters in 1957. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

streams are listed between stations on the main stem in the order in which those tributaries enter the main stem. Descriptive statements are given for each sampling station for which regular series of chemical analyses, temperature observations, or sediment determinations have been made. These statements include the location of the stream-sampling station, drainage area, length of time for which records are available, extremes of mineralization, hardness, water temperature, sediment loads, and other pertinent data. Records of water discharge of the streams at or near the sampling period are included in most tables of analyses.

During the year ending September 30, 1957, 102 regular sampling stations on 63 streams for the study of the chemical character of surface waters were maintained by the Geological Survey in the area covered by this volume. Samples were collected less frequently during the year at many other points. Water temperatures were measured daily at 70 stations. Not all analyses of samples of surface water collected during the year have been included. Single analyses of an incomplete nature generally have been omitted. Also, analyses made of the daily samples before compositing have not been reported. The specific conductance of almost all daily samples was determined, and as noted in the table head-

ings this information is available for reference at the district offices listed under Division of Work, on page

Quantities of suspended sediment are reported for 49 stations during the year ending September 30, 1957. The sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Sediment samples were collected less frequently during the year at many other points. In connection with measurements of sediment discharge, sizes of sediment particles were determined at 46 of the stations.

Material which is transported almost in continuous contact with the stream bed and the material that bounces along the bed in short skips or leaps is termed "bedload" and is not considered in this report. All other undissolved fragmental material in transport is termed "suspended sediment" and generally constitutes the major part of the total sediment load. At the present time no reliable routine method has been developed for determining bedload.

COLLECTION AND EXAMINATION OF SAMPLES

CHEMICAL QUALITY

Samples for chemical analyses were usually collected at or near points on streams where gaging stations are maintained for measurement of water discharge. Two methods of compositing water samples for analysis are used by the Geological Survey: (1) Equal volume method—Three composite samples were usually prepared each month by mixing together equal volumes of daily samples collected from the 1st to the 10th, from the 11th to the 20th, and from the 21st to the end of the month. Composite samples were prepared for shorter periods if the specific conductance of the daily samples indicated that the mineral content of the water had changed significantly. Conversely, composite samples were occasionally prepared for longer periods if the specific conductance of the daily samples indicated that the mineral content had remained nearly uniform. (2) Discharge method—Composite samples were prepared by mixing together a volume from each sample in proportion to the product of the rate of water discharge at the time of sampling and the time interval represented by that sample. Generally, each daily sample is assumed to represent an equal time interval; therefore, the volume from each sample is proportional only to the water discharge at the time of sampling. Compositing samples by the discharge method was limited to some streams west of the Mississippi River.

The samples were analyzed according to methods regularly used by the Geological Survey. These methods are essentially the same as, or are modifications of, methods described in recognized authoritative publications for the mineral analysis of water samples (Collins, 1928; Am. Public Health Assoc., 1955).

TEMPERATURE

Daily water temperatures were measured at most of the stations when chemical quality or sediment samples were collected. So far as practicable, the water temperatures were taken at about the same time each day for an individual station in order that the data would be relatively unaffected by diurnal variations in temperature. Most large, swiftly flowing streams probably have a small diurnal variation in water temperature, whereas sluggish or shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. The thermometers used for determining water temperature were accurate to plus or minus 0.5°F.

At stations where thermographs are located, the records consist of maximum and minimum temperatures for each day, and the monthly averages of maximum daily and minimum daily temperatures.

SEDIMENT

In general, suspended-sediment samples were collected daily with U. S. depth-integrating cable-suspended samplers (U. S. Interagency, 1948, p. 70-76 and U. S. Interagency, 1952, p. 86-90) from a fixed sampling point at one vertical in the cross section. The US DH-48 hand sampler was used at many stations during periods of low flow. Depth-integrated samples were collected periodically at three or more verticals in the cross section to determine the cross-sectional distribution of the concentration of suspended sediment with respect to that at the daily sampling vertical. In streams where transverse distribution of sediment concentration ranges widely, samples were taken regularly at two or more verticals to determine the average concentration across the section. During periods of high flow, samples were taken two or more times throughout the day at many sampling stations, and during periods of rapidly changing flow samples were taken hourly at some stations.

Sediment concentrations were determined by filtration or evaporation of the samples as required. At many stations the daily mean concentration for some days was obtained by plotting the instantaneous concentrations on the original or copies of the original gage-height chart. The plotted concentrations, adjusted if necessary for cross-sectional distribution with respect to that at the daily sampling vertical, were connected or averaged by continuous curves

to obtain a concentration graph. This graph represented the estimated concentration at any time and, for most periods, daily mean concentrations were determined from the graph. When the concentration and water discharge were changing rapidly, the day was often subdivided for this computation. For some periods when the day-to-day variation in the concentration was negligible, the data were not plotted, and the average concentration of the samples was used as the mean concentration for the day. For certain stations, when the discharge and concentrations were relatively low and varied only slightly from day to day, the samples for a number of days were composited and the mean daily concentrations and mean daily loads are shown.

For some periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately preceding and following the periods, and suspended-sediment loads for other periods of similar discharge. The estimates were further guided by weather conditions and sediment discharge for other stations.

In many instances where there were no observations for several days, the suspended-sediment loads for individual days are not estimated, because numerous factors influencing the quantities of transported sediment made it very difficult to make accurate estimates for individual days. However, estimated loads of suspended sediment for missing days in otherwise continuous period of sampling have been included in monthly and annual totals for most streams to provide a complete record. For some streams, samples were collected about weekly, monthly, or less frequently, and only rates of sediment discharge at the time of sampling are shown.

In addition to the records of quantities of suspended sediment transported, records of the particle sizes of sediment are included. The particle sizes of the suspended sediments for many of the stations, and the particle sizes of the bed material for some of the stations were determined periodically. As much of the material carried in suspension is finer than 0.062 mm, the pipet method (Kilmer and Alexander, 1949) or the bottom withdrawal tube method (U. S. Interagency, 1943, p. 82-90) were used in most of the analyses. For most samples, material between 1.0 mm and 0.062 mm was analyzed by the visual accumulation tube method (U. S. Interagency 1957). Separation of sand from the silt-clay-colloid fraction was by sieve. For some samples all sediment coarser than 0.062 mm was analyzed by the sieve method. For material finer than 0.062 mm the settling medium used was native water or distilled water to which a dispersing agent had been added. Because sedimentation diameters of the clay and colloidal fractions are often affected by the chemical character of the settling medium, analyses made with native water may more nearly simulate particle sizes existing in the stream. Results of analyses with dis-

tilled water containing a dispersing agent approximate ultimate particle sizes of the finer fractions. The concentration of sediment suspension for analysis was reduced to less than 5,000 parts per million where necessary by means of a sample splitter, in order to stay within limits recommended for the bottom-withdrawal tube or pipet method; therefore, the concentration of sediment for analyses was often different from the concentration in the stream. The concentration at which analyses were made is indicated in the appropriate tables.

EXPRESSION OF RESULTS

The dissolved mineral constituents are reported in parts per million. A part per million is a unit weight of a constituent in a million unit weights of water. Equivalents per million are not given in this report although the expression of analyses in equivalents per million is sometimes preferred. An equivalent per million is a unit chemical combining weight of a constituent in a million unit weights of water. Equivalents per million are calculated by dividing the concentration in parts per million by the chemical combining weights of the individual constituents. For convenience in making this conversion the reciprocals of chemical combining weights of the most commonly reported constituents (ions) are given in the following table:

Constituent	Factor	Constituent	Factor
Iron (Fe^{++})	0.0358	Carbonate (CO_3^{--})	0.0333
Iron (Fe^{+++})	.0537	Bicarbonate (HCO_3^-)	.0164
Calcium (Ca^{++})	.0499	Sulfate (SO_4^{--})	.0208
Magnesium (Mg^{++})	.0822	Chloride (Cl^-)	.0282
Sodium (Na^+)	.0435	Fluoride (F^-)	.0526
Potassium (K^+)	.0256	Nitrate (NO_3^-)	.0161

Results given in parts per million can be converted to grains per United States gallon by dividing by 17.12. A calculated quantity of sodium and potassium is given in some analyses and is the quantity of sodium needed in addition to the calcium and magnesium to balance the acid constituents.

The hardness, expressed in terms of an equivalent quantity of calcium carbonate ($CaCO_3$), is calculated from the equivalents of calcium and magnesium, or is determined by direct titration. The hardness caused by calcium and magnesium (and other ions if significant) equivalent to the carbonate and bicarbonate is called carbonate hardness; the hardness in excess of this quantity is called noncarbonate hardness.

The value usually reported as dissolved solids is the residue

on evaporation after drying at 180°C for 1 hour. For some waters, particularly those containing moderately large quantities of soluble salts, the value reported is calculated from the quantities of the various determined constituents using the carbonate equivalent of the reported bicarbonate. The calculated sum of the constituents may be given instead of or in addition to the residue. In the analyses of most waters used for irrigation, the quantity of dissolved solids is given in tons per acre-foot as well as in parts per million.

Percent sodium is computed for those analyses where sodium and potassium are reported separately by dividing the equivalents per million of sodium by the sum of the equivalents per million of calcium, magnesium, sodium, and potassium and multiplying the quotient by 100. In analyses where sodium and potassium were calculated and reported as a combined value, the value reported for percent sodium will include the equivalent quantity of potassium. In most waters of moderate to high concentration the proportion of potassium is much smaller than that of sodium.

Specific conductance is given for most analyses and was determined by means of a conductance bridge and using a standard potassium chloride solution as reference. Specific conductance values are expressed in micromhos per centimeter at 25°C. Specific conductance in micromhos is 1 million times the reciprocal of specific resistance at 25°C. Specific resistance is the resistance in ohms of a column of water 1 centimeter long and 1 square centimeter in cross section. The discharge of the streams is reported in cubic feet per second (see Streamflow, p. 17) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892, p. 427-428). Hydrogen-ion concentration is expressed in terms of pH units. By definition the pH value of a solution is the negative logarithm of the concentration of gram ions of hydrogen. However, the pH meter that is generally used in Survey laboratories determines the activity of the hydrogen ions as distinguished from concentration.

An average of analyses for the water year is given for most daily sampling stations. Most of these averages are arithmetical or time-weighted; when analyses during a year are all on 10-day composites of daily samples with no missing days, the arithmetical and time-weighted averages are equivalent. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the river each day for the water year. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all of the water passing a given station during the year after thorough mixing in the reservoir. A discharge-weighted average is computed by multiplying the discharge for the sampling period by the concentrations of the individual constituents for the corresponding period and dividing the sum of the products

by the sum of the discharges. Discharge-weighted averages are usually lower than arithmetical averages for most streams because at times of high discharge the rivers generally have lower concentrations of dissolved solids.

The concentration of sediment in parts per million is computed as 1,000,000 times the ratio of the weight of sediment to the weight of water-sediment mixture. Daily sediment loads are expressed in tons per day and except for subdivided days are usually obtained by multiplying daily mean sediment concentration in parts per million by the daily mean discharge, and the appropriate conversion factor, normally 0.0027.

Particle-size analyses are expressed in percentages of material finer than indicated sizes in millimeters. The size classification used in this report is that recommended by the American Geophysical Union subcommittee on Terminology (Lane and others, 1947, p. 937). Other data included as pertinent to the size analyses for many streams are the date of collection, the stream discharge and sediment concentration when sample was collected, the concentration of the suspension during analysis, and the method of analysis.

COMPOSITION OF SURFACE WATERS

All natural waters contain dissolved mineral matter. Water in contact with soils or rock, even for only a few hours, will dissolve some rock materials. The quantity of dissolved mineral matter in a natural water depends primarily on the type of rocks or soils with which the water has been in contact and the length of time of contact. Some streams are fed by both surface runoff and ground water from springs or seeps. Such streams reflect the chemical character of their concentrated underground sources during dry periods and are more dilute during periods of heavy rainfall. Ground water is generally more highly mineralized than surface runoff because it remains in contact with the rocks and soils for much longer periods. The concentration of dissolved solids in a river water is frequently increased by drainage from mines or oil fields, by the addition of industrial or municipal wastes, or — in irrigated regions—by drainage from irrigated lands.

The mineral constituents and physical properties of natural waters reported in the tables of analyses include those that have a practical bearing on the value of the waters for most purposes. The analyses generally include results for silica, iron, calcium, magnesium, sodium, potassium (or sodium and potassium together as sodium), bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, and dissolved solids. Aluminum, manganese, color, acidity, oxygen consumed, and other dissolved constituents and physical properties are reported for certain streams. Phenolic

material and minor elements including strontium, chromium, nickel, copper, lead, zinc, cobalt, arsenic, cadmium, and others are occasionally determined for a few streams in connection with specific problems in local areas and the results are reported when appropriate. The source and significance of the different constituents and properties of natural waters are discussed in the following paragraphs.

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2)

Silica is dissolved from practically all rocks. Some natural surface waters contain less than 5 parts per million of silica and a few contain more than 50 parts, but most waters contain from 1 to 30 parts per million. Silica affects the usefulness of a water because it contributes to the formation of boiler scale; it usually is removed from feed water for high-pressure boilers. Silica also forms troublesome deposits on the blades of stream turbines.

Aluminum (Al)

Aluminum is generally present only in negligible quantities in natural waters except in areas where the waters have been in contact with the more soluble rocks of high aluminum content such as bauxite and certain shales. Acid waters often contain large amounts of aluminum. It may be troublesome in feed waters where it tends to be deposited as a scale on boiler tubes.

Manganese (Mn)

Manganese is dissolved in appreciable quantities from rocks in some sections of the country. Waters impounded in large reservoirs may contain manganese that has been dissolved from the mud on the bottom of the reservoir by action of carbon dioxide produced by anaerobic fermentation of organic matter. Manganese is not regularly determined in areas where it is not present in the waters in appreciable amounts. It is especially objectionable in water used in laundry work and in textile processing. Concentrations as low as 0.2 part per million may cause a dark-brown or black stain on fabrics and porcelain fixtures. Appreciable quantities of manganese are often found in waters containing objectionable quantities of iron.

Iron (Fe)

Iron is dissolved from many rocks and soils. On exposure to the air, normal basic waters that contain more than 1 part per million of iron soon become turbid with the insoluble reddish ferric oxide produced by oxidation. Surface waters, therefore, seldom contain as much as 1 part per million of dissolved iron, although some acid waters carry large quantities of iron in solution. Iron causes reddish-brown stains on white porcelain or enameled ware and fixtures and on fabrics washed in the water.

Calcium (Ca)

Calcium is dissolved from almost all rocks and soils, but the highest concentrations are usually found in waters that have been in contact with limestone, dolomite, and gypsum. Calcium and magnesium make water hard and are largely responsible for the formation of boiler scale. Most waters associated with granite or silicious sands contain less than 10 parts per million of calcium; waters in areas where rocks are composed of dolomite and limestone contain from 30 to 100 parts per million; and waters that have come in contact with deposits of gypsum may contain several hundred parts per million.

Magnesium (Mg)

Magnesium is dissolved from many rocks, particularly from dolomitic rocks. Its effect in water is similar to that of calcium. The magnesium in soft waters may amount to only 1 or 2 parts per million, but water in areas that contain large quantities of dolomite or other magnesium-bearing rocks may contain from 20 to 100 parts per million or more of magnesium.

Sodium and potassium (Na and K)

Sodium and potassium are dissolved from almost all rocks. Sodium is the predominant cation in some of the more highly mineralized waters found in the Western United States. Natural waters that contain only 3 or 4 parts per million of the two together are likely to carry almost as much potassium as sodium. As the total quantity of these constituents increases, the proportion of sodium becomes much greater. Moderate quantities of sodium and potassium have little effect on the usefulness of the water for most purposes, but waters that carry more than 50 or 100 parts per million of the two may require careful operation of steam boilers

to prevent foaming. More highly mineralized waters that contain a large proportion of sodium salts may be unsatisfactory for irrigation.

Carbonate and bicarbonate (CO_3 and HCO_3)

Bicarbonate occurs in waters largely through the action of carbon dioxide, which enables the water to dissolve carbonates of calcium and magnesium. Carbonate as such is not usually present in appreciable quantities in natural waters. The bicarbonate in waters that come from relatively insoluble rocks may amount to less than 50 parts per million; many waters from limestone contain from 200 to 400 parts per million. Bicarbonate in moderate concentrations in water has no effect on its value for most uses. Bicarbonate or carbonate is an aid in coagulation for the removal of suspended matter from water.

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils but in especially large quantities from gypsum and from beds of shale. It is formed also by the oxidation of sulfides of iron and is therefore present in considerable quantities in waters from mines. Sulfate in waters that contain much calcium and magnesium causes the formation of hard scale in steam boilers and may increase the cost of softening the water.

Chloride (Cl)

Chloride is dissolved from rock materials in all parts of the country. Surface waters in the humid regions are usually low in chloride content, whereas streams in arid or semiarid regions may contain several hundred parts per million of chloride leached from soils and rocks, especially where the streams receive return drainage from irrigated lands or are affected by ground-water inflow carrying appreciable quantities of chloride. Large quantities of chloride may affect the industrial use of water by increasing the corrosiveness of waters that contain large quantities of calcium and magnesium.

Fluoride (F)

Fluoride has been reported as being present in some rocks in about the same amount as chloride. However, the quantity of

fluoride in natural surface waters is ordinarily very small compared to that of chloride. Recent investigations indicate that the incidence of dental caries is less when there are small amounts of fluoride present in the water supply than when there is none. However, excess fluoride in water is associated with the dental defect known as mottled enamel if the water is used for drinking by young children during calcification or formation of the teeth (Dean, 1936, p. 1269-1272). This defect becomes increasingly noticeable as the quantity of fluoride in water increases above 1.5 to 2.0 parts per million.

Nitrate (NO_3)

Nitrate in water is considered a final oxidation product of nitrogenous material and may indicate contamination by sewage or other organic matter. The quantities of nitrate present in surface waters are generally less than 5 parts per million (as NO_3) and have no effect on the value of the water for ordinary uses.

It has been reported that as much as 2 parts per million of nitrate in boiler water tends to decrease intercrystalline cracking of boiler steel. Studies made in Illinois indicate that nitrates in excess of 70 parts per million (as NO_3) may contribute to methemoglobinemia ("blue babies") (Faucett and Miller, 1946, p. 593), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 parts per million or more (as NO_3) may cause methemoglobinemia (Waring, 1949). In a report published by the National Research Council, Maxcy (1950, p. 271) concludes that a nitrate content in excess of 44 parts per million (as NO_3) should be regarded as unsafe for infant feeding.

Boron (B)

Boron in small quantities has been found essential for plant growth, but irrigation water containing more than 1 part per million of boron is detrimental to citrus and other boron-sensitive crops. Boron is reported in Survey analyses of surface waters in arid and semiarid regions where irrigation is practiced or contemplated, but few of the surface waters analyzed have harmful concentrations of boron.

Dissolved solids

The reported quantity of dissolved solids--the residue on evaporation--consists mainly of the dissolved mineral constituents in the water. It may also contain some organic matter and water of crystallization. Waters with less than 500 parts per million of dissolved solids are usually satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids are sometimes successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

PROPERTIES AND CHARACTERISTICS OF WATER

Temperature

Large quantities of water are used in industrial operation; therefore temperature and seasonal fluctuations of that temperature are major considerations in planning the use of water for cooling in industrial plants. Water at high temperature can carry less oxygen in solution than at low temperature. Consequently water temperature can affect or determine the pollution characteristics of a stream. Temperature data are required in studies of water intended for aquatic life. A few degrees rise in temperature may seriously limit the capacity of a stream to support fish life.

Oxygen consumed

The amount of oxygen consumed furnishes an approximation of the oxidizable matter in the unfiltered and filtered samples and gives a partial measure of polluting materials such as sewage and oxidizable industrial wastes. Waters of naturally high color may have relatively high values for oxygen consumed, and waters that are not noticeably colored may contain oxidizable material.

Color

In water analysis the term "color" refers to the appearance of water that is free from suspended solids. Many turbid waters

that appear yellow, red, or brown when viewed in the stream show very little color after the suspended matter has been removed. The yellow-to-brown color of some waters is usually caused by organic matter extracted from leaves, roots, and other organic substances in the ground. In some areas objectionable color in water results from industrial wastes and sewage. Clear deep water may appear blue as the result of a scattering of sunlight by the water molecules. Water for domestic use and some industrial uses should be free from any perceptible color. A color less than 10 units generally passes unnoticed. Some swamp waters have natural color of 200 to 300 units or more.

Hydrogen-ion concentration (pH)

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH (see p.7), is related to the corrosive properties of water and is useful in determining the proper treatment for coagulation that may be necessary at water-treatment plants. A pH of 7.0 indicates that the water is neither acid nor alkaline. pH readings progressively lower than 7.0 denote increasing acidity and those progressively higher than 7.0 denote increasing alkalinity. The pH of most natural surface waters ranges between 6 and 8. Some alkaline surface waters have pH values greater than 8.0, and waters containing free mineral acid usually have pH values less than 4.5.

Specific conductance (micromhos per centimeter at 25° C)

The specific conductance of a water is a measure of its capacity to conduct a current of electricity (see p.7). The conductance varies with the concentration and degree of ionization of the different minerals in solution and with the temperature of the water. When considered in conjunction with results of determinations for other constituents, specific conductance is a useful determination and plays an important part in indicating changes in concentration of the total quantity of dissolved minerals in surface waters.

Hardness

Hardness is the characteristic of water that receives the most attention in industrial and domestic use. It is commonly recognized by the increased quantity of soap required to produce lather. The use of hard water is also objectionable because it contributes to the formation of scale in boilers, water heaters, radiators, and

pipes, with the resultant decrease in rate of heat transfer, possibility of boiler failure, and loss of flow.

Hardness is caused almost entirely by compounds of calcium and magnesium. Other constituents--such as iron, manganese, aluminum, barium, strontium, and free acid--also cause hardness, although they usually are not present in quantities large enough to have any appreciable effect. Water that has less than 60 parts per million of hardness is usually rated as soft and suitable for many purposes without further softening. Waters with hardness ranging from 61 to 120 parts per million may be considered moderately hard, but this degree of hardness does not seriously interfere with the use of water for many purposes except for use in high-pressure steam boilers and in some industrial processes. Waters with hardness ranging from 121 to 200 parts per million are considered hard, and laundries and industries may profitably soften such supplies. Water with hardness above 200 parts per million generally requires some softening before being used for most purposes.

Acidity

The acidity of a natural water represents the content of free carbon dioxide and other uncombined gases, organic acids, mineral acids and salts of strong acids and weak bases that hydrolyze to give hydrogen ions. Sulfates of iron and aluminum in mine and industrial wastes are common sources of acidity.

Corrosiveness

The corrosiveness of a water is that property which makes the water aggressive to metal surfaces and frequently results in the appearance of the "red-water" caused by solution of iron. The disadvantages of iron in water have been discussed previously. Additionally, corrosion causes the deterioration of water pipes, steam boilers, and water-heating equipment. Many waters that do not appreciably corrode cold-water lines will aggressively attack hot-water lines. Oxygen, carbon dioxide, free acid, and acid-generating salts are the principal constituents in water that cause corrosion. In a general way, very soft waters of low mineral content tend to be more corrosive than hard waters containing appreciable quantities of carbonates and bicarbonates of calcium and magnesium.

Percent sodium

The proportion of sodium to the total cation concentration is termed "percent sodium", and is reported in most of the analyses

of waters collected from streams in the western part of the country where irrigation is practiced extensively. The proportion of sodium to all the constituents in the water is explained on page 10 under "Sodium and potassium". Waters in which the percent sodium is more than 60 may be injurious when applied to certain types of soils, particularly when adequate drainage is not provided (Magistad and Christiansen, 1944, p. 8-9).

Sodium-adsorption-ratio

Of more significance than percent sodium for use as an index of the sodium or alkali hazard to the soil is the sodium-adsorption-ratio because it relates more directly to the adsorption of sodium by the soil. The term, "sodium-adsorption-ratio (SAR)" was introduced by the U. S. Salinity Laboratory Staff (1954), and is a ratio expressing the relative activity of sodium ions in exchange reactions with the soil. It is expressed by the equation:

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++}+Mg^{++}}{2}}}$$

where the concentrations of the ions are expressed in milliequivalents per liter (or equivalents per million for most irrigation waters).

Waters are divided into four classes with respect to sodium or alkali hazard: low, medium, high, and very high, depending upon the SAR and the specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26, but at 5,000 micromhos the corresponding dividing points are SAR values of approximately 2.5, 6.5, and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

SEDIMENT

Fluvial sediment is generally regarded as that sediment which is transported by, suspended in, or deposited by water. Suspended sediment is that part of it which remains in suspension in water owing to the upward components of turbulent currents or by colloidal suspension. Most fluvial sediment results from the normal process of erosion, which in turn is part of the geologic cycle of

rock transformation. In some instances, this normal process may have been accelerated by agricultural practices. Sediment also results from a number of industrial activities. In certain sections, waste materials from mining, logging, oil-field, and other industrial operations introduce large quantities of suspended as well as dissolved material.

The quantity of sediment, transported or available for transportation, is affected by climatic conditions, form or nature of precipitation, plant cover, topography, and land use. An important property of fluvial sediment is the fall velocity of the particles in transport. Particle sizes, as determined by various methods, represent mechanical diameters, which are related to sedimentation diameters indirectly. Sediment particles in the sand-size (larger than 0.062 mm) range do not appear to be affected by flocculation or dispersion resulting from the mineral constituents in solution. The sedimentation diameter of clay and silt particles in suspension may vary considerably from point to point in a stream or reservoir, depending on the mineral matter in solution and in suspension and the degree of turbulence present. The size of sediment particles in transport at any point depends on the type of erodible and soluble material in the drainage area, the degree of flocculation present, time in transport, and characteristics of the transporting flow. The flow characteristics include velocity of water, turbulence, and the depth, width, and roughness of the channel. As a result of these variable characteristics, the size of particles transported, as well as the total sediment load, is in constant adjustment with the characteristics and physical features of the stream and drainage area.

STREAMFLOW

Most of the records of stream discharge, used in conjunction with the chemical analyses and in the computation of sediment loads in this volume, are published in Geological Survey reports on the surface-water supply of the United States. The discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges for the time at which samples were collected, computed from a stage-discharge relation or from a discharge measurement.

PUBLICATIONS

Reports giving records of chemical quality and temperatures of surface waters and suspended-sediment loads of streams in the

area covered by this volume for the water years 1941-57, are listed below:

Numbers of water-supply papers containing records for Parts 5-6, 1941-57

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1941	942	1946	1050	1951	1198	1956	1451
1942	950	1947	1102	1952	1251	1957	1521
1943	970	1948	1132	1953	1291		
1944	1022	1949	1162	1954	1351		
1945	1030	1950	1187	1955	1401		

Geological Survey reports containing chemical quality, temperature, and sediment data obtained before 1941 are listed below. Publications dealing largely with the quality of ground-water supplies and only incidentally covering the chemical composition of surface waters are not included. Publications that are out of print are preceded by an asterisk.

PROFESSIONAL PAPER

*135. Composition of river and lake waters of the United States, 1924.

BULLETINS

*479. The geochemical interpretation of water analyses, 1911.
770. The data of geochemistry, 1924.

WATER-SUPPLY PAPERS

*108. Quality of water in the Susquehanna River drainage basin, with an introductory chapter on physiographic features, 1904.
*161. Quality of water in the upper Ohio River basin and at Erie, Pa., 1906.
*193. The quality of surface waters in Minnesota, 1907.
*236. The quality of surface waters in the United States, Part 1, Analyses of waters east of the one hundredth meridian, 1909.
*237. The quality of the surface waters of California, 1910.
*239. The quality of the surface waters of Illinois, 1910.
*273. Quality of the water supplies of Kansas, with a preliminary report on stream pollution by mine waters in southeastern Kansas, 1911.

*274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, 1911.
*339. Quality of the surface waters of Washington, 1914.
*363. Quality of the surface waters of Oregon, 1914.
*418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.
*596-B. Quality of water of Colorado River in 1925-26, 1928.
*596-D. Quality of water of Pecos River in Texas, 1928.
*596-E. Quality of the surface waters of New Jersey, 1928.
*636-A. Quality of water of the Colorado River in 1926-28, 1930.
*636-B. Suspended matter in the Colorado River in 1925-28, 1930.
*638-D. Quality of water of the Colorado River in 1928-30, 1932.
*839. Quality of water of the Rio Grande basin above Fort Quitman, Tex., 1938.
*889-E. Chemical character of surface waters of Georgia, 1944.
*998. Suspended sediment in the Colorado River, 1925-41, 1947.
1048. Discharge and sediment loads in the Boise River drainage basin, Idaho, 1939-40, 1948.
1110-C. Quality of water of Conchas Reservoir, New Mexico, 1939-49, 1952.

Many of the reports listed are available for consultation in the larger public and institutional libraries. Copies of Geological Survey publications still in print may be purchased at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., who will, upon request, furnish lists giving prices.

COOPERATION

The chemical quality of water and sediment investigations in the Missouri River and Red River of the North basins in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, and Wyoming were begun in 1945. Most of the investigations were made as part of the program of the United States Department of the Interior for development of the Missouri River basin with funds provided directly to the Geological Survey. Financial assistance was provided by the Bureau of Reclamation and the Bureau of Sport Fisheries and Wildlife of the Interior Department for some of the investigations in Montana, Nebraska, South Dakota, and Wyoming; by the Agricultural Research Service, Forest Service and Soil Conservation Service, of the Agriculture Department for some of the investigations in Colorado, Iowa, Montana, and Nebraska; and by the Corps of Engineers of the Department of the Army for some of the investigations in North Dakota and South Dakota.

State	Cooperating agency	Drainage basin	District office
Iowa	Iowa Geological Survey, H. G. Hershey, director and State Geologist.	Hudson Bay and upper Mississippi River basins Missouri River basin	132 Nebraska Hall 901 North 17th Street, Lincoln, Nebr. (Chemical-quality data) 508 Hydraulic Laboratory University of Iowa Iowa City, Iowa (Sediment data)
Kansas	Kansas Water Resources Board, Robert L. Smith, executive secretary City of Wichita, Robert H. Hess, director of water.	Missouri River basin	132 Nebraska Hall 901 North 17th Street Lincoln, Nebr.
Minnesota	Minnesota Iron Range Resources and Rehabilitation, Kaarlo J. Otava, commissioner.	Hudson Bay and upper Mississippi River basins	
South Dakota	South Dakota Water Resources Commission, J. W. Grimes, chief engineer.	Missouri River basin	

State	Cooperating agency	Drainage basin	District office
Wisconsin	Wisconsin Conservation Department, L. P. Voigt, director, through the Committee on Water Pollution, George P. Steinmetz, chairman, Theodore F. Wisniewski, director.	Missouri River basin	2822 E. Main Street Columbus 9, Ohio (Sediment data)
Wyoming	Wyoming Natural Resource Board, Water Resources, Paul A. Rechard, director.		1214 Big Horn Ave. Worland, Wyo.

The investigations in Minnesota and Wisconsin and some of the investigations in Iowa were made in cooperation with these states. Cooperative programs with the states of Kansas, South Dakota, and Wyoming became effective in 1957.

The table on page 20 lists State and local agencies that cooperated in quality-of-water investigations in the drainage basins included in this volume, and the locations of quality-of-water district offices responsible for the data collected.

DIVISION OF WORK

The quality-of-water program was conducted by the Water Resources Division of the Geological Survey, L. B. Leopold, chief hydraulic engineer, and S. K. Love, chief of the Quality of Water Branch.

Most of the investigations were made under the direction of P. C. Benedict, regional engineer, succeeded by D. M. Culbertson, district engineer, Lincoln, Nebr., and by T. F. Hanly, district engineer, Worland, Wyo. The sediment investigations in Iowa were made under the direction of V. R. Bennion, district engineer, Iowa City, Iowa, and those in Wisconsin under the direction of G. W. Whetstone, district chemist, Columbus, Ohio.

Additional basic data on file for the streams, lakes, and reservoirs shown in this report can be obtained by writing the responsible Survey district office.

LITERATURE CITED

American Public Health Association, 1955, Standard methods for the examination of water and sewage, 10th ed., p. 1-217.

Collins, W. D., 1928, Notes on practical water analysis: U. S. Geol. Survey Water-Supply Paper 596-H.

Dean, H. T., 1936, Chronic endemic dental fluorosis: Am. Med. Assoc. Jour., v. 107, p. 1269-1272.

Faucett, R. L. and Miller, H. C. 1946, Methemoglobinemia occuring in infants fed milk diluted with well waters of high nitrate content: Jour. Pediatrics, v. 29, p. 593.

Hazen, Allen, 1892, A new color standard for natural waters: Am. Chem. Jour., v. 12, p. 427-428.

Kilmer, V. J. and Alexander, L. T., 1949, Methods of making mechanical analyses of soils: Soil Sci., v. 68, p. 15-24.

Lane, E. W., and others, 1947, Report of the Subcommittee on Terminology: Am. Geophys. Union Trans., v. 28, p. 937.

Magistad, O. C., and Christiansen, J. E., 1944, Saline soils, their nature and management: U. S. Dept. Agriculture Circ. 707, p. 8-9.

Maxcy, K. F., 1950, Report on the relation of nitrate concentrations in well waters to the occurrence of methemoglobinemia: Natl. Research Council, Bull. Sanitary Eng. and Environment, p. 271, App. D.

U. S. Interagency Report 6, 1952, A study of methods used in measurements and analysis of sediment loads in streams, the design of improved types of suspended sediment samplers, p. 86-90, U. S. Engineer Office, St. Paul, Minn.

U. S. Interagency Report 7, 1943, A study of methods used in measurement and analysis of sediment loads in streams, a study of new methods for size analysis of suspended sediment samples, p. 82-90; U. S. Engineer Office, St. Paul, Minn.

U. S. Interagency Report 8, 1948, A study of methods used in measurement and analysis of sediment loads of streams, measurement of the sediment discharge of streams, p. 70-76; U. S. Engineer Office, St. Paul, Minn.

U. S. Interagency Report 11, 1957, A study of methods used in measurement and analysis of sediment loads in streams, the development and calibration of the visual-accumulation tube, p. 1-109.

U. S. Salinity Laboratory Staff, 1954, Diagnosis and improvement of saline and alkali soils: U. S. Dept. Agriculture, Agriculture Handb. 60, p. 1-160.

Waring, F. H., 1949, Significance of nitrates in water supplies: Am. Water Works Assoc. Jour., v. 41, no. 2., p. 147-150.

RED RIVER OF THE NORTH BASIN

RED RIVER OF THE NORTH AT FARGO, N. DAK.

LOCATION.--At intake of Fargo Water Works, about 0.7 mile upstream from Island Park Dam and gaging station at Fargo, Cass County, and about 23.3 miles upstream from Sheyenne River.
DRAINAGE AREA.--6,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 508 ppm Dec. 19-22; minimum, 228 ppm Apr. 21-22.
Hardness: Maximum, 389 ppm Dec. 19-22; minimum, 166 ppm Apr. 21-22.
Specific conductance: Maximum daily, 802 micromhos Dec. 22; minimum daily, 336 micromhos Apr. 21.
Water temperatures: Maximum, 82°F July 15, 16, 18; minimum, 34°F on several days during March.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 508 ppm Dec. 19-22, 1956; minimum, 174 ppm Dec. 1-2, 1955.
Hardness: Maximum, 389 ppm Dec. 19-22, 1956; minimum, 154 ppm Dec. 1-2, 18-19, 1955.
Specific conductance: Maximum daily, 802 micromhos Dec. 22, 1956; minimum daily, 275 micromhos Dec. 1, 1955.
Water temperatures: Maximum, 82°F July 15, 16, 18, 1957; minimum, 33°F on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	62.3	6.3	0.02	47	34	12	4.9	285	44	5.0	0.2	0.1	0.10	294	0.41	51.0	258	24	9	0.3	517	8.0	9
Nov. 1-30.....	44.0	4.9	.00	44	40	15	4.6	298	51	6.0	.2	.1	.12	323	.44	38.4	273	29	10	.4	550	8.0	6
Dec. 1-13.....	43.3	3.6	.00	52	38	15	4.7	307	63	6.0	.3	.0	.09	348	.47	40.7	287	35	10	.4	577	8.2	7
Dec. 14-18.....	59.6	3.8	.00	61	44	18	5.3	a 317	102	7.0	.3	.0	.12	419	.57	67.4	331	71	10	.4	662	8.3	7
Dec. 19-22.....	71.0	4.1	.00	74	50	25	6.0	366	137	9.5	.3	.0	.14	508	.69	97.4	389	89	12	.6	777	8.2	10
Dec. 23-Jan. 6, 1957	74.6	3.9	.00	67	47	20	5.3	370	99	8.0	.3	.0	.11	451	.61	90.8	360	57	11	.5	720	8.2	10
Jan. 7-24	79.7	8.2	.00	59	39	15	4.6	337	71	7.0	.3	.1	.09	372	.51	80.1	308	32	9	.4	613	8.1	9
Jan. 25-30	119	11	.00	66	42	17	5.3	370	66	8.0	.3	.9	.09	419	.57	135	338	35	10	.3	670	8.1	10
Jan. 31-Feb. 28 ...	105	13	.00	60	38	13	4.8	344	49	6.5	.3	1.9	.08	375	.51	106	304	22	8	.3	600	8.1	10
Mar. 1-14.....	202	14	.04	58	38	14	5.7	336	39	6.8	.3	1.9	.10	355	.48	194	301	25	9	.4	595	8.1	7
Mar. 15-23.....	232	15	.04	51	33	11	4.6	300	34	5.9	.3	2.3	.08	313	.43	196	264	18	8	.3	526	8.0	8
Mar. 24.....	732	15	.18	53	36	22	5.7	292	61	12	.6	3.0	.10	380	.52	751	280	41	14	.6	592	8.1	17
Mar. 25.....	1,080	14	.16	48	24	15	6.1	236	52	5.5	.5	3.6	.08	332	.45	968	220	26	12	.4	469	8.1	17
Mar. 26-28.....	1,483	12	.02	38	18	10	5.6	164	51	4.2	.3	3.5	.07	229	.31	917	170	36	11	.3	376	7.8	20
Mar. 29-Apr. 20...	537	12	.01	35	30	11	6.0	208	57	2.0	.2	1.9	.07	263	.36	381	211	40	10	.3	444	7.7	10
Apr. 21-22.....	1,955	13	.02	41	15	8.9	6.4	166	47	.2	.1	1.5	.12	228	.31	1,200	166	30	10	.3	367	7.9	30
Apr. 23.....	2,340	15	.03	49	22	11	6.5	190	78	.4	.1	3.1	.10	278	.38	1,760	212	56	10	.3	448	7.9	30

a Includes equivalent of 5 ppm of carbonate (CO_3).

RED RIVER OF THE NORTH AT FARGO, N. DAK.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Apr. 24-30, 1957..	1,645	16	0.02	61	31	19	7.2	172	168	2.7	0.2	5.5	0.06	404	0.55	1,790	278	137	13	0.5	603	7.7	30
May 1-26.....	902	8.7	.02	60	39	22	6.4	235	156	7.3	.4	.5	.12	438	.60	1,070	310	117	13	.5	661	7.8	--
May 27-June 4	1,185	12	.02	65	43	28	6.6	242	187	7.2	.2	.4	.14	499	.68	1,600	340	142	15	.7	728	7.6	15
June 5-25.....	938	11	.01	58	38	21	5.8	235	145	5.0	.2	.5	.13	431	.59	1,090	302	109	13	.5	637	7.5	7
June 26-July 13 ...	1,336	14	.01	59	41	27	7.0	224	181	6.0	.2	.4	.20	473	.64	1,710	317	133	15	.7	685	7.8	13
July 14-Aug. 4....	715	15	.01	48	32	18	5.1	241	82	5.0	.2	.3	.13	344	.47	664	253	55	13	.5	540	7.7	12
Aug. 5-19	576	17	.01	39	28	11	3.8	236	36	2.6	.2	.4	.07	276	.38	429	211	17	10	.3	432	7.7	9
Aug. 20-Sept. 30..	605	15	.01	45	27	17	5.2	230	62	5.0	.3	.2	.10	299	.41	488	225	36	14	.5	482	7.8	15
Weighted average b.....	492	13	0.02	53	34	19	5.9	232	113	5.1	0.2	1.0	0.12	376	0.51	499	272	82	13	0.5	576	--	--

b Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER OF THE NORTH BASIN--Continued

RED RIVER OF THE NORTH AT FARGO, N. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
[Once-daily measurement between 9 a.m. and 10 a.m.]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	46	39	35	35	35	35	63	66	71	81	68
2	57	48	a 38	36	36	36	36	61	68	73	79	70
3	57	48	40	37	a 35	36	36	60	68	75	77	68
4	57	49	40	37	35	35	40	61	68	76	a 76	66
5	56	48	39	36	36	36	38	a 60	68	75	74	67
6	56	49	39	35	36	36	39	61	68	76	74	66
7	56	45	38	35	36	36	38	62	68	78	74	65
8	55	44	38	35	36	35	39	62	69	76	74	65
9	53	42	36	36	36	35	41	61	69	76	75	65
10	51	42	39	36	a 35	35	41	61	70	76	76	65
11	52	a 41	38	36	35	35	41	63	68	78	a 76	65
12	52	41	38	35	35	35	39	a 63	68	80	76	65
13	54	42	36	35	36	35	40	63	68	81	76	64
14	53	41	--	36	35	34	38	62	68	a 81	76	64
15	53	40	37	35	36	35	41	61	66	82	75	64
16	52	37	37	36	36	34	43	61	67	82	75	61
17	53	39	38	36	a 36	35	43	62	67	81	75	61
18	55	a 38	40	35	35	35	45	60	67	82	74	61
19	55	38	38	35	35	34	47	a 59	66	80	73	56
20	54	40	39	35	35	35	49	60	68	78	74	57
21	53	39	37	36	36	35	49	59	70	a 74	72	55
22	53	40	38	35	36	34	62	58	68	77	73	55
23	52	40	37	35	36	35	57	56	a 66	78	72	54
24	51	--	38	35	36	36	57	57	66	78	72	55
25	50	a 39	38	35	a 36	35	57	58	68	77	72	56
26	49	38	38	35	36	34	58	57	66	78	71	54
27	49	40	38	35	36	36	59	58	67	79	69	56
28	48	39	38	35	--	34	--	60	67	a 79	68	55
29	49	40	38	35	--	36	60	63	69	80	67	56
30	49	40	37	35	--	35	61	63	a 70	80	67	59
31	46	--	37	36	--	35	--	65	--	80	68	--
Average	53	42	38	35	36	35	46	61	68	78	74	61

a Measurement between 7 a.m. and 8 a.m.

RED RIVER OF THE NORTH BASIN--Continued

SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION.--At gaging station at highway bridge, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA.--2,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: January 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,110 ppm Mar. 11-13; minimum, 250 ppm Mar. 21-31.
Hardness: Maximum, 488 ppm Feb. 26 to Mar. 5; minimum, 117 ppm Apr. 4-11.
Specific conductance: Maximum daily, 1,760 micromhos Mar. 12; minimum daily, 333 micromhos Mar. 27.
Water temperatures: Maximum, 83°F Aug. 1; minimum, freezing point on several days during November and February.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 1,230 ppm Mar. 21-23, 1955; minimum, 174 ppm Apr. 17-22, 1956.
Hardness: Maximum, 488 ppm Feb. 26 to Mar. 5, 1957; minimum, 76 ppm Mar. 30 to Apr. 2, 1955.
Specific conductance: Maximum daily, 1,940 micromhos Feb. 1, 1955; minimum daily, 240 micromhos Apr. 4, 1955.
Water temperatures: Maximum (1951-55, 1956-57), 86°F July 21, 1955; minimum, freezing point on several days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1956	6.05	--	--	--	--	87	--	388	6	--	--	--	--	--	521	0.71	8.51	260	0	42	2.3	821	8.2
Nov. 1-30	23.8	--	--	--	--	77	--	398	5	--	--	--	--	--	533	.72	34.3	286	0	37	2.0	829	8.2
Dec. 1-31 a	6.84	25	0.00	64	39	87	6.2	443	0	130	16	0.2	0.8	0.19	601	.82	11.1	320	0	37	2.1	926	8.1
Jan. 1-26, 1957	2.93	--	--	--	--	96	--	462	0	--	--	--	--	--	638	.87	5.05	342	0	38	2.3	958	7.9
Jan. 27-Feb. 13	1.01	--	--	--	--	64	--	380	0	--	--	--	--	--	508	.69	1.39	336	24	29	1.5	781	7.9
Feb. 14-25	1.13	--	--	--	--	81	--	428	0	--	--	--	--	--	587	.80	1.79	324	0	35	2.0	881	8.0
Feb. 26-Mar. 5	5.98	--	--	--	--	183	--	699	0	--	--	--	--	--	1,030	1.40	16.6	488	0	45	3.6	1,500	8.2
Mar. 6-8	26.0	--	--	--	--	118	--	551	0	--	--	--	--	--	791	1.08	55.5	402	0	39	2.6	1,180	8.2
Mar. 9-10	37.5	--	--	--	--	89	--	426	8	--	--	--	--	--	634	.86	64.2	336	0	37	2.1	956	8.4
Mar. 11-13	37.0	--	--	--	--	227	--	669	10	--	--	--	--	--	1,110	1.51	111	458	0	52	4.6	1,610	8.3
Mar. 14-17	19.0	--	--	--	--	106	--	379	0	--	--	--	--	--	612	.83	31.4	264	0	47	2.8	929	8.2
Mar. 18-20	23.3	--	--	--	--	70	--	274	0	--	--	--	--	--	443	.60	27.9	197	0	44	2.2	676	7.8
Mar. 21-31 b	81.3	13	.05	30	13	28	9.0	166	0	46	6.5	.2	4.6	.11	250	.34	54.9	130	0	30	1.1	383	7.5
Apr. 1-3	87.0	--	--	--	--	64	--	237	0	--	--	--	--	--	364	.50	85.5	149	0	48	2.3	565	7.9
Apr. 4-11	66.1	--	--	--	--	41	--	177	0	--	--	--	--	--	268	.36	47.8	117	0	43	1.6	414	7.8
Apr. 12-24	40.8	--	--	--	--	52	--	211	0	--	--	--	--	--	295	.40	32.5	133	0	46	2.0	477	7.8
Apr. 25-May 12	39.4	--	--	--	--	60	--	297	0	--	--	--	--	--	392	.53	41.7	200	0	39	1.8	622	8.1
May 13-31	33.5	--	--	--	--	77	--	390	0	--	--	--	--	--	503	.68	45.5	260	0	39	2.1	789	8.0
June 1-July 1 c	21.0	16	.01	56	34	92	8.1	429	0	101	20	.4	1.2	.20	558	.76	31.6	281	0	41	2.4	872	8.0
July 2-16	11.6	--	--	--	--	74	--	391	0	--	--	--	--	--	466	.63	14.6	253	0	39	2.0	748	7.7

July 17-26.....	48.2	--	--	--	--	44	--	248	0	--	--	--	--	--	315	.43	41.0	167	0	36	1.5	498	7.8
July 27-Aug. 18.....	17.5	--	--	--	--	81	--	362	0	--	--	--	--	--	471	.64	22.3	228	0	44	2.3	742	7.8
Aug. 19-Sept. 1.....	37.2	--	--	--	--	140	--	465	0	--	--	--	--	--	641	.87	64.4	233	0	57	4.0	983	7.9
Sept. 2-20.....	87.4	23	.03	39	17	44	8.0	241	0	59	5.9	.3	.6	.15	325	.44	76.7	167	0	35	1.5	511	7.9
Sept. 21-30.....	19.5	--	--	--	--	49	--	311	0	--	--	--	--	--	401	.55	21.1	233	0	31	1.4	633	7.8
Weighted average d .	25.5	--	--	--	--	67	--	e 314	--	--	--	--	--	--	427	0.58	29.4	210	0	41	2.0	665	--

a Color, 18.
b Color, 55.
c Color, 28.
d Represents 100 percent of runoff for water year October 1956 to September 1957.
e Includes carbonate as bicarbonate.

RED RIVER OF THE NORTH BASIN--Continued

SHEYENNE RIVER NEAR WARWICK, N. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 2 p.m. and 4 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	54	a 41	38	--	34	35	35	67	68	68	83	--
2	55	41	--	36	35	35	34	a 58	--	75	76	--
3	55	a 42	35	34	--	--	35	a 61	64	70	73	63
4	52	--	34	34	36	35	35	62	65	--	--	65
5	53	a 41	34	36	a 36	b 35	35	--	70	75	74	65
6	53	a 37	33	--	36	34	34	65	68	69	76	66
7	--	a 36	33	36	36	35	--	69	69	--	76	66
8	51	36	a 34	34	36	34	34	63	66	70	74	--
9	49	35	--	33	33	b 34	35	60	--	69	72	64
10	48	35	a 35	33	--	--	34	63	58	75	75	64
11	48	--	a 33	33	34	b 34	35	65	66	a 80	--	67
12	53	--	a 33	34	a 34	33	34	--	66	80	73	66
13	55	37	a 34	--	32	34	b 35	67	66	81	76	62
14	--	34	35	33	32	33	--	a 67	64	--	73	59
15	51	32	34	33	32	36	35	62	65	75	72	--
16	54	34	--	33	32	35	37	65	--	81	71	66
17	50	36	a 33	36	--	--	37	63	64	80	72	58
18	54	--	a 35	36	33	a 35	37	64	--	70	--	53
19	56	35	a 40	37	33	35	37	--	64	75	73	a 55
20	53	36	a 44	--	33	b 35	41	55	65	76	72	--
21	--	34	a 38	35	32	37	--	54	66	--	73	--
22	47	--	b 36	34	--	37	52	52	66	75	72	--
23	45	35	--	33	32	b 35	50	55	--	80	71	a 53
24	47	36	b 36	33	--	--	51	60	70	74	72	53
25	45	--	--	33	33	b 35	54	60	67	77	--	53
26	a 45	35	38	33	32	36	55	--	69	80	65	53
27	42	37	38	--	33	37	57	61	--	82	63	55
28	--	35	38	34	35	34	--	65	65	81	62	58
29	41	35	36	34	--	b 35	62	66	68	--	64	--
30	42	35	--	35	--	35	67	--	--	80	64	59
31	a 42	--	34	34	--	--	--	65	--	79	65	--
Average	50	36	36	34	34	35	42	62	--	76	72	--

a Measurement between 5 p.m. and 6 p.m.
b Measurement between 12 m. and 1 p.m.

RED RIVER OF THE NORTH BASIN--Continued

MAUVAIS COULEE NEAR CHURCHS FERRY, N. DAK.

LOCATION.--At gaging station at bridge on U. S. Highway 281, 1 mile downstream from Little Coulee and 6 miles south of Churchs Ferry, Ramsay County.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1957.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 29, 1956...	3.31	--	--	76	30	39	--	322	124	14	--	--	--	531	--	0.72		313	49	21	1.0	764	7.8	
Nov. 27.....	1.08	41	0.01	109	48	63	25	472	196	24	0.2	9.6	0.23	783	--	1.06		471	84	21	1.3	1,100	7.7	
Mar. 26, 1957..	5.72	--	--	53	18	38	--	131	173	16	--	--	.09	418	--	.57		208	101	27	1.1	614	6.9	
Apr. 2.....	.88	18	.00	69	24	50	14	233	160	16	.0	6.2	.13	484	--	.66		269	78	28	1.3	732	7.3	
Apr. 9.....	.31	24	.02	84	31	72	13	356	180	26	.3	1.6	.18	643	--	.87		338	46	31	1.7	946	7.7	
Apr. 15.....	.22	5.4	.02	40	17	25	12	181	67	13	.2	1.6	.07	290	--	.39		169	21	23	.8	461	7.4	
May 6.....	5.09	26	.03	77	36	45	18	a 358	145	20	.3	.4	.11	553	--	.75		340	46	21	1.1	824	8.3	
May 29.....	.57	--	--	87	41	72	--	b 377	197	25	--	--	--	679	--	.92		384	75	29	1.6	976	8.4	
June 25	.12	12	.04	94	57	140	22	331	420	50	.5	3.3	.25	1,010	962	1.37		470	199	38	2.8	1,410	7.9	
Sept. 25.....	.10	2.2	.00	63	61	236	20	273	584	85	.3	2.0	.46	1,230	1,190	1.67		409	185	54	5.1	1,740	7.7	

a Includes equivalent of 3 ppm of carbonate (CO_3).
b Includes equivalent of 11 ppm of carbonate (CO_3).

RED RIVER OF THE NORTH BASIN--Continued

SHEYENNE RIVER AT LISBON, N. DAK.

LOCATION.--At gaging station, 150 feet downstream from dam at State fish hatchery, at north edge of city of Lisbon, Ramsom County, and 3 miles upstream from Timber Coulee.
DRAINAGE AREA.--8,560 square miles, approximately (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 666 ppm Nov. 22-28; minimum, 307 ppm Sept. 5-7, 1957.
Hardness: Maximum, 297 ppm Nov. 22-28; minimum, 148 ppm Sept. 5-7, 1957.
Specific conductance: Maximum daily, 1,120 micromhos Nov. 25; minimum daily, 451 micromhos Sept. 5, 1957.
Water temperatures: Maximum, 81°F on several days during July; minimum, 33°F on many days during December to March.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Aug. 2, 1956 a	b 27.0	15	0.07	45	19	62	9.7	246	103	20	0.3	2.6	0.19	413	0.56	--	192	0	40	1.9	643	7.6	--
Aug. 13-Sept. 18 a	--	16	.01	46	22	68	9.9	264	116	23	.2	.2	.20	439	.60	--	207	0	40	2.1	695	8.0	10
Sept. 22-30 a	3.84	12	.00	50	24	76	10	281	125	26	.3	.5	.20	471	.64	4.88	223	0	41	2.2	739	8.0	10
Oct. 1-22, 25-31	7.66	15	.04	58	26	80	12	296	151	35	.2	.3	.27	531	.72	11.0	250	7	40	2.2	824	8.0	15
Nov. 1-21	28.7	17	.03	64	29	78	9.7	288	173	40	.2	.3	.32	565	.77	43.8	279	43	37	2.0	866	7.9	3
Nov. 22-28	48.7	10	.02	71	29	114	12	351	160	84	.2	.3	.39	666	.91	87.6	297	9	44	2.9	1,070	8.0	4
Nov. 29-Dec. 20	46.7	7.2	.02	60	29	80	10	330	137	30	.2	.6	.33	537	.73	67.7	268	0	38	2.1	845	7.9	3
Dec. 21-Jan. 13, 1957	52.3	5.0	.00	60	26	79	9.6	322	136	23	.3	2.1	.22	525	.71	74.1	258	0	39	2.1	806	8.1	11
Jan. 14-31	50.1	7.0	.00	66	27	85	10	342	151	25	.3	2.6	.29	567	.77	76.7	276	0	39	2.2	864	8.0	14
Feb. 1-28	49.8	9.7	.01	44	39	83	11	330	151	25	.3	3.2	.18	550	.75	74.0	272	1	39	2.2	855	7.9	8
Mar. 1-2	92.5	11	.02	61	31	92	11	c 343	146	31	.4	2.9	.26	576	.78	144	278	0	41	2.4	885	8.3	13
Mar. 3-12	74.1	9.3	.04	58	27	79	5.0	320	128	22	.4	1.5	.21	516	.70	103	255	0	40	2.2	812	8.0	18
Mar. 13-23	65.2	8.6	.05	52	25	69	11	289	119	20	.4	1.5	.20	472	.64	83.1	233	0	38	2.0	747	7.8	20
Mar. 24-30	60.6	7.9	.01	49	21	61	8.6	244	106	19	.3	.4	.17	414	.56	67.7	208	8	38	1.8	658	7.7	20
Mar. 31-Apr. 21	40.8	4.9	.01	43	17	50	7.1	193	103	21	.4	.2	.15	354	.48	39.0	178	20	37	1.6	566	7.5	13
Apr. 22-May 4	42.1	2.7	.01	51	20	59	8.0	205	127	26	.1	.2	.17	415	.56	47.2	210	42	37	1.8	664	7.6	17
May 5-21	35.5	5.1	.00	60	26	80	10	257	160	36	.2	.3	.22	509	.69	48.8	258	47	39	2.2	817	7.7	12
May 22-June 7	60.7	9.4	.02	62	31	89	12	312	171	50	.3	.4	.24	591	.80	96.9	284	28	39	2.3	920	8.0	16
June 8-26	52.8	14	.01	56	29	82	12	305	149	29	.3	.8	.22	530	.72	75.6	259	9	39	2.2	832	7.9	14
June 27-July 28	62.2	17	.01	50	27	76	11	280	139	25	.2	.9	.24	504	.69	84.6	234	4	40	2.2	766	8.0	13
July 29-Aug. 12	45.6	17	.01	51	24	77	11	285	130	24	.4	.0	.22	485	.66	59.7	227	0	41	2.2	751	7.9	15
Aug. 13-Sept. 4	76.8	14	.01	46	22	69	11	243	118	22	.4	.4	.20	434	.59	90.0	205	6	41	2.1	672	7.6	15
Sept. 5-7	536	15	.02	40	12	42	14	168	66	18	.4	1.2	.11	307	.42	444	148	10	36	1.5	487	7.9	20
Sept. 8-30	314	15	.01	52	24	69	11	297	119	16	.3	1.0	.20	461	.63	391	227	0	38	2.0	714	7.8	10
Weighted average d	69.0	12	0.01	53	25	72	11	284	128	24	0.3	1.1	0.21	481	0.65	89.6	234	1	39	2.0	748	--	--

a Not included in weighted average.
b Discharge at time of sampling.
c Includes equivalent of 8 ppm of carbonate (CO_3).
d Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER OF THE NORTH BASIN--Continued

SHEYENNE RIVER AT LISBON, N. DAK.--Continued

Temperature (° F) of water, August to September 1956
/Once-daily measurement between 7 a.m. and 10 a.m./

Day	August	Day	August	Day	September	Day	September
2	--	17	a 73	1	68	16	60
3	--	18	70	2	68	17	60
4	--	19	70	3	66	18	60
5	--	20	71	4	65	19	--
6	--	21	72	5	65	20	--
7	--	22	a 72	6	62	21	--
8	--	23	72	7	62	22	59
9	--	24	70	8	60	23	59
10	--	25	69	9	60	24	59
11	--	26	69	10	62	25	59
12	--	27	68	11	64	26	59
13	75	28	70	12	66	27	58
14	75	29	68	13	66	28	54
15	73	30	71	14	58	29	49
16	74	31	70	15	61	30	a 53
Average							61

a Measurement at 12 m.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 7 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 61	46	35	33	33	33	35	63	68	a 72	79	68
2	56	40	35	33	33	33	35	60	a 68	73	79	b 68
3	54	46	35	33	33	33	35	60	68	--	80	a 68
4	55	b 44	35	33	33	33	35	60	--	a 75	79	65
5	56	b 44	34	33	33	a 33	35	63	b 74	b 76	78	65
6	53	a 42	34	33	33	33	35	63	a 71	77	77	65
7	60	44	34	33	33	33	35	63	69	76	78	a 65
8	a 58	38	33	33	33	33	35	66	69	b 77	77	b 64
9	a 61	44	a 33	33	33	33	35	61	--	a 76	76	a 63
10	a 56	40	33	33	33	33	38	62	a 69	a 77	76	a 63
11	60	38	33	33	33	33	a 38	62	a 69	b 79	75	a 62
12	60	42	a 33	33	33	33	38	63	a 70	a 80	74	a 62
13	61	a 38	33	33	33	33	39	65	b 66	81	74	a 61
14	59	38	b 33	33	33	33	a 39	62	a 66	--	75	a 59
15	58	36	33	33	33	a 33	40	59	--	78	76	a 59
16	56	38	33	33	33	33	41	60	--	b 79	76	a 58
17	55	38	33	33	33	33	42	61	--	b 80	75	a 57
18	53	38	33	33	33	33	42	61	b 67	b 81	74	a 54
19	53	38	33	33	33	33	41	61	--	81	73	a 53
20	54	38	33	33	33	33	42	59	68	b 80	73	b 51
21	50	38	33	33	33	33	46	51	a 66	a 81	73	a 50
22	b 49	38	33	33	33	33	--	55	66	81	73	a 50
23	--	36	33	33	33	33	51	a 58	b 65	a 81	72	b 55
24	--	36	33	33	33	33	56	a 61	62	81	72	b 50
25	b 48	b 34	33	33	33	34	56	a 59	63	a 81	b 70	50
26	b 46	34	33	33	33	34	57	a 57	64	79	68	a 50
27	46	a 34	33	33	33	34	59	a 60	a 68	78	68	50
28	46	--	33	33	33	34	60	a 63	b 70	a 80	68	51
29	46	34	33	33	--	35	61	a 66	a 68	80	a 68	b 54
30	--	34	33	33	--	35	62	b 71	b 71	80	68	52
31	46	--	33	33	--	35	--	a 66	--	80	68	--
Average	54	39	33	33	33	33	44	61	68	79	74	58

a Measurement between 11 a.m. and 2 p.m.
b Measurement between 3 p.m. and 7 p.m.

RED RIVER OF THE NORTH BASIN--Continued

RED RIVER OF THE NORTH AT GRAND FORKS, N. DAK.

LOCATION.--At gaging station, 500 feet downstream from dam at Riverside Park in Grand Forks, Grand Forks County, and 2 miles downstream from Red Lake River.
DRAINAGE AREA.--30,100 square miles, approximately (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: September 1956 to September 1957.
Water temperatures: October 1956 to September 1957.
EXTREMES, September 1956 to September 1957.--Dissolved solids: Maximum, 490 ppm Dec. 1-31; minimum, 246 ppm Mar. 27-31.
Hardness: Maximum, 364 ppm Dec. 1-31; minimum, 174 ppm Mar. 27-31.
Specific conductance: Maximum daily, 795 micromhos Dec. 19; minimum daily, 362 micromhos Mar. 28.
Water temperatures: Maximum, 72°F on several days during August; minimum, 34°F on several days during November to February.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, September 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 26-30, 1956 a.	889	5.9	0.03	66	25	7.6	4.9	201	117	3.5	0.2	0.8	0.10	362	0.49	869	268	103	6	0.2	534	7.9	25
Oct. 1-31	495	6.3	.04	60	26	12	5.2	232	83	8.0	.2	1.3	.10	344	.47	460	257	67	9	.3	531	7.7	20
Nov. 1-13	929	8.5	.03	60	26	16	4.9	246	73	10	.2	1.2	.10	338	.46	848	256	54	12	.4	534	7.8	17
Nov. 14-30	678	12	.03	83	32	16	5.7	272	135	10	.2	2.3	.11	459	.62	840	340	117	9	.4	678	7.8	25
Dec. 1-31	516	14	.00	81	39	23	5.4	321	125	15	.2	1.4	.15	490	.67	683	364	101	12	.5	743	7.9	12
Jan. 1-31, 1957	416	17	.03	74	31	31	3.9	335	80	19	.2	4.8	.29	444	.60	499	314	39	17	.8	703	7.8	5
Feb. 1-18	447	16	.00	73	32	31	5.2	345	68	17	.3	4.9	.13	436	.59	526	314	31	17	.8	689	8.0	9
Feb. 19-28	397	17	.00	70	28	27	4.9	324	57	15	.3	5.0	.11	399	.54	428	288	22	17	.7	633	8.0	8
Mar. 1-18	612	18	.01	65	30	29	6.1	317	55	17	.4	5.4	.10	402	.55	664	286	26	18	.7	640	7.7	7
Mar. 19-22	918	17	.01	58	30	23	5.4	296	45	14	.7	4.5	.09	375	.51	929	267	24	15	.6	590	7.9	8
Mar. 23-26	2,545	11	.02	46	20	15	5.2	211	41	8.0	.4	4.0	.07	276	.38	1,900	196	23	14	.5	438	7.8	25
Mar. 27-31	4,650	12	.02	42	17	12	5.2	173	49	7.5	.3	3.8	.06	246	.33	3,090	174	32	13	.4	394	7.5	25
Apr. 1-4	4,693	13	.02	48	19	10	6.1	178	61	5.0	.3	3.0	.06	266	.36	3,370	198	52	10	.3	423	7.8	23
Apr. 5-12	2,476	13	.01	58	24	11	5.9	211	84	5.9	.3	3.1	.08	323	.44	2,160	242	69	9	.3	504	7.6	22
Apr. 13-23	2,396	15	.02	65	25	13	5.5	232	91	6.0	.3	3.2	.14	360	.49	2,330	266	76	9	.4	545	7.8	22
Apr. 24-May 9	6,820	14	.02	61	22	9.9	5.2	194	88	4.0	.3	2.9	.07	331	.45	6,100	242	83	8	.3	497	7.6	33
May 10-28	2,428	7.6	.01	68	31	17	5.8	247	122	6.5	.4	.6	.10	408	.55	2,670	295	92	11	.4	614	7.8	25
May 29-June 16	2,171	9.1	.02	70	36	22	5.7	259	145	8.1	.3	.4	.13	445	.61	2,610	322	110	13	.5	675	8.0	18
June 17-25	3,773	14	.02	60	30	16	4.6	225	107	5.5	.2	1.1	.12	370	.50	3,770	273	88	11	.4	568	7.8	24
June 26-July 4	12,590	18	.04	58	23	9.6	3.6	196	95	.5	.2	1.0	.10	328	.45	11,150	240	79	8	.3	483	7.7	45
July 5-20	5,299	19	.04	64	29	12	4.3	239	102	2.6	.3	1.0	.10	382	.52	5,470	278	82	8	.3	553	7.4	45
July 21-Aug. 12	3,267	16	.00	54	24	12	4.4	224	67	5.0	.1	.8	.11	306	.42	2,700	232	48	10	.3	479	7.4	20
Aug. 13-Sept. 7	3,076	14	.00	45	20	11	4.2	196	45	5.0	.2	1.0	.09	249	.34	2,070	194	33	11	.3	404	7.2	20
Sept. 8-30	3,919	15	.00	54	24	16	5.5	212	80	6.0	.2	.9	.11	325	.44	3,440	234	60	13	.5	502	7.4	35
Weighted average b	2,374	15	0.02	59	25	14	4.8	222	87	5.5	0.2	1.6	0.10	342	0.47	2,190	251	69	11	0.4	521	--	--

a Not included in weighted average.

b Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER OF THE NORTH BASIN--Continued

RED RIVER OF THE NORTH AT GRAND FORKS, N. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 9 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	a 46	35	35	35	a 35	a 36	b 52	60	b 60	67	70
2	55	45	35	a 35	37	35	36	52	a 62	b 60	b 69	70
3	54	45	a 34	35	35	35	36	52	a 68	b 60	69	70
4	a 54	46	a 35	35	a 35	a 35	36	a 52	a 61	b 60	70	b 70
5	55	47	35	a 35	35	35	35	52	a 62	b 61	70	b 70
6	55	47	35	35	35	a 35	35	b 53	a 62	b 61	71	b 70
7	a 55	47	35	a 35	35	35	35	54	a 62	--	71	b 70
8	54	40	35	35	35	35	35	56	a 60	b 61	71	70
9	a 53	39	35	35	35	35	35	56	60	61	b 72	70
10	53	38	35	a 35	35	35	a 35	58	a 61	61	b 72	70
11	52	39	a 35	35	35	a 35	35	58	a 61	b 61	72	70
12	a 51	a 38	a 35	35	35	35	35	59	a 60	b 61	72	70
13	52	38	a 34	35	35	35	35	59	a 60	b 61	72	69
14	a 52	38	35	35	35	35	36	59	a 60	61	72	b 67
15	a 53	a 37	35	35	35	a 35	36	a 59	60	61	a 72	65
16	53	35	35	34	35	35	36	60	a 60	61	b 72	63
17	a 52	b 35	34	35	35	35	37	60	a 60	61	72	61
18	a 52	35	a 34	35	35	35	a 39	b 60	a 60	61	72	60
19	53	a 35	a 35	35	35	35	39	60	60	62	72	a 59
20	54	34	a 35	35	35	a 35	a 39	60	60	62	72	58
21	a 54	34	35	a 35	35	35	39	60	60	62	b 72	58
22	53	35	35	a 35	34	35	a 39	60	b 60	62	a 72	56
23	52	a 35	35	35	34	35	b 48	a 60	60	a 62	a 72	a 55
24	a 50	35	35	35	34	35	b 50	60	60	62	b 72	54
25	a 48	35	35	35	35	a 35	b 51	60	60	62	72	a 53
26	48	b 35	35	35	34	35	b 51	60	b 60	a 62	72	52
27	a 48	35	35	35	35	a 35	b 51	a 60	b 61	63	71	51
28	a 47	35	34	a 35	34	a 35	51	60	b 60	63	b 71	b 50
29	a 47	a 35	35	34	--	a 36	b 52	a 60	b 60	63	a 71	50
30	--	a 34	35	a 35	--	36	52	60	b 60	b 63	70	a 50
31	46	--	35	a 35	--	36	--	60	--	a 65	70	--
Average	52	38	35	35	35	35	40	58	61	62	71	62

a Measurement between 12 m. and 4 p.m.
b Measurement between 7 a.m. and 8 a.m.

RED RIVER OF THE NORTH AT DRAYTON, N. DAK.

LOCATION.--Temperature recorder at gaging station at interstate highway bridge, 1½ miles northeast of Drayton, Pembina County.
DRAINAGE AREA.--34,800 square miles, approximately (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1955.
Water temperatures: December 1956 to September 1957.
EXTREMES, December 1956 to September 1957.--Water temperatures: Maximum, 80°F on several days during July and August; minimum, 33°F on many days during December to April.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, December 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1					--	--	33	33	33	33	33	33	33	33	59	58	66	63	68	67	80	80	69	68
2					--	--	33	33	33	33	33	33	33	33	58	56	66	64	70	68	80	79	69	69
3					--	--	33	33	33	33	33	33	33	33	58	56	68	64	71	70	79	79	69	66
4					--	--	33	33	33	33	33	33	33	33	59	57	69	66	71	71	79	78	66	65
5					--	--	33	33	33	33	33	33	34	33	60	58	70	67	72	71	78	77	66	66
6					--	--	33	33	33	33	33	33	34	34	61	59	70	67	73	72	77	77	67	66
7					--	--	33	33	33	33	33	33	35	34	61	60	70	66	74	73	77	77	66	65
8					--	--	34	33	33	33	33	33	35	34	60	58	69	67	74	74	77	77	65	65
9					--	--	34	34	33	33	33	33	36	34	58	56	69	65	74	74	77	77	65	64
10					--	--	34	34	33	33	33	33	36	35	60	57	65	63	75	74	77	77	64	64
11					--	--	34	34	33	33	33	33	35	33	62	60	66	63	76	75	77	77	65	64
12					--	--	34	33	33	33	33	33	34	33	62	61	65	63	77	76	77	75	65	64
13					--	--	34	33	33	33	33	33	34	33	62	60	64	63	77	77	75	74	64	63
14					33	33	34	33	33	33	33	33	38	34	62	61	64	62	78	77	74	74	63	63
15					33	33	33	33	33	33	33	33	38	37	62	60	65	61	78	78	74	74	63	61
16					33	33	33	33	33	33	33	33	38	38	62	61	65	63	79	78	74	74	61	60
17					33	33	33	33	33	33	33	33	40	38	62	62	65	63	80	79	74	73	61	60
18					33	33	33	33	33	33	33	33	40	39	62	62	65	63	80	80	73	72	61	59
19					33	33	33	33	33	33	33	33	41	40	62	61	66	63	80	80	72	72	59	57
20					33	33	33	33	33	33	33	33	44	41	62	59	65	65	80	79	72	72	57	56
21					33	33	34	33	33	33	33	33	46	43	59	57	67	65	79	79	73	72	56	56
22					33	33	34	33	33	33	33	33	50	46	57	54	67	63	79	79	73	73	56	55
23					33	33	33	33	33	33	33	33	52	50	56	54	66	62	79	79	73	72	55	54
24					33	33	33	33	33	33	33	33	51	51	59	56	68	65	79	79	72	71	54	53
25					33	33	33	33	33	33	33	33	52	50	59	59	68	66	79	78	72	72	53	53
26					33	33	33	33	33	33	33	33	52	51	59	57	67	65	79	79	72	68	53	53
27					33	33	33	33	33	33	33	33	55	52	58	56	67	65	79	79	69	67	53	52
28					33	33	33	33	33	33	33	33	56	55	62	57	66	64	79	79	67	67	53	52
29					33	33	33	33	--	--	33	33	58	56	64	61	67	66	79	79	67	67	55	53
30					33	33	33	33	--	--	33	33	59	58	67	63	67	67	79	79	68	67	56	55
31					33	33	33	33	--	--	33	33	--	--	67	65	--	--	80	79	68	68	--	--
Average					--	--	33	33	33	33	33	33	42	40	61	59	67	64	77	76	74	74	61	60

SOURIS RIVER NEAR VERENDRYE, N. DAK.

LOCATION.--At gaging station, 2.7 miles north of Verendrye, McHenry County, and 7½ miles southwest of (19 miles upstream from) mouth of Wintering River.
DRAINAGE AREA.--12,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1951, August 1952 to September 1957.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 18, 1956	84	--	--	59	33	77	--	344	142	18	--	--	--	541	0.74		281	0	37	2.0	841	7.8	--
Nov. 8	62	7.1	0.00	58	32	63	9.9	306	151	14	0.5	3.6	0.13	496	.67		276	25	32	1.7	781	7.8	25
Dec. 6	49	--	.01	71	39	84	--	366	184	24	--	--	--	629	.86		337	37	35	2.0	960	7.4	--
Jan. 10, 1957	45	8.4	.04	76	39	82	12	377	193	23	.2	9.3	.16	643	.87		350	41	33	1.9	985	7.3	15
Feb. 5	36	9.5	.01	81	44	94	13	400	205	33	.3	2.5	.16	732	1.00		384	56	34	2.1	1,080	7.3	40
Mar. 30	180	8.1	.11	36	16	52	11	196	99	11	.2	6.5	.10	355	.48		156	0	40	1.8	550	7.2	45
Apr. 11	166	--	--	52	23	50	--	247	119	11	--	--	.10	420	.57		226	23	32	1.5	647	7.5	--
Apr. 18	190	--	--	50	26	55	--	253	124	12	--	--	.11	441	.60		232	25	34	1.6	665	7.7	--
Apr. 24	199	--	--	56	30	77	--	300	171	13	--	--	.15	544	.74		261	15	38	2.1	813	7.6	--
May 9	123	--	--	--	--	64	--	309	138	17	--	--	--	--	--		274	21	34	1.7	782	7.5	--
May 24	67	--	--	--	--	70	--	383	163	22	--	--	--	--	--		303	0	33	1.7	911	7.7	--
June 13	103	11	.03	57	33	95	11	365	155	27	.4	.4	.15	584	.79		276	0	42	2.5	910	7.9	--
July 16	43	--	--	--	--	100	--	378	152	29	--	--	--	--	--		284	0	43	2.6	913	7.6	--
Aug. 9	69	--	--	--	--	79	--	318	150	22	--	--	--	--	--		266	5	38	2.1	811	7.5	--
Sept. 5	120	18	.59	53	34	70	12	302	162	16	.3	.7	.19	550	.75		270	22	35	1.9	797	7.5	--

SOURIS RIVER NEAR WESTHOPE, N. DAK.

LOCATION.--At gaging station, 1,200 feet upstream from second crossing of international boundary, 1 mile downstream from Fish and Wildlife Service dam 357, 7 miles northeast of Westhope, Bottineau County, and 11 miles downstream from Boundary Creek.
DRAINAGE AREA.--17,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1957.
Water temperatures: October 1954 to September 1955, October 1956 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 898 ppm Jan. 23 to Feb. 6; minimum, 162 ppm Apr. 13-18.
Hardness: Maximum, 496 ppm Jan. 23 to Feb. 6; minimum, 85 ppm Apr. 13-18.
Specific conductance: Maximum daily, 1,320 micromhos Jan. 23-28, Feb. 2-3, 5; minimum daily, 232 micromhos Apr. 18.
Water temperatures: Minimum, freezing point on many days during November to April.
EXTREMES, 1954-55, 1956-57.--Dissolved solids: Maximum, 1,080 ppm Jan. 25, 1955; minimum, 162 ppm Apr. 13-18, 1957.
Hardness: Maximum, 550 ppm Jan. 25, 1955; minimum, 85 ppm Apr. 13-18, 1957.
Specific conductance: Maximum daily (1956-57), 1,320 micromhos Jan. 23-28, Feb. 2-3, 5, 1957; minimum daily, 232 micromhos Apr. 18, 1957.
Water temperatures: Minimum, freezing point on many days during winter months each year
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-24, 1956....	98.0	--	--	39	32	74	--	308	129	13	--	2.4	0.16	484	0.66	128	231	0	40	2.1	749	8.2	--
Oct. 25-Nov. 14 ...	266	--	--	57	37	80	--	a 362	154	17	--	4.7	.18	576	.78	414	296	0	36	2.0	880	8.3	--
Nov. 15-30.....	74.4	--	--	78	50	99	--	b 458	216	22	--	4.8	.19	744	1.01	149	400	24	34	2.2	1,100	8.4	--
Dec. 1-11.....	55.8	--	--	83	54	98	--	c 496	210	23	--	2.6	.20	780	1.06	118	430	23	32	2.1	1,150	8.3	--
Dec. 12-31.....	54.5	12	0.01	97	52	106	13	b 534	230	29	0.3	3.7	.23	837	1.14	123	455	17	33	2.2	1,240	8.3	23
Jan. 1-22, 1957....	48.0	--	--	91	49	101	--	482	223	13	--	5.1	.15	787	1.07	102	428	33	34	2.1	1,160	8.1	--
Jan. 9 d	50	--	--	--	--	--	--	469	--	--	--	--	--	--	--	--	414	29	--	--	1,130	8.0	--
Jan. 23-Feb. 6	34.0	--	--	80	72	118	--	553	250	33	--	7.7	.15	898	1.22	82.4	496	43	33	2.3	1,310	8.0	--
Feb. 7.....	28	16	.02	106	55	111	14	544	243	34	.5	9.1	.21	897	1.22	67.8	489	43	32	2.2	1,310	7.4	19
Feb. 8-28.....	25.6	--	--	97	53	126	--	512	248	36	--	10	.12	857	1.17	59.2	460	40	37	2.6	1,280	7.9	--
Mar. 1-10.....	37.5	--	--	79	44	96	--	409	193	29	--	11	.10	705	.96	71.4	378	43	36	2.1	1,060	7.9	--
Mar. 11-18.....	53.8	11	.01	76	40	78	11	380	178	27	.3	11	.11	651	.89	94.6	355	43	31	1.8	985	8.0	10
Mar. 19-25.....	39.0	--	--	33	17	34	--	174	66	12	--	6.7	.07	285	.39	30.0	152	9	32	1.2	452	7.6	--
Mar. 26-Apr. 12...	17.4	--	--	26	14	25	--	145	49	8.0	--	4.5	.06	226	.31	10.6	122	3	29	1.0	362	7.7	--
Apr. 13-18.....	12.9	--	--	18	9.7	21	--	112	33	6.0	--	.9	.05	162	.22	5.64	85	0	34	1.0	266	7.3	--
Apr. 19-26.....	14.9	--	--	31	20	40	--	197	63	11	--	4.8	.08	302	.41	12.1	158	0	35	1.4	483	7.7	--
Apr. 27-May 1.....	50.4	--	--	35	22	46	--	226	74	13	--	2.9	.10	324	.44	44.1	178	0	35	1.5	542	8.0	--
May 2-13.....	202	--	--	40	27	55	--	246	104	17	--	3.2	.13	404	.55	220	209	7	36	1.6	644	7.6	--

May 14-19.....	177	--	--	45	31	60	--	278	125	16	--	1.6	.14	450	.61	215	239	11	34	1.7	713	7.6	--
May 20-June 15....	88.9	--	--	52	37	70	--	322	147	17	--	3.5	.17	525	.71	126	282	18	34	1.8	809	7.4	25
June 16-30	262	7.9	.01	34	40	73	11	290	146	16	.3	6.7	.18	512	.70	362	249	11	38	2.0	762	7.6	30
July 1-Aug. 6.....	65.6	14	.00	30	36	82	11	296	136	17	.3	11	.20	502	.68	88.9	224	0	43	2.4	772	7.6	25
Aug. 7-Sept. 30....	24.4	27	.00	51	42	115	14	428	158	24	.4	9.3	.30	668	.91	44.0	300	0	44	2.9	991	7.8	50
Weighted average e.....	77.8	--	--	52	39	80	--	347	154	18	--	5.5	0.17	566	0.77	119	289	4	37	2.0	859	--	--

a Includes equivalent of 4 ppm of carbonate (CO_3).
b Includes equivalent of 16 ppm of carbonate (CO_3).
c Includes equivalent of 14 ppm of carbonate (CO_3).
d Not included in weighted average.
e Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER OF THE NORTH BASIN--Continued

SOURIS RIVER NEAR WESTHOPE, N. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 5 p.m. and 8 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	38	31	a 32	31	31	32	61	b 65	--	b 82	b 65
2	56	--	b 32	32	31	31	32	61	b 64	--	--	67
3	--	--	--	32	31	31	33	61	62	--	--	b 63
4	b 50	--	a 32	32	31	31	34	59	b 64	--	73	b 61
5	--	--	--	32	31	31	b 32	--	a 74	--	--	--
6	48	36	--	b 31	--	31	b 34	62	--	73	--	--
7	--	--	--	31	--	31	b 34	61	--	--	76	--
8	--	a 37	--	31	--	31	34	58	--	--	--	--
9	45	a 39	--	31	--	31	35	55	--	73	--	a 59
10	--	35	--	31	--	31	33	60	a 75	73	b 71	--
11	49	33	--	31	--	31	--	a 58	62	a 78	--	59
12	--	--	--	31	--	31	--	b 51	--	b 75	a 67	58
13	a 48	--	--	b 31	--	31	--	--	--	b 76	--	a 59
14	--	--	--	31	--	31	--	56	b 61	a 80	--	a 56
15	a 48	--	--	31	--	31	--	58	b 62	--	b 68	b 55
16	--	--	--	31	--	31	--	61	b 65	--	71	54
17	a 51	--	--	31	--	31	--	61	b 62	--	--	56
18	50	a 32	--	31	--	31	--	a 60	b 61	--	--	a 50
19	a 49	31	--	31	31	32	--	a 59	61	--	--	53
20	51	31	32	b 31	31	32	--	a 50	a 65	--	--	--
21	b 48	31	32	31	31	32	--	--	--	--	--	b 48
22	48	b 31	32	31	31	32	--	a 52	--	--	--	48
23	50	31	32	31	31	32	--	a 52	65	--	--	51
24	45	31	32	31	31	32	--	a 58	a 69	--	b 65	--
25	b 42	b 31	32	31	31	--	--	a 62	65	--	b 66	52
26	a 43	--	32	31	31	--	52	a 51	69	--	a 59	49
27	a 42	--	32	a 31	31	--	54	--	b 69	--	--	50
28	b 39	--	32	31	31	--	a 49	a 62	b 67	--	--	a 51
29	40	--	32	31	--	--	60	a 63	73	--	--	--
30	b 40	32	b 32	31	--	--	63	b 63	a 72	--	62	--
31	--	--	b 32	31	--	--	--	62	--	--	66	--
Average	--	--	--	31	--	--	--	58	--	--	--	--

a Measurement between 2 p.m. and 4 p.m.
b Measurement between 8 a.m. and 12 m.

Periodic determinations of suspended-sediment discharge, August 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Aug. 11, 1956	226	18	11
Aug. 14	129	12	4.2
Sept. 9	132	48	17
Oct. 16	70	42	7.9
Nov. 6	296	161	129
Dec. 4	56	90	14
Jan. 9, 1957	e 50	217	29
Feb. 7	e 28	225	17
Mar. 7	e 40	144	16
Mar. 28	11	19	.6
Apr. 5	19	27	1.4
Apr. 16	12	36	1.2
Apr. 23	30	69	5.6
May 7	240	24	16
May 22	46	109	14
June 11	191	29	15
June 12	195	52	27
July 12	51	16	2.2
Aug. 7	26	45	3.2
Sept. 4	23	122	7.6

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES IN RED RIVER OF THE NORTH BASIN

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Pool elevation (ft)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180° C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH
LAKE TEWAUKON AT OUTLET, NEAR CAYUGA, N. DAK.																							
Apr. 27, 1957..		16	0.00	88	53	58	15	211	0	365	19	0.2	2.6	0.27	760		1.03	438	265	22	1.2	1,040	7.5
Sept. 30		24	.01	82	52	54	18	220	0	335	19	.4	2.3	.28	725		.99	420	240	21	1.1	1,000	7.5
LAKE TRAVERSE NEAR WHEATON, MINN.																							
Sept. 26, 1956..	975.9	9.0	0.02	115	64	69	14	187	0	520	15	0.3	4.1	0.37	959		1.30	551	398	21	1.3	1,260	7.5
Sept. 30, 1957..	975.9	39	.01	123	74	72	15	222	0	557	15	.4	2.0	.38	1,060	1,010	1.44	612	430	20	1.3	1,330	7.7
BUFFALO LAKE NEAR ESMOND, N. DAK.																							
Sept. 23, 1956..	a 7.9	20	0.06	17	25	380	20	909	0	184	36	0.6	7.8	0.67	1,230	1,140	1.67	144	0	83	14	1,760	8.1
Apr. 30, 1957..	a 7.5	21	.02	18	27	350	20	852	10	184	33	.4	3.5	.69	1,160	1,090	1.58	158	0	81	12	1,740	8.3
DEVILS LAKE NEAR DEVILS LAKE, N. DAK.																							
Dec. 28, 1956..	b1,418.53	11	0.00	90	279	1,440	150	564	71	3,030	687	0.6	0.5	1.5	6,240	6,040	8.49	1,370	789	67	17	7,820	8.8
Apr. 28, 1957..	1,418.65	5.8	.00	70	181	1,000	112	440	14	2,100	444	.3	2.5	.93	4,140	4,150	5.63	920	536	67	14	5,630	8.4

a Below temporary reference mark.
b On Dec. 27, 1956.

LAKE OF THE WOODS BASIN

MISCELLANEOUS ANALYSES OF STREAMS IN LAKE OF THE WOODS BASIN-IN MINNESOTA

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
SOUTH KAWISHIWI RIVER NEAR ELY																							
Sept. 27, 1955.....	97	8.2	0.44	4.8	2.4	1.6		24	5.0	0.0		1.0	0.02	82	0.11		22	2	14	0.1	49.6	7.0	60
Sept. 24, 1957.....	141	7.8	.70	5.2	2.0	1.1	0.6	22	6.0	.1	0.1	1.2	.05	53	.07		21	3	10	.1	44.6	6.5	110
STONEY RIVER NEAR ISABELLA																							
Sept. 27, 1955.....	246	11	0.98	5.8	4.5	2.5		28	13	0.0	--	2.5	0.03	122	0.17		33	10	14	0.2	62.6	6.6	200
Apr. 25, 1957.....	1,680	5.5	.16	5.0	.4	0.8	1.1	14	5.5	.2	0.0	1.1	.07	72	.10		14	3	10	.1	33.8	6.7	100
Sept. 24.....	40	11	.92	7.8	5.5	1.6	.6	49	6.3	.3	.1	2.0	.08	76	.10		42	2	8	.1	84.5	6.9	110
DUNKA RIVER NEAR BABBITT																							
Sept. 27, 1955.....	26	16	0.97	6.2	5.0	3.2		32	14	0.0		2.9	0.04	124	0.17		36	10	16	0.2	77.0	6.7	180
Sept. 25, 1957.....	41	17	1.7	8.7	5.7	3.5	0.9	38	14	4.7	0.2	3.0	.11	107	.15		45	14	14	.2	99.7	6.6	220
BEAR ISLAND RIVER NEAR ELY																							
Sept. 27, 1955.....	4.8	5.4	0.28	4.6	2.3	1.4		20	6.3	0.0		1.2	0.02	74	0.10		21	5	13	0.1	50.7	6.6	60
Sept. 24, 1957.....	22	4.6	.56	4.5	1.6	1.4	0.8	16	7.0	.1	0.1	1.2	.04	47	.06		18	5	14	.1	42.1	6.1	90
PIKE RIVER NEAR EMBARRASS																							
Sept. 27, 1955.....	110	11	0.89	9.4	3.5	2.1		24	20	0.0		2.3	0.05	128	0.17		38	18	11	0.1	80.7	6.5	180
Sept. 25, 1957.....	64	13	1.5	7.8	3.3	1.8	0.9	25	16	.3	0.2	1.6	.08	90	.12		33	12	10	.1	71.2	6.5	180
STURGEON RIVER NEAR CHISHOLM																							
Sept. 28, 1955.....	77	12	0.68	12	3.6	3.7		52	8.8	0.2		1.2	0.01	88	0.12		45	2	15	0.2	95.6	7.1	90
Sept. 27, 1957.....	82	11	1.1	14	3.2	2.3	1.3	50	14	.4	0.2	2.1	.06	96	.13		48	7	9	.1	101	6.7	110
DARK RIVER NEAR CHISHOLM																							
Sept. 28, 1955.....	28	11	0.81	7.4	4.3	2.1		38	7.5	0.4		1.5	0.02	76	0.10		36	5	11	0.2	74.0	6.9	110
Sept. 26, 1957.....	25	11	1.5	9.3	3.1	2.1	1.1	38	12	.3	0.2	1.8	.07	86	.12		36	5	11	.2	77.4	6.5	180

MISSISSIPPI RIVER AT ST. PAUL, MINN.

LOCATION --Temperature recorder at gaging station, 300 feet upstream from Robert Street Bridge in St. Paul, Ramsey County, and 6 miles downstream from Minnesota River.
DRAINAGE AREA.--36,800 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1956 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 81°F July 22-25; minimum, freezing point on several days during January and February.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1	61	61	56	55	37	37	35	35	32	32	35	35	33	33	57	56	63	62	75	74	79	79	68	68
2	61	60	55	54	37	37	35	35	32	32	35	35	34	33	58	57	63	63	75	75	79	79	68	68
3	60	60	54	53	37	37	35	35	32	32	35	35	35	34	59	58	64	63	75	75	80	79	68	67
4	61	60	53	53	37	36	35	35	32	32	35	35	36	35	59	59	64	64	76	75	80	80	67	67
5	61	61	53	52	36	36	35	35	32	32	35	35	36	36	59	59	65	64	76	76	80	79	67	67
6	62	61	52	52	36	35	35	35	32	32	35	35	36	36	59	59	65	65	76	76	79	79	67	67
7	62	62	52	51	35	35	35	35	32	32	35	35	37	36	59	59	66	65	77	76	79	78	67	66
8	62	62	51	51	35	35	36	35	32	32	35	35	38	37	59	59	66	66	77	77	78	77	66	66
9	62	61	51	49	36	35	36	36	32	32	35	35	38	38	59	59	67	66	77	77	77	76	66	65
10	62	61	49	48	36	36	36	35	33	32	35	35	38	38	60	59	67	67	77	77	76	76	65	65
11	62	62	48	47	36	36	35	35	33	33	35	35	39	38	60	60	68	67	77	77	76	76	65	65
12	62	61	47	47	36	35	35	35	33	33	36	35	41	39	60	60	68	68	77	77	76	75	65	65
13	61	61	47	46	35	35	35	35	34	33	37	36	41	41	60	60	69	68	77	77	75	75	65	65
14	62	61	46	45	35	35	35	34	34	34	37	37	41	41	60	60	69	69	78	77	76	75	65	65
15	62	62	44	42	35	35	34	34	34	34	37	37	42	41	61	60	70	69	79	78	76	76	65	64
16	62	62	42	41	35	35	34	34	34	34	38	37	42	41	61	61	70	70	79	79	76	75	64	64
17	63	62	41	39	35	35	34	34	34	34	38	38	42	42	61	61	71	70	79	79	75	75	64	63
18	63	63	39	39	35	35	34	34	34	34	38	38	43	42	61	60	71	71	79	79	75	75	63	62
19	63	63	39	39	35	34	34	34	34	34	38	38	43	43	60	60	71	71	79	79	75	74	62	62
20	63	63	39	39	34	34	34	34	34	33	38	38	44	43	60	60	72	71	80	79	74	73	62	62
21	63	63	39	39	34	34	34	33	33	33	38	38	45	44	60	59	73	72	80	80	73	73	62	61
22	63	62	39	39	34	34	33	33	34	33	38	38	46	44	59	59	73	73	81	80	73	73	61	61
23	62	62	39	39	34	34	33	33	34	34	39	38	48	46	59	59	74	73	81	81	73	73	61	60
24	62	61	39	39	34	34	33	33	34	33	38	38	49	48	59	59	75	74	81	81	73	72	60	60
25	61	60	39	39	34	34	33	33	33	33	39	38	50	49	59	59	75	75	81	80	72	72	60	60
26	60	60	39	38	34	34	33	33	34	33	38	38	52	50	59	59	75	74	80	80	72	72	60	59
27	60	59	38	38	34	34	33	32	35	34	38	38	54	52	59	59	74	74	80	79	72	71	59	58
28	59	58	38	38	34	34	32	32	35	35	38	37	55	54	59	59	74	74	79	79	71	71	58	58
29	58	58	38	37	34	34	32	32	--	--	37	34	56	55	60	59	74	74	79	79	71	70	58	58
30	58	57	37	37	34	34	32	32	--	--	34	32	56	56	60	60	74	74	79	79	70	69	58	57
31	57	56	--	--	35	34	32	32	--	--	33	32	--	--	62	60	--	--	79	79	69	68	--	--
Average	61	61	45	44	35	35	34	34	33	33	37	36	43	42	60	59	70	69	78	78	75	75	64	63

PAINT CREEK BASIN

PAINT CREEK AT WATERVILLE, IOWA

LOCATION.--At gaging station, on downstream side of bridge on State Highway 373 and 0.5 mile northwest of Waterville, Allamakee County.
DRAINAGE AREA.--42.8 square miles.
RECORDS AVAILABLE.--Water temperatures: November 1952 to September 1956.
Sediment records: November 1952 to September 1957 (discontinued).
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 9,900 ppm June 16; minimum daily, not determined.
Sediment loads: Maximum daily, 13,000 tons June 17; minimum daily, not determined.
EXTREMES, 1952-57.--Sediment concentrations: Maximum daily, 10,200 ppm July 4, 1955; minimum daily, not determined.
Sediment loads: Maximum daily, 23,000 tons July 26, 1953; minimum daily, less than 0.050 ton Jan. 24-31, 1955.
REMARKS.--Maximum observed sediment concentration during water year, 49,500 ppm Apr. 19. Flow affected by by ice Nov. 21-23, 25, 27, 28, Dec. 6, 7, 23-28, Jan. 1-4, Jan. 10 to Feb. 2, Feb. 9-19, Feb. 28 to Mar. 3. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	3.6			3.2			3.2	--	
2	3.6			3.6			3.2	--	
3	3.6			3.2			3.2	--	
4	3.6			3.2			3.2	--	
5	3.6	--	e 0.3	3.2			3.6	--	
6	3.6			3.6			3.0	--	
7	3.6			3.2	--	e 0.2	3.0	29	
8	3.6			3.2			3.0	--	e 0.2
9	3.6			3.2			3.0	--	
10	3.6			3.2			3.0	--	
11	4.0	--	e 1.0	3.2			3.0	--	
12	3.6	86	.8	3.2			3.0	--	
13	4.0	110	a 1.2	3.0			3.0	--	
14	4.6	120	a 1.5	3.2	44	a .4	3.0	29	
15	4.0	--	e 1.0	11	120	b 3.6	3.0	--	
16	3.6			5.4	75	1.1	3.0	--	
17	3.2	--	e .5	4.6	65	a .8	3.0	--	
18	3.6			4.0	60	a .6	3.0	28	
19	3.6	22	.2	3.6			3.0	--	
20	3.2			3.6	--	e .4	3.0	28	e .2
21	3.2			3.5			3.0	--	
22	3.6			3.4			3.0	28	
23	3.2			3.2	--		2.8	--	
24	3.2			3.2	24		2.8	12	
25	3.6	--	e .2	3.2	--		2.8	--	
26	3.6			3.2	--	e .2	2.8	--	
27	3.2			3.2	--		2.8	12	e .1
28	3.2			3.2	--		2.8	--	
29	3.2			3.2	--		3.0	12	
30	3.6			3.2	33		3.0	--	
31	3.6			--	--	--	3.0	--	
Total	110.6	--	12.6	110.1	--	12.3	93.2	--	5.3

e Estimated.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

PAINT CREEK BASIN--Continued

PAINT CREEK AT WATERVILLE, IOWA.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	2.5	20		2.2	15		2.4	10	
2	2.5	--		2.2	--		2.3	12	
3	2.5	20		2.2	--		2.3	--	e 0.1
4	2.5	--	e 0.1	2.2	--		2.2	14	
5	2.7	20		2.2	15	e 0.1	2.2	--	
6	2.7	--		2.2	--		2.2	12	
7	3.0	--		2.2	15		2.2	--	
8	3.0	12		2.2	--		2.2	13	
9	2.7	--		5.0	50	sb 2.4	2.2	--	
10	2.4	12		11	75	a 2.2	2.2	--	e .1
11	2.3	--	e .1	3.5	30	a .3	2.2	9	
12	2.2	--		5.0	75	sb 1.9	2.2	--	
13	2.2	12		10	95	sb 4.0	2.2	12	
14	2.2	--		8.0	100	sa 2.4	2.2		
15	2.2	13		4.0	20	.2	2.2	25	.1
16	2.2	--		3.0	10		2.2		
17	2.2	13	e .1	2.7	--		2.2	9	
18	2.2	--		2.5	9		2.2	--	
19	2.2	13		2.3	--		2.2	4	
20	2.6	--		2.2	12	e .1	2.2	8	e .1
21	100	962	s 597	2.2	--		2.4	11	
22	20	173	s 17	2.2	9		12	159	s 10
23	5.0	45	.6	2.2	--		166	5,530	s 4,120
24	4.0	23	.2	16	90	sa 9.5	37	1,550	s 304
25	3.4	17	a .2	30	105	8.5	6.8	230	4.2
26	3.0	11		8.0	40	.9	4.6	113	1.4
27	2.7	--		3.2	28	.2	4.3	65	a .8
28	2.6	11		2.6	22	a .2	4.3	43	.5
29	2.5	--	e .1	--	--	--	4.3	34	a .4
30	2.4	11		--	--	--	4.3	26	.3
31	2.3	--		--	--	--	4.3	27	.3
Total	196.9	--	617.6	143.2	--	34.3	294.7	--	4 444.0

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	4.3	28	0.3	3.2			6.4	185	3.2
2	4.0	--		3.0			5.0	125	1.7
3	4.0	--		2.7	28	0.2	4.3	105	1.2
4	4.0	18		3.0			4.3	110	1.3
5	4.0	--		3.2	--		10	222	s 10
6	3.6	18		3.2	31		8.0	104	2.2
7	3.6	--	e .2	3.2	32	e .3	5.9	95	1.5
8	3.6	20		3.2	--		5.4	72	1.0
9	3.2	--		3.2	45		5.4	60	a .9
10	3.2	18		3.2	--		57	4,320	s 4 100
11	3.2	--		3.2	36		56	2,760	s 653
12	3.0	8		3.2	--		20	619	33
13	2.7	--		3.2	45	e .4	11	400	12
14	2.7	--		4.3	43		11	191	5.7
15	2.7	--	e .1	3.6	--		11	100	a 3.0
16	2.7	--		3.6			171	9,900	sb11,000
17	2.7	18		3.6	42	.4	289	3,340	s 13,000
18	2.4	--		3.6			223	4,680	s 5,940
19	53	6,200	sb5,100	3.6	--	e .4	28	1,500	113
20	27	5,500	sb 650	3.6			19	144	7.4
21	8.0	900	a 19	3.6			15	75	3.0
22	5.4	183	2.8	3.6	28	.3	12	74	2.4
23	4.3	130	a 1.5	3.6			10	74	2.0
24	3.6	93	.9	3.0	--	e .2	9.7	--	e 1.8
25	3.6	--	e .7	4.9	140	sb 2.4	9.1	61	1.5
26	3.6	75		15	900	sb 44	9.7	61	1.6
27	3.6	--		6.4	125	2.2	8.0	25	.5
28	3.6	46	e .4	6.4	100	a 1.7	7.4	25	.5
29	3.6	--		11	2,000	sb 130	6.4	82	1.4
30	3.6	21	e .2	14	2,000	76	5.0	--	e 1.2
31	--	--	--	8.0	550	12	--	--	--
Total	182.5	--	5,779.8	146.1	--	276.0	1,043.0	--	34,906.0

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

PAINT CREEK BASIN--Continued

PAINT CREEK AT WATERVILLE, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	5.0	82	1.1	12	1,200	39	8.5	120	a 2.8
2	5.0	35	.5	5.9	400	a 6.5	7.4	60	a 1.2
3	5.4			5.4	140	a 2.0	7.4	55	a 1.1
4	6.4	--	e 1.0	5.0	80	a 1.1	7.4	51	1.0
5	4.6	--		5.0	59	.8	6.4	40	a .7
6	4.6	42	e .5	4.3	--	e .3	5.0	30	.4
7	4.3	--		4.3			4.3	31	.4
8	4.3	42		4.0	22	.2	4.0		
9	4.6			4.0	--		4.0		
10	4.3	--	e .6	4.3	15		4.3	--	e .4
11	4.3			4.0	--	e .2	5.4		
12	158	4,490	s 4,330	3.2	--		8.3	55	sb 1.5
13	12	800	26	3.2	15		5.9	--	e .5
14	6.4	400	a 6.9	4.0	--	e .4	5.9		
15	5.9	100	1.6	3.2	18		10	55	sa 2.0
16	108	4,130	s 2,220	3.0	--	e .2	6.4	28	.5
17	18	1,000	49	3.0	--		4.3		
18	8.0	357	7.7	3.0	18		3.6	--	e .3
19	6.6	150	a 2.6	3.6	--		4.3		
20	6.0	100	a 1.6	3.0	--	e .1	8.0	55	sa 1.5
21	33	1,200	sb 170	2.7	--		5.0	13	
22	22	960	57	2.7	16		5.0	--	
23	8.0	--	e 7.0	9.2	100	sb 4.2	4.3	--	e .2
24	7.4	--	e 3.0	7.8	120	a 2.6	4.3	--	
25	6.8	--	e 2.2	4.0	85	a .9	4.3	--	
26	6.4	--	e 2.0	4.0	65	.7	4.0	7	
27	5.9	70	1.1	3.6	44	a .4	4.0	--	
28	5.9			4.3	25	.3	3.6	8	e .1
29	6.4	--	e .9	5.4	55	a .8	4.0	--	
30	5.0			80	2,400	sb 950	4.0	--	
31	105	3,200	s 3,390	14	380	14	--	--	--
Total	593.5	--	10,287.3	225.1	--	1,026.7	163.3	--	18.1

Total discharge for year (cfs-days) 3,302.2
Total load for year (tons) 57,420.0

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

PAINT CREEK AT WATERVILLE, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000
Mar. 23, 1957....	7:50 p.m.	464	43	12,300	2,190	--	25	--	49	--	94	97	99		100		SPWCM
Apr. 19.....	10:50 p.m.	341	60	34,200	2,080	--	32	--	65	--	97	99	100		--		SPWCM
Apr. 19.....	10:50 p.m.	341	60	34,200	1,770	--	26	--	63	--	97	99	100		--		SPNM
June 10.....	8:50 p.m.	830	70	35,000	3,230	--	29	--	58	--	92	97	99		100		SPWCM
June 17.....	11:45 p.m.	2,050	76	13,700	1,580	25	34	46	63	77	92	94	99		100		SPWCM
July 12	11:00 a.m.	905	70	23,300	4,110	21	26	36	52	81	93	96	98		100		SPWCM
Aug. 30.....	11:00 a.m.	294	66	7,300	5,350	--	25	--	57	--	98	99	100		--		SPWCM

WISCONSIN RIVER BASIN

BLACK EARTH CREEK AT BLACK EARTH, WIS.

LOCATION.--At gaging station, 0.7 mile east of Black Earth, Dane County, 2.1 miles upstream from Vermont Creek, and 150 feet south of U. S. Highway 14.
DRAINAGE AREA.--45.9 square miles.
RECORDS AVAILABLE.--Water temperatures: February 1954 to September 1957.
Sediment records: February 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 78°F July 20; minimum, freezing point on several days during November and January.
Sediment concentrations: Maximum daily, 1,630 ppm June 11; minimum daily, 4 ppm Feb. 28.
Sediment loads: Maximum daily, 2,520 tons June 11; minimum daily, 0.2 ton Feb. 27-28, Mar. 7.
EXTREMES, 1954-57.--Water temperatures: Maximum, 78°F July 7, 1955, June 10, 1956, July 20, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,010 ppm May 13, 1956; minimum daily, 1 ppm Dec. 31, 1955.
Sediment loads: Maximum daily, 3,960 tons July 3, 1954; minimum daily, 0.1 ton on several days during October, December 1955, January 1956.
REMARKS.--Flow affected by ice Dec. 30 to Jan. 3, Jan. 10-19. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	--	39	--	35	41	47	52	59	60	73	63
2	54	60	41	33	36	--	43	54	60	--	67	69
3	52	57	42	33	37	35	43	58	55	65	66	64
4	51	56	41	34	38	36	38	60	60	61	62	66
5	49	55	42	36	39	47	41	50	60	66	--	65
6	--	51	42	37	44	44	43	53	60	70	68	66
7	49	44	34	35	38	38	45	54	52	72	70	65
8	50	43	--	37	39	42	41	--	55	65	73	62
9	47	44	33	34	38	36	46	60	58	64	67	64
10	56	45	38	33	36	41	44	51	--	74	64	57
11	47	41	37	34	41	47	44	51	67	71	72	60
12	58	--	33	33	41	52	35	54	62	67	71	57
13	58	49	33	33	42	56	--	59	59	62	70	--
14	57	42	35	--	35	49	42	57	62	65	72	59
15	50	49	41	32	36	--	48	53	69	66	69	58
16	68	36	37	--	33	39	50	59	64	64	65	58
17	63	31	38	32	37	50	51	--	75	73	62	57
18	58	38	--	32	36	40	52	49	69	76	63	55
19	51	40	39	32	33	39	57	47	73	74	--	56
20	57	40	39	33	36	49	56	47	68	78	60	54
21	59	37	40	37	39	49	53	55	72	69	71	56
22	51	--	42	35	38	54	53	56	71	70	71	53
23	50	35	42	34	35	41	58	55	65	72	62	--
24	53	37	38	35	45	40	61	58	59	73	67	47
25	57	37	36	34	44	38	57	57	57	70	70	50
26	56	36	40	33	43	45	62	57	58	73	69	46
27	54	36	41	33	37	46	63	52	58	73	59	60
28	54	37	38	34	42	43	62	52	57	74	62	59
29	48	34	36	33	--	41	54	57	58	75	64	47
30	61	36	34	32	--	39	56	58	60	70	67	58
31	64	--	35	32	--	43	--	59	--	70	67	--
Average	54	42	38	34	38	43	50	55	62	69	67	58

WISCONSIN RIVER BASIN--Continued

BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	19	60	3.1	18	13	a 0.6	18	21	1.0
2	19	46	2.4	18	15	.7	18	26	1.3
3	19	22	1.1	18	15	.7	19	29	1.5
4	18	26	1.3	18	27	1.3	19	21	1.1
5	18	32	1.6	18	27	1.3	22	26	1.5
6	18	32	1.6	41	50	s 6.0	23	16	1.0
7	18	42	2.0	23	22	1.4	21	17	1.0
8	18	41	2.0	20	16	.9	20	25	a 1
9	18	29	1.4	19	20	1.0	19	35	1.8
10	18	11	.5	18	28	1.4	20	33	1.8
11	18	31	1.5	18	30	1.4	19	38	1.9
12	18	36	1.7	18	30	a 1	18	23	1.1
13	18	31	1.5	18	27	1.3	21	13	.7
14	18	16	.8	19	34	1.7	20	10	.5
15	18	16	.8	42	110	sb 13	20	12	.6
16	18	16	.8	25	56	3.8	19	15	.8
17	18	12	.6	21	36	2.0	18	22	1.1
18	18	45	2.2	20	42	2.3	19	20	a 1
19	18	53	2.6	20	42	2.3	18	16	.8
20	18	47	2.3	20	28	1.5	18	16	.8
21	18	44	2.1	24	19	1.2	18	14	.7
22	18	52	2.5	22	17	a 1	18	15	.7
23	18	20	1.0	20	15	.8	20	19	1.0
24	18	23	1.1	19	12	.6	20	13	.7
25	18	30	1.4	19	14	.7	20	11	.6
26	19	37	1.9	19	14	.7	20	13	.7
27	18	22	1.1	19	20	1.0	20	10	.5
28	18	23	1.1	19	22	1.1	20	8	.4
29	18	47	2.3	19	12	.6	20	6	.3
30	18	28	1.4	18	13	.6	19	7	.4
31	18	13	.6	--	--	--	18	12	.6
Total	562	--	48.3	630	--	53.9	602	--	28.9
	January			February			March		
1	18	17	a 0.8	18	17	0.8	18	8	0.4
2	18	22	1.1	17	22	1.0	17	10	a .4
3	18	18	.9	17	15	.7	16	14	.6
4	19	17	.9	17	14	.6	16	23	1.0
5	19	18	.9	17	13	.6	16	16	.7
6	18	24	1.2	17	20	.9	18	10	.5
7	19	30	1.5	18	19	.9	17	5	.2
8	19	21	1.1	18	11	.5	17	7	.3
9	19	18	.9	99	--	e 90	17	8	.4
10	18	18	.9	72	110	sb 35	18	12	.6
11	17	18	.8	25	24	1.6	18	10	.5
12	17	28	1.3	38	--	e 13	18	14	.7
13	17	31	1.4	52	--	e 20	19	21	1.1
14	17	25	a 1	33	--	e 4	20	38	2.0
15	17	22	1.0	22	9	.5	22	30	a 2
16	17	20	a .9	20	13	.7	19	18	.9
17	17	20	.9	18	15	.7	19	26	1.3
18	17	18	.8	18	11	.5	20	33	1.8
19	17	11	.5	18	17	.8	19	19	1.0
20	18	16	.8	17	14	.6	19	19	1.0
21	53	--	e 45	17	14	.6	19	25	1.3
22	71	151	sb 45	16	11	.5	20	30	1.6
23	43	--	e 9	16	16	.7	28	--	e 7
24	22	22	1.3	26	--	e 8	36	95	sb 11
25	20	13	.7	44	--	e 12	25	26	1.8
26	20	11	.6	23	15	.9	22	30	1.8
27	20	15	.8	18	5	.2	22	26	1.5
28	20	14	.8	18	4	.2	22	22	1.3
29	19	15	.8	--	--	--	22	30	1.8
30	18	16	.8	--	--	--	22	26	1.5
31	18	13	.6	--	--	--	21	23	1.3
Total	680	--	125.0	749	--	196.5	622	--	49.3

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

WISCONSIN RIVER BASIN--Continued

BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	22	28	1.7	18	23	1.1	32	41	3.5
2	22	25	1.5	18	37	1.8	27	38	2.8
3	21	30	1.7	18	32	1.6	25	63	4.2
4	22	28	1.7	18	31	1.5	24	48	3.1
5	33	18	1.6	18	37	1.8	32	56	4.8
6	38	27	2.8	18	37	1.8	28	46	3.5
7	31	24	2.0	18	35	1.7	30	61	4.9
8	26	27	1.9	18	30	a 1	29	58	4.5
9	25	24	1.6	18	27	1.3	26	35	2.4
10	23	21	1.3	20	26	1.4	46	--	e 55
11	25	23	1.6	20	30	1.6	465	1,630	s 2,520
12	22	25	1.5	18	24	1.2	66	309	s 64
13	21	35	a 2	18	18	.9	71	--	e 85
14	20	19	1.0	24	--	e 7	74	270	sb 70
15	20	18	1.0	26	65	sb 5	44	105	12
16	20	25	1.4	20	22	1.2	61	550	sb 100
17	20	27	1.4	19	23	1.2	41	128	14
18	20	26	1.4	19	24	1.2	37	107	11
19	22	38	2.2	20	33	1.8	35	83	7.8
20	22	24	1.4	20	39	2.1	33	73	6.5
21	21	23	1.3	26	194	s 22	31	68	5.7
22	20	30	1.6	38	146	15	29	68	5.3
23	22	22	1.3	26	54	3.8	28	78	5.9
24	20	33	1.8	23	32	2.0	70	560	s 147
25	20	30	1.6	23	37	2.3	47	303	38
26	22	27	1.6	27	42	3.1	43	182	21
27	20	20	1.1	24	42	2.7	34	137	12
28	19	24	1.2	22	60	3.6	32	82	7.1
29	18	34	1.6	23	63	3.9	31	77	6.4
30	18	30	1.4	53	145	s 28	29	90	7.0
31	--	--	--	45	88	11	--	--	--
Total	675	--	47.2	716	--	135.6	1,600	--	3,234.4

Day	July			August			September		
1	28	87	6.6	21	27	1.5	28	32	2.4
2	28	80	a 6	21	34	1.9	25	38	2.6
3	28	72	5.4	20	32	1.7	24	45	2.9
4	28	57	4.3	21	25	1.4	23	40	2.5
5	27	65	4.7	20	25	a 1	22	43	2.6
6	26	53	3.7	20	25	1.4	22	37	2.2
7	25	58	3.9	20	32	1.7	21	37	2.1
8	25	78	5.3	20	40	2.2	21	37	2.1
9	25	64	4.3	24	--	e 6	21	31	1.8
10	24	54	3.5	38	130	sb 17	21	36	2.0
11	24	60	3.9	24	22	1.4	23	36	2.2
12	27	75	5.5	21	28	1.6	25	24	1.6
13	27	65	4.7	21	27	1.5	22	20	a 1
14	25	51	3.4	20	35	1.9	21	20	1.1
15	24	40	2.6	20	37	2.0	21	21	1.2
16	25	45	3.0	20	35	1.9	21	19	1.1
17	26	50	3.5	20	38	2.0	21	23	1.3
18	24	41	2.6	20	45	2.4	20	26	1.4
19	23	34	2.1	20	45	a 2	22	15	.9
20	23	40	2.5	19	44	2.2	23	13	.8
21	24	62	4.0	19	49	2.5	22	15	.9
22	26	57	4.0	19	54	2.8	22	12	.7
23	24	50	3.2	20	67	3.6	22	13	.8
24	23	38	2.4	20	41	2.2	21	23	1.3
25	22	37	2.2	20	40	2.2	20	35	1.9
26	25	42	2.8	19	60	3.1	20	33	1.8
27	24	41	2.6	18	50	2.4	20	20	1.1
28	22	35	2.1	20	45	2.4	20	15	.8
29	22	33	2.0	29	100	sb 16	20	20	1.1
30	21	32	1.8	115	374	s 130	20	17	.9
31	21	25	1.4	35	68	s 6.8	--	--	--
Total	766	--	110.0	764	--	228.7	654	--	47.1

Total discharge for year (cfs-days) 9,020
Total load for year (tons) 4,304.9

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 21, 1957.....	7:10 p.m.	45		1,080	984	59	75	90	96	98	99	100					BSWCM
May 21	7:10 p.m.	45		1,080	955	33	48	80	94	98	99	100					BSNM
May 21	8:30 p.m.	54		957	780	62	78	89	96	99	99	100					BSWCM
June 11.....	7:55 a.m.	852		2,480	2,010	69	83	89	92	97	100	--					BSWCM
June 11.....	7:55 a.m.	852		2,480	1,890	63	80	93	97	99	100	--					BSNM
June 12.....	9:00 a.m.	69		313	526	75	83	89	96	98	99	100					BSWCM
June 16.....	8:05 a.m.	64		915	753	67	82	91	97	99	100	--					BSWCM
June 24.....	12:25 p.m.	125		2,600	2,280	46	61	75	91	97	100	--					BSWCM
Aug. 30.....	9:45 a.m.	158		472	797	64	71	80	88	95	99	100					BSWCM

ROCK RIVER BASIN

ROCK RIVER AT AFTON, WIS.

LOCATION.--Temperature recorder at gaging station on right bank 20 feet downstream from highway bridge in Afton, Rock County, and 0.8 mile upstream from Bass Creek.
DRAINAGE AREA.--3,300 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: September 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 84°F July 21, 30, Aug. 1; minimum, freezing point on many days during December to February.
EXTREMES, 1954-57.--Water temperatures: Maximum, 89°F July 27-30, Aug. 4, 1955; minimum, freezing point on many days during winter months each year.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1	64	58	60	56	33	33	33	32	32	32	38	36	45	44	68	63	64	62	75	71	84	72	78	72
2	67	61	58	57	34	33	33	32	32	32	39	36	47	44	67	63	65	62	77	73	82	76	76	72
3	64	58	60	57	35	33	32	32	32	32	39	36	45	44	63	59	65	62	75	74	80	77	74	70
4	64	59	58	57	35	33	32	32	32	32	39	37	44	42	60	56	67	63	76	73	--	--	72	67
5	64	58	59	56	37	35	32	32	32	32	40	38	42	41	60	55	66	64	76	71	--	--	71	66
6	63	59	59	56	37	37	32	32	32	32	40	39	43	40	61	55	68	66	78	72	77	70	69	66
7	61	56	56	50	37	36	34	32	34	32	41	39	44	42	63	57	67	65	79	74	76	66	70	61
8	61	56	50	47	36	34	33	32	33	33	41	38	44	43	65	60	66	65	79	76	79	66	71	62
9	59	54	47	44	34	33	33	32	33	32	40	39	45	43	64	60	67	63	80	74	76	69	68	62
10	58	53	46	44	33	33	33	32	33	32	40	39	46	43	61	59	68	65	80	73	75	69	71	64
11	56	54	45	43	34	33	33	33	33	32	41	40	45	44	59	57	69	67	82	73	78	68	68	66
12	59	52	44	43	33	32	33	33	34	32	45	40	45	43	57	56	72	68	79	75	77	70	67	63
13	62	55	44	42	33	33	33	33	34	32	48	44	44	42	57	56	71	70	78	73	76	71	70	62
14	60	57	46	43	33	33	33	33	34	32	49	47	46	42	60	56	70	69	81	74	79	74	69	62
15	62	57	48	45	33	32	33	33	33	33	47	43	44	42	59	56	73	69	81	73	79	73	69	63
16	65	57	45	41	33	33	33	33	34	32	45	43	46	43	59	54	76	72	77	73	78	72	68	61
17	65	57	41	40	33	32	33	33	33	32	44	41	49	45	56	54	80	76	78	72	76	69	68	61
18	64	57	41	40	32	32	33	33	34	32	43	39	51	48	54	52	80	76	80	73	76	68	69	62
19	62	57	40	38	32	32	33	32	34	33	40	39	54	51	52	50	76	74	82	73	76	69	71	64
20	62	58	39	39	33	32	32	32	34	33	41	38	59	54	54	50	75	72	83	76	77	66	67	61
21	62	57	39	37	33	33	32	32	34	33	42	39	61	56	56	52	74	71	84	78	78	66	63	61
22	63	57	37	34	33	33	32	32	35	34	43	41	58	56	61	55	75	72	80	76	77	66	66	57
23	60	56	34	33	33	33	32	32	35	35	44	41	59	55	61	58	75	72	79	72	70	66	64	59
24	59	54	34	33	33	33	32	32	40	35	42	41	61	57	64	59	72	70	78	71	73	65	63	57
25	59	54	34	33	33	33	32	32	40	39	42	40	62	60	63	61	71	69	77	70	76	65	65	57
26	59	55	34	33	33	33	33	32	39	38	40	39	64	61	62	61	72	69	76	71	75	65	61	57
27	58	53	34	33	34	33	33	32	39	36	41	37	63	61	61	59	71	69	79	72	70	65	61	53
28	56	51	33	33	34	33	33	32	38	36	42	39	64	61	62	58	70	69	80	73	67	64	61	52
29	57	52	34	33	33	33	32	32	--	--	43	40	64	60	64	60	73	68	82	75	72	65	61	53
30	59	54	33	33	33	32	33	32	--	--	45	41	66	61	62	61	74	69	84	77	73	66	63	54
31	59	55	--	--	33	32	33	32	--	--	44	42	--	--	62	61	--	--	82	78	75	70	--	--
Average	61	56	44	42	34	33	33	32	34	33	42	40	52	49	61	57	71	68	79	74	76	69	68	62

ROCK RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.

LOCATION.--At gaging station, 0.6 mile upstream from bridge on County Road F, 2.7 miles upstream from Yellowstone Lake dam, 7 miles southwest of Blanchardville, Lafayette County, and about 9 miles upstream from mouth.
DRAINAGE AREA.--29.1 square miles.
RECORDS AVAILABLE.--Water temperatures: August 1954 to September 1957.
Sediment records: August 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 83°F Aug. 14; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 1,540 ppm June 13; minimum daily, 3 ppm Nov. 11-12, Dec. 12, 15.
Sediment loads: Maximum daily, not determined; minimum daily, less than 0.050 ton on several days during October to February.
EXTREMES, 1954-57.--Water temperatures: Maximum, 89°F July 27, 1955; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 1,540 ppm June 13, 1957; minimum daily, 1 ppm on several days during 1954-56.
Sediment loads: Maximum daily, not determined; minimum daily, less than 0.050 ton on many days.
REMARKS.--Flow affected by ice Dec. 23-28, Jan. 10 to Feb. 8, Feb. 15 to Mar. 9. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement at varying hours)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	62	58	40	32	33	39	46	65	61	73	76	75
2	58	56	41	32	33	36	37	60	64	72	78	68
3	61	43	40	33	34	34	37	56	65	72	78	70
4	56	40	39	32	35	35	37	62	70	73	77	69
5	58	--	39	32	--	39	40	64	68	75	79	70
6	57	50	35	34	33	46	41	60	67	76	78	69
7	55	45	31	33	33	39	41	63	70	76	79	69
8	56	42	33	34	34	40	40	64	65	77	75	68
9	55	43	31	34	34	42	43	63	66	70	81	65
10	58	44	34	32	34	39	41	62	69	68	76	68
11	56	45	32	32	34	46	45	61	68	69	82	69
12	59	44	32	32	34	42	43	63	67	69	80	67
13	57	45	32	32	33	44	45	62	68	70	79	69
14	60	45	32	32	33	45	48	58	70	72	83	69
15	56	42	34	32	33	49	53	60	75	72	81	68
16	57	35	36	32	33	45	57	50	78	71	78	68
17	60	44	33	32	34	46	55	51	68	71	80	68
18	60	43	32	32	32	42	58	48	67	73	78	67
19	60	42	31	33	32	38	57	49	69	70	72	66
20	56	43	32	34	33	39	55	50	68	72	72	60
21	55	41	32	35	33	42	61	48	67	73	75	51
22	56	42	34	32	34	40	57	51	66	76	74	52
23	57	41	33	32	33	45	63	51	67	77	75	55
24	55	41	34	34	36	41	64	68	66	76	75	62
25	55	43	36	33	36	44	60	63	67	78	75	63
26	56	42	33	33	35	50	62	58	63	77	78	66
27	58	40	34	34	34	45	66	60	65	75	70	55
28	54	39	32	33	36	48	65	59	67	75	75	54
29	56	40	32	32	--	46	69	65	68	76	73	54
30	58	42	32	32	--	44	70	62	70	78	75	52
31	59	--	33	33	--	45	--	63	--	77	78	--
Average	57	43	34	33	34	42	52	59	68	74	77	64

ROCK RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	5.6	12	0.2	4.6	13	0.2	4.8	--	e 0.1
2	5.6	13	.2	4.6	11	.1	5.0	--	e .1
3	4.8	16	.2	4.4	10	.1	5.0	8	.1
4	4.8	39	.5	4.2	9	.1	5.0	6	.1
5	4.8	46	.6	4.8	12	.2	5.6	8	.1
6	4.8	29	.4	12.1	20	a .6	5.6	10	.2
7	4.8	42	.5	5.3	13	.2	4.8	10	.1
8	4.4	30	.4	4.4	14	.2	4.4	9	.1
9	4.2	28	.3	4.2	8	.1	4.4	6	.1
10	4.2	35	.4	4.2	4	(t)	4.4	4	(t)
11	4.6	29	.4	4.0	3	(t)	4.6	5	.1
12	4.8	32	.4	3.8	3	(t)	4.2	3	(t)
13	4.6	35	.4	3.8	6	.1	5.0	5	.1
14	4.6	28	.3	4.8	14	.2	5.3	4	.1
15	4.4	14	.2	11.0	30	a .9	5.3	3	(t)
16	4.4	7	.1	6.1	13	.2	5.0	4	.1
17	4.4	13	.2	5.3	12	.2	4.8	5	.1
18	4.4	10	.1	5.0	9	.1	4.6	6	.1
19	4.4	9	.1	5.0	13	.2	4.6	6	.1
20	4.4	8	.1	5.3	12	.2	4.8	11	.1
21	4.4	4	(t)	7.8	5	.1	4.8	8	.1
22	4.2	5	.1	5.8	8	.1	5.0	10	.1
23	4.2	11	.1	5.0	11	.1	5.0	7	.1
24	4.2	13	.1	4.8			5.0	5	.1
25	4.6	12	.1	5.3			5.0	8	.1
26	5.3	10	.1	5.0			5.0	10	.1
27	4.8	7	.1	5.0	--	e .1	5.0	10	.1
28	4.4	6	.1	4.8			5.0	11	.1
29	4.4	9	.1	4.6			5.0	11	.1
30	4.6	12	.1	4.8			5.0	10	.1
31	4.6	10	.1	--	--	--	4.8	21	.3
Total	142.7	--	7.0	159.8	--	5.0	151.8	--	3.2

Day	January			February			March		
1	4.4	39	0.5	4.4	6	0.1	5.0	22	0.3
2	3.8	32	.3	4.4	5	.1	4.8	25	.3
3	4.2	24	.3	4.4	4	(t)	4.7	14	.2
4	4.6	27	.3	4.4	5	.1	4.6	7	.1
5	4.4	24	.3	4.4	8	.1	4.6	41	.5
6	4.6	17	.2	4.4	8	.1	4.7	37	.5
7	4.6	22	.3	4.6	4	(t)	4.7	30	.4
8	4.6	12	.1	5.5	7	.1	4.8	29	.4
9	4.2	8	.1	157	550	sa 410	4.8	36	.5
10	4.1	7	.1	42	132	s 26	5.3	52	.7
11	4.0	8	.1	15.8	--	e 6	5.6	32	.5
12	4.0	6	.1	118	649	s 476	5.6	17	.2
13	4.0	5	.1	56	--	e 80	5.6	11	.2
14	4.0	8	.1	24	--	e 9	6.4	10	.2
15	4.0	10	.1	10	7	.2	7.0	9	.2
16	4.0	9	.1	6.0	11	.2	5.6	12	.2
17	4.0	11	.1	5.5	11	.2	6.1	11	.2
18	4.0	8	.1	5.0	12	.2	6.4	8	.1
19	4.0	4	(t)	4.7	10	.1	6.1	6	.1
20	4.5	8	.1	4.5	8	.1	6.1	15	.2
21	40	306	s 96	4.5	9	.1	6.4	38	.6
22	15	45	s 3.5	4.5	13	.2	7.2	38	.7
23	9.0	12	.3	4.5	12	.1	11.7	35	sa 1
24	6.8	11	.2	8.0	15	a .3	12.1	45	sa 2
25	6.0	14	.2	12	50	a 2	8.1	15	.3
26	5.5	17	.2	8.0	34	.7	7.5	9	.2
27	5.0	19	.2	6.3	12	.2	7.2	8	.2
28	4.8	7	.1	5.5	21	.3	7.2	8	.2
29	4.7	4	.1	--	--	--	7.2	9	.2
30	4.6	5	.1	--	--	--	6.7	11	.2
31	4.5	6	.1	--	--	--	6.4	8	.1
Total	189.9	--	104.4	538.3	--	1,012.6	196.2	--	11.7

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.

ROCK RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	6.7	10	0.2	5.8	40	0.6	19.9	37	2.0
2	7.0	24	.4	5.3	16	.2	15.8	52	2.2
3	6.4	27	.5	5.0	18	.2	14.2	64	2.4
4	7.2	28	.5	5.0	16	.2	12.8	61	2.1
5	10.4	29	.8	5.0	14	.2	18.2	--	e 7
6	11.4	15	.5	5.0	24	.3	13.5	43	1.6
7	8.8	12	.3	4.8	34	.4	12.1	42	1.4
8	8.1	11	.2	4.6	30	.4	11.0	44	1.3
9	7.5	11	.2	5.0	24	.3	10.0	43	1.2
10	7.0	11	.2	8.4	23	.5	74	--	e 900
11	7.2	8	.2	8.8	38	.9	284	--	e 3,100
12	6.7	7	.1	6.4	42	.7	36	100	9.7
13	6.7	7	.1	6.4	58	1.0	130	1,540	s 1,230
14	6.1	8	.1	14.9	615	s 47	34	400	37
15	6.1	8	.1	12.4	428	s 16	30	110	8.9
16	6.4	9	.2	9.1	58	1.4	57	1,330	s 318
17	6.4	8	.1	9.4	37	.9	29	840	66
18	6.1	6	.1	9.4	42	1.1	28	630	48
19	6.4	4	.1	10.4	38	1.1	26	172	12
20	6.4	5	.1	9.1	51	1.2	24	73	4.7
21	5.6	6	.1	11.0	65	sa 2	22	50	b 3
22	6.4	20	.3	14.2	65	a 2	19.9	70	b 4
23	7.5	11	.2	11.4	60	1.8	19.0	103	5.3
24	6.7	38	.7	10.0	67	1.8	18.2	79	3.9
25	6.4	65	sa 1	13.5	57	2.1	17.4	64	3.0
26	23	--	e 40	16.6	70	a 3	19.0	90	4.6
27	9.7	74	1.9	12.8	52	1.8	16.6	83	3.7
28	8.1	67	1.5	11.4	65	2.0	16.6	78	3.5
29	7.0	76	1.4	12.8	--	e 7	14.6	85	3.4
30	6.4	99	1.7	30	401	s 39	13.2	76	2.7
31	--	--	--	26	53	3.7	--	--	--
Total	231.8	--	53.8	319.9	--	140.8	1,056.0	--	5,792.6

Day	July			August			September		
1	12.4	71	2.4	8.8	61	1.4	6.7	21	0.4
2	12.1	71	2.3	6.7	70	1.3	6.4	20	.3
3	12.4	70	2.3	6.7	35	.6	5.8	21	.3
4	12.4	58	1.9	6.4	17	.3	5.8	37	.6
5	11.7	51	1.6	6.1	39	.6	5.8	27	.4
6	11.0	60	1.8	6.1	34	.6	6.4	23	.4
7	11.0	59	1.8	5.8	33	.5	6.4	23	.4
8	12.4	52	1.7	5.8	33	.5	6.1	26	.4
9	11.0	22	.6	6.4	34	.6	5.8	22	.3
10	9.7	11	.3	6.7	34	.6	6.4	16	.3
11	9.4	11	.3	6.4	36	.6	7.0	13	.2
12	14.2	--	e 5	5.8	41	.6	7.5	22	.4
13	11.4	75	2.3	5.8	43	.7	6.4	23	.4
14	10.0	49	1.3	6.1	60	1.0	6.4	17	.3
15	8.8	68	1.6	5.8	59	.9	7.0	16	.3
16	18.4	--	e 16	5.8	43	.7	7.0	13	.2
17	11.0	45	1.3	5.8	32	.5	7.5	20	.4
18	8.8	39	.9	6.1	30	.5	6.4	23	.4
19	8.2	54	1.2	6.4	35	.6	5.8	69	1.1
20	7.8	36	.8	5.8	40	.6	7.8	70	1.5
21	8.4	42	1.0	5.8	42	.6	7.0	47	.9
22	11.0	50	1.5	5.6	38	.6	6.4	50	.9
23	8.8	38	.9	6.4	40	.7	6.1	41	.7
24	7.5	39	.8	6.7	46	.8	6.1	31	.5
25	7.2	38	.7	6.1	36	.6	6.4	29	.5
26	7.0	40	.8	5.8	26	.4	6.7	45	.8
27	7.0	41	.8	6.4	39	.7	5.8	34	.5
28	6.7	32	.6	9.7	45	1.2	6.1	23	.4
29	6.7	50	.9	10.5	190	sa 12	7.0	23	.4
30	6.7	68	1.2	38	--	e 230	6.1	20	.3
31	7.5	65	1.3	7.8	27	.6	--	--	--
Total	308.6	--	57.9	234.1	--	261.9	194.1	--	14.9

Total discharge for year (cfs-days) 3,723.2

Total load for year (tons) 7,465.8

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

b Computed from estimated concentration graph.

ROCK RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Jan. 21, 1957	6:15 p.m.	--		1,650	1,280	25	35	46	60	85	98	99	100				BSWCM
Jan. 21	6:35 p.m.	--		1,080	1,480	35	44	54	68	90	98	100	--				BSWCM
Feb. 9	6:00 p.m.	446		1,280	1,700	30	37	53	72	90	98	99	100				BSWCM
Feb. 12	6:50 p.m.	559		2,280	2,000	24	34	44	62	88	98	99	100				BSWCM
Feb. 12	6:50 p.m.	559		2,280	1,870	12	20	31	48	87	97	99	99		100		BSNM
Feb. 12	7:45 p.m.	559		1,490	1,110	32	43	55	75	93	99	100	--				BSWCM
May 30	2:10 p.m.	51		1,010	1,800	36	48	60	78	95	100	--	--				BSWCM
June 11	7:30 a.m.	105		1,730	1,430	56	69	81	90	97	99	99	100				BSWCM
June 11	7:30 a.m.	105		1,730	1,430	33	49	69	87	96	99	100	--				BSNM
June 13	10:45 a.m.	674		5,320	3,290	40	51	64	80	91	100	--	--				BSWCM
June 13	2:35 p.m.	168		2,940	2,140	53	64	78	89	96	100	--	--				BSWCM
June 16	6:35 a.m.	215		3,670	2,680	33	45	60	74	85	99	99	100				BSWCM

ROCK RIVER BASIN--Continued

MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.

LOCATION.--At gaging station at bridge on State Highway 92, 0.9 mile upstream from West Branch Sugar River and 2.5 miles southeast of Mount Vernon, Dane County.
DRAINAGE AREA.--16.1 square miles.
RECORDS AVAILABLE.--Water temperatures: January 1954 to September 1957.
Sediment records: January 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 71°F June 17; minimum, freezing point on several days during November, January, and February.
Sediment concentrations: Maximum daily, 560 ppm June 13; minimum daily, 2 ppm Dec. 20, 28.
Sediment loads: Maximum daily, 178 tons June 13; minimum daily, 0.1 ton Dec. 17, 20, 27-28.
EXTREMES, 1954-57.--Water temperatures: Maximum, 75°F July 14, 1955; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 2,010 ppm Apr. 7, 1954; minimum daily, 1 ppm Sept. 20, 1955.
Sediment loads: Maximum daily, 498 tons Apr. 7, 1954; minimum daily, less than 0.050 ton Sept. 20, 1955.
REMARKS.--Flow affected by ice Dec. 12-13, Jan. 1-2, 9-20, Jan. 23 to Feb. 7, Feb. 16-24, Feb. 26 to Mar. 9. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.
REVISIONS.--Revised figures of discharge and suspended sediment for water years 1954 and 1955, superseding figures published in WSP 1401, are given herewith:

Suspended sediment

Date	Mean discharge (cfs)	Suspended sediment (tons per day)
June 22, 1954	145	sa310.1
June 1954	787	549.1
Water year 1953-54	4,490	1,890.6
Oct. 10, 1954	112	s177
October 1954	675	366.6
Feb. 20, 1955	197	sb250
February 1955	625	297.8
June 30, 1955	113	s212
June 1955	617	322.9
Water year 1954-55	6,665	2,063.4

s Computed by subdividing day. b Computed from partly estimated concentration graph.
a Computed from estimated concentration graph.

Particle-size analyses of suspended sediment

Date of collection	Time	Discharge (cfs)
June 22, 1954	8:00 a.m.	170
June 22	8:30 a.m.	162
June 22	10:40 a.m.	111
June 30, 1955	9:00 a.m.	154

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement at approximately 5:30 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	57	56	35	39	42	39	45	69	--	65	58	58
2	--	55	39	40	37	38	45	53	61	66	59	56
3	--	55	43	43	31	35	46	53	64	63	58	50
4	--	52	44	41	36	35	38	54	63	62	55	51
5	--	54	46	--	42	42	37	49	64	62	55	48
6	53	49	39	36	42	41	47	61	64	64	55	48
7	48	43	37	35	43	38	46	62	51	64	57	49
8	--	40	36	34	40	45	44	64	57	63	51	49
9	--	42	34	34	35	41	48	55	62	63	55	44
10	49	43	33	35	36	46	46	46	62	63	54	49
11	47	41	34	32	38	48	40	47	66	64	55	--
12	51	40	36	34	38	49	43	51	60	55	57	--
13	59	--	35	34	38	55	43	52	63	61	55	49
14	55	44	36	34	37	49	53	57	--	64	59	53
15	56	46	35	35	36	36	49	48	65	64	59	52
16	59	--	35	35	36	43	54	46	56	61	55	52
17	59	40	34	33	37	45	57	44	71	62	56	52
18	56	41	34	32	39	42	59	45	67	63	48	55
19	56	43	36	34	40	39	61	47	69	65	55	54
20	55	40	44	37	40	44	60	53	69	63	57	51
21	55	37	--	36	40	46	57	56	67	60	56	51
22	55	32	46	34	38	49	49	62	65	57	55	51
23	50	--	45	35	36	45	60	58	53	58	57	57
24	50	--	48	32	46	39	62	60	55	58	56	58
25	55	33	43	34	45	41	59	58	55	59	49	60
26	52	36	44	32	43	43	62	54	61	60	53	55
27	52	36	43	34	40	51	58	55	54	61	49	55
28	46	35	42	35	45	41	58	55	59	60	50	57
29	53	35	39	34	--	43	64	54	63	59	51	59
30	56	35	38	34	--	48	66	54	64	59	57	57
31	57	--	37	35	--	45	--	57	--	56	59	--
Average	54	42	39	35	39	43	52	54	62	61	55	53

ROCK RIVER BASIN--Continued

MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	12	16	0.5	12	24	0.8	13	19	0.7
2	12	26	.8	12	25	.8	13	27	.9
3	12	24	.8	12	21	.7	13	21	.7
4	12	21	.7	12	18	.6	13	14	.5
5	12	12	.4	12	23	.7	13	15	.5
6	12	18	.6	19	60	a 3	13	13	.4
7	12	12	.4	13	26	.9	13	5	.2
8	12	12	.4	13	18	.6	12	5	.2
9	12	13	.4	12	18	.6	12	9	.3
10	12	20	.6	12	20	.6	12	18	.6
11	13	24	.8	12	10	.3	12	32	1.0
12	13	12	.4	12	14	.4	12	37	1.2
13	13	9	.3	12	27	.9	12	29	.9
14	13	6	.2	13	22	.8	12	16	.5
15	13	18	.6	21	84	4.8	12	16	.5
16	13	15	.5	14	33	1.2	12	10	.3
17	12	10	.3	13	22	.8	12	3	.1
18	12	19	.6	13	24	.8	13	13	.4
19	12	13	.4	13	20	.7	12	5	.2
20	12	17	.6	13	30	1.0	12	2	.1
21	12	23	.7	15	40	a 2	12	6	.2
22	12	21	.7	13	26	.9	13	11	.4
23	12	19	.6	13	25	.9	13	14	.5
24	12	21	.7	13	21	.7	13	14	.5
25	13	25	.9	13	20	.7	13	6	.2
26	13	17	.6	13	27	.9	13	5	.2
27	12	13	.4	13	35	1.2	13	4	.1
28	12	16	.5	13	37	1.3	13	2	.1
29	12	19	.6	13	26	.9	13	12	.4
30	12	22	.7	13	26	.9	12	32	1.0
31	12	24	.8	--	--	--	12	29	.9
Total	380	--	17.5	397	--	31.4	388	--	14.7

Day	January			February			March		
1	12	28	0.9	11	22	0.6	11	31	0.9
2	12	20	.6	11	25	.7	11	32	1.0
3	12	12	.4	11	24	.7	11	25	.7
4	12	15	.5	11	20	.6	11	22	.6
5	12	16	.5	11	24	.7	11	22	.6
6	12	14	.4	11	26	.8	11	33	1.0
7	12	24	.8	12	18	.6	11	33	1.0
8	12	25	.8	13	20	.7	11	23	.7
9	12	22	.7	61	416	s 82	11	28	.8
10	11	26	.8	37	192	s 27	12	28	.9
11	11	24	.7	17	54	2.5	12	24	.8
12	11	26	.8	33	325	s 52	12	43	1.4
13	11	23	.7	27	--	e 15	12	48	1.6
14	11	23	.7	19	65	sa 4	12	43	1.4
15	11	24	.7	13	23	.8	13	45	1.6
16	11	24	.7	12	25	.8	12	32	1.0
17	11	24	.7	11	27	.8	12	27	.9
18	11	23	.7	11	30	.9	13	35	1.2
19	12	24	.8	11	31	.9	13	36	1.3
20	13	28	1.0	11	34	1.0	13	31	1.1
21	34	289	s 58	11	28	.8	13	25	.9
22	41	275	s 51	11	23	.7	13	27	.9
23	16	38	1.6	11	25	.7	16	158	s 9.1
24	13	34	1.2	13	65	sa 3	16	81	s 3.8
25	13	35	1.2	17	110	a 5	13	32	1.1
26	12	30	1.0	12	37	1.2	13	30	1.0
27	12	20	.6	12	24	.8	13	32	1.1
28	12	30	1.0	11	30	.9	13	31	1.1
29	12	24	.8	--	--	--	13	18	.6
30	12	25	.8	--	--	--	13	20	.7
31	12	27	.9	--	--	--	13	18	.6
Total	421	--	132.0	452	--	206.2	384	--	41.4

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.

ROCK RIVER BASIN--Continued

MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	13	15	b 0.5	12	14	b 0.4	14	70	b 3
2	13	16	.6	12	11	.4	13	61	2.1
3	13	20	.7	12	14	.4	12	51	1.6
4	14	34	1.3	12	16	.5	12	52	1.7
5	21	114	s 7.7	12	17	b .6	15	56	2.3
6	21	96	s 5.9	12	18	.6	14	61	2.3
7	16	27	1.2	12	19	.6	13	51	1.8
8	15	24	1.0	12	21	.7	13	49	1.7
9	14	22	.8	12	17	.6	13	48	1.7
10	14	30	1.1	13	12	.4	19	--	e 20
11	14	28	1.0	13	12	.4	60	440	sa 95
12	13	27	.9	13	12	.4	17	95	4.4
13	13	23	.8	13	19	.7	63	560	s 178
14	13	16	.6	17	161	s 8.3	25	105	7.1
15	13	11	.4	16	48	2.1	17	78	3.6
16	13	13	.4	13	26	.9	22	155	s 11
17	13	13	.4	14	71	2.7	15	79	3.2
18	13	8	.3	14	41	1.5	15	78	3.2
19	13	16	.6	15	42	1.7	14	62	2.3
20	13	18	.6	13	64	2.2	13	49	1.7
21	13	12	.4	16	114	s 6.1	13	49	1.7
22	13	21	.7	22	102	s 6.8	13	50	1.8
23	13	23	.8	15	62	2.5	13	50	b 2
24	13	19	.7	14	63	2.4	14	51	1.9
25	13	14	.5	17	97	4.4	14	33	1.2
26	15	35	1.4	18	56	2.7	20	220	sa 16
27	13	24	.8	14	53	2.0	14	34	1.3
28	13	18	b .6	13	58	2.0	14	28	1.0
29	12	12	.4	13	59	2.1	14	25	.9
30	12	15	.5	20	168	s 14	14	36	1.4
31	--	--	--	19	117	6.0	--	--	--
Total	415	--	33.6	443	--	77.1	542	--	376.9

Day	July			August			September		
1	13	48	1.7	13	22	0.8	13	32	1.1
2	14	43	1.6	13	21	.7	13	39	1.4
3	14	34	1.3	12	21	.7	13	45	1.6
4	14	33	1.2	12	17	.6	13	41	1.4
5	13	37	1.3	12	17	.6	13	36	1.3
6	13	32	1.1	12	25	.8	13	42	1.5
7	13	22	.8	12	23	.7	12	48	1.6
8	14	23	.9	12	35	1.1	12	46	1.5
9	14	38	1.4	12	37	1.2	12	40	1.3
10	13	46	1.6	13	23	.8	12	32	1.0
11	14	46	1.7	12	32	1.0	12	21	.7
12	14	48	1.8	12	42	1.4	13	23	.8
13	15	42	1.7	12	47	1.5	12	24	.8
14	14	48	1.8	12	41	1.3	12	25	.8
15	14	57	2.2	12	48	1.6	12	20	.6
16	14	48	1.8	11	33	1.0	12	25	.8
17	14	40	1.5	11	43	1.3	12	32	1.0
18	13	46	1.6	11	34	1.0	12	31	1.0
19	13	45	1.6	11	27	.8	12	28	.9
20	13	38	1.3	11	37	1.1	12	27	.9
21	13	37	1.3	11	49	1.4	12	20	.6
22	15	34	1.4	11	38	1.1	12	13	.4
23	14	25	.9	12	38	1.2	12	17	.6
24	13	22	.8	12	34	1.1	12	30	1.0
25	13	23	.8	12	19	.6	12	27	.9
26	13	23	.8	12	18	.6	12	28	.9
27	13	22	.8	13	18	.6	12	24	.8
28	13	21	.7	13	28	1.0	12	18	.6
29	13	19	.7	14	110	sa 6	12	28	.9
30	13	17	.6	20	160	sa 9	12	33	1.1
31	13	19	.7	14	54	2.0	--	--	--
Total	419	--	39.4	382	--	44.6	367	--	29.8

Total discharge for year (cfs-days) 4,990
Total load for year (tons) 1,044.6

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

ROCK RIVER BASIN--Continued

MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Jan. 21, 1957	6:30 p.m.	52		856	1,320	22	28	36	50	75	90	93	97		100		BSWCM
Feb. 9	4:25 p.m.	80		663	1,170	22	30	40	57	77	94	96	99		100		BSWCM
Mar. 23	6:05 p.m.	21		432	623	39	52	60	75	90	97	98	99		100		BSWCM
Apr. 5	4:00 p.m.	25		216	285	38	43	53	70	88	96	98	100		--		BSWCM
May 14	4:00 p.m.	24		715	951	39	48	64	81	90	98	99	100		--		BSWCM
May 21	10:35 p.m.	32		374	672	42	52	66	77	87	99	100	--		--		BSWCM
June 11	8:20 a.m.	77		518	536	46	64	75	82	89	96	97	98		100		BSWCM
June 11	8:20 a.m.	77		518	489	18	31	54	76	91	96	97	99		100		BSNM
June 11	11:20 a.m.	50		480	390	51	68	81	87	93	97	98	100		--		BSWCM
June 13	12:40 p.m.	146		2,460	2,270	38	49	64	81	95	99	100	--		--		BSWCM
June 13	2:40 p.m.	160		945	804	56	72	83	89	95	98	99	100		--		BSWCM
June 26	8:00 a.m.	26		530	951	51	65	79	90	95	99	99	100		--		BSWCM

IOWA RIVER AT IOWA CITY, IOWA

LOCATION.--At Benton Street Bridge at Iowa City, Johnson County, 0.5 mile downstream from gaging station, 0.4 mile upstream from Ralston Creek, and 4.1 miles (revised) downstream from Clear Creek.
DRAINAGE AREA.--3,271 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1906 to September 1907, January 1944 to September 1954.
Water temperatures: January 1944 to September 1957.
Sediment records: October 1943 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 90°F July 19; minimum, freezing point on many days during November to February.
Sediment concentrations: Maximum daily, 2,480 ppm July 7; minimum daily, 21 ppm Jan. 2, 4, Feb. 7, 8.
Sediment loads: Maximum daily, 19,800 tons June 20; minimum daily, 5 tons Nov. 23.
EXTREMES, 1943-57.--Water temperatures (1944-57): Maximum, 90°F July 19, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 7,800 ppm June 13, 1953; minimum daily, 4 ppm Feb. 10-12, 1945, Feb. 5, 1947.
Sediment loads: Maximum daily, 177,000 tons May 23, 1944; minimum daily, 2 tons Jan. Jan. 28, Feb. 2-8, 10, 1951.
REMARKS.--Flow affected by ice Nov. 26-29, Dec. 7-18, Dec. 21 to Jan. 20. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 4 p.m. and 8 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	64	a 61	41	35	34	36	50	78	70	b 78	b 84	a 82
2	66	64	a 43	36	34	34	38	a 76	70	b 78	b 87	b 76
3	70	60	42	38	32	35	43	70	71	81	a 82	a 76
4	70	60	44	37	38	37	42	64	74	b 78	b 78	b 70
5	68	60	40	37	34	38	40	64	77	b 76	80	72
6	66	60	38	37	37	36	45	70	a 78	a 82	b 74	68
7	68	57	35	38	a 36	36	a 46	70	b 69	82	b 74	72
8	64	50	33	39	38	35	50	b 65	a 69	b 81	b 75	a 72
9	64	48	a 34	35	34	a 36	50	b 68	a 70	80	80	a 70
10	60	43	38	32	a 38	a 39	52	64	b 70	a 85	b 78	b 72
11	60	46	--	32	34	40	46	60	75	a 85	84	a 70
12	58	42	37	32	35	38	48	b 65	a 72	a 88	a 84	70
13	65	48	66	a 32	36	50	46	a 60	b 70	a 82	86	b 66
14	64	49	35	32	a 37	44	48	b 62	b 73	86	a 88	b 70
15	68	43	40	32	b 34	42	51	a 59	80	82	b 86	a 72
16	70	41	41	32	32	44	56	a 58	82	a 87	78	b 68
17	70	40	32	32	35	43	a 46	a 58	80	a 88	84	70
18	68	42	36	32	b 32	40	60	57	b 78	b 84	a 78	a 70
19	68	42	39	32	32	41	66	a 56	80	90	b 76	a 72
20	70	39	39	32	34	44	67	a 57	79	88	a 78	a 68
21	68	34	39	33	36	42	a 67	a 64	a 78	88	78	b 64
22	67	a 32	39	33	33	46	61	b 60	a 72	a 84	b 76	a 62
23	63	34	37	33	32	46	66	61	b 64	b 80	b 76	a 64
24	62	35	38	b 32	--	42	68	b 64	b 72	b 78	a 76	a 62
25	62	34	38	32	38	40	b 66	70	a 72	a 80	a 78	a 70
26	68	38	39	32	36	41	b 66	a 64	a 74	a 80	a 82	a 62
27	60	40	39	32	36	44	66	a 68	72	b 81	73	a 62
28	60	37	38	34	38	41	68	70	64	a 81	a 74	a 64
29	62	38	38	32	--	47	72	b 68	b 74	a 85	72	a 62
30	62	40	39	33	--	50	73	a 72	78	a 86	78	a 68
31	62	--	39	34	--	56	--	b 71	--	b 82	79	--
Average	65	45	39	34	35	41	55	65	74	83	79	69

a Measurement between 11 a.m. and 3 p.m.
b Measurement between 7 a.m. and 10 a.m.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	78	61	13	80	90	19	110	28	8
2	72	54	11	90	98	24	134	47	17
3	79	69	15	98	80	21	132	36	13
4	132	49	17	103	99	28	139		
5	79	82	17	103	113	31	242	36	24
6	98	73	19	101	109	30	128	22	8
7	84	55	12	112	114	34	105	22	6
8	58	78	12	108	108	32	92		
9	57	61	9	105	93	26	92	26	7
10	65	71	12	105	83	24	98		
11	188	85	43	112	94	28	100		
12	60	61	10	115	87	27	100	41	11
13	58	76	12	115	83	26	100		
14	60	66	11	122	76	25	100		
15	61	53	9	178	86	41	100	56	15
16	90	56	14	169	80	37	102		
17	132	58	21	147	--	e 28	105		
18	64	61	11	121	64	21	105	40	11
19	215	52	30	124	68	23	106		
20	200	78	42	115	54	17	103		
21	200	66	36	176	48	23	100	39	11
22	170	56	26	98	32	8	100		
23	170	58	27	86	22	5	105		
24	175	75	35	96	24	6	110	42	13
25	178	97	47	119	26	8	110		
26	165	64	29	115	31	10	115		
27	149	78	31	105	32	9	120	43	14
28	143	100	39	100			120		
29	98	96	25	100	39	11	120		
30	65	58	10	100			115	34	10
31	156	86	36	--	--	--	110		
Total	3,599	--	681	3,418	--	644	3,518	--	361

Day	January			February			March		
1	105	23	7	230	54	34	426	35	40
2	100	21	6	212	46	26	400	34	37
3	100	24	6	202	36	20	416	--	e 40
4	100	21	6	192	33	17	375	38	39
5	105	35	10	188	30	15	437	41	48
6	105	36	10	182	24	12	431	35	41
7	98	43	11	178	21	10	398	48	52
8	92	36	9	162	21	10	364	40	39
9	88	74	18	530	50	sa 85	266	35	25
10	82	47	10	681	255	469	317	33	28
11	76	54	11	627	160	271	353	54	52
12	72	53	10	693	110	206	320	67	58
13	70	75	14	795	120	258	302	78	64
14	70	--	e 14	955	123	317	357	91	88
15	70	75	14	988	115	307	300	80	65
16	70	74	14	1,090	108	318	305	64	53
17	70	97	18	1,090	144	424	238	47	30
18	70	94	18	955	145	374	290	61	48
19	70	109	21	825	128	285	382	58	60
20	70	80	15	705	104	198	339	31	28
21	230	55	sa 46	570	71	109	330	42	37
22	762	271	558	485	52	68	343	58	54
23	474	215	275	440	50	59	359	66	64
24	704	175	333	404	40	44	376	77	78
25	753	160	325	492	28	37	406	68	75
26	675	240	437	494	31	41	399	42	45
27	550	170	253	450	29	35	407	36	40
28	436	132	155	348	41	39	449	58	70
29	342	121	112	--	--	--	442	67	80
30	280	103	78	--	--	--	398	70	75
31	248	73	49	--	--	--	374	81	82
Total	7,137	--	2,863	15,183	--	4,088	11,299	--	1,635

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	420	100	113	269	90	65	1,720	628	s 3,160
2.....	476	108	139	310	96	80	1,990	1,350	7,250
3.....	440	99	118	250	96	65	2,180	1,000	5,890
4.....	389	83	87	385	131	136	2,650	800	5,720
5.....	451	55	67	263	124	88	2,480	580	3,880
6.....	468	67	85	142	105	40	2,530	430	2,940
7.....	426	66	76	256	128	88	2,210	343	2,050
8.....	399	94	101	241	106	69	2,450	420	a 2,800
9.....	356	114	110	182	100	49	2,690	370	2,690
10.....	450	144	175	330	112	100	2,610	395	2,780
11.....	342	132	122	246	90	60	2,130	390	2,240
12.....	344	144	134	252	80	54	1,550	335	1,400
13.....	308	112	93	674	112	204	1,350	325	1,180
14.....	359	73	71	780	285	600	1,230	253	840
15.....	288	96	75	779	333	700	1,160	247	774
16.....	262	104	74	1,020	227	625	1,020	245	675
17.....	306	98	81	1,060	355	1,020	1,040	231	649
18.....	271	104	76	1,060	310	887	1,560	306	1,290
19.....	340	136	125	1,120	218	659	2,610	1,200	sa 8,800
20.....	274	128	95	1,060	160	458	3,460	2,120	19,800
21.....	270	132	96	1,010	140	382	3,640	1,770	17,400
22.....	281	158	120	1,020	120	331	3,660	1,080	10,700
23.....	292	152	120	1,410	210	800	4,400	825	9,800
24.....	318	156	134	1,300	605	2,120	4,600	625	7,760
25.....	340	130	119	1,020	412	1,130	4,500	500	6,080
26.....	285	121	93	955	217	560	3,460	375	3,500
27.....	328	119	105	874	185	437	2,370	389	2,490
28.....	223	87	52	825	165	368	1,890	423	2,160
29.....	252	54	37	764	145	299	1,660	420	1,880
30.....	258	93	65	795	210	451	1,480	375	1,500
31.....	--	--	--	1,020	160	441	--	--	--
Total.	10,216	--	2,958	21,672	--	13,366	72,280	--	140,078

Day	July			August			September		
1.....	1,340	270	977	1,700	545	2,500	920	372	924
2.....	1,230	225	747	1,510	440	1,790	800	225	486
3.....	1,120	220	665	1,340	257	930	682	203	374
4.....	1,090	253	745	1,200	277	898	591	160	255
5.....	1,200	250	810	922	233	580	462	125	156
6.....	2,370	1,000	sa 7,000	759	225	461	476	113	145
7.....	2,930	2,480	19,600	675	164	299	356	98	94
8.....	3,280	1,570	13,900	575	137	213	388	87	91
9.....	3,460	820	7,660	510	131	180	369	117	117
10.....	3,190	450	3,880	462	123	153	412	80	89
11.....	2,210	360	2,150	378	103	105	296	94	75
12.....	1,510	311	1,270	458	109	135	325	99	87
13.....	1,260	237	806	400	82	89	308	82	68
14.....	1,090	193	568	350	97	92	316	89	76
15.....	988	168	448	330	99	88	360	105	102
16.....	890	171	411	320	110	95	336	105	95
17.....	825	125	279	320	70	61	340	109	100
18.....	765	154	318	330	75	67	342	97	90
19.....	693	129	241	386	86	90	254	101	69
20.....	515	143	199	364	96	94	348	96	90
21.....	545	161	237	314	101	86	320	82	71
22.....	603	162	264	310	101	85	260	112	79
23.....	609	143	235	290	84	66	286	99	76
24.....	633	137	234	287	60	47	316	116	99
25.....	1,120	163	493	252	62	42	311	98	82
26.....	1,090	221	651	257	52	36	215	104	60
27.....	825	405	902	300	76	62	295	108	86
28.....	681	253	465	564	96	146	222	97	58
29.....	639	182	314	716	242	468	338	92	84
30.....	1,480	263	1,050	1,500	273	1,110	94	75	19
31.....	2,050	468	2,590	1,300	528	1,850	--	--	--
Total.	42,231	--	70,109	19,379	--	12,918	11,338	--	4,297

Total discharge for year (cfs-days)..... 221,270
Total load for year (tons)..... 253,998

s Computed by subdividing day.
a Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 14, 1957	3:10 p.m.	765	62	398	2,070		96		99		100						SPWCM
May 24	11:00 a.m.	1,340	66	700	2,310		86		96		100						SPWCM
May 24	11:00 a.m.	1,340	66	700	2,390		83		93		100						SPNM
June 3	1:50 p.m.	1,930	72	928	3,430		81		90		100						SPWCM
June 3	1:50 p.m.	1,930	72	928	3,300		80		92		100						SPNM
June 19	1:50 p.m.	2,130	76	1,440	2,950		68		94		100						SPWCM
June 19	1:50 p.m.	2,130	76	1,440	2,220		56		88		100						SPNM
June 24	1:50 p.m.	4,600	72	618	2,690		49		72		99	100					SPWCM

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA

LOCATION.--At gaging station, on upstream side of bridge on State Highway 1, at east edge of Iowa City, Johnson County, and 2.2 miles upstream from mouth.
DRAINAGE AREA.--3.01 square miles.
RECORDS AVAILABLE.--Sediment records: April 1952 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 8,230 ppm May 21; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 186 tons May 21; minimum daily, 0 tons on many days.
EXTREMES, 1952-57.--Sediment concentrations: Maximum daily, 8,230 ppm May 21, 1957; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,300 tons July 18, 1956; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 65,800 ppm on May 21. Flow affected by ice Jan. 21-23, Feb. 7-15, 24-26, Mar. 11-14. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0			
2				0	--	0			
3				0	--	0			
4				0	--	0			
5				0	--	0			
6				0	--	0			
7				0	--	0			
8				0	--	0			
9				0	--	0			
10				0	--	0			
11				0	--	0			
12				0	--	0			
13				0	--	0			
14				.74	320	sa 4.2			
15				.01	130	sa .1			
16				0	--	0			
17				0	--	0			
18				0	--	0			
19				0	--	0			
20				0	--	0			
21				0	--	0			
22				0	--	0			
23				0	--	0			
24				0	--	0			
25				0	--	0			
26				0	--	0			
27				0	--	0			
28				0	--	0			
29				0	--	0			
30				0	--	0			
31				--	--	--			
Total	0		0	0.75	--	4.3	0		0

s Computed by subdividing day.
a Computed from estimated concentration graph.

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	0	--	0	0	--	0
2	0	--	0	0	--	0	0	--	0
3	0	--	0	0	--	0	0	--	0
4	0	--	0	0	--	0	0	--	0
5	0	--	0	0	--	0	0	--	0
6	0	--	0	0	--	0	0	--	0
7	0	--	0	.30	--	(t)	0	--	0
8	0	--	0	3.0	240	sa 17	0	--	0
9	0	--	0	1.5	420	1.7	0	--	0
10	0	--	0	.30	250	.2	0	--	0
11	0	--	0	.10	112	(t)	.14	98	s .1
12	0	--	0	.22	140	a .1	.08		
13	0	--	0	.08	165	(t)	.05	35	(t)
14	0	--	0	.03			.03	133	(t)
15	0	--	0	.02	--	(t)	.02	48	(t)
16	0	--	0	0	--	0	0	--	0
17	0	--	0	0	--	0	0	--	0
18	0	--	0	0	--	0	.22	55	sb .1
19	0	--	0	0	--	0	.26	50	(t)
20	0	--	0	0	--	0	.09	28	
21	8.0	846	s 40	0	--	0	.05	25	
22	.20	150	a .1	0	--	0	.04	25	(t)
23	.01	--	(t)	0	--	0	.02	22	
24	0	--	0	.03			.01	--	
25	0	--	0	.12	--	(t)	.02		
26	0	--	0	.04			.02	6	(t)
27	0	--	0	0	--	0	.07		
28	0	--	0	0	--	0	.05		
29	0	--	0	--	--	--	.03	27	
30	0	--	0	--	--	--	.01	--	(t)
31	0	--	0	--	--	--	.01	16	
Total	8.21	--	40.1	5.74	--	19.1	1.22	--	0.3

Day	April			May			June		
1	0.02			0.05	24		0.02	--	(t)
2	.09	13	(t)	.03	--	(t)	0	--	0
3	.09			.01	32		0	--	0
4	.41	120	sb 0.2	0	--	0	0	--	0
5	.27	28	(t)	0	--	0	0	--	0
6	.14			0	--	0	0	--	0
7	.09			0	--	0	.07	144	(t)
8	.06			0	--	0	.05	50	(t)
9	.04	14	(t)	.01	--	(t)	.04		
10	.05			.51	2,500	s 7.3	.01	--	(t)
11	.04			.12	190	.1	.02		
12	.01			.18	240	.1	.03	160	(t)
13	.01			.32	220	sb .4	.13	180	b .1
14	.01			.55	300	b .4	.05		
15	.01	--	(t)	.14	100	(t)	.02	--	(t)
16	.01			.05	75		.01		
17	.01			.05	--	(t)	.01		
18	.01			.05	73		0	--	0
19	.11	85	(t)	.05	46	(t)	0	--	0
20	.02	--	(t)	.05			0	--	0
21	0	--	0	1.7	8,230	s 186	0	--	0
22	.60	2,700	sb 11	.36	5,000	s 7.9	0	--	0
23	.26	160	.1	.15	440	.2	0	--	0
24	.12	120	(t)	.05	80	(t)	0	--	0
25	.10	110	(t)	.22	170	.1	0	--	0
26	.16	100	sb .1	.08	--		0	--	0
27	.43	145	s .3	.04	--		0	--	0
28	.23	--		.02	97	(t)	0	--	0
29	.12	22	(t)	.01	53		0	--	0
30	.07	--		.10	65	sa .1	0	--	0
31	--	--	--	.10	40	(t)	--	--	--
Total	3.59	--	11.9	5.00	--	202.7	0.46	--	0.2

s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0		0	0		0
2				0		0	0		0
3				0		0	0		0
4				0		0	0		0
5				0		0	0		0
6				0		0	0		0
7				0		0	0		0
8				0		0	0		0
9				0		0	0		0
10				0		0	0		0
11				0		0	0		0
12				0		0	0		0
13				0		0	0		0
14				0		0	0		0
15				0		0	0		0
16				0		0	0		0
17				0		0	0		0
18				0		0	0		0
19				0		0	0		0
20				0		0	.34	950	sb 3.4
21				0		0	0		0
22				0		0	0		0
23				0		0	0		0
24				0		0	0		0
25				0		0	0		0
26				0		0	0		0
27				0		0	0		0
28				3.9	1,170	s 48	0		0
29				.01		(t)	0		0
30				0		0	0		0
31				0		0	--		--
Total	0		0	3.91		48	0.34		3.4

Total discharge for year (cfs-days) 29.22
Total load for year (tons) 330.0

s Computed by subdividing day.
t Less than 0.050 ton.
b Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 21, 1957.....	7:30 p.m.	2.3	58	41,200	4,090		59		92		100						SPWCM
Aug. 26.....	8:30 a.m.	34	61	4,360	2,460		56		89		100						SPWCM

DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA

LOCATION.--At Euclid Avenue Bridge in Des Moines, Polk County, 2.1 miles upstream from gaging station, 4.9 miles upstream from Raccoon River, and 2.4 miles downstream from Beaver Creek.
DRAINAGE AREA.--6,245 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1954 to June 1955.
Water temperatures: November 1954 to September 1957.
Sediment records: November 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 91°F July 17, 18, 20; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 5,900 ppm June 16; minimum daily, not determined.
Sediment loads: Maximum daily, 99,000 tons June 16; minimum daily, not determined.
EXTREMES, 1954-57.--Water temperatures: Maximum, 95°F July 28, 1955; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 5,900 ppm June 16, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 99,000 tons June 16, 1957; minimum daily, not determined.
REMARKS.--Flow affected by ice Dec. 8, 9, Dec. 11 to Feb. 28. No appreciable inflow between sampling site and gaging station except during periods of heavy local runoff. Discharge records at gaging station at Des Moines for water year October 1956 to September 1957 given in WSP 1508.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement 12 m. to 6 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	55	32	a 32	32	37	47	73	69	79	90	b 83
2	68	57	32	32	32	32	45	73	69	b 79	89	b 78
3	69	58	32	32	32	32	42	63	73	77	80	73
4	66	b 54	32	32	32	36	41	61	77	79	b 77	67
5	b 61	53	32	32	32	39	39	59	79	b 79	80	72
6	61	51	32	32	32	37	43	68	79	81	b 75	66
7	b 56	43	32	32	32	32	45	69	71	b 87	77	73
8	62	40	32	32	32	32	47	71	65	83	b 80	73
9	55	--	32	32	32	37	51	69	70	b 82	85	--
10	57	43	32	32	32	b 47	51	55	71	b 83	80	b 67
11	59	b 46	32	32	32	48	49	56	73	a 81	b 83	b 69
12	68	43	32	32	32	48	43	64	72	a 86	87	67
13	67	45	32	32	32	56	a 44	67	73	b 81	89	69
14	b 63	49	32	32	32	45	54	65	b 75	81	89	68
15	65	41	32	32	37	33	49	57	77	81	b 85	68
16	66	35	32	32	33	42	57	52	75	86	75	69
17	69	40	32	32	32	44	61	61	74	91	77	65
18	67	42	32	32	32	39	64	59	73	b 91	b 79	67
19	66	41	32	32	32	39	65	57	74	89	78	68
20	b 61	34	32	32	32	47	b 66	56	75	91	76	67
21	b 60	32	32	32	32	43	a 62	66	77	b 84	77	63
22	65	b 32	32	32	32	47	b 61	66	78	b 83	76	67
23	60	32	32	32	36	47	67	66	72	b 81	75	68
24	57	32	32	32	32	39	71	69	71	80	74	68
25	54	32	a 32	32	37	35	71	67	72	82	75	67
26	57	32	32	32	36	41	61	62	73	83	79	66
27	59	32	32	32	36	47	63	64	68	79	69	65
28	b 53	32	32	32	32	50	69	--	73	81	75	63
29	b 57	32	32	32	--	49	69	73	76	83	b 77	64
30	59	32	32	32	--	47	74	71	81	87	a 77	65
31	54	--	32	32	--	49	--	--	--	87	81	--
Average	62	41	32	32	33	42	56	64	73	83	80	68

a Measurement before 11 a.m.
b Measurement after 6 p.m.

DES MOINES RIVER BASIN--Continued

DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	68			81			116	13	4.1
2	63			81	42	9.0	128	13	4.5
3	63	46	7.9	76			128		
4	62			98			128	9	3.1
5	62			98	49	13	157	9	3.8
6	60			98			128	14	4.8
7	58			98	18	4.8	68	14	2.6
8	58			122	18	5.9	74	14	2.8
9	57			150	--	e 7.5	80		
10	57	36	5.5	172	18	8.4	98	17	4.1
11	56			150			88		
12	56			135	22	8.2	76		
13	59	95	sa 40	128			62	24	4.2
14	98	130	sa 46	122	30	9.9	58		
15	68	57	10	135	30	11	56		
16	81	49	11	172	30	14	60	17	2.7
17	76			165			57		
18	76			135	14	5.5	54		
19	76			135			60	25	4.1
20	76	55	11	135	17	6.2	66		
21	76			110	17	5.1	72		
22	72			60	17	2.8	77	22	4.6
23	68			76	18	3.7	83		
24	68	46	8.7	104	18	5.1	74		
25	72			116	18	5.6	68	9	1.7
26	68			110			78		
27	65			122			89		
28	63			128	26	8.1	84	15	3.6
29	63	63	11	104			92		
30	68			116			102	12	3.4
31	72			--	--	--	110		
Total	2,085	--	338.5	3,532	--	237.6	2,671	--	112.0

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	100			54			210	21	12
2	90	14	3.4	53	34	5.0	219	27	16
3	83			54			172	35	16
4	80			54			210	16	9.1
5	78			55	19	2.8	228		
		16	3.3					20	12
6	76			56			228		
7	74			66	14	2.5	186	20	10
8	72			74	13	2.6	135		
9	69			90	18	4.4	150	23	9.0
10	66	25	4.6	100	17	4.6	150		
11	64			110	--	e 5.5	179	62	30
12	62	32	5.3	122	18	5.9	202	62	34
13	60			120	33	11	202		
14	59	19	3.0	120	15	4.9	202		
15	58			155	33	14	202	51	28
16	57			168	10	4.5	202		
17	56			170	20	9.2	194	54	28
18	56			180	44	22	255	54	37
19	56	35	5.3	185	26	13	255		
20	56			176	28	13	285	91	72
21	56			158	13	5.5	305		
22	64			140	--	e 6.0	295	64	51
23	66	26	4.4	134	18	6.5	285	64	49
24	61			138	12	4.5	315	73	62
25	57			144	24	9.3	391	73	77
26	58	51	8.1	150	11	4.5	510	135	186
27	60			138	16	6.0	600	193	313
28	57	44	6.7	175	41	19	682	203	374
29	56			--	--	--	785	219	464
30	54	29	4.2	--	--	--	1,050	297	842
31	54			--	--	--	1,280	315	1,090
Total	2,015	--	145.8	3,339	--	201.8	10,564	--	4,050.1

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.

DES MOINES RIVER BASIN--Continued

DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,310	260	920	347	55	52	2,340	1,010	6,380
2	1,260	207	704	325	71	62	2,480	790	5,290
3	1,170	148	468	305	61	50	2,440	610	4,020
4	1,150	112	348	275			2,200	450	2,670
5	1,150	98	304	275	41	30	1,910	383	1,980
6	1,000	72	194	275			1,720	350	1,630
7	892	81	195	275			1,550	310	1,300
8	770	51	106	255	34	23	1,400	290	1,100
9	641	85	147	275	100	sa 100	1,260	270	919
10	600	97	157	380	380	a 400	1,170	250	790
11	510	71	98	413	180	201	1,050	270	765
12	460	73	91	413	150	a 170	969	210	549
13	424	80	92	510	380	a 500	938	225	570
14	413	67	75	654	315	556	922	195	485
15	413	75	84	682	255	470	1,640	1,500	sa 7,000
16	413	83	93	654	170	300	5,780	5,900	sa 99,000
17	402	82	89	641	175	303	9,200	3,520	87,400
18	402	74	80	587	145	230	8,720	1,870	44,000
19	413	81	90	548	118	175	7,300	890	17,500
20	380	58	60	628	140	237	5,040	500	6,800
21	347	57	53	888	800	sa 2,100	3,640	480	4,720
22	347	55	52	785	405	858	2,900	454	3,550
23	336	29	26	695	240	450	2,600	475	3,330
24	315	51	43	1,100	315	936	2,320	450	2,820
25	275	82	61	1,350	350	1,280	2,000	270	1,460
26	380	200	sa 240	1,370	360	1,330	1,890	280	1,430
27	668	900	sa 1,600	1,330	235	844	2,000	500	2,700
28	498	270	363	1,190	205	659	2,180	--	e 3,000
29	413	180	201	1,020	180	496	2,220	395	2,370
30	380	125	128	907	195	478	2,100	340	1,930
31	--	--	--	1,280	380	sa 1,500	--	--	--
Total	18,132	--	7,162	20,632	--	14,880	83,879	--	317,458

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,970	273	1,450	682	198	365	435	185	217
2	1,870	230	1,160	695	193	362	448	177	214
3	1,680	213	966	695	205	385	413	158	176
4	1,620	215	940	654	180	318	369	200	199
5	2,600	2,400	a 17,000	614	95	157	347	145	136
6	2,160	1,180	6,770	574	101	157	347	95	89
7	1,760	490	2,330	560	88	133	358	95	92
8	1,460	300	1,180	498	77	104	347	80	75
9	1,310	237	838	460	54	67	325	--	e 55
10	1,260	290	987	402	52	56	305	62	51
11	1,300	273	958	358	48	46	336	74	67
12	1,190	265	851	336	48	44	336	81	73
13	1,070	294	849	315	43	37	391	80	84
14	984	240	638	315	46	39	347	60	56
15	922	199	495	285	39	30	325	52	46
16	876	181	428	265			295	45	36
17	800	202	436	255			347	45	42
18	710	128	245	255	40	27	347	47	44
19	668	180	325	237			325	46	40
20	628	146	248	228			275	44	33
21	574	144	223	245			265	20	14
22	574	122	189	255	29	19	245	48	32
23	548	119	176	237			245	47	31
24	695	220	sa 460	219	16	9.5	237	39	25
25	668	160	289	210	33	19	237	36	23
26	535	138	199	210	38	22	210		
27	498	107	144	285	93	72	210	40	22
28	628	120	203	295	45	36	202		
29	668	257	464	315	53	45	194		
30	682	313	576	336	122	111	179	38	18
31	654	242	427	424	167	191	--	--	--
Total	33,562	--	42,444	11,714	--	2,997.5	9,242	--	2,056

Total discharge for year (cfs-days) 201,367

Total load for year (tons) 392,083.3

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

DES MOINES RIVER BASIN--Continued

DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 27, 1957....	8:30 p.m.	770	69	690	2,380		61		90		100	--	--				SPWCM
May 21.....	10:00 p.m.	860	66	1,100	3,110		62		92		100	--	--				SPWCM
June 4.....	1:30 p.m.	2,180	78	435	2,570		44		79		96	99	100				SPWCM
June 4.....	1:30 p.m.	2,180	78	435	2,240		37		83		96	99	100				SPNM
June 15.....	12:45 p.m.	1,610	77	1,370	2,540		54		90		98	100	--				SPWCM
June 15.....	12:45 p.m.	1,610	77	1,370	2,170		36		96		98	100	--				SPNM
June 17.....	5:50 p.m.	9,440	74	3,070	2,890		59		74		89	93	98		100		SPWCM

DES MOINES RIVER BASIN--Continued

EAST FORK HARDIN CREEK NEAR CHURDAN, IOWA

LOCATION.--At gaging station, on upstream side of highway bridge, 4.4 miles upstream from mouth and 6.5 miles southeast of Churdan, Greene County.
DRAINAGE AREA.--24.0 square miles.
RECORDS AVAILABLE.--Sediment records: July 1952 to September 1957 (discontinued)
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 600 ppm June 16; minimum daily, no flow on many days during October to February.
Sediment loads: Maximum daily, 500 tons June 16; minimum daily, 0 tons on many days during October to February.
EXTREMES, 1952-57.--Sediment concentrations: Maximum daily, 668 ppm Mar. 17, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 500 tons June 16, 1957; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Nov. 29, Dec. 9-11, 16, 17, Dec. 22 to Jan. 9, Feb. 4-8, 14-22, Feb. 26 to Mar. 3. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0		0	0.13	3	
2				0		0	.23	--	
3				0		0	.31	--	
4				0		0	.35	--	
5				0		0	.45	--	
6				.17		(t)	.23	--	(t)
7				.19			.08	--	
8				.11	15	(t)	.02	--	
9				.04			.03	--	
10				.02		(t)	.05	--	
11				.01			.02	--	
12				0		0	.01	--	
13				0		0	0	--	0
14				0		0	0	--	0
15				0		0	0	--	0
16				0		0	0	--	0
17				0		0	0	--	0
18				0		0	0	--	0
19				0		0	0	--	0
20				0		0	0	--	0
21				0		0	0	--	0
22				0		0	.03	--	
23				0		0	.05	--	
24				0		0	.02	--	
25				0		0	.01	--	
26				0		0	.03	--	(t)
27				0		0	.05	--	
28				.01			.04	--	
29				.03		(t)	.03	14	
30				.08			.05	--	
31				--		--	.10	--	
Total	0		0	0.66		0.1	2.32	--	(t)

t Less than 0.050 ton.

DES MOINES RIVER BASIN--Continued

EAST FORK HARDIN CREEK NEAR CHURDAN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.04			0	--	0	0.30		
2	.02	28	(t)	0	--	0	.25		
3	.03			0	--	0	.23		
4	.01			.01	--		.31		
5	0		0	.05	--		.27		
6	0		0	.60	15	(t)	.19		
7	0		0	.80	--		.13		
8	0		0	.70	20		.13	3	(t)
9	0		0	1.6	17	.1	.11		
10	0		0	2.0	14	.1	.19		
11	0		0	4.2	15	.2	.27		
12	0		0	2.8	10	.1	.27		
13	0		0	1.7			.23		
14	0		0	1.2	4	(t)	.19		
15	0		0	.70			.01		
16	0		0	.50			.04	--	(t)
17	0		0	.35			.23		
18	0		0	.30	2	(t)	1.5	15	0.1
19	0		0	.24			2.4	11	.1
20	0		0	.18			1.6		
21	0		0	.15			1.3		
22	0		0	1.0	--	(t)	1.0	10	(t)
23	0		0	5.2	--	e .2	1.2		
24	0		0	3.9	2	(t)	.78		
25	0		0	2.4			.45	3	
26	0		0	.50			.40	--	
27	0		0	.40	1	(t)	.35	6	(t)
28	0		0	.35			.31	6	
29	0		0	--	--	--	.23	4	
30	0		0	--	--	--	.19	2	
31	0		0	--	--	--	.19	1	
Total	0.10		(t)	31.83	--	0.9	15.25	--	0.4

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.19	2		0.08	--		3.1	54	e 0.5
2	.19	3		.06	8		2.2	--	
3	.23	2		.06	--		1.9	--	e .3
4	.35	2		.06	--		1.6	70	
5	.45	--	(t)	.06	19	(t)	1.4	31	e .1
6	.35	2		.06	10		1.2	--	
7	.35	--		.01	--		1.3	65	
8	.27	4		.01	46	(t)	1.2	48	
9	.23	--		.04	--		1.2	--	
10	.23	21		.16	--	(t)	1.2	--	e .2
11	.35	--		.23			1.4	--	
12	.27	19	(t)	3.5	100	sa 3.0	1.3	37	
13	.27	--		7.6	75	sa 1.9	6.3	95	sb 13
14	.23	--		5.8	30	.5	176	550	a 260
15	.27	--		3.9	28	b .3	124	300	sa 140
16	.19	--		2.8	--		270	600	sa 500
17	.23	--		3.1	26		150	280	113
18	.19	--	(t)	2.8	--	e .2	118	260	b 85
19	.19	--		2.4	35		86	110	26
20	.19	7		2.2	--		57	64	9.9
21	.13	--		12	130	sa 5.0	37	80	a 8.0
22	.11	--		4.9	36	b .5	43	130	a 15
23	.11	--	(t)	3.1	18	.2	28	90	b 7.0
24	.11	8		2.4	16	b .1	19	80	4.1
25	.11	--		2.9	50	b .4	16	75	3.2
26	.23	11	(t)	2.6	50	.4	13	95	
27	.19	--		1.9	--		11	--	e 2.8
28	.11	5		1.6	42	e .2	10	--	
29	.08	--	(t)	1.6	--		8.4	--	e 1.5
30	.08	--		2.6	80	sb 1.2	7.0		
31	--	--	--	9.0	90	sa 3.2	--	--	--
Total	6.48	--	0.2	79.53	--	18.5	1,198.7	--	1,198.6

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

DES MOINES RIVER BASIN--Continued

EAST FORK HARDIN CREEK NEAR CHURDAN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	6.4	63		0.63	--		0.27	--	(t)
2	5.8	59	e 1.0	.56	--		.95	--	e 0.3
3	5.5	--		.50	--	e 0.1	.50	--	e .1
4	36	200	sa 22	.45	55		.40	--	
5	20	68	3.7	.40	--		.31	--	(t)
6	12	--	e 2.2	.35	--		.31	20	
7	9.6			.31	--		.23	16	
8	7.0	--	e 1.6	.27	29	(t)	.16	--	
9	5.5			.31	--		.11	--	
10	4.9	94	1.2	.31	--		.19	--	
11	4.4			.27	--		.40	16	(t)
12	3.9	--	e 1.0	.23	81		.40	--	
13	2.9			.23	--	e .1	.27	--	
14	2.6			.27	--		.31	17	
15	2.4	--	e .6	.23	--		.31	--	
16	2.3			.16	--		.27		
17	1.9	--		.13	--		.31		
18	1.7	56		.16	72	(t)	.31	--	(t)
19	1.5	--		.13	--		.27		
20	1.4	--	e .3	.16	--		.27		
21	1.6	--		.27	--	(t)	.27	42	(t)
22	1.4	--		.16	--		.20		
23	1.2	--		.16	--		.15	--	(t)
24	1.0			.16	--		.10		
25	.95			.11	--	(t)	.08		
		--	e .2						
26	.95			.06	34		.08		
27	.95			.39	--		.06	--	(t)
28	1.2	87	.3	.56	--		.06		
29	.95			.78	27	(t)	.04		
30	.87	--	e .2	.63	--		.02		
31	.78			.35	32		--	--	--
Total	149.55	--	45.1	9.69	--	1.5	7.61	--	0.7

Total discharge for year (cfs-days) 1,501.72
Total load for year (tons) 1,266.0

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.

PART 6 A. MISSOURI RIVER BASIN ABOVE SIOUX CITY, IOWA

BIG HOLE RIVER BASIN

BIG HOLE RIVER NEAR MELROSE, MONT.

LOCATION.--At gaging station at bridge on U.S. Highway 91, an eighth of a mile downstream from Rock Creek and 8 miles south of Melrose, Madison County.
DRAINAGE AREA.--2,470 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957 (discontinued).
Water temperatures: August 1956 to September 1957 (discontinued).
Sediment records: August 1956 to September 1957 (discontinued).
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 162 ppm Aug. 22 to Sept. 30, 1957; minimum, 64 ppm May 11-21.
Hardness: Maximum, 122 ppm Aug. 22 to Sept. 30, 1957; minimum, 29 ppm May 11-21.
Specific conductance: Maximum daily, 300 micromhos Sept. 16, 1957; minimum daily, 73.8 micromhos May 19.
Water temperatures: Maximum, 68°F July 5; minimum, freezing point on many days during November to January.
Sediment concentrations: Maximum daily, 93 ppm May 4; minimum daily, not determined.
Sediment loads: Maximum daily, 1,700 tons May 21; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Dec. 10 to Mar. 14. Records of discharge for August and September 1956 given in WSP 1439 and for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Aug. 8-31, 1956 a..	399	14	0.00	27	7.0	7.6	2.5	121	16	1.0	0.1	0.2	0.02	142	0.19	153	96	0	14	0.3	223	7.7	3
Sept. 1-30 a.....	303	16	.01	32	7.8	8.5	2.7	138	20	2.0	.1	.1	.02	154	.21	126	112	0	14	.3	257	7.8	4
Oct. 1-31	359	18	.02	29	7.0	8.6	2.6	126	19	1.5	.2	.2	.03	150	.20	145	101	0	15	.4	234	7.6	4
Nov. 1-30.....	440	18	.02	25	5.7	7.8	2.4	108	17	1.5	.2	.2	.02	131	.18	156	86	0	16	.4	217	7.8	5
Dec. 1-31.....	321	18	.00	26	4.9	7.7	2.0	107	16	1.0	.1	.0	.07	133	.18	115	85	0	16	.4	206	7.7	5
Jan. 1-31, 1957....	268	19	.00	26	6.1	8.4	2.6	113	18	1.5	.1	.0	.02	134	.18	97.0	90	0	16	.4	219	7.7	5
Feb. 1-28.....	315	17	.01	23	6.5	8.4	1.7	106	15	1.5	.2	.7	.02	126	.17	107	84	0	17	.4	201	7.6	5
Mar. 1-31.....	372	20	.01	21	5.7	7.9	2.6	98	12	2.0	.2	.1	.02	120	.16	121	76	0	18	.4	185	7.6	5
Apr. 1-10.....	450	20	.02	9.0	11	7.0	3.0	87	14	1.0	.1	.1	.06	116	.16	141	69	0	17	.4	173	7.6	6
Apr. 11-28.....	1,214	17	.07	12	4.1	6.8	3.7	62	10	1.5	.1	.4	.03	96	.13	315	47	0	22	.4	131	7.2	25
Apr. 29-May 5.....	2,659	16	.05	11	2.8	4.7	3.0	51	10	.5	.1	.7	.03	82	.11	589	39	0	19	.3	112	7.1	30
May 6-10.....	4,778	15	.06	9.8	1.8	4.0	2.2	40	9.4	.7	.1	.6	.03	73	.10	942	32	0	20	.3	89.4	6.9	33
May 11-21.....	5,940	15	.05	11	.4	3.5	2.0	36	7.7	.1	.1	.4	.04	64	.09	1,030	29	0	19	.3	77.8	6.9	32
May 22-28.....	5,636	16	.10	11	1.1	4.1	2.2	41	7.1	.3	.1	.5	.03	72	.10	1,100	32	0	20	.3	88.5	6.9	35
May 29-June 5.....	6,301	15	.05	11	1.3	3.3	1.7	42	6.5	.3	.1	.4	.04	67	.09	1,140	33	0	17	.3	81.9	7.2	35
June 6-14	5,584	15	.05	12	2.0	3.7	1.3	51	6.2	.1	.1	.4	.03	71	.10	1,070	38	0	17	.3	95.6	7.2	32
June 15-23	3,121	17	.04	15	3.1	5.1	1.4	67	4.1	.2	.1	.3	.03	85	.12	716	50	0	18	.3	124	7.4	28
June 24-July 6.....	1,721	17	.01	17	4.5	5.8	1.7	80	5.3	.0	.3	.2	.03	99	.13	460	61	0	17	.3	156	7.3	13
July 7-26.....	898	12	.01	21	5.5	6.4	1.7	95	9.0	.0	.0	.0	.02	109	.15	264	75	0	15	.3	176	7.6	14
July 27-Aug. 4.....	585	6.7	.00	22	6.1	6.6	2.3	103	12	.1	.2	.1	.03	112	.15	177	80	0	15	.3	190	7.7	12
Aug. 5-21.....	312	6.9	.00	29	6.7	7.7	2.7	126	13	.4	.2	.1	.03	137	.19	115	100	0	14	.3	233	7.7	14
Aug. 22-Sept. 30...	236	14	.00	35	8.4	9.6	3.1	148	18	3.0	.3	.2	.02	162	.22	103	122	1	14	.4	278	7.5	5
Weighted average b	1,166	16	0.04	15	3.0	5.1	2.1	64	9.0	0.5	0.1	0.4	0.03	88	0.12	276	50	0	17	0.3	126	--	--

a Not included in weighted average.

b Represents 100 percent of runoff for water year October 1956 to September 1957.

BIG HOLE RIVER BASIN--Continued

BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Temperature (° F) of water, August to September 1956
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	August	Day	August	Day	September	Day	September
2	--	17	66	1	57	16	--
3	--	18	--	2	55	17	52
4	--	19	58	3	54	18	52
5	--	20	67	4	56	19	60
6	--	21	58	5	--	20	55
7	--	22	--	6	--	21	50
8	55	23	60	7	57	22	50
9	55	24	57	8	58	23	--
10	56	25	56	9	56	24	49
11	56	26	56	10	55	25	48
12	56	27	57	11	54	26	49
13	58	28	--	12	56	27	49
14	58	29	57	13	47	28	44
15	62	30	57	14	47	29	45
16	62	31	56	15	51	30	--
Average							52

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 1 p.m. and 5 p.m. October to April and between 7 a.m and 11 a.m. May to September/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	35	a 32	33	36	34	38	51	54	--	59	b 59
2	a 45	34	35	34	33	34	40	49	52	59	56	b 59
3	a 47	33	--	34	b 33	34	41	52	55	57	57	67
4	52	35	35	33	36	34	42	52	56	b 67	59	54
5	a 49	35	31	33	34	34	45	--	57	b 68	65	b 65
6	a 41	41	31	33	33	34	44	50	57	59	60	55
7	55	38	32	33	34	a 34	42	50	57	b 67	b 65	58
8	48	41	32	33	33	34	45	53	58	58	57	62
9	a 46	36	31	33	33	34	47	49	54	57	60	b 64
10	a 46	36	35	33	33	34	47	47	57	59	59	b 65
11	48	37	33	33	33	34	44	51	54	b 65	b 67	49
12	50	38	34	34	33	34	40	49	54	60	58	b 62
13	47	37	33	33	a 33	34	41	49	53	60	57	b 60
14	a 39	32	33	32	a 34	34	44	--	50	57	b 67	52
15	50	32	a 32	32	a 35	34	41	47	49	57	56	--
16	52	32	32	32	34	35	--	47	b 49	59	58	b 60
17	a 47	36	32	32	34	38	44	47	b 53	57	58	b 59
18	49	a 31	34	32	34	38	a 40	51	54	55	--	--
19	44	31	32	33	33	37	43	48	55	58	b 67	b 47
20	49	33	34	33	33	--	a 40	47	51	58	60	45
21	--	33	32	34	33	--	b 44	b 45	b 53	59	57	b 55
22	42	a 32	33	33	33	--	a 42	44	53	59	60	--
23	a 37	33	32	33	34	--	a 43	48	53	56	56	47
24	40	33	33	33	34	--	43	b 55	55	59	b 65	50
25	37	33	a 31	33	34	--	41	52	55	60	55	51
26	41	32	33	33	a 34	--	45	51	54	59	b 62	52
27	40	33	34	33	35	--	a 40	55	57	59	b 65	52
28	40	33	34	33	36	a 38	a 42	b 53	64	61	56	52
29	37	a 31	34	33	--	39	57	52	66	62	b 56	b 54
30	38	34	--	33	--	a 38	a 51	53	57	61	55	54
31	35	--	33	36	--	40	--	53	--	60	55	--
Average	45	35	33	33	34	--	43	50	55	59	60	56

a Measurement between 7 a.m. and 11 a.m.
b Measurement between 4 p.m. and 8 p.m.

BIG HOLE RIVER BASIN--Continued

BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, August to September 1956

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				676			362		
2				639			342		
3				618			330		
4				590			322		
5				572	--	e 20	314		
6				566			306		
7				566			306		
8				560			318	5	4
9				518			318		
10				536	13	18	306		
11				536			306		
12				512			310		
13				482			310		
14				455			302		
15				445			294		
16				435			290		
17				420			290		
18				400			286		
19				370			286		
20				346			283		
21				330			280		
22				318	8	8	286		
23				310			286	4	3
24				306			294		
25				298			290		
26				302			290		
27				318			286		
28				334			286		
29				330			298		
30				354			306		
31				362			--	--	--
Total				13,804	--	392	9,083	--	105

Total discharge for period Aug. 1 to Sept. 30, 1956 (cfs-days) 22,887
Total load for period Aug. 1 to Sept. 30, 1956 (tons) 497

e Estimated.

BIG HOLE RIVER BASIN--Continued

BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	310			465			354		
2	314			370			362		
3	314			354			405		
4	306			385			405		
5	298			470			310		
6	298			548			240		
7	306			578			200		
8	310			554			200		
9	314			578			220		
10	318			554			250		
11	326			572			350		
12	330			560			380		
13	334			572			380		
14	342			488			370		
15	342			395	5	6	370		
16	346	4	4	375			370	4	3
17	350			482			360		
18	354			455			360		
19	358			346			360		
20	370			298			300		
21	362			354			260		
22	370			435			250		
23	375			415			260		
24	385			405			280		
25	385			410			300		
26	405			380			320		
27	465			354			340		
28	470			350			350		
29	455			346			350		
30	450			354			340		
31	482			--		--	340		
Total	11,144		124	13,202		180	9,936		93

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	340			240			420		
2	320			240			410		
3	300			240			400		
4	300			250			380		
5	300			260			360		
6	300			260			370	14	15
7	300			270			390		
8	290			270			420		
9	290			280			420		
10	290			280			410		
11	300			290			360		
12	310			300			350		
13	310			310			350		
14	300			310			360		
15	280			320	7	6	362	12	12
16	270	4	3	340			362		
17	270			350			366		
18	260			350			350		
19	260			340			354		
20	280			300			358		
21	280			300			385		
22	260			300			338		
23	240			320			346		
24	200			360			338		
25	190			400			358		
26	180			440			334	6	6
27	190			450			354		
28	200			440			354		
29	210			--		--	375		
30	220			--		--	385		
31	230			--		--	415		
Total	8,310		93	8,810		168	11,534	--	336

BIG HOLE RIVER BASIN--Continued

BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	435			2,330	68	428	6,220	32	537
2	405			2,680	68	492	6,610	40	714
3	440			2,800	60	454	7,000	40	756
4	425			3,400	93	854	7,070	33	630
5	435	6	7	3,880	--	e 1,000	7,220	32	624
6	455			4,600	90	1,120	7,020	33	625
7	445			4,460	48	578	6,660	30	539
8	465			4,420	40	477	6,320	20	341
9	488			5,170	65	907	6,710	27	490
10	506			5,240	51	722	6,240	23	388
11	646			5,360	50	724	5,390	19	276
12	692	12	24	5,290	30	428	4,460	17	205
13	785			5,270	32	455	3,880	18	189
14	848			5,960	49	788	3,580	14	135
15	950			6,110	52	858	3,520		
16	1,030	--	e 40	5,960	32	515	3,460		
17	1,080	31	90	5,460	21	310	3,440		
18	1,110	30	90	5,150	18	250	3,290		
19	1,230	37	123	5,340	22	317	2,900	12	99
20	1,460	68	268	7,350	79	1,570	2,700		
21	1,650	58	258	8,090	78	1,700	2,990		
22	1,710	56	259	8,060	61	1,330	2,970		
23	1,820	65	319	6,920	30	561	2,820		
24	1,860	49	246	5,960	23	370	2,460		
25	1,580	22	94	5,120	23	318	2,140		
26	1,250	18	61	4,510	20	244	1,900		
27	1,050	13	37	4,330	20	234	1,850	6	30
28	1,110	14	42	4,550	20	246	1,900		
29	1,500	35	142	4,980	23	309	1,810		
30	2,020	70	382	5,440	24	353	1,690		
31	--	--	--	5,870	26	412	--	--	--
Total	29,880	--	2,658	160,060	--	19,324	126,220	--	7,619

Day	July			August			September		
1	1,620			560			213		
2	1,530			506			219		
3	1,450			465			225		
4	1,440			450			228		
5	1,340			425			228		
6	1,240			425			228		
7	1,140			415			237		
8	1,120			395			231		
9	1,060			370			216		
10	1,020			358			210		
11	980			338			216		
12	920			314			213		
13	893			286			207		
14	893			280			207		
15	920			269			213		
16	893	3	8	262	5	4	213	5	3
17	848			252			219		
18	803			243			240		
19	785			234			276		
20	794			222			306		
21	794			210			322		
22	830			182			318		
23	848			188			318		
24	830			180			314		
25	821			175			306		
26	767			180			306		
27	716			178			298		
28	684			182			294		
29	668			188			286		
30	618			195			283		
31	597			201			--		--
Total	29,862		248	9,128		124	7,590		90

Total discharge for year (cfs-days) 425,676

Total load for year (tons) 31,057

e Estimated.

BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 6, 1957	5:15 p.m.	4,710	54	70							70	78	88		100		VWCM
May 22	10:20 a.m.	8,240	46	50							92	94	96		99	100	VWCM
June 5	2:10 p.m.	7,440	63	34	201		24		38		63	72	86		100		VBWCM

GALLATIN RIVER BASIN

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.

LOCATION.--At Williams Bridge, 3½ miles downstream from gaging station, 4 miles downstream from Spanish Creek, and 4 miles south of Gallatin Gateway, Gallatin County.
DRAINAGE AREA.--828 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957 (discontinued).
Water temperatures: August 1956 to September 1957 (discontinued).
Sediment records: August 1956 to September 1957 (discontinued).
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 212 ppm Feb. 1-28; minimum, 89 ppm May 29 to June 13.
Hardness: Maximum, 155 ppm Jan. 1-31; minimum, 61 ppm May 29 to June 13.
Specific conductance: Maximum daily, 346 micromhos Nov. 20, Feb. 20; minimum daily, 120 micromhos June 9.
Water temperatures: Maximum, 69°F Aug. 13, 1957; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 510 ppm June 3; minimum daily, not determined.
Sediment loads: Maximum daily, 7,120 tons June 3; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Nov. 22, 23, Jan. 22 to Feb. 5, Feb. 21-23. No appreciable inflow between gaging station and sampling station except during periods of intense local precipitation. Several diversions for irrigation between gaging station and sampling station. Records of discharge for August and September 1956 given in WSP 1439 and for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Aug. 9-31, 1956 a..	485	14	0.01	34	11	3.7	1.2	122	36	0.0	0.1	0.0	0.01	159	0.22	208	129	29	6	0.1	267	7.9	3
Sept. 1-30 a.....	423	16	.00	36	11	4.2	1.2	126	38	.5	.2	.0	.04	168	.23	192	134	31	6	.2	279	7.9	4
Oct. 1-31	376	13	.03	38	11	3.8	1.8	129	43	.0	.2	.1	.03	182	.25	185	141	35	6	.1	288	7.8	3
Nov. 1-30	323	15	.01	40	12	4.1	1.8	134	48	.0	.2	.2	.03	185	.25	161	148	38	6	.1	304	7.9	2
Dec. 1-31.....	300	16	.01	39	12	4.4	1.4	134	50	.5	.4	.1	.00	189	.26	153	148	38	6	.2	308	7.7	3
Jan. 1-31, 1957 ...	287	15	.03	39	14	4.3	2.0	134	54	.5	.3	.2	.05	196	.27	152	155	45	6	.2	318	8.0	1
Feb. 1-28.....	282	15	.00	42	12	4.1	1.3	134	55	.2	.3	.0	.00	212	.29	161	154	44	5	.1	319	7.9	5
Mar. 1-31.....	273	15	.00	40	13	4.7	1.7	134	48	.7	.4	.0	.03	194	.26	143	154	44	6	.2	318	7.8	4
Apr. 1-28.....	308	16	.01	41	11	4.2	2.1	131	49	.2	.4	.2	.02	194	.26	161	149	42	6	.1	310	7.4	5
Apr. 29-May 7.....	834	16	.02	29	7.2	4.0	2.0	102	28	.7	.2	.5	.03	143	.19	322	102	18	8	.2	220	7.4	10
May 8-28.....	1,854	14	.02	24	5.6	3.3	1.4	88	18	.6	.2	.4	.02	118	.16	591	83	11	8	.2	176	7.3	10
May 29-June 13....	4,273	12	.03	20	2.7	1.8	1.0	72	11	.2	.1	.3	.01	89	.12	1,030	61	2	6	.1	133	7.0	10
June 14-26	2,391	12	.02	20	4.6	2.3	1.0	76	15	.5	.1	.2	.01	100	.14	646	69	7	7	.1	151	7.2	6
June 27-July 14	1,913	12	.01	20	4.6	2.5	1.3	74	14	.1	.0	.0	.01	92	.13	475	69	8	7	.1	150	7.3	9
June 15-24	1,045	14	.01	25	6.7	3.0	1.5	94	20	.0	.1	.0	.01	115	.16	324	90	13	7	.1	191	7.5	4
July 25-Aug. 24....	624	16	.00	32	8.3	3.6	1.5	113	29	.2	.2	.0	.02	148	.20	249	114	21	6	.1	247	7.9	6
Aug. 25-Sept. 30...	475	14	.00	36	11	4.1	1.6	124	37	1.0	.3	.1	.02	160	.22	205	134	32	6	.2	273	7.6	0
Weighted average b.....	801	13	0.02	27	6.7	3.0	1.4	96	25	0.3	0.2	0.2	0.02	128	0.17	277	95	16	6	0.1	202	--	--

a Not included in weighted average.
b Represents 100 percent of runoff for water year October 1956 to September 1957.

GALLATIN RIVER BASIN--Continued

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.--Continued

Temperature (° F) of water, August to September 1956
(Once-daily measurement between 7 a.m. and 11 a.m.)

Day	August	Day	August	Day	September	Day	September
2	--	17	55	1	50	16	52
3	--	18	55	2	52	17	52
4	--	19	54	3	47	18	48
5	--	20	52	4	47	19	50
6	--	21	54	5	46	20	49
7	--	22	53	6	47	21	50
8	--	23	--	7	47	22	45
9	53	24	54	8	51	23	--
10	53	25	52	9	50	24	44
11	52	26	54	10	51	25	44
12	52	27	50	11	49	26	46
13	52	28	52	12	--	27	48
14	53	29	48	13	52	28	46
15	57	30	48	14	49	29	43
16	57	31	46	15	49	30	44
Average							48

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 11 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	43	32	33	33	--	a 38	a 35	48	44	52	59	--
2	45	32	36	a 33	--	a 40	a 45	45	47	52	54	a 58
3	44	a 32	40	a 33	--	34	39	43	43	49	52	--
4	44	34	a 33	a 32	--	34	38	45	45	46	54	--
5	50	35	a 32	32	--	32	39	--	45	52	61	a 63
6	44	36	32	32	--	a 35	--	--	a 51	a 56	--	--
7	44	35	a 32	a 32	32	35	35	44	44	--	56	a 64
8	44	34	a 32	32	33	37	39	43	46	a 59	a 64	52
9	42	38	32	a 32	33	40	38	41	46	55	57	49
10	46	37	33	a 32	--	35	39	42	45	58	65	49
11	46	39	a 33	32	34	33	37	44	44	a 61	54	52
12	45	41	34	32	34	35	--	44	46	54	56	53
13	44	39	a 37	32	a 34	32	36	44	45	a 62	a 69	51
14	42	a 35	36	32	36	32	40	44	44	56	a 59	a 56
15	42	a 33	a 34	32	34	34	38	43	44	a 63	--	47
16	42	32	--	32	32	36	37	44	44	54	--	--
17	43	33	a 34	a 32	32	35	41	42	44	56	57	a 54
18	44	32	35	32	--	34	40	47	45	55	55	47
19	42	a 36	34	32	32	35	38	44	47	55	55	a 44
20	40	36	33	32	32	35	41	42	47	54	54	a 43
21	42	a 34	32	32	32	36	44	37	48	56	--	a 49
22	38	34	32	a 32	a 32	--	42	42	a 49	59	--	43
23	42	34	32	a 32	--	a 40	43	43	48	56	56	a 56
24	38	36	32	a 32	38	a 39	41	--	48	52	56	a 57
25	36	34	32	a 32	36	a 38	39	--	48	54	53	a 55
26	38	a 34	a 33	a 32	a 38	33	39	46	48	53	54	46
27	38	33	32	a 32	37	36	38	--	a 51	54	59	53
28	34	34	a 33	a 32	37	39	46	46	a 51	54	--	a 59
29	33	32	33	32	--	40	47	44	50	56	50	48
30	33	a 36	33	--	--	41	45	46	51	a 63	54	49
31	35	--	34	--	--	39	--	45	--	57	52	--
Average	41	35	33	32	--	36	40	44	46	55	57	52

a Measurement between 12 m. and 5 p.m.

GALLATIN RIVER BASIN--Continued

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.--Continued

Suspended sediment, August to September 1956

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				646			466		
2				625			449		
3				604			432		
4				590			438		
5				576			432		
6				562			427		
7				576			422		
8				569			427		
9				541			444		
10				534			454		
11				534			460		
12				520			466		
13				508			490		
14				490			444		
15				502			427		
					7	10		5	6
16				502			416		
17				490			405		
18				478			405		
19				478			400		
20				472			395		
21				466			416		
22				454			405		
23				449			395		
24				449			395		
25				449			395		
26				444			385		
27				449			380		
28				460			405		
29				460			405		
30				527			395		
31				496			--		--
Total				15,900		310	12,675		180

Total discharge for period Aug. 1 to Sept. 30, 1956 (cfs-days)..... 28,575
Total load for period Aug. 1 to Sept . 30, 1956 (tons)..... 490

GALLATIN RIVER BASIN--Continued

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	405			349			301		
2	395			305			317		
3	390			313			329		
4	390			375			325		
5	395			385			278		
6	380			375			271		
7	375			375			289		
8	375			353			271		
9	370			370			264		
10	365			361			301		
11	365			365			317		
12	365			361			317		
13	370			365			329		
14	385			333			325		
15	380			289			313		
16	380	5	5	337	4	3	317	3	2
17	370			365			301		
18	370			341			309		
19	375			289			309		
20	370			247			289		
21	370			268			293		
22	357			280			289		
23	380			290			282		
24	380			293			297		
25	357			289			289		
26	370			282			293		
27	390			278			301		
28	370			293			293		
29	360			282			285		
30	353			282			297		
31	395			--		--	301		
Total	11,652		155	9,690		90	9,292		62

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	297			285			264		
2	293			290			260		
3	282			290			271		
4	271			295			278		
5	264			300			274		
6	282			305	4	3	274		
7	289			301			274		
8	289			309			282		
9	289			293			293		
10	289			282			289		
11	289			285			264		
12	305			289	11	9	268		
13	317			289	29	23	271		
14	309			285	29	22	250		
15	289			282	16	12	254		
16	274	3	2	271			264	5	4
17	271			264			264		
18	282			264			264		
19	293			260			264		
20	305			257			278		
21	301			255			285		
22	295			255	5	4	271		
23	290			265			260		
24	280			285			260		
25	280			293			264		
26	280			289			274		
27	280			289			271		
28	280			278			274		
29	280			--	--	--	285		
30	280			--	--	--	317		
31	285			--	--	--	301		
Total	8,910		62	7,905	--	151	8,462		124

GALLATIN RIVER BASIN--Continued

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	297			542	28	41	3,900	314	3,310
2	278			653	55	97	4,300	314	3,650
3	297			692	40	75	5,170	510	7,120
4	289			874	60	142	5,240	357	5,050
5	293			1,140	100	308	5,260	323	4,590
6	297			1,300	113	397	5,070	246	3,370
7	285			1,450	122	478	5,210	272	3,830
8	297	6	5	1,630	162	713	5,120	221	3,060
9	293			1,780	162	779	4,980	204	2,740
10	297			1,700	82	376	4,190	136	1,540
11	289			1,760	95	451	3,490	89	839
12	285			1,880	119	604	3,370	85	773
13	289			1,920	108	560	3,090	71	592
14	301			2,320	217	1,360	2,640	58	413
15	329	11	10	2,030	92	504	2,380	54	347
16	309	11	9	1,860	65	326	2,310	33	206
17	317	12	10	1,750	55	260	2,180	34	200
18	301	14	9	1,800	54	262	2,070	34	190
19	333	11	10	1,940	69	361	2,280	58	357
20	317	7	6	2,090	98	553	2,610	94	662
21	337	10	9	1,870	87	439	2,950	128	1,020
22	349	17	16	1,660	31	139	2,540	54	370
23	357	21	20	1,570	27	114	2,300	37	230
24	337	12	11	1,500	26	105	2,340	28	177
25	317	8	7	1,540	26	108	2,320	24	150
26	313	7	6	1,680	39	177	2,160	27	157
27	293	7	6	2,050	144	797	2,440	37	244
28	329	8	7	2,610	272	1,920	2,490	37	249
29	385	12	12	3,080	272	2,260	2,440	37	244
30	470	18	23	3,320	255	2,290	2,420	30	196
31	--	--	--	3,580	255	2,460	--	--	--
Total	9,480	--	241	55,571	--	19,456	99,260	--	45,876

Day	July			August			September		
1	2,640	64	456	712			563		
2	2,480	81	542	693			526		
3	2,210	30	179	674			508		
4	1,980	20	107	660			514		
5	1,820	18	88	648			496		
6	1,780			641			484		
7	1,700			628			479		
8	1,600			615			462		
9	1,540			602			462		
10	1,470			582			468		
11	1,440			570			462		
12	1,420	11	40	563			457		
13	1,320			550			479		
14	1,250			544			468		
15	1,200			532			452		
16	1,100			532	5	8	446	4	5
17	1,060			526			440		
18	1,030			520			446		
19	1,160			508			474		
20	1,130	70	214	502			479		
21	1,030	32	89	496			479		
22	954			508			479		
23	906			532			474		
24	875			508			457		
25	838			502			440		
26	808	10	22	496			430		
27	794			502			420		
28	773			496			415		
29	766			508			410		
30	780			538			410		
31	738			544			--		--
Total	40,592	--	2,455	17,432		248	13,979		150

Total discharge for year (cfs-days) 292,225

Total load for year (tons) 69,070

GALLATIN RIVER AT WILLIAMS BRIDGE, NEAR GALLATIN GATEWAY, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 7, 1957.....	11:30 a.m.	1,410	45	156	1,440		47		69		94	98	100		--	--	VBWCM
May 21	4:25 p.m.	1,820	38	39	243		21		36		82	90	97		99	100	VBWCM
June 4.....	6:25 p.m.	4,870	52	266	1,600		20		33		70	80	89		97	100	VBWCM

GALLATIN RIVER AT LOGAN, MONT.

LOCATION.--At gaging station at highway bridge, half a mile west of Logan, Gallatin County, and 5 miles upstream from mouth.
DRAINAGE AREA.--1,805 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957 (discontinued).
Water temperatures: August 1956 to September 1957 (discontinued).
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 268 ppm July 22 to Aug. 27, 1957; minimum, 124 ppm June 5-10.
Hardness: Maximum, 196 ppm Oct. 1-31, 1956, Aug. 28 to Sept. 30, 1957; minimum, 92 ppm June 5-10.
Specific conductance: Maximum daily, 443 micromhos Jan. 26; minimum daily, 187 micromhos June 5, 6.
Water temperatures: Maximu, 72°F July 22; minimum, freezing point Dec. 8, Jan. 6, 29.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Aug. 8-31, 1956 a.	459	25	0.01	52	16	12	3.8	228	29	4.5	0.1	0.8	0.05	256	0.35	317	194	7	12	0.4	414	8.0	4
Sept. 1-30 a	562	23	.01	49	18	12	3.4	224	31	3.5	.1	1.0	.04	257	.35	390	195	11	12	.4	410	7.9	4
Oct. 1-31	524	21	.04	53	16	12	3.5	228	31	4.0	.2	.7	.06	252	.34	357	196	9	11	.4	414	7.8	5
Nov. 1-30	794	23	.01	53	15	11	2.8	210	36	3.5	.2	1.9	.06	246	.33	527	192	20	11	.3	404	7.9	7
Dec. 1-31	746	22	.00	52	14	11	3.0	208	36	3.0	.2	1.2	.10	240	.33	483	188	17	11	.4	399	7.8	2
Jan. 1-31, 1957	539	21	.05	53	15	11	2.6	208	38	4.0	.3	2.2	.04	252	.34	367	192	21	11	.3	403	7.9	13
Feb. 1-28	645	21	.00	51	14	8.0	2.8	198	42	3.3	.2	1.6	.02	240	.33	418	185	23	8	.3	388	8.0	5
Mar. 1-31	746	21	.00	51	14	9.1	3.0	202	33	3.8	.3	1.5	.05	236	.32	475	186	20	10	.3	392	7.8	5
Apr. 1-29	757	22	.01	30	28	9.8	3.4	206	36	4.0	.3	1.7	.05	251	.34	513	189	20	10	.3	400	7.8	3
Apr. 30-May 5	974	19	.00	48	12	7.4	2.3	186	32	2.0	.3	2.0	.04	217	.30	571	170	17	8	.2	358	7.4	6
May 6-28	1,703	17	.00	37	9.1	5.4	1.7	142	22	.0	.3	.6	.03	166	.23	763	130	14	8	.2	275	7.3	8
May 29-June 4	3,140	16	.01	31	6.2	3.7	1.5	116	15	.0	.2	.5	.03	137	.19	1,160	103	8	7	.2	219	7.5	10
June 5-10	4,388	14	.01	27	6.0	3.4	1.8	104	13	.1	.2	.3	.02	124	.17	1,470	92	7	7	.2	193	7.6	10
June 11-30	2,596	17	.01	33	7.9	4.8	2.0	130	16	.1	.2	.8	.02	149	.20	1,040	115	8	8	.2	247	7.7	8
July 1-10	1,781	17	.00	33	8.6	5.3	1.8	133	18	.6	.2	.2	.04	149	.20	716	118	9	9	.2	253	7.7	9
July 11-21	557	22	.00	46	13	9.5	3.3	196	26	2.3	.2	.3	.04	223	.30	335	168	7	11	.3	360	8.0	8
July 22-Aug. 27	380	27	.00	52	16	13	4.2	225	33	4.4	.3	1.1	.05	268	.36	275	194	9	13	.4	418	8.1	8
Aug. 28-Sept. 30	578	23	.00	54	15	12	4.0	224	29	4.5	.3	1.0	.02	253	.34	395	196	12	11	.4	415	7.6	5
Weighted average b	948	20	0.01	42	12	7.8	2.6	172	27	2.1	0.2	1.0	0.04	201	0.27	514	155	14	10	0.3	328	--	--

a Not included in weighted average.
b Represents 100 percent of runoff for water year October 1956 to September 1957.

GALLATIN RIVER BASIN--Continued

GALLATIN RIVER AT LOGAN, MONT.--Continued

Temperature (° F) of water, August to September 1956
(Once-daily measurement between 11 a.m. and 3 p.m.)

Day	August	Day	August	Day	September	Day	September
2	--	17	66	1	60	16	56
3	--	18	65	2	58	17	56
4	--	19	64	3	56	18	58
5	--	20	64	4	57	19	60
6	--	21	66	5	56	20	--
7	--	22	66	6	58	21	56
8	66	23	65	7	56	22	54
9	66	24	64	8	64	23	56
10	65	25	65	9	58	24	57
11	64	26	64	10	56	25	56
12	64	27	63	11	58	26	58
13	--	28	60	12	62	27	54
14	64	29	--	13	56	28	54
15	64	30	54	14	--	29	54
16	66	31	60	15	55	30	54
Average							57

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 11 a.m. and 3 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	41	40	35	34	40	42	56	56	60	68	59
2	56	38	36	34	34	40	42	55	56	61	67	58
3	55	36	42	34	34	38	44	58	56	59	68	58
4	54	39	34	33	33	38	44	56	56	57	70	64
5	55	38	33	34	34	35	46	59	61	64	71	62
6	54	42	34	32	34	34	44	55	55	64	70	61
7	58	42	34	34	34	38	44	54	56	63	68	63
8	52	41	32	33	33	39	46	53	56	62	68	59
9	--	38	33	33	34	40	46	48	55	64	71	57
10	53	44	35	33	34	38	43	52	53	66	69	55
11	53	44	35	34	34	--	43	50	55	68	68	59
12	53	--	36	34	--	38	42	52	54	65	67	58
13	51	--	40	34	34	40	44	53	52	67	68	59
14	50	38	36	33	35	38	46	48	52	67	66	59
15	46	38	38	34	36	37	46	50	--	68	66	59
16	--	--	--	33	34	40	46	53	48	70	67	59
17	52	41	37	33	36	38	46	55	52	69	68	59
18	52	37	--	34	34	44	46	55	57	68	69	51
19	--	36	38	33	33	42	47	54	56	67	64	46
20	--	34	36	34	33	43	49	48	55	69	63	48
21	48	35	38	34	--	44	50	46	54	--	66	51
22	43	38	35	34	33	44	50	--	56	72	66	--
23	--	39	38	33	34	--	47	--	57	69	67	55
24	46	37	36	33	34	43	46	58	56	67	65	54
25	--	34	34	33	41	42	45	--	56	68	62	56
26	46	36	35	33	40	44	47	--	54	68	64	59
27	--	36	37	33	36	42	46	--	58	68	63	57
28	--	35	40	33	38	44	54	59	60	70	59	59
29	40	36	34	32	--	44	55	60	60	67	57	58
30	40	34	--	--	--	44	56	58	62	--	59	60
31	42	--	36	33	--	44	--	55	--	--	60	--
Average	--	38	36	33	35	41	46	54	56	66	66	57

MARIAS RIVER BASIN

TETON RIVER NEAR CHOTEAU, MONT.

LOCATION.--Lat 47°47', long 112°9', in sec. 5, T. 23 N., R. 4 W., at bridge on U. S. Highway 89, 3½ miles southeast of Choteau, Teton County.
RECORDS AVAILABLE.--Chemical analyses: August 1955 to October 1957 (discontinued).
REMARKS.--No discharge records available for this station.

Chemical analyses, in parts per million, October 1956 to October 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 2, 1956.....		--	--	--	--	19	--	--	--	--	--	--	--	--	--		254	--	14	0.5	534	--	--
Nov. 7.....		8.4	0.00	62	26	27	1.3	296	72	2.5	0.4	0.7	0.05	345	0.47		262	19	18	.7	578	8.1	4
Dec. 5.....		8.2	.00	61	33	21	1.0	316	72	3.0	.4	.5	.07	356	.48		289	30	14	.5	602	7.8	4
Jan. 2, 1957.....		--	--	--	--	26	--	--	--	--	--	--	--	--	--		260	--	18	.7	579	--	--
Feb. 4.....		--	--	--	--	17	--	283	--	--	--	--	--	--	--		265	33	12	.5	543	7.9	--
Mar. 6.....		--	--	--	--	20	--	273	--	--	--	--	--	--	--		247	23	15	.6	523	8.0	--
Apr. 3.....		--	--	--	--	24	--	a 273	--	--	--	--	--	324	.44		245	22	18	.7	542	8.3	--
May 8.....		--	--	29	32	14	--	215	46	.4	--	--	--	235	.32		204	28	13	.4	406	8.1	--
May 22.....		9.1	.02	29	32	21	2.0	239	60	1.3	.3	.2	.03	286	.39		206	10	18	.6	477	8.2	10
June 6.....		--	--	--	--	12	--	218	36	.7	--	--	--	226	.31		185	6	12	.4	395	7.8	--
June 19.....		--	.00	59	22	20	--	268	--	--	--	--	.05	297	.40		236	16	16	.6	505	7.6	--
July 2.....		--	.00	50	19	16	--	233	--	--	--	--	.05	237	.32		205	14	15	.5	427	7.9	--
Aug. 6.....		--	.00	57	23	20	--	253	--	--	--	--	.05	307	.42		238	31	15	.6	517	7.7	--
Sept. 7.....		--	--	--	--	22	--	262	60	1.3	--	--	--	293	.40		228	13	17	.6	503	7.8	--
Oct. 1.....		--	--	--	--	25	--	283	73	.8	--	--	--	329	.45		257	25	17	.7	556	8.1	--

a Includes equivalent of 4 ppm of carbonate (CO_3).

GREENFIELD-PRIEST BUTTE LAKE DRAIN NEAR CHOTEAU, MONT.

LOCATION.--Lat 47°47', long 112°07', in N½ sec. 4, T. 23 N., R. 4 W., at outlet pipe of drain, 4 miles southeast of Choteau, Teton County.
RECORDS AVAILABLE.--Chemical analyses: August 1955 to October 1957 (discontinued).
REMARKS.--No discharge records available for this station.

Chemical analyses, in parts per million, October 1956 to October 1957

Date of collection	Estimated discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180° C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
Oct. 2, 1956	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12,000	--	--
Nov. 7	.1	6.5	0.00	455	478	390	12	348	0	3,550	28	0.6	3.1	0.59	5,580	5,090	7.59	3,100	2,820	21	3.0	5,240	7.8	13
Jan. 2, 1957	.1	7.2	.02	493	255	192	9.3	320	0	2,280	14	.4	2.2	.46	3,800	3,410	5.17	2,280	2,020	15	1.7	3,720	7.7	4
Apr. 3	--	2.0	.01	150	587	1,460	14	427	0	5,200	204	.9	.3	1.8	8,720	7,830	11.9	2,790	2,440	53	12	8,680	7.9	10
May 8	--	--	--	--	--	1,940	--	550	10	6,310	208	--	--	--	9,630	--	13.1	2,980	2,510	59	16	10,200	8.2	--
May 22	--	--	--	--	--	1,860	--	554	0	6,060	266	--	--	--	10,000	--	13.6	3,210	2,760	56	14	10,200	8.1	--
June 6	--	3.3	.03	149	663	1,990	18	558	4	6,250	291	1.2	1.3	1.3	10,100	9,650	13.7	3,100	2,640	58	16	10,500	8.3	11
June 19	--	--	.00	70	614	1,770	--	498	18	5,510	288	--	--	.97	8,990	--	12.2	2,700	2,260	58	15	9,770	8.4	--
July 2	--	--	.00	50	607	1,810	--	431	33	5,560	304	--	--	--	8,940	--	12.2	2,620	2,210	59	15	9,790	8.6	--
Aug. 6	--	--	.06	99	803	2,180	--	339	62	7,330	340	--	--	--	11,600	--	15.8	3,550	3,170	56	16	12,000	8.9	--
Sept. 7	--	--	--	--	--	1,660	--	384	51	5,270	279	--	--	--	8,150	--	11.1	2,340	1,940	58	15	8,870	8.8	--
Oct. 1	--	--	--	--	--	1,930	--	473	43	5,960	431	--	--	--	9,340	--	12.7	2,600	2,140	58	16	10,000	8.6	--

MARIAS RIVER BASIN--Continued

TETON RIVER NEAR DUTTON, MONT.

LOCATION.--At gaging station at Kerr Bridge, 1 mile downstream from Hunt Coulee and 10 miles northeast of Dutton, Teton County.
RECORDS AVAILABLE.--Chemical analyses: August 1954 to September 1957 (discontinued).
Water temperatures: August 1954 to September 1957 (discontinued).
Sediment records: August 1954 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,890 ppm Apr. 28 to May 5; minimum, 320 ppm Dec. 10-12.
Hardness: Maximum, 738 ppm Apr. 28 to May 5; minimum, 226 ppm Dec. 10-12.
Specific conductance: Maximum daily, 2,680 micromhos May 2; minimum daily, 540 micromhos Dec. 12.
Water temperatures: Minimum, freezing point on many days during October to March.
Sediment concentrations: Maximum daily, 6,270 ppm May 22; minimum daily, not determined.
Sediment loads: Maximum daily, 16,800 tons May 22; minimum daily, not determined.
EXTREMES, 1954-57.--Dissolved solids: Maximum, 5,190 ppm Sept. 7-8, 1954; minimum, 320 ppm Dec. 10-12, 1956.
Hardness: Maximum, 1,970 ppm Sept. 7-8, 1954; minimum, 226 ppm Dec. 10-12, 1956.
Specific conductance: Maximum daily, 6,090 micromhos Sept. 15, 1954; minimum daily, 540 micromhos Dec. 12, 1956.
Water temperatures: Maximum (1954-55), 78°F July 15, 16, 1955; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 6,270 ppm May 22, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 16,800 tons May 22, 1957; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Oct. 29 to Nov. 5, Nov. 16 to Mar. 23. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-2, 1956..	75.0	--	--	68	74	137	--	a 298	460	20	--	--	0.14	1,010		1.37	205	474	230	39	2.7	1,400	8.3	--
Oct. 3-13	64.5	--	--	68	43	54	--	b 310	195	5.5	--	--	.09	541		.74	94.2	346	92	25	1.3	829	8.3	--
Oct. 14-16	61.7	--	--	71	51	78	--	284	305	12	--	--	.10	686		.93	114	388	155	30	1.7	1,010	8.2	--
Oct. 17-31	63.5	--	--	43	42	61	--	216	243	7.5	--	--	.06	521		.71	89.3	279	102	30	1.6	801	8.2	--
Nov. 1-Dec. 3..	83.8	6.9	0.00	63	38	48	1.8	280	177	5.5	0.5	1.4	.04	479		.65	108	312	82	25	1.2	756	8.1	3
Dec. 4-9.....	49.2	--	--	72	47	61	--	328	230	6.5	--	--	.09	588		.80	78.1	374	105	26	1.4	887	8.2	--
Dec. 10-12.....	56.7	--	--	49	25	29	--	210	113	3.0	--	--	.06	320		.44	49.0	226	54	21	.8	550	8.1	--
Dec. 13-16.....	80.0	--	--	81	43	50	--	356	178	5.0	--	--	.09	562		.76	121	380	88	22	1.1	853	8.2	--
Dec. 17-31.....	95.7	7.1	.00	71	36	41	1.7	303	153	4.5	.4	1.7	.07	471		.64	122	326	78	21	1.0	743	8.1	4
Jan. 1-7, 1957..	66.4	--	--	43	51	46	--	300	169	4.5	--	--	.05	496		.67	88.9	316	70	23	1.1	770	8.2	--
Jan. 8-13	42.5	--	--	72	51	59	--	336	230	6.0	--	--	.07	624		.85	71.6	388	112	25	1.3	908	8.1	--
Jan. 14-Feb. 2.	32.3	--	--	75	44	47	--	322	193	6.0	--	--	.06	560		.76	48.8	366	102	22	1.1	840	8.0	--
Feb. 3-25.....	35.7	--	--	78	40	44	--	312	191	5.5	--	--	.05	543		.74	52.3	360	104	21	1.0	821	8.1	--
Feb. 26-Mar. 2.	226	8.4	.02	51	29	44	5.9	212	146	5.6	.4	2.1	.09	418		.57	255	248	74	27	1.2	646	7.9	38
Mar. 3-31.....	185	8.7	.00	56	36	49	3.5	256	161	6.0	.4	1.1	.07	460		.63	230	288	78	27	1.3	718	8.0	15
Apr. 1-6.....	155	--	--	72	72	144	--	292	490	19	--	--	.14	968		1.32	405	476	237	40	2.9	1,370	8.0	--
Apr. 7-27.....	164	--	--	78	112	244	--	357	790	33	--	--	.19	1,520		2.07	673	655	362	45	4.1	2,060	8.0	--
Apr. 28-May 5..	122	--	--	78	132	310	--	345	1,070	44	--	--	.27	1,890		2.57	623	738	455	46	5.0	2,450	8.1	--
May 6-17	173	--	--	72	89	200	--	298	696	30	.4	1.1	.20	1,280		1.74	598	546	302	43	3.7	1,760	7.5	--
May 18-21.....	249	--	--	69	70	156	--	294	509	21	--	--	.17	990		1.35	666	460	219	42	3.2	1,390	7.8	--

May 22-26	841	--	--	64	44	84	--	308	258	5.0	--	.8	.13	628		.85	1,430	342	89	35	2.0	939	8.0	--
May 27-June 7	312	--	--	66	63	134	--	309	421	19	--	--	.14	892		1.21	751	423	170	41	2.8	1,280	7.9	--
June 8-10	501	--	--	62	61	108	--	350	329	13	--	--	.16	786		1.07	1,060	404	117	36	2.3	1,150	7.9	--
June 11-16	408	--	--	64	73	154	--	327	485	23	--	--	.17	995		1.35	1,100	460	192	42	3.1	1,410	7.9	--
June 17-24	584	11	.03	62	61	114	3.1	348	336	14	.4	.7	.15	792		1.08	1,250	406	121	38	2.5	1,150	7.8	--
June 25-July 2	251	--	--	63	76	166	--	315	506	25	--	--	.15	1,060		1.44	718	468	210	44	3.3	1,470	7.7	--
July 3-17	121	--	--	64	90	222	--	295	656	33	--	--	.18	1,280		1.74	418	528	286	48	4.2	1,760	8.0	--
July 18-Aug. 5	69.2	--	--	63	67	142	--	285	461	21	--	--	.16	942		1.28	176	431	197	42	3.0	1,340	8.1	--
Aug. 20-29	41.9	--	--	71	100	252	--	305	797	40	--	--	.21	1,470		2.00	166	589	339	48	4.5	1,990	8.1	--
Aug. 30-Sept. 7	56.4	--	--	64	88	204	--	303	667	32	--	--	.22	1,240		1.69	189	523	275	45	3.9	1,720	8.0	--
Sept. 8-30	63.7	3.7	.01	70	112	284	3.7	324	887	45	.4	.1	.25	1,600	1,570	2.18	275	634	368	49	4.9	2,140	8.0	7
Weighted average c	137	--	--	65	64	127	--	306	408	17	--	--	0.13	870		1.18	322	424	173	39	2.7	1,240	--	--
Weighted average d	134	--	--	65	64	128	--	306	411	17	--	--	0.14	875		1.19	317	425	174	40	2.7	1,250	--	--

a Includes equivalent of 8 ppm of carbonate (CO_3).
b Includes equivalent of 6 ppm of carbonate (CO_3).
c Represents 99 percent of runoff for water year October 1956 to September 1957.
d Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1956 to September 1957.

MARIAS RIVER BASIN--Continued

TETON RIVER NEAR DUTTON, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 7 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	39	32	--	--	--	32	a 39	a 64	a 62	--	65	--
2	52	32	--	32	--	--	--	a 61	a 65	a 70	a 74	--
3	36	32	32	32	--	a 32	39	--	a 60	a 67	--	--
4	36	32	--	32	--	32	--	--	a 60	69	a 79	59
5	--	32	32	32	a 32	32	a 45	a 59	a 70	a 74	a 75	a 58
6	--	32	--	32	--	33	--	--	--	--	a 71	62
7	--	33	32	--	--	32	a 42	--	62	--	65	65
8	35	--	--	--	32	32	40	a 58	--	a 76	--	--
9	35	--	--	--	a 32	a 33	--	49	--	--	--	--
10	a 39	--	--	--	a 32	a 32	--	--	59	--	--	56
11	--	33	--	32	a 32	a 33	a 40	a 50	--	72	--	59
12	35	--	32	32	a 32	a 33	a 39	--	--	a 72	--	56
13	39	33	32	32	32	a 33	--	a 53	a 52	a 71	--	a 52
14	a 40	32	32	32	a 32	--	a 49	a 49	--	a 70	--	a 62
15	36	34	32	32	--	a 33	--	a 54	--	a 61	67	--
16	35	--	32	--	a 32	a 33	a 41	--	--	61	a 73	a 68
17	33	34	32	32	32	a 33	--	a 59	a 63	65	a 77	54
18	33	33	--	32	a 32	--	--	--	62	a 71	--	--
19	35	--	--	32	a 32	a 34	--	--	60	--	--	41
20	31	33	--	--	a 32	a 34	a 51	49	63	--	62	--
21	34	32	--	32	a 32	--	--	44	a 60	--	66	--
22	33	33	--	32	32	--	a 50	48	a 62	a 73	--	a 62
23	33	--	--	--	--	--	a 51	48	--	--	--	--
24	a 34	--	32	--	a 32	a 40	a 50	a 49	a 65	a 73	a 70	a 61
25	a 34	--	32	--	a 32	a 41	a 51	--	a 63	a 70	--	a 60
26	--	33	32	--	--	a 35	45	58	a 64	--	54	a 64
27	33	a 36	32	--	a 33	--	--	a 61	a 65	64	a 58	--
28	33	--	32	--	a 32	a 38	--	--	--	a 72	--	--
29	32	34	32	--	--	a 41	a 53	--	61	72	57	--
30	32	34	32	--	--	a 39	a 62	--	--	a 74	--	59
31	33	--	--	--	--	a 45	--	52	--	a 75	50	--
Average	35	--	--	--	--	--	--	--	--	--	--	--

a Measurement between 3 p.m. and 9 p.m.

MARIAS RIVER BASIN--Continued

TETON RIVER NEAR DUTTON, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	76			94			90		
2	74			96			90	53	13
3	73			96			80		
4	69			96			65		
5	67			95			50		
6	65			92			35		
7	63			85			40		
8	62			88	80	20	50		
9	61			96			55	41	6
10	61			93			55		
11	63			91			55		
12	63			84			60		
13	63			79			70		
14	61	54	9	73			80		
15	61			58			85		
16	63			60			85		
17	63			60	78	13	90		
18	61			60			90		
19	62			65			95		
20	61			65			95		
21	59			75			95		
22	57			85			95	31	8
23	56			90			95		
24	56			90			95		
25	56			90			95		
26	57			90	92	22	95		
27	63			90			95		
28	61			90			100		
29	71	89	18	90			100		
30	80			90			100		
31	90			--	--	--	100		
Total	1,998	--	324	2,506	--	578	2,480	--	243

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	95			30	--		340	360	330
2	90			30	--		360	465	452
3	75			30	--		360	155	151
4	65			30	--		340	105	96
5	55			30	28	e 2	190	54	28
6	45			30	--		100	40	11
7	40			30	--		95	28	7
8	40			30			100	73	20
9	40			30			120	155	50
10	40	42	6	35			140	195	74
11	45			35			160	205	89
12	45			40			180	230	112
13	45			40			195	233	123
14	45			45			195	--	e 120
15	45			45			200	230	124
16	45			45	40	4	205	280	155
17	45			45			210	260	148
18	45			45			210	--	e 140
19	40			40			220	--	e 300
20	35	--		35			210	--	e 280
21	30	14		35			210	--	e 240
22	30	14		30			200	--	e 220
23	25	--		30			195	--	e 200
24	20	--		30			189	388	198
25	20	--	e 1	35			201	395	214
26	20	--		60	--	e 7	187	390	197
27	25	--		110	41	12	154	305	127
28	25	--		260	350	246	145	218	85
29	30	--		--	--	--	152	215	88
30	30	--		--	--	--	154	215	89
31	30	--		--	--	--	162	233	102
Total	1,305	--	126	1,310	--	351	8,079	--	4,850

e Estimated.

MARIAS RIVER BASIN--Continued

TETON RIVER NEAR DUTTON, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	167	305	138	112			299	393	318
2	145			113			284	337	258
3	154			120	101	33	245	290	192
4	154			131			234	255	161
5	156	300	124	131			232	248	155
6	154			173	--	e 100	234	220	139
7	152			194	445	233	278	284	213
8	156			196	345	183	349	--	e 500
9	148			191	320	165	423	--	e 1,000
10	152			182	--	e 130	731	2,800	5,530
11	156	175	73	182	199	98	594	1,640	2,630
12	154			167	--	e 70	444	--	e 800
13	156			156			383	440	455
14	158			154			362	400	391
15	187	385	194	145	108	44	325	--	e 300
16	204	480	265	154			339	--	e 400
17	206	--	e 200	187	160	81	586	1,440	s 2,850
18	187	298	150	189	225	115	950	2,850	7,310
19	173	268	125	178	--	e 90	718	1,420	2,750
20	169	225	103	191	212	109	574	874	1,360
21	165	--	e 90	438	2,030	s 3,660	510	651	896
22	165	192	86	990	6,270	16,800	475	590	757
23	162	185	81	1,080	3,450	10,100	456	--	e 700
24	158	166	71	925	--	e 6,500	401	415	449
25	150	170	69	682	--	e 3,200	345	320	298
26	143	140	54	530	1,160	1,660	296	255	204
27	136	--	e 46	459	845	1,050	275	220	163
28	130	--	e 40	426	615	707	260	--	e 140
29	124	106	35	387	--	e 600	237	190	122
30	116	112	35	356	525	505	218	--	e 95
31	--	--	--	315	455	387	--	--	--
Total	4,737	--	3,088	9,834	--	46,884	12,057	--	31,536

Day	July			August			September		
1	198	145	78	48			61		
2	182	140	69	47			66	--	e 4
3	171	150	69	45			65		
4	160	162	70	47			55		
5	152	145	60	48	40	5	49		
6	147			54			48		
7	134			54			48		
8	130	115	41	53			47		
9	128			56	--	e 5	45		
10	124			53			45		
11	111			48			44	19	3
12	108	124	35	48			46		
13	96			45	--	e 3	49		
14	92			46			49		
15	88			44	16	2	48		
16	88	107	27	44			48		
17	93			43			48		
18	98			42			59		
19	102			42			76	21	4
20	106	106	30	41			86	--	e 20
21	113			41			102	--	e 15
22	100			40	12	1	109	39	11
23	87			41			96	24	6
24	77			43			78		
25	68	80	16	43			71		
26	64			41			68		
27	58			41			65	18	3
28	54			44			63		
29	52	37	5	44			61		
30	50			53	--	e 2	61		
31	50			63	24	4	--	--	--
Total	3,281	--	1,000	1,442	--	84	1,856	--	134

Total discharge for year (cfs-days) 48,885
Total load for year (tons) 88,898

e Estimated.
s Computed by subdividing day.

TETON RIVER NEAR DUTTON, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Feb. 28, 1957....	5:55 p.m.	a 260	--	425	1,720		60		78		92	97	98		100		VBWCM
Apr. 3	2:10 p.m.	152	44	334	2,620		76		98		99	--	--				PWCM
Apr. 18	12:05 p.m.	186	51	288	1,120		74		92		98	--	--				BWCM
May 9.....	9:50 a.m.	189	49	313	1,120		74		96		--	--	--				BWCM
May 23.....	10:10 a.m.	1,090	49	3,560	5,210	1	4		66		91	97	100				VPN
May 23.....	10:10 a.m.	1,090	49	3,560	5,160		48		70		91	97	100				VPWC
June 6.....	2:00 p.m.	234	62	214	1,520		67		89		98	100	--				VBWCM
June 19.....	4:50 p.m.	664	67	1,180	4,060		48		67		89	97	100				VPWCM

a Daily mean discharge.

MILK RIVER BASIN

WILLOW CREEK NEAR GLASGOW, MONT.

LOCATION.--At gaging station, 6 miles south of Glasgow, Valley County, and 8 miles upstream from mouth.
DRAINAGE AREA.--536 square miles.
RECORDS AVAILABLE.--Sediment records: October 1953 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 30,000 ppm Mar. 21; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 69,000 tons Mar. 21; minimum daily, 0 tons on many days.
EXTREMES, 1953-57.--Sediment concentrations: Maximum daily, 58,000 ppm Apr. 5, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 390,000 tons Apr. 6, 1954; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Mar. 12-20. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1956 to September 1956

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Loads (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	0	0	0	0	0	0		--
November	0	0	0	0	0	0		--
December	0	0	0	0	0	0		--
January	0	0	0	0	0	0		--
February	0	0	0	0	0	0		--
March	5,485	10,880	ab 250,700	8,090	69,000	0		24,200
April	354.2	703	a 6,322	211	3,200	(t)		17,500
May	219.9	436	a 6,037	195	5,000	0		4,330
June	1,013.9	2,010	a 39,661	1,320	17,000	0		19,500
July	11.5	23	a 21	.7	14	0		536
August	317	629	a 20,000	645	20,000	0		27,300
September	875.0	1,740	ab 31,765	1,060	12,000	(t)		1,300
Water year	8,276.5	16,420	354,506	971	69,000	0		27,300

t Less than 0.50 ton.
a Includes loade computed from estimated concentration graph.
b Includes estimated daily loads.

WILLOW CREEK NEAR GLASGOW, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 3, 1957.....	1:05 p.m.	24	44	6,430	4,490		97		100								PWCM
Sept. 13.....	1:40 p.m.	a 8		1,300	1,690		99		100								BWCM

a Daily mean discharge.

YELLOWSTONE RIVER BASIN

YELLOWSTONE RIVER AT BILLINGS, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 87, 1 mile northeast of Billings, Yellowstone County, and 12 miles upstream from Pryor Creek.
DRAINAGE AREA.--11,870 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 418 ppm Dec. 7-10; minimum, 112 ppm May 31 to June 16.
Hardness: Maximum, 238 ppm Dec. 7-10; minimum, 71 ppm May 31 to June 16, June 26 to July 19.
Specific conductance: Maximum daily, 723 micromhos Apr. 23; minimum daily, 153 micromhos June 10.
Water temperatures: Maximum, 77°F Aug. 13; minimum, freezing point Nov. 13 and probably on many other days during winter months.
EXTREMES, 1950-57.--Dissolved solids: Maximum, 868 ppm Feb. 2, 1951; minimum, 96 ppm June 19, 1951.
Hardness: Maximum, 476 ppm Feb. 2, 1951; minimum, 52 ppm May 21-23, 1954.
Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 129 micromhos May 22, 1954.
Water temperatures: Maximum, 80°F July 24, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	3,056	--	--	--	--	33	--	167	--	--	--	--	--	298	0.41	2,460	171	34	30	1.1	475	7.6	--
Nov. 1-Dec. 6.....	3,378	--	--	--	--	30	--	164	--	--	--	--	--	293	.40	2,670	172	38	28	1.0	473	7.8	--
Dec. 7-10.....	2,245	--	--	--	--	41	--	211	--	--	--	--	--	418	.57	2,530	238	65	27	1.1	631	7.8	--
Dec. 11-31.....	2,951	17	0.00	45	15	28	2.7	163	93	7.5	0.4	1.0	0.21	293	.40	2,330	173	39	26	.9	464	7.6	5
Jan. 1-8, 1957.....	2,119	--	--	--	--	31	--	171	--	--	--	--	--	323	.44	1,850	184	44	27	1.0	497	7.9	--
Jan. 9-14	1,206	--	--	--	--	41	--	215	--	--	--	--	--	403	.55	1,310	233	57	28	1.2	612	8.0	--
Jan. 15-25	1,541	--	--	--	--	32	--	182	--	--	--	--	--	332	.45	1,380	196	47	26	1.0	516	7.8	--
Jan. 26	1,250	--	--	--	--	17	--	90	--	--	--	--	--	174	.24	587	102	28	27	.7	288	7.6	--
Jan. 27-Feb. 26 ...	2,313	--	--	--	--	28	--	162	--	--	--	--	--	304	.41	1,900	173	40	26	.9	470	7.6	--
Feb. 27-Mar. 13...	3,356	--	--	--	--	28	--	144	--	--	--	--	--	271	.37	2,460	154	36	28	1.0	422	7.5	--
Mar. 14-31.....	2,841	16	.00	41	15	30	3.2	154	85	8.4	.6	.4	.23	286	.39	2,190	165	39	28	1.0	453	7.8	3
Apr. 1-22.....	2,941	--	--	--	--	31	--	156	--	--	--	--	--	293	.40	2,330	166	38	29	1.0	463	7.6	--
Apr. 23-27.....	4,070	--	--	--	--	43	--	177	--	--	--	--	--	389	.53	4,270	213	68	31	1.3	594	7.7	--
Apr. 28-May 6.....	4,618	--	--	--	--	24	--	159	--	--	--	--	--	253	.34	3,150	167	37	24	.8	402	7.8	--
May 7-30.....	17,950	--	--	--	--	13	--	119	--	--	--	--	--	167	.23	8,090	105	7	21	.6	262	7.7	--
May 31-June 16....	41,740	11	.00	22	3.9	7.5	1.3	84	16	.6	.3	.3	.05	112	.15	12,620	71	2	18	.4	180	7.3	9
June 17-25.....	33,820	--	--	--	--	15	--	114	--	--	--	--	--	165	.22	15,070	100	7	25	.7	265	7.8	--
June 26-July 19....	24,250	--	--	--	--	9.7	--	84	--	--	--	--	--	116	.16	7,600	71	2	23	.5	192	7.3	--
July 20-Aug. 9.....	8,902	--	--	--	--	17	--	104	--	--	--	--	--	151	.21	3,630	92	7	29	.8	256	7.3	--
Aug. 10-27.....	4,661	--	--	--	--	25	--	139	--	--	--	--	--	224	.30	2,820	131	17	29	1.0	367	7.4	--
Aug. 28-Sept. 30...	4,801	18	.00	39	15	30	4.3	162	80	6.0	.5	.1	.17	275	.37	3,560	159	26	28	1.0	449	7.5	10
Weighted average a.	8,467	--	--	--	--	16	--	115	--	--	--	--	--	177	0.24	4,050	107	13	25	0.7	285	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER AT BILLINGS, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 3 p.m. and 4 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	51	--				--	51	65	60	62	72	60
2	54	--				--	39	65	56	68	72	65
3	53	--				--	45	65	60	60	73	56
4	54	--				--	45	63	62	62	74	62
5	52	--				--	46	65	60	63	76	70
6	54	--				--	44	60	60	68	76	69
7	55	34				--	45	62	58	65	76	70
8	45	34				--	42	55	59	64	74	66
9	48	--				--	36	49	60	68	74	62
10	63	36				--	44	57	57	72	74	62
11	51	37				--	40	60	60	71	73	61
12	50	33				--	41	52	58	70	67	61
13	49	32				--	42	52	59	71	77	60
14	47	34				--	47	51	56	70	76	60
15	47	--				--	50	50	52	72	75	62
16	47	--				--	46	51	50	72	74	61
17	46	--				--	41	52	51	73	73	59
18	48	--				--	50	56	60	71	72	50
19	44	34				35	49	56	60	70	68	65
20	45	33				34	49	52	60	72	73	60
21	45	--				42	48	47	55	71	76	52
22	44	33				41	57	49	56	72	69	53
23	38	--				40	50	40	55	72	71	58
24	36	--				42	50	65	62	73	72	60
25	48	--				42	49	58	61	72	70	66
26	36	--				40	50	60	60	73	65	60
27	35	34				44	52	62	50	71	68	62
28	35	--				44	60	61	58	74	63	64
29	36	--				48	60	67	64	71	69	63
30	36	--				50	54	62	62	72	69	62
31	--	--				50	--	56	--	72	65	--
Average	46	--				--	47	57	58	70	72	61

YELLOWSTONE RIVER BASIN--Continued

MUSKRAT CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 2 miles upstream from mouth and 7 miles southwest of Shoshoni, Fremont County.
DRAINAGE AREA.--760 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: June 1950 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 47,000 ppm May 12; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 26,000 tons June 11; minimum daily, 0 tons on many days.
EXTREMES, 1950-57.--Sediment concentrations: Maximum daily, not determined; miaimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 150,000 tons (estimated) July 22, 1951; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1956 to September 1957

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	0	0	0	0	0	0		--
November	0	0	0	0	0	0		--
December	0	0	0	0	0	0		--
January	0	0	0	0	0	0		--
February	0	0	0	0	0	0		--
March	0	0	0	0	0	0		--
April	200	397	a 32,129	1,070	20,400	0		71,700
May	510.5	1,010	a 62,364	2,010	13,900	0		71,200
June	245	486	a 34,806	1,160	a 26,000	0		150,000
July	0	0	0	0	0	0		--
August	0	0	0	0	0	0		--
September	0	0	0	0	0	0		--
Water year	955.5	1,890	129,299	354	a 26,000	0		150,000

a Partly estimated.

MUSKRAT CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 23, 1957....	2:25 p.m.	271	--	70,300	3,230		63		81		90	94	98		100		VPWCM
Apr. 23	8:55 p.m.	113	42	54,200	3,030		82		92		96	98	100				VPWCM
Apr. 24	4:35 p.m.	41	55	42,300	3,290		82		--		99	100	--				VPWCM
May 1	12:30 p.m.	a .5	73	38,500	3,650		97		100		--	--	--				PWCM
May 12.....	10:05 p.m.	55	51	39,400	3,020		74		92		97	99	100				VPWCM
May 13.....	1:10 p.m.	79	61	39,400	4,050		71		89		97	98	100				VPWCM
May 13.....	11:40 p.m.	196	51	71,200	4,110		46		63		92	98	100				VPWCM
May 15.....	2:00 p.m.	a 40	54	32,200	3,030		77		93		96	99	100				VPWCM
May 17.....	1:00 p.m.	e 50	69	25,500	4,540		72		90		98	99	100				VPWCM
May 25.....	4:05 p.m.	71	68	35,900	3,060		68		86		96	99	100				VPWCM
June 16.....	3:30 p.m.	a 10	66	35,200	3,590		78		98		99	100	--				VPWCM

e Estimated.
a Daily mean discharge.

Particle-size analyses of bed material, water years October 1955 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material											Methods of analysis
				Percent finer than indicated size, in millimeters											
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
May 25, 1956.....	--	748	4			4	6	22	46	76	91	97	99	100		SV
May 13, 1957.....	1:00 p.m.	79	22			1	3	11	56	95	99	99	100			SV
May 13	12:00 p.m.	196	20			4	6	20	66	94	98	99	100			SV

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.

LOCATION.--At gaging station, 1,400 feet upstream from Wyoming Canal siphon and 4 miles north of Pavillion, Fremont County.
DRAINAGE AREA.--143 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to November 1951.
Water temperatures: October 1950 to September 1951.
Sediment records: October 1949 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 14,700 ppm June 16; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1,020 tons June 30; minimum daily, 0 tons on many days.
EXTREMES, 1949-57.--Sediment concentrations: Maximum daily, 77,400 ppm Sept. 20, 1950; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 123,000 tons Sept. 20, 1950; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0			
2				0	--	0			
3				0	--	0			
4				0	--	0			
5				0	--	0			
6				0	--	0			
7				0	--	0			
8				0	--	0			
9				.5	1,600	sa 6			
10				.7	--	e 4			
11				.8	1,500	sa 4			
12				.3	--	e 2			
13				.4	--	e 2			
14				0	--	0			
15				0	--	0			
16				0	--	0			
17				0	--	0			
18				0	--	0			
19				0	--	0			
20				0	--	0			
21				0	--	0			
22				0	--	0			
23				0	--	0			
24				0	--	0			
25				0	--	0			
26				0	--	0			
27				0	--	0			
28				0	--	0			
29				0	--	0			
30				0	--	0			
31				--	--	--			
Total	0		0	2.7	--	18	0		0

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0	3	3,240	s 52
2				0	--	0	2	3,200	sa 32
3				0	--	0	2	3,110	s 33
4				0	--	0	2	--	e 30
5				0	--	0	2	--	e 20
6				0	--	0	1	--	e 8
7				0	--	0	1	800	sa 7
8				0	--	0	1	--	e 10
9				0	--	0	1	--	e 20
10				0	--	0	3	--	e 80
11				0	--	0	3	4,850	s 76
12				0	--	0	2	2,700	sa 24
13				0	--	0	2	1,300	sa 14
14				0	--	0	2	--	e 20
15				.5	168	s 1	2	--	e 30
16				1	263	s 2	3	3,800	sa 55
17				.5	--	e 1	3	--	e 50
18				.5	260	sa 1	3	2,200	sa 30
19				0	--	0	2	2,300	s 19
20				.1	--	(t)	2	2,620	s 22
21				.4	200	(t)	2	2,800	sa 22
22				.1	260	(t)	2	1,800	sa 14
23				.1	--	(t)	1	2,300	sa 12
24				.2	--	e 1	1	--	e 12
25				.3	--	e 2	1	2,100	s 11
26				.5	2,800	sa 6	1	--	e 11
27				1	2,900	sa 13	1	--	e 11
28				2	--	e 30	2	2,030	s 21
29				--	--	--	3	2,300	sa 38
30				--	--	--	4	--	e 50
31				--	--	--	4	3,600	sa 55
Total	0		0	7.2	--	58	64	--	889

Day	April			May			June		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1	5	4,100	sa 80	0.4	450	sa 1	0.6	860	1
2	5	4,900	sa 100	.3	--	(t)	.1	470	(t)
3	5	4,100	sa 80	.3	380	(t)	.1	540	(t)
4	5	--	e 75	.1	--	(t)	.1	200	(t)
5	5	3,500	sa 70	.4	--	e 1	0	--	0
6	6	--	e 80	.4	--	e 1	.2	260	(t)
7	4	--	e 44	.2	--	(t)	0	--	0
8	3	2,300	sa 26	1.0	1,500	sa 7	0	--	0
9	3	--	e 28	2.0	2,520	14	0	--	0
10	4	2,600	sa 40	2.0	1,710	9	1.1	2,770	s 13
11	3	--	e 28	1.9	4,900	sb 75	7.5	8,550	s 234
12	2	2,590	s 18	8.5	11,100	s 302	4.7	5,410	s 88
13	2	--	e 13	8.0	6,500	sb 220	2.3	4,940	s 47
14	2			9.5	7,200	sa 240	1.3	4,300	sa 20
15	2	1,280	7	20	9,600	b 500	6.0	13,000	sa 700
16	2			21	7,600	431	13	14,700	516
17	1.8			14	4,750	180	7.0	7,720	s 168
18	1.4			11	--	e 120	2.9	3,800	30
19	1.2			9.5	--	e 100	1.9	3,900	20
20	1.3	--	e 4	7.5	--	e 75	1.4	3,100	12
21	1.2			8.0	3,700	80	1.1	1,550	5
22	1.3	1,700	a 6	7.0	2,400	b 46	1.9	4,020	s 60
23	1.7	1,900	a 9	7.0	2,100	40	.8	1,190	3
24	1.4	--	e 8	14	7,600	sb 360	.4	430	(t)
25	1.2	2,300	sa 11	13	7,000	sa 440	.1	--	(t)
26	1.2	1,550	5	4.4	6,050	s 134	0	--	0
27	1.0	--	e 4	1.2	1,650	5	0	--	0
28	.8	--	e 2	.8	1,950	4	0	--	0
29	.6	450	sa 1	.6	590	1	0	--	0
30	.5	--	e 1	.4	650	1	8.1	4,210	s 1,020
31	--	--	--	.8	1,120	2	--	--	--
Total	74.6	--	773	175.2	--	3,390	62.6	--	2,938

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	20	12,300	s 974						
2	.9	1,800	4						
3	.1	500	(t)						
4	0	--	0						
5	0	--	0						
6	0	--	0						
7	0	--	0						
8	0	--	0						
9	0	--	0						
10	0	--	0						
11	0	--	0						
12	0	--	0						
13	0	--	0						
14	0	--	0						
15	0	--	0						
16	0	--	0						
17	0	--	0						
18	0	--	0						
19	0	--	0						
20	0	--	0						
21	0	--	0						
22	0	--	0						
23	0	--	0						
24	0	--	0						
25	0	--	0						
26	0	--	0						
27	0	--	0						
28	0	--	0						
29	0	--	0						
30	0	--	0						
31	0	--	0						
Total	21.0	--	978	0		0	0		0

Total discharge for year (cfs-days)	407.3
Total load for year (tons)	9,044

s Computed by subdividing day.
t Less than 0.50 ton.

FIVEMILE CREEK ABOVE WYOMINT CANAL, NEAR PAVILLION, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 1, 1957.....	4:30 p.m.	e 10	35	8,560	7,000		23		38		68	90	99		100		VPWCM
Mar. 18	3:20 p.m.	e 10	48	6,380	4,430		29		48		78	96	100		--		VPWCM
Apr. 17.....	1:05 p.m.	1.6	64	1,300	3,080		27		43		67	95	100		--		VPWCM
Apr. 25.....	12:05 p.m.	2.6	45	4,370	1,410		12		19		50	80	97		99	100	VBWCM
May 14	2:00 p.m.	18	50	10,600	4,990		26		40		70	92	100		--		VPWCM
May 16	3:45 p.m.	23	53	7,260	3,000		23		35		69	92	100		--		VPWCM
May 25	9:50 a.m.	10	56	3,260	3,320		39		59		79	96	100		--		VPWCM

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.

LOCATION.--At gaging station, 3 miles downstream from Ocean drain, 12½ miles north of Riverton, Fremont County, and 13 miles upstream from mouth.
DRAINAGE AREA.--342 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1950 to November 1951.
Water temperatures: October 1950 to September 1951; October 1952 to September 1957.
Sediment records: October 1949 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 75°F July 30; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 25,300 ppm May 2; minimum daily, not determined.
Sediment loads: Maximum daily, 9,550 tons May 15; minimum daily, not determined.
EXTREMES, 1949-57.--Water temperatures (1950-51, 1952-57): Minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 89,500 ppm Sept. 20, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 199,000 tons Sept. 20, 1950; minimum daily, not determined.
REMARKS.--Flow affected by ice Nov. 15 to Mar. 4. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 12 m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	51	36	32	32	32	32	34	47	60	67	67	57
2	47	33	a 34	32	a 32	34	34	45	62	65	65	53
3	48	32	32	32	32	36	35	53	63	64	67	a 69
4	48	35	32	32	--	38	37	49	63	--	66	58
5	50	32	32	a 32	32	33	35	51	64	66	66	58
6	47	40	a 32	--	32	33	36	48	64	a 71	68	63
7	47	36	32	32	--	32	38	53	59	62	67	63
8	52	32	32	--	32	35	38	52	65	65	73	60
9	46	36	a 32	a 32	a 32	33	37	50	59	69	65	a 63
10	49	38	32	32	--	a 43	40	47	60	68	63	54
11	49	41	32	a 32	--	32	39	49	58	65	65	51
12	47	40	32	32	--	32	39	49	58	a 72	66	52
13	45	35	a 33	32	32	32	38	51	56	68	63	51
14	43	32	32	--	a 32	32	39	49	51	63	64	49
15	46	a 33	32	--	a 32	32	41	46	51	60	67	55
16	44	a 33	--	--	34	32	39	45	51	62	a 73	52
17	44	32	32	a 32	33	32	42	47	49	64	66	55
18	42	32	32	a 32	33	32	44	51	52	64	60	53
19	44	32	a 32	32	32	32	43	53	52	68	60	46
20	42	a 32	a 32	32	a 32	32	40	51	61	66	63	47
21	42	32	32	a 32	a 32	34	38	46	54	61	a 73	47
22	42	32	32	32	33	34	39	47	a 63	67	a 63	46
23	42	32	a 32	32	33	32	41	49	56	61	a 70	48
24	43	32	--	a 32	34	32	40	49	a 73	62	--	49
25	39	33	32	32	35	33	36	49	58	64	--	50
26	41	32	--	a 32	32	44	42	51	60	61	62	50
27	39	a 34	32	32	32	39	44	50	60	67	a 66	53
28	40	32	32	--	34	34	42	58	a 71	--	59	55
29	41	32	--	--	--	43	44	57	63	63	a 69	54
30	36	33	32	--	--	42	46	67	70	a 75	a 69	53
31	39	--	a 32	a 32	--	41	--	54	--	62	a 69	--
Average	44	34	32	b 32	b 32	34	39	50	58	64	66	53

a Measurement between 1 p.m. and 6 p.m.
b Includes estimated temperature, 32° F, on missing days.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	120	2,750	891	46	1,340	166	35	1,280	121
2	121	3,200	1,050	42	1,610	183	35	1,230	116
3	109	2,650	780	39	1,530	161	35	1,380	130
4	110	2,600	772	45	1,540	187	35	1,420	134
5	120	2,850	923	43	1,470	171	35	700	66
6	119	3,150	1,010	46	1,490	185	30	440	36
7	128	3,300	1,140	45	1,430	174	30	290	23
8	127	3,150	1,080	42	1,450	164	30		
9	127	3,700	1,270	43	1,260	146	30	172	14
10	107	3,100	896	45	1,390	169	30		
11	57	2,200	339	42	1,540	175	30		
12	52	1,590	223	42	1,610	183	28		
13	51	1,220	168	42	1,640	186	28	437	32
14	50	1,310	177	42	1,650	187	26		
15	48	1,200	156	35	--	e 170	24		
16	48	1,090	141	32	1,940	168	24	560	36
17	48	1,070	139	31	1,870	157	24	540	35
18	51	1,220	168	33	1,770	158	24	394	26
19	52	1,100	154	29	1,600	125	22	190	11
20	51	1,230	169	31	1,470	123	20	188	10
21	51	1,300	179	32	1,450	125	20		
22	49	1,150	152	33	1,430	127	20		
23	50	1,960	265	34	1,360	125	20		
24	51	1,520	209	36	1,320	128	20	292	16
25	50	1,340	181	35	1,270	120	20		
26	62	4,080	s 939	34	1,210	111	18		
27	70	3,270	s 667	34	1,220	112	16		
28	48	1,590	206	36	1,210	118	15	415	17
29	46	1,410	175	36	1,280	124	15		
30	45	1,410	171	35	1,250	118	15		
31	45	1,240	151	--	--	--	15	490	20
Total	2,263	--	14,941	1,140	--	4,546	769	--	1,130

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	15	610	25	14			30	4,500	364
2	15	280	11	14			30	5,450	441
3	15	370	15	14			30	5,500	446
4	15	460	19	14			30	5,000	405
5	14			14	267	10	28	3,200	242
6	14			14			24	3,600	233
7	14	556	21	14			29	4,560	s 392
8	14			14			36	5,790	s 630
9	14			14			29	4,770	s 432
10	14	375	14	14			28	5,200	393
11	14	610	23	14	454	17	21	4,160	s 249
12	14	1,140	43	14			24	5,530	358
13	14	600	23	14			22	3,400	202
14	14	424	16	14			22	4,300	255
15	14	327	12	11	720	21	22	4,950	294
16	14			11	820	24	22	5,960	s 403
17	14			11	1,170	35	25	6,900	s 514
18	14			11	980	29	25	6,250	422
19	14			11	740	22	24	6,260	406
20	14			11	610	18	22	5,550	s 355
21	14			10	550	15	22	5,850	347
22	14			15	440	18	18	3,650	177
23	14	192	7	20	630	34	15	4,600	s 202
24	14			25	1,490	101	16	4,930	s 263
25	14			30	2,400	194	18	4,450	216
26	14			35	3,450	326	18	5,250	255
27	14			35	4,950	468	18	5,210	s 280
28	14			30	5,750	466	15	4,950	200
29	14			--	--	--	19	5,050	259
30	14			--	--	--	18	4,650	226
31	14			--	--	--	22	5,350	318
Total	438	--	418	462	--	1,953	722	--	10,179

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	31	8,000	sa 750	14	2,400	91	99	4,600	1,230
2	26	5,200	sa 400	71	25,300	4,850	96	5,400	1,400
3	22	3,350	199	56	12,600	1,910	92	3,900	969
4	18	3,600	175	57	9,750	1,500	92	4,650	1,160
5	18	3,700	180	58	8,300	1,300	87	4,450	1,050
6	24	5,400	350	56	7,250	1,100	88	4,850	1,150
7	24	4,950	321	66	8,200	a 1,500	90	4,150	1,010
8	21	4,650	264	73	6,800	1,340	90	4,000	972
9	25	6,460	s 483	77	5,600	1,160	98	5,450	1,440
10	29	7,050	552	74	5,400	1,080	133	7,100	2,550
11	24	4,750	308	75	5,600	1,130	119	5,800	1,860
12	24	4,300	279	104	8,550	2,400	108	6,100	1,780
13	22	4,150	247	113	10,200	3,110	102	5,200	1,430
14	22	4,100	244	145	12,000	a 4,700	100	5,050	1,360
15	21	3,850	218	213	16,600	9,550	114	5,000	1,540
16	18	3,450	168	142	11,000	4,220	150	8,000	a 3,200
17	22	3,800	226	126	9,250	3,150	150	6,700	2,710
18	20	2,850	154	102	6,850	1,890	114	5,750	1,770
19	20	3,500	189	100	6,550	1,770	118	5,500	1,750
20	20	3,200	173	95	5,800	1,490	122	5,100	1,680
21	19	2,950	151	86	5,050	1,170	122	4,600	1,520
22	18	3,100	151	92	5,500	1,370	121	4,900	1,600
23	22	3,900	232	92	5,000	1,240	120	4,250	1,380
24	21	3,250	184	98	5,550	1,470	115	4,650	1,440
25	17	3,050	140	97	5,900	1,550	109	3,650	1,070
26	18	2,950	143	101	8,070	s 2,400	105	4,200	1,190
27	17	2,900	133	87	4,750	1,120	112	4,450	1,350
28	15	2,900	117	85	4,650	1,070	110	4,000	1,190
29	15	2,400	97	89	4,650	1,120	106	4,400	1,260
30	15	2,450	99	139	7,990	s 4,100	99	4,050	1,080
31	--	--	--	120	7,110	2,300	--	--	--
Total	628	--	7,327	2,903	--	68,151	3,281	--	45,091

Day	July			August			September		
1	152	13,000	sa 6,300	171	6,050	2,790	167	3,950	1,780
2	118	5,800	1,850	168	5,950	2,700	162	4,100	1,790
3	150	7,100	2,880	159	5,500	2,360	162	3,800	1,660
4	133	5,400	1,940	168	5,750	2,580	155	3,750	1,570
5	149	5,950	2,390	180	5,750	2,790	166	3,906	1,750
6	159	7,000	3,010	178	5,750	2,760	155	3,850	1,610
7	188	6,650	3,380	187	6,250	3,160	144	3,850	1,500
8	180	6,600	3,210	181	6,450	3,150	144	4,000	1,560
9	168	6,450	2,930	183	6,850	3,380	148	3,600	1,440
10	164	6,300	2,790	183	7,500	3,710	153	3,750	1,550
11	171	6,500	3,000	190	8,500	4,360	155	3,900	1,630
12	179	7,050	3,410	206	8,550	4,760	158	3,900	1,660
12	175	6,400	3,020	212	7,750	4,440	174	4,000	1,880
14	179	6,250	3,020	205	6,800	3,760	172	4,050	1,880
15	176	6,350	3,020	201	6,500	3,530	168	3,650	1,660
16	184	7,200	3,580	209	7,050	3,980	174	4,200	1,970
17	184	6,800	3,380	197	7,770	4,130	167	4,000	1,800
18	175	6,050	2,860	194	5,200	2,720	159	3,900	1,670
19	184	6,250	3,110	206	5,100	2,840	155	4,300	1,800
20	181	8,700	4,250	246	7,100	4,720	130	3,850	1,350
21	190	6,950	3,570	206	5,300	2,950	121	3,500	1,140
22	192	6,950	3,600	202	5,500	3,000	114	3,450	1,060
23	168	6,400	2,900	213	5,600	3,220	116	3,300	1,030
24	154	5,550	2,310	212	6,050	3,460	122	3,700	1,220
25	145	5,600	2,190	198	5,950	3,180	121	3,100	1,010
26	153	5,800	2,400	187	5,100	2,570	132	3,400	1,210
27	159	5,850	2,510	172	5,050	2,350	136	3,050	1,120
28	167	5,950	2,680	152	4,350	1,790	126	2,850	970
29	175	5,500	2,600	154	4,000	1,660	121	2,850	931
30	166	5,800	2,600	164	4,100	1,820	121	2,750	898
31	174	5,700	2,680	170	4,400	2,020	--	--	--
Total	5,192	--	93,370	5,852	--	96,640	4,398	--	44,699

Total discharge for year (cfs-days) 28,048

Total load for year (tons) 387,845

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 8, 1956	2:25 p.m.	120	58	2,780	3,100	--	18		28		42	55	79		95	100	VPWCM
Oct. 22	4:15 p.m.	47	51	1,060	799	--	--		22		31	41	68		89	98	VBWCM
Nov. 7	3:25 p.m.	46	42	1,640	1,690	--	15		22		38	46	66		83	97	VBWCM
Nov. 27	2:15 p.m.	a 34	34	2,620	2,530	--	14		22		32	38	63		90	99	VBWCM
Mar. 8, 1957	4:45 p.m.	61	39	13,600	3,680	--	28		49		73	84	91		97	100	VPWCM
Mar. 19	6:35 p.m.	27	44	9,760	5,850	--	31		50		69	78	85		92	98	VPWCM
Apr. 8	2:55 p.m.	20	55	4,440	3,580	--	31		50		74	87	92		97	100	VPWCM
Apr. 26	4:20 p.m.	18	58	3,860	3,720	--	36		52		72	85	90		98	100	VPWCM
May 2	11:00 a.m.	70	56	25,000	4,380	--	37		61		88	95	97		99	100	VPWCM
May 14	3:05 p.m.	155	53	11,700	3,220	--	28		42		74	88	95		98	100	VPWCM
May 15	9:20 p.m.	209	47	17,000	3,190	--	32		45		75	89	97		99	100	VPWCM
May 30	5:35 p.m.	201	--	11,300	4,670	--	28		42		75	89	97		99	100	VPWCM
May 30	6:45 p.m.	302	--	28,500	4,130	--	35		56		84	93	97		99	100	VPWCM
May 31	6:45 p.m.	110	60	5,580	3,930	--	24		35		58	75	88		96	99	VPWCM
June 10	7:15 p.m.	188	58	11,200	4,590	--	25		37		59	70	79		86	97	VPWCM
June 26	12:40 p.m.	102	71	3,290	4,470	--	24		33		52	68	88		95	100	VPWCM
July 2	9:50 a.m.	121	66	5,360	2,310	--	26		37		60	78	92		98	100	VPWCM
July 18	10:50 a.m.	187	64	5,880	3,760	--	21		31		49	69	88		95	99	VPWCM
Aug. 7	3:40 p.m.	195	76	6,430	5,170	--	26		40		63	77	90		96	99	VPWCM
Aug. 17	5:15 p.m.	216	65	9,120	3,420	--	22		35		61	78	92		99	100	VPWCM
Aug. 17	6:00 p.m.	261	61	9,030	3,750	1	2		28		57	79	92		98	100	VPN
Aug. 17	6:00 p.m.	261	61	9,030	3,650	16	19		32		57	79	92		98	100	VPWCM
Aug. 20	11:35 a.m.	261	68	6,630	3,990	--	26		39		59	72	90		98	100	VPWCM
Sept. 4	5:20 p.m.	150	68	3,570	3,020	--	16		25		51	62	83		94	99	VPWCM
Sept. 20	4:00 p.m.	130	55	3,200	3,940	--	16		25		43	59	80		92	99	VPWCM

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1½ miles upstream from normal high-water line of Boysen Reservoir and 5 miles west of Shoshoni, Fremont County.
DRAINAGE AREA.--397 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1949 to November 1951.
Water temperatures: December 1948 to September 1957.
Sediment records: August 1948 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 72°F July 28; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 12,700 ppm May 15; minimum daily, not determined.
Sediment loads: Maximum daily, 11,800 tons May 15; minimum daily, not determined.
EXTREMES, 1948-57.--Water temperatures: Maximum, 84°F June 10, 1949; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 136,000 ppm June 12, 1949; minimum daily, 10 ppm Jan. 31, 1951.
Sediment loads: Maximum daily, 350,000 tons (estimated) Sept. 19, 1948; minimum daily, less than 0.50 ton Jan. 31, 1951.
REMARKS.--Flow affected by ice Nov. 16 to Mar. 20. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	39	a 33	--	32	32	38	52	63	66	67	58
2	48	35	a 34	32	a 35	33	37	58	65	66	65	56
3	50	32	32	32	a 35	35	39	54	--	66	64	54
4	--	35	32	32	a 35	36	40	58	63	59	63	67
5	55	34	a 32	a 33	a 34	34	44	51	--	60	66	59
6	51	37	--	a 34	32	34	39	54	62	63	70	59
7	50	38	--	32	--	33	35	52	61	62	63	60
8	53	36	--	a 34	--	37	39	53	65	63	66	59
9	49	38	--	a 32	--	36	44	49	65	--	67	54
10	51	--	--	32	--	37	43	51	60	63	65	53
11	51	a 49	--	a 33	--	34	39	52	61	65	68	51
12	52	a 49	32	a 33	--	40	38	--	62	67	64	52
13	48	38	a 36	a 34	--	35	44	56	56	65	61	50
14	44	32	a 33	--	--	38	48	50	51	68	66	46
15	46	a 32	a 33	a 32	a 33	34	48	47	54	64	65	51
16	44	32	a 33	a 34	34	34	47	46	53	61	63	49
17	41	a 37	32	a 31	--	42	45	54	53	65	67	57
18	45	--	a 33	a 34	33	32	43	53	54	65	59	53
19	44	32	a 33	a 32	34	33	49	55	--	67	61	43
20	42	a 35	a 33	a 33	32	33	--	53	62	60	63	43
21	48	32	32	a 33	33	42	--	49	54	64	69	47
22	44	a 33	--	32	32	34	46	48	56	66	63	49
23	44	a 34	a 33	a 34	33	35	43	49	55	61	--	50
24	42	--	a 32	--	33	34	46	50	58	64	65	--
25	42	--	a 34	a 33	33	36	43	51	60	64	63	51
26	40	a 34	--	--	32	39	47	53	61	66	66	54
27	43	a 34	32	a 32	32	35	41	58	62	65	63	54
28	42	a 35	32	a 32	35	38	47	--	61	72	60	53
29	42	a 35	--	a 32	--	42	45	--	64	64	59	53
30	37	a 32	--	a 33	--	45	51	--	67	66	62	57
31	41	--	--	a 32	--	44	--	54	--	68	64	--
Average	46	36	--	33	--	36	43	52	60	65	64	53

a Measurement between 4 p.m. and 5 p.m.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	207	1,860	1,040	68	480	88	45	710	86
2.....	207	1,820	1,020	68	470	86	45	690	84
3.....	207	1,900	1,060	66	500	89	45	690	84
4.....	214	1,850	1,070	66	530	94	45	730	89
5.....	221	1,840	1,100	63	570	97	45	470	57
6.....	225	1,800	1,090	64	600	104	40		
7.....	239	2,110	1,360	68	610	112	35		
8.....	242	2,170	1,420	64	580	100	35		
9.....	246	2,470	1,640	63	630	107	40	--	e 26
10.....	214	2,150	1,240	68	790	145	40		
11.....	128	1,220	422	64	540	93	45		
12.....	106	720	206	63	750	128	45		
13.....	95	550	141	69	720	134	45		
14.....	88	560	133	61	620	102	45		
15.....	84	540	122	44	350	42	45		
16.....	92	670	166	45	630	77	45	249	30
17.....	88	580	138	45	750	91	45		
18.....	82	500	111	45	710	86	45		
19.....	80	550	119	40	450	49	45		
20.....	80	500	108	40	420	45	45		
21.....	78	410	86	45	550	67	40		
22.....	78	990	208	45	610	74	35		
23.....	78	1,120	236	45	820	100	35		
24.....	80	540	117	45	770	94	35		
25.....	76	420	86	45	560	68	35		
26.....	82	850	sa 240	45	630	77	35	264	26
27.....	99	2,900	sa 900	45	600	73	40		
28.....	76	590	121	45	740	90	35		
29.....	72	580	113	45	600	80	35		
30.....	70	480	91	45	650	79	35		
31.....	70	580	110	--	--	--	35		
Total.	4,004	--	16,014	1,624	--	2,671	1,260	--	1,112

	January			February			March		
1.....	35			35			55	2,890	429
2.....	35	318	30	35			55	3,420	508
3.....	35			35			55	2,780	413
4.....	35			35	290	27	55	1,980	294
5.....	35			35			55	1,070	159
6.....	35			35			50	1,780	240
7.....	35			35	305	29	55	1,980	294
8.....	35			35	331	31	60	2,510	407
9.....	35			35	337	32	55	2,740	407
10.....	35			35	440	42	50	2,070	279
11.....	35			35	480	45	45	1,890	230
12.....	35			35	500	47	45	2,430	295
13.....	35			35	590	56	45	1,860	226
14.....	35			35	790	75	40	1,760	190
15.....	30			35	970	92	40	1,830	198
16.....	30			30	710	58	40	2,170	234
17.....	30			30	550	45	45	2,630	320
18.....	30	153	14	30	690	56	50	2,130	288
19.....	35			30	540	44	45	2,090	254
20.....	35			30	450	36	40	2,230	241
21.....	35			30	450	36	35	2,180	206
22.....	35			30	370	30	31	1,770	148
23.....	35			30	1,320	107	30	1,580	128
24.....	35			40	1,480	160	30	1,570	127
25.....	30			45	1,960	238	30	1,940	157
26.....	30			55	2,550	379	27	2,310	168
27.....	30			65	3,490	612	28	1,710	129
28.....	30			60	2,700	437	26	1,600	112
29.....	35			--	--	--	30	1,960	159
30.....	35			--	--	--	30	2,080	168
31.....	35			--	--	--	36	3,330	324
Total.	1,045		498	1,030	--	2,849	1,313	--	7,732

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	50	4,320	583	52	4,200	s 800	138	4,350	1,620
2	72	3,430	667	115	12,400	s 4,180	123	3,650	1,210
3	52	2,550	358	123	8,750	2,910	115	3,400	1,060
4	30	2,060	167	110	7,100	2,110	113	3,850	1,170
5	31	2,120	177	120	5,950	1,930	108	4,200	1,220
6	37	2,700	270	133	4,800	1,720	118	4,400	1,400
7	40	3,180	343	135	5,300	1,930	133	4,250	1,530
8	33	2,410	215	128	5,050	1,750	141	4,200	1,600
9	39	2,470	260	172	5,450	2,530	138	5,250	1,960
10	48	3,130	406	159	3,950	1,700	169	7,050	3,220
11	44	2,800	333	169	3,800	1,730	179	6,300	3,040
12	33	1,990	177	232	7,000	4,380	165	5,200	2,320
13	33	1,440	128	242	8,000	sa 5,600	147	3,850	1,530
14	36	1,630	158	263	9,660	6,860	138	4,000	1,490
15	34	1,740	160	344	12,700	11,800	169	4,550	2,080
16	28	1,490	113	263	10,800	s 8,280	249	5,650	3,800
17	34	1,770	162	197	6,950	3,700	256	5,850	4,040
18	30	1,510	122	176	5,450	2,590	214	4,700	2,720
19	33	1,360	121	159	5,150	2,210	211	5,300	3,020
20	33	--	e 120	147	4,700	1,870	249	4,700	3,160
21	27	--	e 110	123	3,450	1,150	260	4,100	2,880
22	31	1,340	112	115	3,800	1,180	246	3,650	2,420
23	42	1,770	201	128	3,550	1,230	246	3,600	2,390
24	40	1,630	176	141	4,450	1,690	239	3,700	2,390
25	34	1,360	125	147	4,700	1,870	263	3,850	2,730
26	34	1,200	110	147	5,450	2,160	267	3,500	2,520
27	31	1,180	99	130	4,150	1,460	267	3,250	2,340
28	30	1,000	81	123	3,550	1,180	277	3,750	2,800
29	30	950	77	118	3,150	1,000	298	3,550	2,860
30	30	1,130	92	164	7,500	s 5,110	277	3,000	2,240
31	--	--	--	176	8,580	s 4,350	--	--	--
Total	1,099	--	6,223	4,951	--	92,960	5,913	--	68,760

	July			August			September		
1	326	8,740	s 8,340	380	4,800	4,920	298	3,450	2,780
2	263	4,700	3,340	380	4,250	4,360	305	4,350	3,580
3	284	5,600	4,290	372	4,050	4,070	298	4,400	3,540
4	277	4,200	3,140	380	4,250	4,360	288	3,500	2,720
5	288	4,450	3,460	400	4,900	5,290	281	4,000	3,030
6	284	4,900	3,760	392	4,300	4,550	274	3,250	2,400
7	295	6,250	4,980	406	4,650	5,120	263	3,200	2,270
8	298	5,400	4,340	404	4,200	4,560	274	3,150	2,330
9	288	5,200	4,040	408	4,550	5,010	267	3,050	2,200
10	309	5,250	4,380	400	5,050	5,450	270	3,050	2,220
11	330	5,350	4,770	404	5,700	6,220	274	3,850	2,850
12	348	5,950	5,590	424	6,000	6,870	288	4,050	3,150
13	344	5,300	4,920	432	5,700	6,650	319	3,700	3,190
14	344	5,450	5,060	420	5,100	5,780	340	3,700	3,400
15	344	5,250	4,880	404	4,250	4,640	323	3,700	3,230
16	330	6,100	5,440	408	5,200	5,730	312	3,500	2,950
17	356	6,100	5,860	445	6,500	s 9,420	291	3,550	2,790
18	340	5,600	5,140	444	7,050	8,450	281	3,850	2,920
19	390	6,200	6,530	448	5,800	7,020	284	3,600	2,760
20	360	6,000	5,830	492	7,000	9,300	253	2,850	1,950
21	384	5,300	5,210	440	7,050	8,380	235	2,850	1,810
22	364	5,150	5,060	432	5,900	8,880	218	3,050	1,800
23	356	4,600	4,420	436	5,250	6,180	218	2,550	1,500
24	337	4,700	4,280	408	5,800	6,390	211	2,400	1,370
25	323	4,950	4,320	364	5,700	5,600	200	2,250	1,220
26	323	4,400	3,840	344	4,750	4,410	200	2,000	1,080
27	316	4,550	3,880	316	4,850	4,140	207	2,700	1,510
28	344	4,400	4,090	267	4,400	3,170	200	2,400	1,300
29	356	4,700	4,520	281	3,700	2,810	204	2,400	1,320
30	348	4,650	4,370	295	4,100	3,270	207	2,050	1,150
31	372	4,750	4,770	319	4,600	3,960	--	--	--
Total	10,201	--	146,850	12,147	--	172,980	7,883	--	70,320

Total discharge for year (cfs-days) 52,420
Total load for year (tons) 588,969

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.

FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 8, 1956	5:05 p.m.	238	57	2,040	2,010	--	18		26		40	53	76		95	99	VPWCM
Oct. 22	12:30 p.m.	76	47	430	587	--	30		40		48	51	68		98	100	VBWCM
Nov. 7	2:00 p.m.	64	43	556	1,020	--	38		49		64	73	88		99	100	VBWCM
Dec. 3	4:45 p.m.	a 45	36	871	1,940	--	27		42		63	72	86		97	100	VBWCM
Feb. 25, 1957	1:50 p.m.	a 45	32	3,010	4,850	--	36		71		88	94	100		--	--	VPWCM
Mar. 8	1:50 p.m.	a 60	46	2,260	2,690	--	28		41		61	80	96		100	--	VPWCM
Mar. 19	4:00 p.m.	a 45	52	1,740	3,430	--	42		61		77	88	96		100	--	VPWCM
Mar. 29	11:15 a.m.	27	47	2,760	3,820	--	54		80		87	93	98		100	--	VPWCM
Apr. 24	1:30 p.m.	39	56	1,630	3,340	--	35		56		73	86	94		99	100	VPWCM
May 2	11:25 a.m.	128	58	13,300	5,580	--	35		56		79	91	97		99	100	VPWCM
May 12	10:50 p.m.	242	54	7,230	3,710	--	27		43		68	81	93		99	100	VPWCM
May 14	5:20 p.m.	298	54	9,830	3,410	--	25		38		65	80	93		99	100	VPWCM
May 15	12:10 p.m.	404	49	17,600	3,230	--	28		44		72	87	95		99	100	VPWCM
May 25	3:10 p.m.	147	62	4,130	4,960	--	25		36		52	71	89		98	100	VPWCM
May 31	11:20 a.m.	153	54	7,020	4,210	--	23		34		56	78	91		99	100	VPWCM
June 16	2:40 p.m.	280	60	5,260	2,980	--	24		35		54	71	90		99	100	VPWCM
June 26	3:55 p.m.	263	66	2,670	3,320	--	17		27		44	63	87		98	100	VPWCM
July 1	4:50 p.m.	326	75	9,430	4,050	--	40		60		82	93	98		100	--	VPWCM
July 18	4:10 p.m.	333	70	4,820	3,210	--	24		36		53	70	88		96	99	VPWCM
Aug. 7	11:30 a.m.	428	68	4,380	3,790	--	24		35		58	73	88		96	99	VPWCM
Aug. 17	8:30 p.m.	750	62	21,400	4,130	2	3		42		75	86	92		97	99	VPN
Aug. 17	8:30 p.m.	750	62	21,400	3,860	20	28		47		75	86	92		97	99	VPWCM
Aug. 20	4:30 p.m.	504	73	7,820	2,620	--	25		40		68	82	94		99	100	VPWCM
Sept. 5	12:00 m.	288	64	3,840	4,280	--	15		23		39	55	84		99	100	VPWCM
Sept. 20	12:30 p.m.	263	52	2,660	3,340	--	15		22		36	51	78		97	99	VPWCM

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

BADWATER CREEK AT BONNEVILLE, WYO.

LOCATION.--At gaging station at Bonneville, Fremont County, 3 miles upstream from normal high-water line of Boysen Reservoir.
DRAINAGE AREA.--790 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1947 to February 1954, August 1954 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 50,000 ppm May 11; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 13,700 tons May 25; minimum daily, 0 tons on many days.
EXTREMES, 1947-57.--Sediment concentrations: Maximum daily, 108,000 ppm July 11, 1949; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 210,000 tons May 29, 1956; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during October to December; record is omitted. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Suspended sediment, January to September 1957

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....				0		0	2	4,400	sa 50
2.....				0		0	3	4,450	s 84
3.....				0		0	2	5,300	sa 55
4.....				0		0	5	6,800	a 90
5.....				0		0	1	1,500	sa 18
6.....				0		0	0	--	0
7.....				0		0	0	--	0
8.....				0		0	1	1,990	s 27
9.....				0		0	2	2,400	sb 24
10.....				0		0	4	5,800	63
11.....				0		0	3	2,650	21
12.....				0		0	6	7,500	sa 150
13.....				0		0	4	5,200	sa 75
14.....				0		0	4	2,900	31
15.....				0		0	8	5,800	sa 190
16.....				0		0	4	4,800	sa 80
17.....				0		0	3	5,550	45
18.....				0		0	3	3,720	s 32
19.....				0		0	3	5,300	sa 50
20.....				0		0	3	5,200	sa 48
21.....				0		0	2	4,000	22
22.....				0		0	2	3,250	18
23.....				0		0	.5	1,200	sb 3
24.....				0		0	.5	1,690	s 7
25.....				0		0	1	4,700	sa 17
26.....				0		0	1	6,100	sa 28
27.....				0		0	1	4,000	11
28.....				1	3,080	s 33	3	5,450	44
29.....				--		--	3	4,650	38
30.....				--		--	2	2,900	16
31.....				--		--	1	1,200	sb 5
Total.	0		0	1		33	78.0	--	1,342

s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

BADWATER CREEK AT BONNEVILLE, WYO.--Continued

Suspended sediment, January to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2	3,890	s 28	0	--	0	18	7,000	340
2	2	8,400	45	0	--	0	12	9,000	a 300
3	.1	2,430	s 2	.1	6,000	sa 3	8	11,000	b 240
4	0	--	0	0	--	0	4	10,100	109
5	1	2,060	s 17	0	--	0	3	6,300	b 50
6	1	5,050	14	0	--	0	3	3,300	27
7	1	3,650	10	0	--	0	1	1,400	4
8	0	--	0	0	--	0	0	--	0
9	0	--	0	1	5,000	14	0	--	0
10	0	--	0	3	13,000	105	1	2,200	sb 75
11	0	--	0	14	50,000	1,960	8	22,800	492
12	0	--	0	55	36,900	5,680	5	17,400	235
13	0	--	0	69	20,400	3,800	3	21,100	171
14	.5	9,900	sa 16	107	34,000	sa 11,000	2	8,100	44
15	.1	7,900	2	120	23,700	7,680	5	7,500	sa 150
16	.2	2,950	s 3	111	13,700	4,110	22	24,000	sa 1,500
17	.5	3,900	s 8	107	10,600	3,060	21	25,700	1,460
18	0	--	0	102	6,600	1,820	21	7,500	425
19	0	--	0	88	4,800	1,140	20	6,900	373
20	0	--	0	71	3,900	748	17	4,200	193
21	0	--	0	76	3,600	739	20	6,040	s 369
22	0	--	0	87	3,700	869	18	13,600	661
23	0	--	0	96	6,000	1,560	16	7,000	302
24	0	--	0	96	4,500	1,170	10	5,300	143
25	0	--	0	107	39,400	s 13,700	6	4,100	66
26	0	--	0	42	13,900	1,580	2	4,200	23
27	.1	3,100	sa 1	36	8,700	846	2	1,800	10
28	0	--	0	25	8,100	b 550	0	--	0
29	0	--	0	20	6,400	sa 400	0	--	0
30	.5	7,500	sa 15	20	20,000	a 1,100	2	10,000	sa 85
31	--	--	--	19	9,800	503	--	--	--
Total	9.0	--	161	1,472.1	--	64,137	250	--	7,847

Day	July			August			September		
1	1	675	s 7						
2	0	--	0						
3	0	--	0						
4	0	--	0						
5	0	--	0						
6	0	--	0						
7	0	--	0						
8	0	--	0						
9	0	--	0						
10	0	--	0						
11	0	--	0						
12	0	--	0						
13	5	10,000	sa 280						
14	0	--	0						
15	0	--	0						
16	0	--	0						
17	0	--	0						
18	0	--	0						
19	0	--	0						
20	0	--	0						
21	0	--	0						
22	0	--	0						
23	0	--	0						
24	0	--	0						
25	0	--	0						
26	0	--	0						
27	0	--	0						
28	0	--	0						
29	0	--	0						
30	0	--	0						
31	0	--	0						
Total	6	--	287	0		0	0	0	0

Total discharge for year (cfs-days) 1,816.1
Total load for year (tons) 73,807

s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

BADWATER CREEK AT BONNEVILLE, WYO.--Continued

Particle-size analyses of suspended sediment, January to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 2, 1957....	11:20 p.m.	e 15	32	12,900	3,390		59		91		94	98	100		--		VPWCM
May 13	4:50 p.m.	83	60	33,200	3,390		50		65		90	97	99		100		VPWCM
May 13	2:55 p.m.	63	65	14,000	4,950		56		76		95	99	100		--		VPWCM
May 15	12:55 p.m.	103	54	18,500	4,040		40		59		88	96	99		100		VPWCM
May 21	10:40 a.m.	81	51	4,340	4,470		29		44		78	93	100		--		VPWCM
May 25	2:55 p.m.	140	44	69,800	3,420		39		59		81	93	99		100		VPWCM
June 16	4:30 p.m.	22	67	29,200	4,740		54		75		91	95	97		99	100	VPWCM

e Estimated.

Particle-size analyses of bed material, water years October 1955 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
May 26, 1956.....		83	5			4	11	35	61	76	84	94	98	100		SV
Mar. 29, 1957.....		2.1	11			3	5	24	60	80	86	91	94	96		SV
May 13.....	2:55 p.m.	63	9			1	4	26	74	94	98	100	--	--		SV

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR PAVILLION, WYO.

LOCATION.--At gaging station, 600 feet upstream from Wyoming Canal siphon, 4 1/8 miles downstream from Sheep Creek, and 9¼ miles northeast of Pavillion, Fremont County. Prior to Oct. 16, 1956, gaging station at site one-eighth mile upstream.
DRAINAGE AREA.--267 square miles.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1954 to September 1957.
Sediment records: March 1949 to November 1953, October 1954 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 89°F June 5; minimum, freezing point probably on many days during November to March.
Sediment concentrations: Maximum daily, 64,200 ppm May 15; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 18,000 tons June 11; minimum daily, 0 tons on many days.
EXTREMES, 1949-53, 1954-57.--Water temperatures (1954-57): Maximum, 89°F June 5, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 140,000 tons (estimated) July 4, 1950; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Oct. 30, Nov. 1, Nov. 9 to Mar. 15, Mar. 23, 25. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 2 p.m. and 7 p.m. Many days of no flow/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	34	--	--	--	34	37	61	72	83	a 75	--
2	--	33	--	--	--	34	44	69	72	83	a 57	a 64
3	--	33	a 32	--	--	35	43	60	83	72	64	a 59
4	--	32	--	--	--	33	48	59	84	a 65	74	--
5	--	33	--	a 32	--	32	48	65	89	a 70	73	79
6	a 59	35	--	--	--	33	40	63	78	a 76	83	a 49
7	65	33	--	--	--	34	46	58	70	75	a 82	a 63
8	54	33	--	--	--	a 34	47	56	77	82	a 75	67
9	57	--	--	--	--	36	52	54	84	a 79	88	--
10	51	44	--	--	33	34	a 38	68	63	a 72	a 80	a 52
11	a 40	48	--	--	34	33	36	40	70	a 79	75	a 53
12	--	44	a 32	--	38	34	37	56	63	79	--	a 50
13	48	a 33	a 32	32	34	34	57	60	62	82	--	54
14	a 36	--	--	--	36	33	58	--	--	--	--	60
15	a 35	--	--	--	34	33	54	50	--	75	--	a 50
16	a 48	a 34	--	--	--	34	54	49	57	a 68	--	a 49
17	a 35	--	--	--	34	33	55	60	61	a 68	--	60
18	a 34	--	--	--	33	36	54	61	75	a 66	--	48
19	a 41	--	--	--	33	39	46	64	--	a 77	--	49
20	--	--	--	--	32	40	55	56	a 67	74	--	53
21	a 46	--	a 32	--	32	38	58	55	66	87	--	61
22	45	--	--	--	34	42	47	63	a 56	86	--	61
23	52	a 34	--	--	35	35	44	56	66	--	a 56	65
24	43	--	--	--	35	34	51	68	74	82	a 63	74
25	46	--	--	--	34	39	52	68	a 63	a 71	74	68
26	46	--	--	--	34	40	49	73	63	--	a 76	68
27	44	--	--	--	34	42	54	a 57	67	70	--	a 56
28	--	--	--	--	34	37	54	57	a 72	84	74	a 51
29	41	--	--	--	--	43	72	69	79	69	a 62	70
30	45	--	--	--	--	47	65	66	67	79	--	62
31	43	--	a 32	--	--	43	--	a 53	--	75	63	--
Average	--	--	b 32	b 32	b 34	36	50	60	70	76	--	59

a Measurement between 7 a.m. and 11 a.m.
b Includes estimated temperature, 32° F, on missing days.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR PAVILLION, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1.0			0.4	707	1	0.5	--	
2	1.2			.4	500	1	.5	--	
3	1.4			.3	175	(t)	.5	252	
4	1.4			.3	60	(t)	.5	--	
5	1.4			.5	83	(t)	.5	--	
6	1.8			1.4	193	1	.3	--	
7	2.2			3.8	760	8	.2	--	
8	1.4			1.5	700	sa 6	.2	--	
9	1.8			2.1	850	sa 7	.2	306	
10	1.8	39	(t)	3.0	1,600	sa 20	.3	--	
11	1.4			2.6	1,800	13	.4	--	
12	1.8			1.8	1,300	sa 9	.4	182	
13	1.8			2.0	1,900	sa 15	.3	236	
14	1.8			1.5	--	e 10	.3	--	
15	1.8			1.0	--	e 3	.3	--	(t)
16	1.6			.3	45		.3	--	
17	1.6			.3	--		.3	--	
18	1.5			.5	--		.3	--	
19	1.5			1.0	--		.2	--	
20	1.5	195	a 1	.3	--		.2	--	
21	1.5	190	1	.2	--		.2	208	
22	1.5	73	(t)	.1	--		.2	--	
23	1.6	84	(t)	.5	40	(t)	.2	648	
24	2.0	109	1	.5	--		.2	--	
25	1.3	300	sa 2	.5	--		.2	--	
26	1.4	480	sa 3	.5	--		.1	--	
27	1.6	230	1	.5	--		.1	--	
28	1.4	330	1	.5	--		0	--	0
29	1.5	210	1	.5	--		0	--	0
30	1.0	380	sa 2	.5	--		0	--	0
31	1.6	590	3	--	--	--	.1	366	(t)
Total	48.1	--	20	29.3	--	95	8.0	--	6

Day	January			February			March		
1	0.1			0	--	0	10	4,050	s 222
2	.1			0	--	0	8.0	3,780	s 147
3	.1		(t)	0	--	0	8.0	2,860	s 114
4	.1			0	--	0	6.0	2,900	s 73
5	.1			0	--	0	3.0	600	5
6	0		0	0	--	0	6.0	950	15
7	0		0	0	--	0	6.0	2,200	s 75
8	0		0	0	--	0	7.0	3,800	sa 120
9	0		0	0	--	0	8.0	5,330	s 186
10	0		0	.1	314	(t)	8.0	5,310	s 154
11	0		0	.5	370	(t)	6.0	5,450	s 126
12	.1		(t)	.5	390	1	6.0	4,650	s 113
13	.1	465	(t)	1.0	360	1	5.0	3,200	s 93
14	0		0	1.0	1,300	sa 6	6.0	4,140	s 125
15	0		0	2.0	686	s 7	8.0	4,770	s 185
16	0		0	1.5	550	sa 5	12	7,170	s 332
17	0		0	2.0	400	2	12	6,800	sa 260
18	0		0	2.0	380	2	9.2	7,680	s 289
19	0		0	3.0	310	3	11	8,500	s 319
20	0		0	3.0	310	3	8.1	8,370	s 277
21	0		0	3.0	250	2	7.1	9,120	s 271
22	0		0	1.0	300	1	7.2	6,820	s 220
23	0		0	3.0	500	4	9.0	7,530	s 276
24	0		0	4.0	1,200	sa 22	6.5	7,010	s 216
25	0		0	4.0	2,200	sa 50	9.0	8,360	s 253
26	0		0	4.0	2,980	s 67	7.7	7,170	s 181
27	0		0	4.0	3,420	s 78	8.3	6,450	s 190
28	0		0	6.0	3,200	sa 95	7.4	7,260	s 200
29	0		0	--	--	--	6.6	9,500	169
30	0		0	--	--	--	6.9	10,300	192
31	0		0	--	--	--	7.6	8,830	181
Total	0.7		1	45.6	--	350	236.6	--	5,579

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR PAVILLION, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	7.6	8,000	164	5.0			21	4,200	238
2	7.2	8,700	169	4.2			12	2,900	94
3	5.5	7,630	s 141	4.2			10	3,700	100
4	6.2	9,080	s 183	4.5			9.5	2,350	60
5	7.2	11,500	224	4.5			9.5	1,900	49
6	5.8	6,000	94	4.5	4,830	60	19	3,300	169
7	4.8	3,450	45	4.8			19	2,250	115
8	4.5			4.8			12	1,650	53
9	3.8	1,080	12	4.8			7.6	1,100	23
10	3.8			4.8			30	24,000	sa 5,000
11	8.4	19,100	s 698	4.8			78	52,000	sa 18,000
12	6.9	11,700	218	8.0	13,200	285	18	4,900	238
13	5.0	11,100	150	12	23,200	s 957	14	4,150	157
14	6.2			29	39,000	sa 4,100	13	5,000	176
15	5.5			72	64,200	s 13,900	37	25,000	sa 8,700
16	5.2			48	20,000	2,590	70	45,000	sa 11,000
17	3.8			18	11,300	549	21	6,600	s 402
18	4.0	7,840	104	12	7,100	230	18	3,600	175
19	4.8			9.0	4,600	112	15	2,400	97
20	4.5			7.6	5,800	sa 150	14	4,050	153
21	4.5			12	6,300	204	20	11,000	sa 1,000
22	5.8			14	5,060	191	38	26,000	sa 3,300
23	7.6	15,300	s 412	14	9,560	s 391	21	6,000	340
24	8.6	13,000	s 322	22	26,000	s 3,520	16	3,450	149
25	7.2	8,100	157	14	17,000	sa 1,000	12	2,100	68
26	6.6	6,400	114	20	27,000	sa 2,700	9.0	2,250	55
27	3.5	1,400	13	8.3	3,650	82	8.3	1,950	44
28	2.4	500	3	7.2	2,750	53	7.6	1,700	35
29	4.5	8,000	97	8.3	5,900	132	7.6	1,650	34
30	5.0	5,490	74	12	3,050	99	36	22,400	s 9,850
31	--	--	--	22	5,500	327	--	--	--
Total	166.4	--	4,250	420.3	--	32,232	623.1	--	59,874

Day	July			August			September		
1	12	11,200	s 578	0.4	950	1	1.3	--	e 4
2	6.2	1,500	25	.4	640	1	.8	200	(t)
3	5.5	1,040	15	.4	220	(t)	.6	100	(t)
4	5.8	970	15	.2			1.4	575	2
5	5.8	540	8	.3			1.4	300	1
6	8.0	680	15	.2			1.1	140	(t)
7	8.6	650	15	.3			.6	73	(t)
8	9.0	600	15	.2	115	(t)	.1	39	(t)
9	9.5	575	15	.1			.1	--	(t)
10	5.8	420	7	.1			.7	85	(t)
11	4.2	540	6	.1			1.1	160	(t)
12	2.8	680	5	0	--	0	1.5	190	1
13	2.8	330	2	0	--	0	2.4	940	6
14	2.8			0	--	0	2.4	1,570	10
15	2.8			0	--	0	2.4	360	2
16	2.7			0	--	0	2.2		
17	2.6			0	--	0	2.0	185	1
18	2.6			0	--	0	2.1		
19	3.2	401	3	.1	--	e 1	2.8	650	5
20	3.2			0	--	0	2.4	1,300	8
21	2.6			0	--	0	2.4	720	5
22	2.0			0	--	0	2.4	440	3
23	2.0			.2			2.2	390	2
24	2.2			.2			1.8		
25	3.0	650	sa 7	.1	53	(t)	2.0		
26	1.8	--	e 5	.1			2.6	187	1
27	.8	280	1	.1			2.6		
28	.5	120	(t)	.2			2.6		
29	.4	190	(t)	1.0	420	sa 6	2.6		
30	.2	130	(t)	2.2	--	e 10	2.8		
31	.1	70	(t)	1.6	1,300	6	--	--	--
Total	121.5	--	768	8.5	--	26	53.4	--	61

Total discharge for year (cfs-days) 1,761.5
Total load for year (tons) 103,262

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR PAVILLION, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Feb. 15, 1957....	2:15 p.m.	e 5	33	1,160	2,580		29		43		70	83	100				VBWCM
Mar 1.....	3:30 p.m.	e 25	--	32,200	4,290		19		32		80	95	100				VPWCM
Mar. 18.....	1:55 p.m.	20	43	19,800	2,710		35		57		84	98	100				VPWCM
Mar. 22.....	3:05 p.m.	20	--	21,800	3,090		26		39		86	99	100				VPWCM
Apr. 23	9:05 p.m.	12	40	31,400	2,980		43		65		92	99	100				VPWCM
Apr. 25	2:50 p.m.	9.0	48	11,800	3,830		33		57		91	98	100				VPWCM
May 14.....	12:30 p.m.	14	50	31,100	5,510		39		57		89	98	100				VPWCM
May 25.....	1:20 p.m.	12	65	6,660	4,330		50		74		92	99	100				VPWCM
June 6.....	5:30 a.m.	18	58	3,420	3,210		26		40		80	98	100				VPWCM
June 11.....	11:20 a.m.	63	64	40,500	4,180		41		64		94	99	100				VPWCM
June 21.....	12:00 m.	18	--	15,000	3,660		36		57		87	97	100				VPWCM
June 30.....	7:35 p.m.	175	59	98,300	4,480		35		54		93	99	100				VPWCM

e Estimated.

Particle-size analyses of bed material, water years October 1955 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material											Methods of analysis
				Percent finer than indicated size, in millimeters											
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
Apr. 26, 1956.....		7.4	3			5	25	79	94	97	98	100	--			SV
May 25.....		26	3			3	10	33	57	69	78	86	94	98		SV
Apr. 25, 1957.....	2:50 p.m.	9.0	16			9	23	57	87	95	98	99	100			SV

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 2¼ miles upstream from normal high-water line of Boysen Reservoir and 9 miles northwest of Shoshoni, Fremont County.
DRAINAGE AREA.--340 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1956 to September 1957.
Sediment records: March 1949 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 85°F June 4; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 57,500 ppm June 11; minimum daily, no flow on many days during December to February.
Sediment loads: Maximum daily, 20,500 tons June 11; minimum daily, 0 tons on many days during December to February.
EXTREMES, 1949-57.--Water temperatures: Maximum (1956-57), 85°F June 4, 1957; minimum (1949, 1956-57), freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1951-57), 119,000 ppm July 22, 1951; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 200,000 tons (estimated) July 5, 1950; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Nov. 4-6, Nov. 14 to Mar. 21, Mar. 24. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 12 m. and 5 p.m. Many days of no flow/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	66	--	--		--	34	37	70	a 63	76	78	64
2	--	32	--		--	34	--	76	a 70	80	78	--
3	61	--	32		--	--	43	75	--	75	a 68	--
4	65	--	--		--	36	--	--	85	--	a 63	77
5	65	34	32		--	a 32	53	a 51	--	70	a 70	77
6	--	--	--		--	32	--	76	--	70	79	69
7	--	42	--		--	32	--	a 59	77	--	75	--
8	63	--	--		--	34	46	58	a 68	80	78	--
9	62	41	--		--	34	--	63	--	81	79	65
10	--	--	--		--	33	57	66	a 65	a 66	74	61
11	61	--	--		--	a 32	--	--	70	76	--	a 52
12	61	--	32		--	--	--	a 53	65	73	a 67	--
13	--	a 32	--		--	32	--	66	a 61	--	a 62	53
14	--	a 32	--		--	33	--	52	--	77	78	59
15	a 45	--	--		33	35	a 51	54	a 50	80	78	--
16	--	a 33	--		32	35	63	47	59	79	78	70
17	59	--	--	32	--	--	a 47	66	59	69	--	a 63
18	--	--	--		--	38	--	65	72	69	a 60	a 52
19	55	a 32	--		--	39	62	--	74	80	67	49
20	--	--	--		32	40	--	a 56	68	a 62	72	59
21	--	a 32	a 32		32	40	--	--	a 53	a 61	76	a 53
22	54	--	--		--	a 33	52	--	62	78	63	--
23	--	35	--		--	--	46	51	67	71	73	a 54
24	42	--	--		--	42	59	--	75	a 68	--	--
25	52	--	--		32	40	47	61	76	72	--	68
26	--	--	--		a 32	--	57	70	a 65	78	69	--
27	--	32	--		34	a 34	a 41	a 63	81	80	66	74
28	--	--	--		34	46	--	a 55	81	--	a 63	a 53
29	43	--	--		--	47	68	a 55	--	78	71	--
30	45	--	--		--	--	67	--	--	78	72	70
31	--	--	--		--	--	--	59	--	--	--	--
Average	--	--	--		--	--	--	--	--	74	71	--

a Measurement between 7 a.m. and 11 a.m.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	14	1,120	42	10	--	e 28	2.0	--	
2	13	--	e 40	8.8	768	18	2.0	--	
3	18	1,530	74	6.0	--	e 12	2.0	280	e 1
4	20	1,550	84	8.0	--	e 15	2.0	--	
5	20	1,500	81	7.0	700	13	2.0	224	
6	18	--	e 60	9.0	--	e 36	1.0	--	
7	16			12	2,280	74	.5	--	
8	14			10	--	e 60	.6	--	
9	14			10	2,000	a 55	.6	--	
10	16	1,080	44	12			.7	--	
11	16			13	--	e 70	.7	--	
12	14			12			.7	156	
13	12			10	1,200	a 32	.7	--	(t)
14	10			10	1,020	28	.7	--	
15	9.2			9.0	--	e 12	.7	--	
16	9.2			8.0	266		.6	--	
17	10			7.0	--		.6	--	
18	9.2			6.0	--	e 4	.6	--	
19	9.0			5.0	203		.5	--	
20	9.0			2.0	--		.5	--	
21	9.0			1.0	260		.3	154	
22	8.8	1,030	26	1.0	--		.2	--	
23	9.0			1.0	318		.2	--	
24	9.0			1.0	--		.1	--	(t)
25	9.2			1.0	--	e 1	.1	--	
26	9.2			1.0	--		.1	--	
27	9.8			1.0	336		0	--	0
28	9.5			1.5	--		0	--	0
29	9.5			2.0	--		0	--	0
30	10			2.0	--		0	--	0
31	10			--	--	--	0	--	0
Total	373.6	--	1,139	187.3	--	620	20.7	--	10

	January			February			March		
1	0		0	0	--	0	25	1,070	s 144
2	0		0	0	--	0	25	1,060	s 127
3	0		0	0	--	0	25	--	e 110
4	0		0	0	--	0	22	930	s 80
5	0		0	0	--	0	7.0	650	sa 16
6	0		0	0	--	0	4.0	383	s 5
7	0		0	0	--	0	3.0	600	sa 8
8	0		0	0	--	0	16	900	sa 60
9	0		0	0	--	0	18	1,500	sa 110
10	0		0	0	--	0	18	2,400	sa 160
11	.1			0	--	0	10	2,000	s 66
12	.2			0	--	0	12	5,250	s 252
13	.3			0	--	0	12	3,570	s 144
14	.4			.2	--	(t)	12	4,000	sa 200
15	.5			1.0	310	1	14	3,860	s 206
16	.5			2.0	370	2	16	5,900	sa 360
17	.4	170	(t)	3.0	--	e 3	20	8,500	sa 550
18	.2			4.0	320	3	24	6,660	s 560
19	.1			4.0	--	e 3	28	7,100	sa 650
20	.1			4.0	276	3	30	7,400	sa 750
21	.1			4.0	202	2	25	8,300	sa 700
22	0		0	3.0	--	e 2	15	6,670	s 312
23	0		0	5.0	--	e 3	12	5,600	sa 220
24	0		0	7.0	--	e 6	11	6,900	sa 260
25	0		0	9.0	394	s 12	12	6,480	s 244
26	0		0	12	598	s 26	13	6,720	s 297
27	0		0	20	710	s 50	13	5,970	210
28	0		0	25	995	s 86	14	7,400	sa 340
29	0		0	--	--	--	16		
30	0		0	--	--	--	16	8,060	348
31	0		0	--	--	--	16		
Total	2.9		1	103.2	--	202	504.0	--	8,185

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	21	8,630	489	4.8			39	11,400	1,200
2	20	--	e 400	5.8			25	6,900	466
3	15			4.8			17	5,100	b 240
4	13			4.0			16	4,750	205
5	13	5,500	208	5.8	2,930	49	14	4,200	b 160
6	16			6.4			36	14,000	sa 1,500
7	14			6.4			53	13,000	a 1,900
8	11			6.4			44	9,650	1,150
9	8.6			9.5			32	7,500	b 650
10	8.6	3,770	90	8.6			42	10,000	sa 1,300
11	7.2			9.5	--	e 95	109	57,500	s 20,500
12	14	--	e 360	16	5,050	218	43	26,800	s 3,750
13	12	--	e 220	18	6,000	292	26	9,150	642
14	11			32	13,500	1,170	20	7,300	b 400
15	11			134	40,200	15,100	18	7,000	340
16	9.5			117	40,500	13,300	86	56,000	sa 17,000
17	11			61	19,100	s 3,610	51	27,200	s 4,040
18	10			31	7,750	649	39	16,500	1,740
19	10	4,660	123	21	5,400	b 300	40	13,000	1,400
20	10			16	4,200	181	40	11,300	1,220
21	8.6			15	5,200	211	46	12,000	a 1,500
22	8.6			38	16,000	sb 1,700	66	25,000	sa 5,200
23	8.6			31	7,700	644	62	19,000	3,180
24	13	8,200	sa 300	24	6,000	b 380	54	12,400	1,810
25	13	10,200	358	32	32,000	sa 3,300	43	9,200	1,070
26	11	5,290	157	27	31,000	sa 2,500	25	5,250	354
27	10	--	e 130	18	23,400	1,140	19	4,650	239
28	7.6	--	e 80	14	8,100	306	18	4,600	224
29	5 4	2,400	35	13	6,500	228	18	--	e 220
30	5.4	2,980	43	21	13,000	sb 900	20	4,750	256
31	--	--	--	39	13,000	1,370	--	--	--
Total	337.1	--	5,202	790.0	--	48,084	1,161	--	73,856

	July			August			September		
1	74	57,000	sa16,000	49	6,750	893	18	2,350	114
2	47	17,500	2,220	47	5,900	749	18	2,700	131
3	36	10,300	1,000	45	5,450	662	14	2,710	102
4	47	12,000	b 1,500	33	4,350	388	14	1,780	67
5	48	11,500	1,490	34	4,600	422	14	1,360	51
6	51	13,200	1,820	40	4,450	481	13	1,230	43
7	51	13,000	b 1,800	51	5,600	771	12		
8	54	11,100	1,620	55	6,150	913	11		
9	55	11,200	1,660	60	6,250	1,010	11		
10	52	9,500	1,330	57	6,200	954	10	1,370	41
11	48	8,050	1,040	71	7,250	1,390	10		
12	47	7,550	958	70	7,750	1,460	11		
13	52	7,800	b 1,100	56	7,000	1,060	15	2,100	85
14	54	8,250	1,200	56	6,250	945	20	2,420	131
15	54	7,750	1,130	56	5,700	862	18	--	e 120
16	60	8,350	1,350	63	17,000	a 2,900	16	2,620	113
17	62	8,600	1,440	55	9,800	sa 1,600	14	2,070	78
18	63	8,650	1,470	57	12,000	sa 2,200	18	3,600	sa 200
19	70	9,650	1,820	49	6,000	794	29	3,930	308
20	81	13,500	2,950	65	9,150	1,610	16	3,590	155
21	70	15,100	2,850	62	6,350	1,060	13	2,460	86
22	63	10,700	1,820	52	4,850	681	13	--	e 70
23	54	8,000	1,170	46	5,650	702	11	1,490	44
24	66	9,850	1,760	61	9,900	b 1,600	11	--	e 36
25	66	8,950	1,590	62	8,300	b 1,400	11		
26	43	6,100	708	63	6,650	1,130	9.8		
27	36	5,450	530	58	5,600	877	9.8	1,000	27
28	22	4,200	249	50	5,150	695	10		
29	27	4,250	310	21	3,000	170	10		
30	34	4,900	450	40	4,650	502	10		
31	42	5,500	624	18	2,150	104	--	--	--
Total	1,629	--	56,959	1,602	--	30,985	410.6	--	2,342

Total discharge for year (cfs-days) 7,121.4

Total load for year (tons) 227,585

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

b Computed from estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 1, 1956	1:50 p.m.	14	66	1,100	1,290		23		28		45	74	98		100		VPWCM
Feb. 25, 1957	2:25 p.m.	a 9.0	32	666	1,180		27		37		59	87	100		--		VBWCM
Feb. 27	4:30 p.m.	34	33	1,570	3,390		34		55		77	93	100		--		VPWCM
Mar. 8	3:05 p.m.	34	34	2,440	4,260		21		36		65	86	100		--		VPWCM
Mar. 19	3:25 p.m.	52	39	13,400	3,070		30		40		69	90	99		100		VPWCM
Apr. 24	2:30 p.m.	15	59	6,070	5,640		40		60		84	91	99		100		VPWCM
May 12	11:30 p.m.	19	53	5,620	5,690		43		64		78	87	99		100		VPWCM
May 14	11:30 a.m.	38	52	11,600	2,950		46		71		82	91	99		100		VPWCM
May 15	11:35 a.m.	128	50	39,400	3,160		32		48		80	90	98		100		VPWCM
May 25	2:35 p.m.	37	61	52,400	4,090		58		85		91	96	99		100		VPWCM
May 26	1:50 p.m.	50	70	33,200	5,140		38		64		88	95	99		100		VPWCM
May 31	10:45 a.m.	43	55	14,500	3,330		24		44		76	88	98		100		VPWCM
June 6	6:15 a.m.	24	59	8,740	4,910		22		36		80	94	99		100		VPWCM
June 11	9:25 a.m.	144	59	42,300	3,100		26		37		76	90	98		100		VPWCM
June 11	10:10 a.m.	183	61	43,000	3,520		30		46		79	92	98		100		VPWCM
June 11	7:30 p.m.	103	66	92,100	3,500		41		60		90	96	99		100		VPWCM
June 16	2:05 p.m.	121	59	92,400	3,280		29		47		84	93	98		100		VPWCM
June 25	3:00 p.m.	44	76	9,000	5,080		21		29		68	89	98		100		VPWCM
July 1	5:15 p.m.	61	76	42,400	3,320		41		62		86	95	99		100		VPWCM
July 18	1:25 p.m.	65	69	8,580	5,410		15		22		46	78	96		100		VPWCM
Aug. 7	12:55 p.m.	54	75	6,040	4,140		11		16		40	70	93		99	100	VPWCM
Aug. 18	8:10 a.m.	49	60	12,400	2,980		40		51		67	85	98		100		VPWCM
Aug. 29	4:05 p.m.	15	71	1,860	1,330		25		33		49	78	97		100		VBWCM
Sept. 5	1:55 p.m.	14	77	1,340	1,900		26		35		55	82	99		100		VBWCM
Sept. 25	5:15 p.m.	10	68	860	1,770		27		39		52	81	97		100		VBWCM

a Daily mean discharge.

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
Apr. 24, 1957.....	2:30 p.m.	15	14			17	33	56	78	84	86	89	94	97		SV
May 15.....		132	17			5	23	70	92	96	96	98	99	100		SV
June 11.....		187	21			9	29	67	91	96	97	99	100	--		SV

YELLOWSTONE RIVER BASIN--Continued

FIFTEENMILE CREEK NEAR WORLAND, WYO.

LOCATION.--At gaging station, 1¾ miles upstream from mouth and 2¾ miles west of Worland, Washakie County.
DRAINAGE AREA.--594 square miles.
RECORDS AVAILABLE.--Sediment records: March 1951 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 105,000 ppm May 13; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 150,000 tons May 15; minimum daily, 0 tons on many days.
EXTREMES, 1951-57.--Sediment concentrations: Maximum daily, 125,000 ppm Apr. 16, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 148,000 tons May 22, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Apr. 3-5. No flow during period October to March; record is omitted. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Suspended sediment, April to September 1957

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	0.4	25,500	28	23	30,500	1,890
2	0	--	0	.2	--	e 10	11	20,500	609
3	2	35,100	s 373	0	--	0	8.0	16,500	356
4	2	51,300	s 304	0	--	0	7.0	15,000	284
5	1	42,200	118	0	--	0	6.0	15,500	251
6	9.9	39,900	s 1,240	.8	--	e 160	5.2	15,500	218
7	52	56,200	8,180	.9	53,500	135	6.9	18,500	345
8	21	40,900	2,400	.2	26,000	14	3.8	21,000	215
9	11	45,700	1,410	.4	22,000	s 27	2.3	--	e 130
10	4.9	36,500	501	.1	13,000	4	393	46,000	s 86,500
11	3.3	28,300	252	0	--	0	76	40,700	s 9,380
12	5.6	30,100	455	17	32,600	s 3,370	24	22,500	1,460
13	4.2	27,500	312	268	105,000	s 94,800	33	16,900	s 2,670
14	1.0	29,500	80	222	71,400	s 48,200	116	43,600	s 15,100
15	.2	29,200	16	570	90,500	150,000	43	31,300	s 4,060
16	0	--	0	93	47,900	s 15,200	555	84,800	s 140,000
17	0	--	0	25	20,500	1,380	467	70,300	s 110,000
18	0	--	0	16	16,500	713	76	22,800	4,680
19	0	--	0	13	15,500	544	44	12,000	1,430
20	0	--	0	7.0	14,500	274	29	10,500	822
21	0	--	0	15	24,000	s 1,330	84	32,400	s 10,500
22	0	--	0	44	39,700	s 5,230	48	38,100	5,120
23	0	--	0	18	24,500	1,190	20	16,000	864
24	91	73,000	s 23,000	12	18,500	599	15	12,000	486
25	14	54,500	2,140	7.0	--	e 340	11	11,500	342
26	8.0	41,000	918	7.0	18,000	340	7.5	10,000	203
27	5.6	34,500	541	4.6	18,000	224	7.5	10,500	213
28	4.6	32,500	419	3.8	17,500	180	48	69,600	s 13,600
29	3.1	30,000	251	9.5	30,000	770	13	59,200	s 2,270
30	1.2	28,500	92	25	43,100	s 3,830	68	50,400	s 12,000
31	--	--	--	74	59,600	s 13,300	--	--	--
Total	245.6	--	43,002	1,453.9	--	342,192	2,251.2	--	425,998

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

FIFTEENMILE CREEK NEAR WORLAND, WYO.--Continued

Suspended sediment, April to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	7.0	29,600	s 663	0	--	0	163	74,000	s 36,700
2	3.2	22,000	s 217	0	--	0	202	75,300	s 45,600
3	.8	15,000	32	0	--	0	12	46,600	1,570
4	0	--	0	0	--	0	3.2	29,000	251
5	0	--	0	0	--	0	1.4	19,000	72
6	0	--	0	0	--	0	.3	--	e 9
7	0	--	0	0	--	0	0	--	0
8	0	--	0	0	--	0	0	--	0
9	0	--	0	0	--	0	0	--	0
10	0	--	0	0	--	0	0	--	0
11	0	--	0	0	--	0	0	--	0
12	0	--	0	0	--	0	0	--	0
13	0	--	0	0	--	0	0	--	0
14	0	--	0	0	--	0	0	--	0
15	0	--	0	0	--	0	0	--	0
16	0	--	0	0	--	0	0	--	0
17	0	--	0	4.0	1,560	s 46	0	--	0
18	0	--	0	84	52,200	s 18,000	0	--	0
19	0	--	0	8.9	46,400	s 1,440	0	--	0
20	0	--	0	.8	8,000	17	0	--	0
21	0	--	0	0	--	0	0	--	0
22	0	--	0	0	--	0	0	--	0
23	0	--	0	0	--	0	0	--	0
24	0	--	0	0	--	0	0	--	0
25	0	--	0	0	--	0	0	--	0
26	0	--	0	0	--	0	0	--	0
27	0	--	0	0	--	0	0	--	0
28	0	--	0	0	--	0	0	--	0
29	0	--	0	160	84,000	s 53,900	0	--	0
30	0	--	0	20	65,200	s 3,910	0	--	0
31	0	--	0	10	41,000	1,150	--	--	--
Total	11.0	--	912	287.7	--	78,463	381.9	--	84,202

Total discharge for year (cfs-days) 4,631.3
Total load for year (tons) 974,769

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

FIFTEENMILE CREEK NEAR WORLAND, WYO.--Continued

Particle-size analyses of suspended sediment, April to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 3, 1957	5:00 p.m.	a 2	--	70,300	3,510	--	89		100		--	--	--		--		PWCM
Apr. 9	10:50 a.m.	12	46	47,600	4,680	--	100		--		--	--	--		--		PWCM
Apr. 24	9:20 a.m.	239	--	102,000	5,370	--	63		86		94	96	100		--		VPWCM
May 13	8:10 a.m.	510	--	157,000	4,640	--	56		77		91	93	98		100		VPWCM
May 13	5:20 p.m.	112	61	82,400	2,590	--	70		90		99	99	100		--		VPWCM
May 15	3:30 a.m.	329	49	97,000	4,940	--	43		63		90	96	99		100		VPWCM
May 15	8:15 a.m.	1,020	49	113,000	2,370	--	55		72		97	98	99		100		VPWCM
May 24	11:05 a.m.	12	61	18,000	5,150	--	100		--		--	--	--		--		PWCM
May 30	5:35 p.m.	57	65	72,900	3,600	--	69		92		100	--	--		--		VPWCM
June 10	5:10 p.m.	1,140	58	72,200	2,460	--	53		70		87	93	98		100		VPWCM
June 14	6:05 a.m.	250	50	65,300	2,920	--	47		65		93	97	98		99	99	VPWCM
June 16	9:20 a.m.	642	50	83,400	3,850	--	35		48		77	93	99		100		VPWCM
June 17	7:35 a.m.	754	48	90,300	4,480	--	34		44		73	90	98		100		VPWCM
June 21	2:25 p.m.	186	--	46,400	3,850	--	53		71		92	98	100		--		VPWCM
June 28	10:15 a.m.	139	68	126,000	2,800	--	52		73		94	98	100		--		VPWCM
Aug. 17	8:20 p.m.	9.7	67	28,400	5,190	--	82		98		99	100	--		--		VPWCM
Aug. 18	6:10 a.m.	268	56	65,200	4,730	5	8		76		96	99	100		--		VPN
Aug. 18	6:10 a.m.	268	56	65,200	4,340	45	55		77		96	99	100		--		VPWC
Aug. 29	4:00 p.m.	110	--	111,000	2,930	--	61		83		97	99	100		--		VPWCM
Sept. 2	2:35 a.m.	481	--	87,800	3,600	--	42		59		85	94	99		100		VPWCM

a Daily mean discharge.

Particle-size analyses of bed material, water years October 1955 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material											Methods of analysis
				Percent finer than indicated size, in millimeters											
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
Aug. 27, 1956		142	5			46	56	85	96	100						SV
June 10, 1957	5:10 p.m.	1,140	12			9	16	29	46	63	74	82	90	93	100	SV

BIGHORN RIVER AT KANE, WYO.

LOCATION.--At bridge on State Highway 14, half a mile upstream from Shoshone River, 1½ miles northeast of Kane, Big Horn County, and 12½ miles downstream from gaging station.
DRAINAGE AREA.--15,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953, June 1955 to September 1957 (discontinued).
Water temperatures: July to September 1949, October 1950 to September 1957.
Sediment records: March 1946 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,090 ppm May 15; minimum, 385 ppm June 26 to July 12.
Hardness: Maximum, 524 ppm May 15; minimum, 191 ppm July 24-28.
Specific conductance: Maximum daily, 1,430 micromhos May 15; minimum daily, 548 micromhos June 30.
Water temperatures: Maximum, 74°F Aug. 5; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 20,500 ppm May 14; minimum daily, not determined.
Sediment loads: Maximum daily, 383,000 tons June 17; minimum daily, not determined.
EXTREMES, 1946-57.--Dissolved solids (1955-57): Maximum, 1,090 ppm May 15, 1957; minimum, 292 ppm June 6, 1956.
Hardness (1955-57): Maximum, 524 ppm May 15, 1957; minimum, 152 ppm June 6, 1956.
Specific conductance (1955-57): Maximum daily, 1,440 micromhos Nov. 17, 1955; minimum daily, 460 micromhos June 6, 1956.
Water temperatures (1950-57): Maximum, 85°F July 14, 30, 1953, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 33,000 ppm Apr. 20, Sept. 21, 1948; minimum daily, not determined.
Sediment loads: Maximum daily, 972,000 tons June 25, 1946; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Dec. 4 to Feb. 26. No appreciable inflow between gaging station and sampling point except during periods of intense local precipitation. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	2,260	--	--	61	29	79	--	180	275	14	--	--	0.09	584	0.79	3,560	273	125	38	2.1	858	7.8	--
Nov. 1-Dec. 4.....	2,370	10	0.00	76	23	77	3.4	191	278	13	0.3	0.4	.10	581	.79	3,720	283	126	37	2.0	848	7.6	5
Dec. 5-14.....	1,900	--	--	85	28	89	--	219	315	16	--	--	.11	663	.90	3,400	327	147	37	2.1	962	7.8	--
Dec. 15-31.....	2,120	--	--	78	25	77	--	204	280	15	--	--	.10	603	.82	3,450	298	131	35	1.9	892	7.8	--
Jan. 1-6, 1957.....	2,050	--	--	78	22	75	--	192	280	15	--	--	.10	641	.87	3,550	284	127	35	1.9	865	8.1	--
Feb. 6.....	1,400	--	--	70	19	60	--	174	235	13	--	--	.07	534	.73	2,020	254	111	32	1.6	741	8.2	--
Feb. 7-28.....	1,520	--	--	80	23	75	--	197	295	15	--	--	.09	658	.89	2,700	296	134	33	1.9	883	8.0	--
Mar. 1-18.....	2,040	--	--	64	34	85	--	194	285	14	--	--	.06	621	.84	3,420	299	140	38	2.1	905	7.7	--
Mar. 19-31.....	1,340	11	.01	85	34	110	3.9	221	360	18	.4	.9	.08	738	1.00	2,670	352	171	40	2.6	1,060	7.8	3
Apr. 1-24.....	1,020	--	--	85	42	117	--	234	400	20	--	--	.14	821	1.12	2,260	384	192	40	2.6	1,160	7.9	--
Apr. 25-May 8.....	1,050	--	--	95	29	117	--	222	390	20	--	--	.15	778	1.06	2,210	356	174	41	2.7	1,100	7.5	--
May 9-14.....	3,030	--	--	87	23	92	--	215	324	14	--	--	.13	667	.91	5,460	311	135	38	2.3	965	6.9	--
May 15.....	6,300	--	--	168	26	146	--	300	556	13	--	--	.17	1,090	1.48	18,540	524	278	38	2.8	1,430	7.6	--
May 16-28.....	3,510	--	--	80	22	100	--	206	314	14	--	--	.17	648	.88	6,140	291	122	42	2.6	942	7.4	--
May 29-June 2.....	5,240	--	--	67	17	68	--	182	197	9.2	--	--	.09	488	.66	6,900	236	87	39	1.9	722	7.8	--

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
June 16-20, 1957..	6,900	14	0.01	66	17	75	3.6	180	224	9.0	0.4	2.4	0.08	533	0.72	9,930	236	88	40	2.1	781	7.6	--
June 21-25.....	7,990	--	--	58	16	59	--	159	178	8.0	--	--	.08	434	.59	9,360	210	80	38	1.8	650	7.5	--
June 26-July 12 ...	9,610	--	--	53	15	49	--	151	165	7.1	--	--	10	385	.52	9,990	193	69	35	1.5	588	7.4	--
July 13-23.....	6,020	--	--	57	16	54	--	155	187	9.1	--	--	.08	422	.57	6,860	208	81	35	1.6	639	7.5	--
July 24-28.....	5,340	--	--	52	15	50	--	144	168	8.6	--	--	.08	392	.53	5,650	191	73	36	1.6	588	7.4	--
July 29-Aug. 3....	3,100	--	--	60	17	62	--	162	202	11	--	--	.08	459	.62	3,840	220	87	38	1.8	691	7.7	--
Aug. 4-23	1,590	--	--	70	23	80	--	166	275	14	--	--	.13	585	.80	2,510	268	132	39	2.1	848	7.8	--
Aug. 24-Sept. 11..	1,200	--	--	99	31	124	--	226	405	18	--	--	.14	823	1.12	2,670	374	189	42	2.8	1,140	7.6	--
Sept. 12-30.....	2,000	17	.00	79	27	87	4.7	192	315	15	.4	.2	.12	649	.88	3,500	308	151	38	2.1	933	7.7	10
Weighted average a.....	2,750	--	--	69	22	75	--	182	254	12	--	--	0.10	553	0.75	4,110	263	114	38	2.0	806	--	--
Weighted average b.....	2,870	--	--	68	22	72	--	179	248	12	--	--	0.10	542	0.74	4,200	258	111	37	1.9	791	--	--

a Represents 84 percent of runoff for water year October 1956 to September 1957.

b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	43	35	--	--	--	47	55	58	65	71	61
2	56	40	--	33	--	33	41	56	63	66	68	57
3	58	36	33	33	--	--	43	63	65	67	69	62
4	54	36	32	--	--	33	41	57	67	64	71	62
5	60	39	--	33	--	32	42	58	66	65	74	63
6	56	40	--	--	--	33	43	59	65	--	73	64
7	--	40	--	--	--	32	34	59	61	67	69	63
8	58	42	--	--	--	32	42	58	62	66	69	62
9	56	43	--	--	--	34	41	50	62	--	71	56
10	55	43	--	--	--	33	42	56	61	71	--	57
11	56	44	32	--	--	33	38	57	58	70	70	55
12	52	42	--	--	34	34	41	57	61	71	72	57
13	53	42	33	--	34	--	48	55	60	70	68	55
14	56	38	33	--	--	32	--	56	58	72	69	55
15	52	36	33	--	33	32	47	53	56	70	68	56
16	48	36	--	--	32	38	46	54	54	73	68	55
17	50	40	--	--	34	38	50	52	51	70	68	57
18	53	35	33	--	33	38	49	54	55	69	--	55
19	52	32	--	--	--	43	48	59	62	70	69	48
20	--	32	32	--	33	41	48	53	64	68	69	45
21	49	32	--	--	--	42	52	49	59	69	--	50
22	48	34	--	--	--	38	59	54	60	70	68	50
23	51	34	--	--	--	37	--	48	--	70	65	51
24	--	35	33	--	33	37	--	59	61	69	65	53
25	44	33	--	--	--	32	47	57	62	70	65	55
26	46	33	--	--	32	42	50	58	64	68	67	56
27	52	--	--	--	34	43	41	59	64	70	--	57
28	48	35	--	--	35	44	54	62	64	72	--	58
29	56	33	--	--	--	45	--	63	60	72	--	60
30	42	35	--	--	--	50	58	66	70	70	--	58
31	43	--	--	--	--	43	--	60	--	70	64	--
Average	52	37	--	--	--	37	46	57	61	69	--	56

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,950	690	3,630	2,510	590	4,000	2,180	625	3,680
2	2,010	670	3,640	2,320	640	4,010	2,170	--	e 4,000
3	2,050	695	3,850	2,440	720	4,740	2,080	1,040	5,840
4	2,140	780	4,510	2,460	786	5,220	1,900	960	4,920
5	2,110	720	4,100	2,510	1,180	8,000	1,800	--	e 2,000
6	2,080	555	3,120	2,540	1,310	8,980	1,500	--	
7	2,100	550	3,120	2,590	1,260	8,810	1,200	--	
8	2,110	550	3,130	2,540	1,530	10,500	1,300	--	
9	2,160	560	3,270	2,520	1,530	10,400	1,400	--	e 400
10	2,180	530	3,120	2,560	1,020	7,050	1,600	--	
11	2,300	645	4,010	2,560	1,040	7,190	1,500	--	
12	2,240	660	3,990	2,520	1,260	8,570	1,700	50	
13	2,200	650	3,860	2,560	792	5,470	2,100		
14	2,240	550	3,330	2,520	608	4,140	2,200		
15	2,230	485	2,920	2,510	624	4,230	2,200		
16	2,240	475	2,870	2,480	656	4,390	2,200		
17	2,260	600	3,660	2,520	688	4,680	2,100		
18	2,290	505	3,120	2,350	736	4,670	2,100		
19	2,290	455	2,810	2,240	472	2,850	2,100		
20	2,290	610	3,770	2,360	160	1,020	2,000	121	653
21	2,300	595	3,690	2,280	152	936	2,000		
22	2,300	475	2,950	2,240	944	5,710	2,000		
23	2,300	470	2,920	2,280	1,190	7,330	1,900		
24	2,400	700	4,540	2,260	--	e 7,000	1,800		
25	2,510	840	5,690	2,260	1,180	7,200	1,800		
26	2,440	1,650	10,900	2,240	1,060	6,410	1,900		
27	2,430	890	5,840	2,280	810	4,990	2,000		
28	2,440	600	3,950	2,290	890	5,500	2,000		
29	2,460	640	4,250	2,220	1,090	6,530	2,000	554	2,990
30	2,480	650	4,350	2,170	690	4,040	2,000		
31	2,490	685	4,610	--	--	--	2,000		
Total	70,020	--	123,520	72,130	--	174,566	58,730	--	47,332

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	2,000			1,200	--		1,840	540	2,680
2	2,000			1,200	--		1,750	545	2,580
3	2,000	253	1,370	1,200	--		1,750	550	2,600
4	2,000			1,200	--		1,770	460	2,200
5	2,000			1,250	--		1,700	250	1,150
6	1,800	120	583	1,300	230	e 800	1,550	125	523
7	1,600	--		1,350	--		1,570	145	615
8	1,600	--		1,400	--		1,750	320	1,510
9	1,300	--		1,450	235		2,010	720	3,910
10	1,100	--		1,450	--		2,220	920	5,510
11	1,200	--		1,450	275		2,350	730	4,630
12	1,300	--		1,450			2,490	970	6,520
13	1,400	--		1,550			2,730	820	6,040
14	1,400	--		1,650			2,850	1,140	8,770
15	1,400	--		1,700			2,600	1,510	10,600
16	1,300	--		1,750			2,240	1,870	11,300
17	1,300	--		1,800			1,900	1,310	6,720
18	1,300	--		1,850	377	1,680	1,610	1,010	4,390
19	1,300	--	e 400	1,750			1,610	1,070	4,650
20	1,300	--		1,750			1,590	1,100	4,720
21	1,300	--		1,750			1,550	1,220	5,110
22	1,250	--		1,600			1,540	1,080	4,490
23	1,200	--		1,400			1,500	1,190	4,820
24	1,200	--		1,400			1,410	936	3,560
25	1,200	--		1,800	475	2,310	1,110	558	1,670
26	1,150	--		2,100	770	4,370	1,090	549	1,620
27	1,150	--		2,200	820	4,870	1,220	630	2,080
28	1,150	--		2,050	690	3,820	1,220	648	2,130
29	1,150	137		--	--	--	1,220	522	1,720
30	1,150	--		--	--	--	1,220	531	1,750
31	1,150	--		--	--	--	1,150	639	1,980
Total	43,650	--	17,433	44,000	--	46,010	54,110	--	122,548

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1,120	630	1,910	908	549	1,350	5,860	6,450	102,000
2	1,090	621	1,830	884	513	1,220	5,980	4,050	65,400
3	1,080	450	1,310	868	475	1,110	6,440	4,900	85,200
4	1,140	594	1,830	876	504	1,190	8,010	5,500	119,000
5	1,060	396	1,130	1,180	6,000	s 20,500	9,200	5,870	146,000
6	1,040	1,210	3,400	1,110	4,080	12,200	10,000	5,050	136,000
7	1,100	2,540	7,540	1,080	1,800	5,250	12,600	8,400	286,000
8	1,080	1,760	5,130	1,120	1,240	3,750	10,300	8,800	245,000
9	1,030	1,420	3,950	1,310	1,380	4,880	8,780	6,150	146,000
10	1,070	1,980	5,720	1,380	1,620	6,040	10,200	8,400	231,000
11	1,030	1,350	3,750	1,910	2,590	s 15,600	11,600	9,150	287,000
12	1,030	990	2,750	2,940	8,530	67,700	9,760	6,000	158,000
13	994	828	2,220	5,380	19,400	282,000	7,920	4,850	104,000
14	1,000	720	1,940	5,260	20,500	291,000	7,210	3,900	75,900
15	949	738	1,890	6,300	18,000	306,000	6,160	3,850	64,000
16	976	878	2,310	5,530	16,400	245,000	6,690	5,110	92,300
17	940	756	1,920	3,780	7,600	77,600	9,580	14,800	383,000
18	884	711	1,700	2,780	2,810	21,100	6,690	9,600	173,000
19	908	720	1,770	2,900	2,070	16,200	5,770	3,680	57,300
20	884	531	1,270	3,230	5,220	45,500	5,770	2,730	42,500
21	844	558	1,270	3,640	5,180	50,900	7,020	3,940	74,700
22	836	396	894	3,750	2,720	27,500	7,920	4,170	89,200
23	1,010	2,100	s 8,920	3,520	2,000	19,000	7,940	3,220	69,000
24	1,380	2,880	s 13,100	3,210	2,830	24,500	8,540	3,200	73,800
25	1,470	5,370	21,300	3,250	1,960	17,200	8,540	2,620	60,400
26	1,180	7,380	23,500	3,160	1,940	16,600	9,010	2,370	57,700
27	1,090	2,500	7,360	3,230	2,560	22,300	8,630	2,250	52,400
28	1,040	1,080	3,030	3,690	2,250	22,400	8,630	2,260	52,700
29	994	855	2,290	4,220	3,520	40,100	9,060	2,700	66,000
30	958	612	1,580	3,990	2,760	29,700	9,780	3,530	93,200
31	--	--	--	6,140	8,670	144,000	--	--	--
Total	31,207	--	138,514	92,526	--	1,839,390	249,590	--	3,687,700

Day	July			August			September		
1	11,600	5,590	175,000	2,700	830	6,050	1,190	3,400	10,900
2	11,400	5,790	178,000	2,620	900	6,370	1,680	2,870	s 14,400
3	11,200	3,740	113,000	2,400	730	4,730	1,710	9,200	42,500
4	10,200	2,650	73,000	1,980	695	3,720	1,320	9,400	33,500
5	10,100	2,310	63,000	1,860	705	3,540	1,280	2,000	6,910
6	9,940	2,200	59,000	1,760	1,190	5,650	1,120	780	2,360
7	9,690	2,000	52,300	1,750	790	3,730	1,100	510	1,510
8	9,550	1,850	47,700	1,680	710	3,220	1,120	590	1,780
9	8,900	1,500	36,000	1,700	780	3,580	1,140	480	1,480
10	8,690	1,560	36,600	1,680	720	3,270	1,120	390	1,180
11	8,420	1,450	33,000	1,680	700	3,180	1,830	887	s 4,710
12	8,510	1,680	38,600	1,700	760	3,490	2,050	1,330	7,360
13	8,330	1,680	37,800	1,710	740	3,420	2,050	1,050	5,810
14	7,890	1,320	28,100	1,500	680	2,750	2,770	2,820	21,100
15	6,320	1,360	23,200	1,360	410	1,510	2,340	6,190	s 41,200
16	5,130	1,680	23,300	1,140	435	s 1,460	1,400	2,550	9,640
17	4,740	1,250	16,000	1,450	820	3,210	1,310	1,700	6,010
18	4,630	1,160	14,500	1,590	1,390	5,970	1,240	550	1,840
19	4,690	1,120	14,200	1,720	1,490	6,920	1,330	550	1,980
20	6,010	2,420	39,300	1,590	2,850	12,200	2,080	1,480	8,310
21	6,110	2,520	41,600	1,540	1,040	4,320	2,160	1,120	6,530
22	6,310	1,660	28,300	1,480	693	2,770	2,050	710	3,930
23	6,040	1,210	19,700	994	410	1,100	2,070	710	3,970
24	5,940	966	15,500	916	350	866	2,040	605	3,330
25	5,760	830	12,900	932	390	981	2,010	600	3,260
26	5,710	800	12,300	924	350	873	2,010	400	2,170
27	5,450	710	10,400	924	400	998	1,980	400	2,140
28	3,830	910	9,410	908	--	e 2,500	2,230	700	4,210
29	3,690	790	7,870	1,080	--	e 5,000	2,400	660	4,280
30	3,630	800	7,840	1,280	2,800	9,680	2,400	625	4,050
31	3,530	850	8,100	1,150	4,150	12,900	--	--	--
Total	221,940	--	1,275,520	47,698	--	129,958	52,530	--	262,350

Total discharge for year (cfs-days) 1,038,131
Total load for year (tons) 7,864,841

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 1, 1956	12:20 p.m.	1,940	59	595	1,060	--	12		18		31	50	88		100		VBWCM
Apr. 8, 1957	11:10 a.m.	1,140	45	1,800	4,300	--	1		83		86	91	96		100		VPN
Apr. 8	11:10 a.m.	1,140	45	1,800	4,200	--	65		84		86	91	96		100		VPWC
Apr. 17	11:20 a.m.	1,010	50	694	2,380	--	44		57		65	74	92		100		VBWCM
Apr. 25	11:25 a.m.	1,600	47	4,350	4,310	--	69		82		87	92	97		100		VPWCM
May 14	3:40 p.m.	5,900	59	28,500	4,170	--	69		91		96	98	99		100		VPWCM
May 16	5:25 a.m.	6,810	53	16,400	5,000	1	4		84		94	97	99		100		VPN
May 16	5:25 a.m.	6,810	53	16,400	4,960	--	63		84		94	97	99		100		VPWC
May 17	8:00 a.m.	4,370	52	10,600	3,160	--	58		79		90	93	96		100		VPWCM
May 22	2:30 p.m.	4,030	53	3,400	3,400	--	50		63		82	89	97		100		VPWCM
May 31	12:00 m.	6,010	61	4,980	2,800	--	36		51		80	88	97		100		VPWCM
May 31	5:35 p.m.	6,100	64	11,800	3,860	--	59		79		91	95	98		100		VPWCM
June 8	12:00 m.	10,700	65	10,000	3,070	6	15		74		97	99	100		--		VPN
June 8	12:00 m.	10,700	65	10,000	2,950	35	49		77		97	99	100		--		VPWC
June 17	1:40 p.m.	10,800	54	16,800	3,570	--	53		72		92	97	98		100		VPWCM
July 1	10:10 a.m.	11,600	65	5,300	4,160	--	30		49		83	94	98		100		VPWCM
July 15	11:50 a.m.	6,310	74	1,580	4,740	--	13		22		53	81	96		100		VPWCM
Aug. 5	9:20 a.m.	1,880	74	732	2,460	--	12		23		51	78	98		100		VPWCM
Aug. 19	10:30 a.m.	1,810	70	1,100	3,290	--	23		35		54	67	94		100		VPWCM
Aug. 30	12:40 p.m.	1,180	68	3,560	5,250	--	70		91		94	95	100		--		VPWCM
Sept. 30	11:00 a.m.	2,400	62	628	1,340	--	14		20		36	58	92		100		VBWCM

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.062	0.125	0.175	0.250	0.350	0.500	1.000	2.000	4.000	8.000	16.000		
Apr. 8, 1957		1,110	19	11	24	31	51	68	75	76	77	80	90	91		SV
June 8		12,000	20	19	27	31	41	53	62	67	69	72	77	84		SV
July 15		6,200	20	12	28	41	58	76	87	91	92	94	97	100		SV
Aug. 19		1,860	25	5	20	43	76	92	98	99	100	--	--	--		SV

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 10, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 4 miles east of Custer.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1957.
Water temperatures: April 1949 to September 1951, August 1952 to September 1957.
Sediment records: July 1947 to September 1954, October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 818 ppm Apr. 28 to May 19; minimum, 387 ppm June 21 to July 14.
Hardness: Maximum, 390 ppm Dec. 5-14; minimum, 200 ppm June 21 to July 14.
Specific conductance: Maximum daily, 1,260 micromhos May 8; minimum daily, 521 micromhos July 6.
Water temperatures: Maximum, 77°F July 17; minimum, freezing point on many days during December to March.
Sediment concentrations: Maximum daily, 14,700 ppm May 16; minimum daily, not determined.
Sediment loads: Maximum daily, 449,000 tons June 18; minimum daily, 128 tons Jan. 10.
EXTREMES, 1947-57.--Dissolved solids (1951-57): Maximum, 1,190 ppm July 28-31, 1955; minimum, 304 ppm June 23, 1951.
Hardness (1951-57): Maximum, 544 ppm July 28-31, 1955; minimum, 151 ppm June 23, 1951.
Specific conductance (1951-57): Maximum daily, 1,640 micromhos Nov. 18, 1955; minimum daily, 384 micromhos June 20, 1951.
Water temperatures (1949-51, 1952-57): Maximum, 89°F Aug. 7, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations (1947-54, 1955-57): Maximum daily, 23,200 ppm May 24, 1952; minimum daily, not determined.
Sediment loads (1947-54, 1955-57): Maximum daily, 727,000 tons May 24, 1952; minimum daily, 128 tons Jan. 10, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Nov. 15 to Mar. 24. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-28, 1956....	3,257	--	--	--	--	100	--	207	--	--	--	--	--	719	0.98	6,320	324	154	40	2.4	1,030	7.7	--
Oct. 29-Dec. 4	4,039	--	--	--	--	83	--	210	--	--	--	--	--	670	.91	7,310	317	145	36	2.0	947	7.8	--
Dec. 5-14	2,710	13	0.01	100	34	107	4.2	260	373	15	0.5	0.3	0.14	799	1.09	5,850	390	177	37	2.4	1,130	7.8	5
Dec. 15-28	2,943	--	--	--	--	81	--	220	--	--	--	--	--	665	.90	5,280	323	143	35	2.0	944	7.8	--
Dec. 29-Jan. 8, 1957	3,127	--	--	--	--	83	--	219	--	--	--	--	--	649	.88	5,480	318	138	36	2.0	922	7.9	--
Jan. 9-31	2,009	--	--	--	--	90	--	256	--	--	--	--	--	760	1.03	4,120	378	168	34	2.0	1,050	8.0	--
Feb. 1-6	2,083	--	--	--	--	98	--	252	--	--	--	--	--	745	1.01	4,190	381	174	36	2.2	1,070	7.7	--
Feb. 7-13	2,543	--	--	--	--	84	--	221	--	--	--	--	--	627	.85	4,300	324	143	36	2.0	919	7.6	--
Feb. 14	2,750	--	--	--	--	40	--	178	--	--	--	--	--	390	.53	2,900	220	74	28	1.2	597	7.7	--
Feb. 15-27	2,842	--	--	--	--	86	--	211	--	--	--	--	--	647	.88	4,960	321	148	37	2.1	935	7.8	--
Feb. 28-Mar. 1....	3,300	--	--	--	--	64	--	180	--	--	--	--	--	522	.71	4,650	258	110	35	1.7	752	8.0	--
Mar. 2-3.....	2,850	--	--	--	--	79	--	176	--	--	--	--	--	616	.84	4,740	282	138	38	2.1	875	7.9	--
Mar. 4-31.....	2,742	12	.01	89	32	100	3.6	220	319	16	.5	1.3	.13	742	1.01	5,490	352	172	38	2.3	1,050	7.9	5
Apr. 1-23	2,377	--	--	--	--	109	--	235	--	--	--	--	--	805	1.09	5,170	378	185	39	2.4	1,120	8.0	--
Apr. 24	9,100	--	--	--	--	81	--	206	--	--	--	--	--	728	.99	17,890	378	209	32	1.8	1,010	8.1	--
Apr. 25-27.....	5,313	--	--	--	--	94	--	200	--	--	--	--	--	678	.92	9,730	304	140	40	2.3	973	8.2	--
Apr. 28-May 19....	4,126	--	--	--	--	116	--	236	--	--	--	--	--	818	1.11	9,110	348	154	42	2.7	1,110	7.9	--
May 20-28.....	6,757	--	--	--	--	87	--	209	--	--	--	--	--	674	.92	12,300	293	122	39	2.2	926	7.9	--

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
May 29-June 3, 1957.	7,922	--	--	--	--	70	--	205	--	--	--	--	--	557	0.76	11,910	269	101	36	1.9	810	7.6	--
June 4-17.....	12,980	14	0.01	62	16	56	3.3	186	174	5.5	0.4	1.8	0.07	437	.59	15,320	221	38	35	1.6	658	7.5	8
June 18-20.....	16,270	--	--	--	--	69	--	206	--	--	--	--	--	500	.68	21,960	239	70	39	1.9	750	7.7	--
June 21-July 14	15,600	--	--	--	--	46	--	171	--	--	--	--	--	387	.53	16,300	200	60	33	1.4	575	7.7	--
July 15-29.....	7,973	--	--	--	--	58	--	160	--	--	--	--	--	441	.60	9,490	214	83	37	1.7	656	7.6	--
July 30-Aug. 7.....	3,798	--	--	--	--	76	--	176	--	--	--	--	--	549	.75	5,630	254	110	39	2.1	803	7.6	--
Aug. 8-27	2,354	--	--	--	--	100	--	196	--	--	--	--	--	700	.95	4,450	309	148	41	2.5	1,000	7.5	--
Aug. 28-Sept. 30...	2,894	18	.00	129	7.1	100	4.7	218	383	14	.5	1.6	.06	778	1.06	6,080	351	172	38	2.3	1,090	7.5	10
Weighted average a	4,744	--	--	--	--	76	--	200	--	--	--	--	--	586	0.80	7,510	279	115	37	2.0	840	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 58	41	a 37	--	a 32	32	46	57	64	69	71	64
2	54	37	a 37	34	a 32	32	42	56	67	68	70	60
3	54	--	a 35	a 33	32	32	42	51	65	68	70	61
4	53	36	33	32	a 32	32	40	61	67	64	68	62
5	57	a 34	a 32	a 32	32	a 32	41	60	68	65	72	62
6	a 60	a 39	a 32	a 33	32	32	42	59	69	68	74	65
7	54	a 40	a 32	32	32	--	40	60	65	70	70	64
8	52	a 42	a 33	a 32	a 32	--	44	60	65	68	70	62
9	49	a 45	33	a 32	a 32	32	42	52	65	69	70	60
10	50	a 45	33	a 32	a 32	32	39	52	62	70	74	57
11	a 56	a 45	32	a 32	32	32	35	58	65	70	72	57
12	54	a 45	32	a 32	--	32	34	60	64	75	72	57
13	53	42	a 33	32	32	a 33	38	57	61	73	73	57
14	a 54	a 39	33	32	--	32	41	57	59	73	71	54
15	49	a 36	a 33	--	32	32	45	55	58	73	71	56
16	50	34	a 32	a 32	32	32	45	54	58	74	70	57
17	a 56	a 34	32	a 32	32	32	45	54	56	77	69	57
18	49	a 35	33	32	32	32	45	58	55	71	69	54
19	a 52	a 34	34	32	a 32	32	46	59	60	71	70	49
20	a 54	a 38	33	a 32	a 32	32	45	57	63	70	71	49
21	a 54	a 33	32	a 32	a 32	33	50	51	62	71	70	49
22	46	34	a 33	a 33	a 32	32	54	50	58	72	67	49
23	45	35	a 34	a 32	a 32	--	50	51	57	72	65	51
24	a 46	a 37	a 34	--	32	--	45	52	62	72	67	55
25	--	34	34	--	32	--	46	56	67	72	67	54
26	--	a 37	a 35	a 32	32	42	46	57	65	71	63	57
27	41	a 37	a 35	a 32	32	39	56	61	63	72	64	55
28	41	a 35	34	--	32	37	46	64	64	71	65	62
29	42	a 39	a 34	a 32	--	40	52	60	66	71	63	60
30	39	a 35	34	a 32	--	45	56	67	69	70	65	60
31	41	--	a 35	a 32	--	45	--	65	--	73	66	--
Average	50	38	33	b 32	b 32	34	45	57	63	71	69	57

a Measurement between 1 p.m. and 6 p.m.
b Includes estimated temperature, 32° F, on missing days.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2,460	429	2,850	4,370	629	7,420	3,900	468	4,930
2	2,750	391	2,900	4,230	591	6,750	3,900	391	4,120
3	2,770	374	2,800	4,210	544	6,180	3,800	536	5,500
4	2,880	391	3,040	4,210	561	6,380	3,200	425	3,670
5	2,940	451	3,580	4,210	548	6,230	3,000	230	1,860
6	2,980	595	4,790	4,300	489	5,680	2,000	136	734
7	3,020	586	4,780	4,390	472	5,590	1,800	81	394
8	3,060	574	4,740	4,440	480	5,750	2,300	60	373
9	3,100	442	3,700	4,440	493	5,910	2,800	51	386
10	3,100	416	3,480	4,440	604	7,240	3,000	306	2,480
11	3,100	438	3,670	4,420	706	8,420	3,200	323	2,790
12	3,140	425	3,600	4,440	552	6,620	3,000	434	3,520
13	3,280	578	5,120	4,420	510	6,090	2,900	421	3,300
14	3,260	510	4,490	4,320	510	5,950	3,100	391	3,270
15	3,490	620	5,840	4,000	484	5,230	3,300	638	5,680
16	3,320	506	4,540	3,900	527	5,550	3,300	180	1,600
17	3,280	459	4,060	3,900	536	5,640	3,200	108	933
18	3,400	382	3,510	4,000	544	5,800	3,100	148	1,240
19	3,220	701	6,090	3,900	548	5,770	3,100	166	1,390
20	3,080	540	4,490	3,600	506	4,920	3,000	171	1,390
21	3,120	472	3,980	3,400	510	4,680	3,000	95	770
22	3,260	616	5,420	3,400	527	4,840	2,900	147	1,150
23	3,400	468	4,300	3,700	574	5,730	2,800	220	1,660
24	3,530	361	3,440	3,900	706	7,430	2,800	150	1,130
25	3,640	272	2,670	3,700	612	6,110	2,700	160	1,170
26	3,860	502	5,230	3,900	646	6,800	2,600	195	1,370
27	4,260	986	11,300	3,900	616	6,490	2,600	180	1,260
28	4,490	1,530	18,500	3,900	434	4,570	2,800	125	945
29	4,320	969	11,300	3,900	450	4,740	3,000	360	2,920
30	4,230	688	7,860	4,000	544	5,880	3,100	300	2,510
31	4,260	561	6,450	--	--	--	3,200	320	2,760
Total	104,000	--	162,520	121,840	--	180,470	92,400	--	67,205

Day	January			February			March		
1	3,200	200	1,730	2,100	430	2,440	3,200	750	6,480
2	3,200	140	1,210	2,000	370	2,000	3,000	450	3,650
3	3,200	190	1,640	1,900	350	1,800	2,700	510	3,720
4	3,100	195	1,630	2,000	400	2,160	2,400	250	1,620
5	3,100	250	2,090	2,200	430	2,550	2,200	205	1,220
6	3,100	300	2,510	2,300	450	2,790	1,900	210	1,080
7	3,200	180	1,560	2,300	470	2,920	1,800	--	e 1,000
8	3,000	110	891	2,400			1,800	--	e 1,000
9	2,200	50	297	2,500			2,100	200	1,130
10	1,900	25	128	2,600			2,400	330	2,140
11	1,900	--	e 130	2,600			2,600	400	2,810
12	1,900	28	144	2,700	--	e 1,100	2,800	680	5,140
13	2,100	33	187	2,700			3,000	740	5,990
14	2,300	--	e 340	2,750			3,100	420	3,520
15	2,400	105	680	2,800			3,100	370	3,100
16	2,200	110	653	2,850			3,100	410	3,430
17	2,400	--	e 800	2,900	152	1,190	3,200	525	4,540
18	2,500	150	1,010	2,900	150	1,170	3,300	740	6,590
19	2,500	220	1,480	2,900	145	1,140	3,000	1,000	8,100
20	2,500	270	1,820	2,900	155	1,210	2,800	1,800	13,600
21	2,300	230	1,430	2,800	165	1,250	2,800	2,040	15,400
22	2,100	--	e 600	2,700	175	1,280	3,000	2,090	16,900
23	2,000	40	216	2,600	180	1,260	3,200	2,120	18,300
24	1,900	--	e 340	2,600	180	1,260	3,400	3,320	30,500
25	1,800	--	e 460	2,800	300	2,270	3,620	2,350	23,000
26	1,600	150	648	3,000	445	3,600	3,040	1,380	11,300
27	1,500	255	1,030	3,200	600	5,180	2,690	1,020	7,410
28	1,500	410	1,660	3,400	870	7,990	2,620	884	6,250
29	1,400	--	e 1,400	--	--	--	2,620	840	5,940
30	1,500	300	1,220	--	--	--	2,580	808	5,630
31	1,800	390	1,900	--	--	--	2,600	744	5,220
Total	71,300	--	31,834	73,400	--	55,360	85,670	--	225,710

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended-sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2,640	735	5,240	1,970	1,260	6,700	8,710	3,150	74,100
2	2,560	600	4,150	1,860	1,020	5,120	9,340	6,300	159,000
3	2,500	570	3,850	1,900	828	4,250	8,800	4,250	101,000
4	2,450	540	3,570	1,920	630	3,270	8,980	2,620	63,500
5	2,410	540	3,510	1,900	716	3,670	10,200	2,840	78,200
6	2,580	532	3,710	2,070	855	4,780	11,300	3,460	106,000
7	2,500	540	3,650	2,940	945	7,500	12,400	4,620	155,000
8	2,540	668	4,580	2,750	2,770	20,600	14,600	5,510	217,000
9	2,580	611	4,260	2,860	2,920	22,500	14,300	6,510	251,000
10	2,560	1,050	7,260	2,960	1,120	8,950	12,800	5,670	196,000
11	2,460	1,050	6,970	3,280	909	8,050	13,300	4,410	158,000
12	2,450	1,220	8,070	3,510	1,150	10,900	14,400	5,980	233,000
13	2,410	1,130	7,350	6,500	4,520	s 84,800	13,700	5,950	220,000
14	2,330	880	5,540	9,340	11,100	280,000	14,200	3,650	140,000
15	2,160	752	4,390	8,770	13,600	322,000	14,300	2,890	112,000
16	2,130	748	4,300	8,600	14,700	341,000	13,900	2,570	96,500
17	2,160	608	3,550	8,120	12,300	270,000	13,400	2,810	102,000
18	2,070	591	3,300	6,520	11,000	194,000	18,500	8,990	449,000
19	2,220	684	4,100	5,800	6,300	98,700	16,200	8,200	359,000
20	2,200	693	4,120	5,730	2,730	42,200	14,100	4,670	178,000
21	2,200	810	4,810	7,080	3,150	60,200	13,200	2,620	93,400
22	2,070	855	4,780	8,370	4,670	106,000	14,900	2,520	101,000
23	2,500	950	s 8,400	8,030	4,460	96,700	16,200	2,600	114,000
24	9,100	10,100	248,000	7,400	3,410	68,100	16,000	2,150	92,900
25	7,350	7,100	141,000	6,500	2,420	42,500	15,600	1,870	78,800
26	5,020	4,200	56,900	6,050	1,890	30,900	15,400	1,630	67,800
27	3,570	3,000	28,900	5,800	1,580	24,700	15,800	1,700	72,500
28	2,790	3,210	24,200	5,850	1,400	22,100	15,700	1,620	68,700
29	2,350	3,370	21,400	6,280	1,470	24,900	15,900	1,620	69,500
30	2,070	2,440	13,600	6,860	1,840	34,100	16,400	1,720	76,200
31	--	--	--	7,540	2,100	42,800	--	--	--
Total	86,930	--	647,460	165,060	--	2,291,990	412,530	--	4,283,100

	July			August			September		
1	17,200	2,230	104,000	4,490	568	6,890	3,220	2,210	19,200
2	19,200	3,040	158,000	3,990	464	5,000	2,900	1,360	10,600
3	20,300	3,300	181,000	3,490	552	5,200	2,840	1,250	9,580
4	20,000	2,550	138,000	3,380	496	4,530	3,380	1,600	14,600
5	18,900	2,030	104,000	3,180	488	4,190	2,980	1,260	10,100
6	17,300	1,800	84,100	2,920	440	3,470	2,790	2,260	17,000
7	15,900	1,650	70,800	2,860	468	3,610	2,640	3,060	21,800
8	15,100	1,590	64,800	2,660	456	3,270	2,330	1,280	8,050
9	14,700	1,520	60,300	2,580	480	3,340	2,260	472	2,880
10	13,200	1,470	52,400	2,520	396	2,690	2,160	364	2,120
11	12,500	1,350	45,600	2,460	336	2,230	2,160	288	1,680
12	11,900	1,250	40,200	2,410	424	2,760	2,220	328	1,970
13	11,600	1,200	37,600	2,350	424	2,690	2,940	640	5,080
14	11,500	1,170	36,300	2,370	328	2,100	2,940	624	4,950
15	10,800	1,320	38,500	2,370	360	2,300	3,320	984	8,820
16	9,400	1,260	32,000	2,160	256	1,490	3,680	944	9,380
17	8,310	1,470	33,000	2,020	256	1,400	2,980	1,080	8,690
18	7,670	1,260	26,100	2,000	240	1,300	2,520	2,230	15,200
19	7,370	1,060	21,100	2,330	304	1,910	2,520	1,180	8,030
20	7,160	980	18,900	2,500	480	3,240	2,560	864	5,970
21	8,230	1,120	24,900	2,480	640	4,280	3,040	896	7,350
22	8,680	1,030	24,100	2,480	476	3,190	3,620	796	7,780
23	8,770	1,220	28,900	2,480	896	6,000	3,400	880	8,080
24	8,290	738	16,500	2,430	504	3,310	3,360	800	7,260
25	7,870	604	12,800	2,200	296	1,760	3,320	720	6,450
26	7,430	612	12,300	2,160	240	1,400	3,300	544	4,850
27	7,210	578	11,300	2,110	240	1,370	3,300	416	3,710
28	6,890	620	11,500	2,130	224	1,290	3,320	--	e 3,600
29	5,510	576	8,570	2,130	248	1,430	3,300	392	3,490
30	5,040	568	7,730	2,260	248	1,510	3,570	480	4,630
31	4,830	648	8,450	3,000	1,120	9,070	--	--	--
Total	348,760	--	1,513,750	80,900	--	98,220	88,870	--	242,900

Total discharge for year (cfs-days) 1,731,660
Total load for year (tons) 9,800,510

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Nov. 6, 1956	2:20 p.m.	4,440	38	504	2,690		17		25		39	55	97		100		VBWCM
Apr. 2, 1957	3:00 p.m.	2,710	45	556	1,930		11		17		29	60	98		100		VBWCM
Apr. 10	9:30 a.m.	2,560	39	973	3,680		52		70		73	81	99		100		VPWCM
Apr. 16	6:55 p.m.	2,280	49	588	808		35		44		52	65	96		100		VBWCM
Apr. 26	7:50 a.m.	5,270	46	3,950	5,200		62		81		90	97	100		--		VPWCM
May 7	10:40 a.m.	2,980	64	916	4,190		26		45		60	77	98		100		VPWCM
May 14	3:40 p.m.	10,600	58	11,000	3,590		55		76		93	98	100		--		VPWCM
May 15	10:20 a.m.	9,520	55	14,500	4,740	2	4		86		95	98	100		--		VPN
May 15	10:20 a.m.	9,520	55	14,500	4,620		67		86		95	98	100		--		VPWC
May 16	10:00 a.m.	8,510	55	19,000	3,380		65		89		96	98	100		--		VPWCM
May 17	8:40 a.m.	8,710	54	11,200	3,760		68		91		95	98	100		--		VPWCM
May 22	9:05 a.m.	8,290	50	4,940	3,070		47		67		89	96	100		--		VPWCM
June 1	7:15 p.m.	9,490	--	3,590	4,010		39		60		87	97	100		--		VPWCM
June 9	11:40 a.m.	14,800	65	6,260	4,410		61		84		95	98	100		--		VPWCM
June 13	7:50 a.m.	13,600	61	7,120	4,820		60		84		94	97	100		--		VPWCM
June 18	8:10 p.m.	19,500	59	10,400	3,460		63		80		95	98	100		--		VPWCM
July 1	7:50 p.m.	17,400	70	2,180	3,430		28		45		77	91	100		--		VPWCM
July 16	3:50 p.m.	9,280	80	1,200	5,760		22		41		69	89	99		100		VPWCM
Aug. 5	6:40 p.m.	3,100	80	400	1,490		28		42		60	77	99		100		VBWCM
Aug. 20	10:30 a.m.	2,540	72	358	1,940		21		33		50	58	97		100		VPWCM
Sept. 3	1:40 p.m.	2,880	67	1,720	2,850		64		86		88	90	99		100		VPWCM

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
Nov. 6, 1956.....	2:20 p.m.	4,440	30			3	10	67	75	76	76	77	78	85		SV
Apr. 2, 1957.....	3:00 p.m.	2,710	18			1	11	70	94	94	95	95	95	97		SV
May 14.....	--	9,340	23			7	18	46	85	87	87	87	88	92		SV
June 9.....	--	15,600	23			9	19	48	56	56	56	58	65	86		SV
July 16.....	--	9,220	22			4	25	71	80	81	81	81	83	87		SV
Aug. 20	10:30 a.m.	2,540	22			9	27	93	100	--	--	--	--	--		SV

YELLOWSTONE RIVER BASIN--Continued

TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: April 1949 to September 1957.
Sediment records: June 1946 to September 1951.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 859 ppm Jan. 8-31; minimum, 227 ppm June 30 to July 12.
Hardness: Maximum, 516 ppm Jan. 8-31; minimum, 96 ppm Feb. 28.
Specific conductance: Maximum daily, 1,300 micromhos Dec. 8; minimum daily, 327 micromhos June 21.
Water temperatures: Maximum, 75°F July 11, 13; minimum, freezing point on many days during November to April.
EXTREMES, 1949-57.--Dissolved solids (1951-57): Maximum, 1,430 ppm July 26 to Aug. 4, 1954; minimum, 200 ppm June 23-27, 1953.
Hardness (1951-57): Maximum, 556 ppm Nov. 26 to Dec. 5, 1952; minimum, 94 ppm May 4, 1955.
Specific conductance (1951-57): Maximum daily, 2,280 micromhos July 24, 1953; minimum daily, 288 micromhos June 21, 1953.
Water temperatures: Maximum, 86°F July 20, 1954; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-17, 1956....	62.9	--	--	--	--	84	--	315	--	--	--	--	--	650	0.88	110	349	91	34	2.0	960	8.1	--
Oct. 18-22	31.8	--	--	--	--	109	--	376	--	--	--	--	--	778	1.06	66.8	394	86	38	2.4	1,140	7.9	--
Oct. 23-31	129	--	--	--	--	64	--	256	--	--	--	--	--	550	.75	192	318	108	30	1.6	844	7.6	--
Nov. 1-19.....	316	--	--	--	--	51	--	272	--	--	--	--	--	529	.72	451	332	109	25	1.2	807	7.9	--
Nov. 20-Dec. 4....	247	--	--	--	--	57	--	301	--	--	--	--	--	611	.83	407	383	136	24	1.3	905	7.9	--
Dec. 5-14.....	215	--	--	--	--	83	--	400	--	--	--	--	--	844	1.15	490	504	176	26	1.6	1,190	8.1	--
Dec. 15-31.....	229	7.6	0.01	83	56	65	4.2	339	290	4.5	0.3	0.8	0.12	691	.94	427	436	158	24	1.4	1,010	7.9	8
Jan. 1-7, 1957.....	177	--	--	--	--	66	--	334	--	--	--	--	--	700	.95	335	421	147	25	1.4	986	8.0	--
Jan. 8-31	119	--	--	--	--	79	--	413	--	--	--	--	--	859	1.17	276	516	177	25	1.5	1,180	8.0	--
Feb. 1-15.....	117	--	--	--	--	75	--	398	--	--	--	--	--	805	1.09	254	490	164	25	1.5	1,140	7.9	--
Feb. 16-21.....	123	--	--	--	--	63	--	257	--	--	--	--	--	547	.74	182	292	81	32	1.6	809	7.7	--
Feb. 22-26.....	128	--	--	--	--	70	--	348	--	--	--	--	--	709	.96	245	418	133	27	1.5	1,020	8.1	--
Feb. 27.....	300	--	--	--	--	43	--	174	--	--	--	--	--	342	.47	277	174	31	35	1.4	525	7.6	--
Feb. 28.....	500	--	--	--	--	33	--	132	--	--	--	--	--	244	.33	329	96	0	43	1.5	366	7.9	--
Mar. 1.....	1,000	--	--	--	--	39	--	238	--	--	--	--	--	414	.56	1,120	264	69	24	1.0	645	8.1	--
Mar. 2-6.....	320	--	--	--	--	30	--	161	--	--	--	--	--	309	.42	267	169	37	28	1.0	477	7.8	--
Mar. 7.....	90	--	--	--	--	99	--	310	--	--	--	--	--	638	.87	155	296	42	42	2.5	944	8.2	--
Mar. 8-13.....	233	--	--	--	--	60	--	229	--	--	--	--	--	465	.63	293	253	65	34	1.6	715	7.7	--
Mar. 14-31.....	187	7.7	.01	66	48	72	5.5	303	242	4.0	.5	.1	.15	616	.84	311	360	112	30	1.6	925	8.2	7
Apr. 1-23.....	215	--	--	--	--	67	--	291	--	--	--	--	--	626	.85	363	370	131	28	1.5	918	8.1	--

Apr. 24-25	2,243	--	--	--	--	78	--	226	--	--	--	--	--	376	.51	2,280	128	0	57	3.0	587	8.2	--
Apr. 26-May 20	284	--	--	--	--	64	--	266	--	--	--	--	--	596	.81	457	349	131	28	1.5	886	8.1	--
May 21-24	805	--	--	--	--	52	--	220	--	--	--	--	--	448	.61	974	243	63	32	1.4	683	8.2	--
May 25-27	961	--	--	--	--	30	--	212	--	--	--	--	--	403	.55	1,050	252	78	21	.8	594	7.9	--
May 28-June 6	758	--	--	--	--	23	--	188	--	--	--	--	--	318	.43	651	207	53	19	.7	484	7.7	--
June 7-16	1,749	--	--	--	--	16	--	166	--	--	--	--	--	244	.33	1,150	173	37	17	.5	389	7.3	--
June 17-29	2,848	9.2	.00	38	13	22	2.4	157	60	.0	.3	.7	.05	233	.32	1,790	147	18	24	.8	376	7.4	20
June 30-July 12	1,304	--	--	--	--	15	--	158	--	--	--	--	--	227	.31	799	158	28	17	.5	368	7.6	--
July 13-26	199	--	--	--	--	43	--	216	--	--	--	--	--	385	.52	207	222	45	30	1.3	588	7.8	--
July 27-Aug. 27	96.1	--	--	--	--	67	--	269	--	--	--	--	--	494	.67	128	272	51	35	1.8	768	7.8	--
Aug. 28-Sept. 3	225	--	--	--	--	46	--	222	--	--	--	--	--	402	.55	244	234	52	30	1.3	622	7.6	--
Sept. 4-30	295	12	.00	58	32	39	4.4	234	172	3.0	.4	.1	.10	447	.61	356	278	86	23	1.0	682	7.6	10
Weighted average a	413	--	--	--	--	38	--	215	--	--	--	--	--	388	0.53	433	237	61	26	1.1	591	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957

YELLOWSTONE RIVER BASIN--Continued

TONGUE RIVER AT MILES CITY, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement at approximately 7 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	45	35	32	32	32	32	45	56		70	70	63
2	47	35	32	32	32	32	37	58		71	66	61
3	50	32	32	32	32	32	40	60		70	64	59
4	50	33	32	32	32	32	38	58		63	61	58
5	55	32	32	32	32	32	39	56		67	63	56
6	42	32	32	32	32	32	40	55		70	70	60
7	46	32	32	32	32	32	37	60		71	65	62
8	46	32	32	32	32	32	40	58		68	67	62
9	43	32	32	32	32	32	39	51		71	64	58
10	44	32	32	32	32	33	40	49		73	66	48
11	47	38	32	32	32	32	33	56		75	71	55
12	45	36	32	32	32	32	32	62		74	72	58
13	50	39	32	32	32	32	35	51		75	61	54
14	46	37	32	32	32	32	38	57		70	65	52
15	44	32	32	32	32	32	47	56		73	68	55
16	45	32	32	32	32	32	38	49		74	63	54
17	45	32	32	32	32	32	39	55		74	63	56
18	45	32	32	32	32	32	40	54		69	64	55
19	46	32	32	32	32	32	45	55		67	64	48
20	42	32	32	32	--	32	42	56		67	61	48
21	41	32	32	32	--	34	45	53		72	68	50
22	39	32	32	32	--	36	51	48		70	66	49
23	39	32	32	32	--	35	52	52		74	58	51
24	41	32	32	32	32	34	45	53		68	63	48
25	35	32	32	32	32	38	47	57		69	65	55
26	39	32	32	32	32	38	45	58		73	60	54
27	39	32	32	32	33	35	46	65		71	60	55
28	38	32	32	32	32	33	48	65		66	60	58
29	38	32	32	32	--	36	53	64		69	--	58
30	34	32	32	32	--	40	57	67		66	63	58
31	35	--	32	32	--	43	--	65		68	62	--
Average	43	33	32	32	32	34	42	57		70	64	55

POWDER RIVER AT ARVADA, WYO.

LOCATION.--At county highway bridge, 0.1 mile south of Arvada, Sheridan County, a quarter of a mile upstream from Wildhorse Creek, and half a mile downstream from gaging station.
DRAINAGE AREA.--6,050 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to July 1952, May to August 1953.
Water temperatures: March 1949 to September 1957 (discontinued).
Sediment records: April 1946 to September 1957 (discontinued).
EXTREMES, 1956-57.--Water temperatures: Minimum, freezing point probably on many days during winter months.
Sediment concentrations: Maximum daily, 65,700 ppm June 12; minimum daily, no flow on many days during October and August.
Sediment loads: Maximum daily, 465,000 tons June 12; minimum daily, 0 tons on many days during October and August.
EXTREMES, 1946-57.--Water temperatures: Maximum (1949-54), 90°F July 16, 1954; minimum (1949-57), freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 105,000 ppm July 19, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,340,000 tons May 24, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--No appreciable inflow between gaging station and sampling point except during periods of intense local rainfall. Flow affected by ice Nov. 2 to Mar. 16. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957

/Twice-daily measurements between 6 a.m. and 10 a.m. and between 4 p.m. and 7 p.m. No flow Oct. 1-30/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.
1										--	32	32	40	--	52	--	--	a 70	--	--	69			--
2				a 32				a 32		--	33	a 34	37	--	58	73	64	--	--	80	--			55
3										--	--	--	--	--	--	67	61	77	70	70	--			--
4					a 32					a 32	--	--	--	44	--	--	70	77	--	73	--			--
5										--	--	--	35	a 44	--	--	66	--	--	--	69			--
6										--	--	--	--	--	--	--	--	--	--	--	--			--
7										--	--	--	--	--	56	--	57	67	--	--	--	a 85		--
8										--	--	--	--	--	55	--	60	72	--	--	--			--
9										--	--	--	--	--	a 51	53	61	--	65	--	--			65
10										--	--	--	--	--	--	--	--	--	--	--	--			--
11										--	--	--	--	--	57	--	57	a 66	--	--	--			--
12										--	a 34	--	--	--	57	--	63	67	--	--	--			--
13										--	--	--	35	--	55	--	62	62	--	--	60			--
14										--	--	--	--	--	55	--	--	a 63	--	--	--			--
15										--	34	--	--	--	a 52	54	55	63	--	--	--			--
16										--	--	--	47	--	48	49	--	--	71	--	--			--
17										--	--	--	--	a 48	48	56	--	--	--	--	--			--
18										--	35	--	--	--	51	--	--	a 66	--	72	--			a 53
19										--	36	--	--	47	--	58	60	74	--	--	--			--
20										--	35	--	42	--	--	--	--	--	--	--	--			--
21										--	--	--	--	61	45	a 47	--	--	--	--	--			--
22										--	35	--	--	--	47	--	55	60	--	83	--			--
23										--	--	--	55	--	--	--	56	a 65	68	--	--			--
24										--	34	--	45	a 56	50	--	60	--	--	74	--			--
25										--	--	--	--	--	55	--	--	72	--	--	--			--
26										--	37	--	--	--	--	a 68	--	--	--	82	--			--
27										--	35	--	--	60	--	--	--	67	68	--	--			--
28										34	--	--	--	64	--	a 75	--	75	67	--	--			--
29										--	--	--	--	--	59	--	--	80	--	--	--			--
30										--	--	--	55	--	--	--	--	--	--	--	--			--
31										--	44	--	--	--	58	65	--	--	--	--	--			--
Average										--	--	--	--	--	--	--	--	--	--	--	--			--

a Measurement between 11 a.m. and 3 p.m.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0		0	7.8	--	e 20	90	--	
2	0		0	12	1,120	36	90	--	
3	0		0	4			85	--	
4	0		0	1.3			73	498	
5	0		0	1.0	--	e 4	60	--	
6	0		0	1.0			50	--	
7	0		0	1.0			40	--	
8	0		0	10			30	--	
9	0		0	7.0	--	e 30	35	--	
10	0		0	20			40	--	
11	0		0	100			45	--	
12	0		0	90			50	--	
13	0		0	80	--	e 200	55	--	
14	0		0	70			60	--	
15	0		0	15	1,230		65	--	
16	0		0	17	--		70	--	e 140
17	0		0	19	--		75	--	
18	0		0	15	--		80	--	
19	0		0	18	--		85	928	
20	0		0	20	--		90	--	
21	0		0	25	--		90	--	
22	0		0	35	--	e 130	80	--	
23	0		0	45	--		70	--	
24	0		0	55	--		75	--	
25	0		0	60	--		80	--	
26	0		0	65	--		85	--	
27	0		0	70	944		90	--	
28	0		0	75	--		95	--	
29	0		0	80	--		100	--	
30	0		0	85	--		100	--	
31	3.9		e 10	--	--	--	100	--	
Total	3.9		10	1,104.1	--	3,046	2,233	--	4,340

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	95	--		25	--		310	1,990	1,670
2	90	865		26	--		270	2,600	1,900
3	85	--		27	--		260	1,270	892
4	80	--		28	310		350	2,340	2,210
5	70	--		28	--		300	--	e 1,600
6	75	--		29	--		250	--	e 800
7	80	--		30	--		230	--	e 400
8	77	--		30	--		280	--	e 800
9	73	755		31	--		260	810	569
10	65	--		31	--		300	--	e 2,400
11	60	--		31	--		320	6,050	5,230
12	65	--		32	634	e 40	300	6,400	5,180
13	70	--	e 140	33	--		280	5,960	4,510
14	65	--		34	--		250	--	e 4,500
15	60	--		35	--		220	7,740	4,600
16	50	--		36	--		190	--	e 3,400
17	55	--		37	--		173	--	e 3,000
18	60	--		38	--		173	6,200	2,900
19	65	--		35	--		169	5,900	2,690
20	70	--		30	--		173	5,950	2,780
21	65	--		25	--		184	--	e 2,700
22	58	496		20	--		184	5,350	2,660
23	40	--		25	--		180	--	e 2,400
24	30	--		30	--	e 70	184	5,010	2,490
25	20			50	--	e 120	180	--	e 2,500
26	15			70	--	e 190	184	5,200	2,580
27	17	--	e 20	100	1,150	310	184	4,580	2,280
28	19			220	1,690	1,000	169	--	e 1,900
29	21			--	--	--	159	--	e 1,600
30	23			--	--	--	149	--	e 1,300
31	24			--	--	--	136	3,010	1,110
Total	1,742	--	3,500	1,166	--	2,610	6,951	--	75,551

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	140	3,350	1,270	159	13,300	5,710	1,140	28,000	86,200
2	146	3,200	1,260	130	12,900	4,530	1,300	34,000	124,000
3	152	--	e 1,600	102	8,800	2,420	1,250	44,100	154,000
4	159	4,400	1,890	93	--	e 2,000	703	29,400	55,800
5	169	5,000	2,280	118	--	e 2,700	601	18,900	30,700
6	192	--	e 2,900	127	--	e 3,100	1,010	25,400	s 165,000
7	203	--	e 3,600	209	11,400	6,430	1,940	60,100	s 373,000
8	218	--	e 4,600	207	11,700	6,540	1,010	37,100	105,000
9	238	9,310	5,980	211	11,000	6,270	1,550	31,100	s 154,000
10	242	--	e 6,200	259	--	e 8,400	1,070	26,000	a 75,000
11	234	--	e 6,000	285	12,500	9,620	1,840	52,600	s 299,000
12	289	--	e 8,600	285	11,300	8,700	2,530	65,700	465,000
13	289	12,400	9,680	392	37,700	s 45,500	1,790	49,300	247,000
14	230	--	e 7,500	308	13,300	11,100	1,320	30,100	107,000
15	188	--	e 6,000	459	16,600	20,600	902	22,300	54,300
16	166	11,000	4,930	674	21,800	39,700	796	--	e 39,000
17	177	8,500	4,060	1,080	38,600	117,000	710	--	e 30,000
18	230	--	e 10,000	1,150	47,100	152,000	796	15,000	32,200
19	397	37,400	s 50,200	1,000	39,400	110,000	992	18,600	49,800
20	338	39,800	37,700	800	--	e 70,000	828	--	e 40,000
21	304	31,000	25,400	600	25,400	41,100	766	--	e 34,000
22	276	--	e 17,000	543	14,900	21,800	1,330	34,400	s 143,000
23	215	22,000	12,800	594	31,000	sa 55,000	1,550	46,000	200,000
24	238	21,500	13,800	568	20,100	30,800	1,190	34,100	114,000
25	289	24,000	sa 21,000	549	9,770	14,500	964	20,400	53,100
26	359	37,000	a 37,000	556	8,700	13,100	724	--	e 25,000
27	299	22,600	18,200	568	--	e 14,000	620	8,580	14,400
28	222	21,200	12,700	675	16,700	30,400	568	7,370	11,300
29	195	16,000	sa 9,600	762	20,100	41,400	530	6,600	9,440
30	211	19,100	10,900	675	--	e 35,000	492	--	e 7,000
31	--	--	--	898	17,900	43,400	--	--	--
Total	7,005	--	354,650	15,036	--	972,820	32,812	--	3,297,240

Day	July			August			September		
1	839	28,000	sa 82,000	28	852	64	98	14,000	sa 3,900
2	854	25,000	sa 63,000	22	--	e 36	592	54,700	s 122,000
3	731	20,000	39,500	20	--	e 17	134	23,000	sa 9,700
4	474	13,500	17,300	14	--	e 10	50	9,300	1,260
5	378	--	e 10,000	8.6	236	5	26	--	e 400
6	335	--	e 7,000	6.8	--	e 4	20	--	e 130
7	300	--	e 4,900	3.4	223	2	15	--	e 44
8	278	--	e 3,300	1.0	--	e 1	10	--	
9	254	3,200	2,190	.4	--	e 1	7	224	
10	212	2,940	1,680	0	--	0	6	--	
11	178	--	e 1,300	0	--	0	5	--	e 3
12	146	--	e 1,000	0	--	0	4	--	
13	128	--	e 800	199	40,000	s 33,500	3	--	
14	116	--	e 650	62	17,700	s 4,670	2	--	
15	125	--	e 1,200	57	16,000	a 2,500	2	--	
16	102	2,900	799	26	--	e 500	24	--	
17	85	--	e 480	27	--	e 600	28	--	
18	73	1,500	296	139	37,000	sa 18,000	31	590	
19	69	--	e 180	173	37,000	a 18,000	48	--	
20	69	--	e 600	134	--	e 11,000	48	--	
21	156	12,000	sa 9,100	55	--	e 4,200	46	--	
22	240	21,000	a 14,000	39	25,900	2,730	44	--	
23	131	23,000	8,140	25	--	e 1,300	42	--	e 100
24	80	22,200	4,800	22	--	e 700	46	1,380	
25	63	--	e 3,600	9.2	--	e 70	49	--	
26	313	31,300	s 35,300	2.2	--	e 3	48	--	
27	300	27,100	s 25,700	16	--	e 40	48	--	
28	161	12,200	5,300	8.6	521	12	42	--	
29	95	--	e 1,700	101	17,000	sa 6,600	36	--	
30	55	--	e 550	20	--	e 850	36	--	
31	39	--	e 170	23	4,400	sa 1,100	--	--	--
Total	7,379	--	346,535	1,242.2	--	106,515	1,590	--	138,958

Total discharge for year (cfs-days) 78,264.2

Total load for year (tons) 5,305,775

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 4, 1957	4:10 p.m.	159	44	4,600	2,650	--	47		77		87	96	100		--		VPWCM
Apr. 16	1:10 p.m.	156	--	10,500	5,720	--	63		82		88	93	99		100		VPWCM
May 2	10:40 a.m.	143	58	13,200	4,220	0	1		85		93	97	99		100		VPN
May 2	10:40 a.m.	143	58	13,200	4,210	--	66		87		93	97	99		100		VPWC
May 9	4:20 p.m.	195	53	9,730	3,800	--	44		71		88	98	100		--		VPWCM
May 17	5:30 p.m.	1,150	56	45,100	2,630	2	3		58		88	96	100		--		VPN
May 17	5:30 p.m.	1,150	56	45,100	2,640	--	34		57		88	96	100		--		VPWC
May 18	9:40 a.m.	1,100	51	46,900	3,230	--	47		68		89	97	100		--		VPWCM
May 21	2:30 p.m.	581	47	21,900	2,940	--	51		73		91	98	100		--		VPWCM
June 4	10:50 a.m.	661	73	28,600	4,660	--	58		80		95	99	100		--		VPWCM
June 12	3:10 p.m.	2,520	69	64,800	3,270	--	42		63		90	96	99		100		VPWCM
June 19	5:30 p.m.	945	74	16,700	3,050	--	34		56		90	98	100		--		VPWCM
July 4	4:30 p.m.	444	73	12,200	6,950	--	45		57		94	99	100		--		VPWCM
July 16	9:00 a.m.	110	--	4,080	3,760	--	73		87		95	98	100		--		VPWCM
Aug. 22	12:25 p.m.	44	--	25,600	3,120	--	92		--		100	--	--		--		PWCM
Sept. 18	1:20 p.m.	31	53	596	1,560	--	80		98		98	--	--		--		BWCM
Oct. 2	6:10 p.m.	24	66	670	1,790	--	81		98		100	--	--		--		BWCM

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
June 19, 1957	5:30 p.m.	945	20			8	29	77	93	98	99	100				SV
July 16	9:00 a.m.	110	20			26	59	82	93	97	98	99	99	99	100	SV

POWDER RIVER AT MOOREHEAD, MONT.

LOCATION.--At gaging station at Moorhead, Powder River County, 6¼ miles upstream from Buffalo Creek.
RECORDS AVAILABLE.--Chemical analyses: February 1951 to September 1953, October 1955 to September 1957 (discontinued).
Water temperatures: February 1951 to September 1953, October 1955 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 2,710 ppm Oct. 1-19; minimum, 434 ppm June 27 to July 1.
Hardness: Maximum, 1,240 ppm Oct. 1-19; minimum, 242 ppm June 27 to July 1.
Specific conductance: Maximum daily, 3,000 micromhos Oct. 14, 15; minimum daily, 627 micromhos July 1.
Water temperatures: Maximum, 85°F July 22; minimum, freezing point on many days during November to February.
EXTREMES, 1951-53, 1955-57.--Dissolved solids: Maximum (1951, 1952-53, 1955-57), 3,460 ppm July 22-24, 1953; minimum, 290 ppm Mar. 17, 1956.
Hardness: Maximum, 1,580 ppm Aug. 1, 1956; minimum, 160 ppm Mar. 17, 1956.
Specific conductance: Maximum daily (1951, 1952-53, 1955-57), 4,100 micromhos July 22, 1953; minimum daily, 234 micromhos Oct. 7, 1952.
Water temperatures: Maximum, 90°F July 7, 1951; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-19, 1956.	8.63	--	--	--	--	277	--	244	1,580	--	--	--	0.29	2,710	--	3.69	63.1	1,240	1,040	33	3.4	2,920	7.9	--
Oct. 20-22.....	30.7	--	--	--	--	216	--	300	1,280	--	--	--	.27	2,300	--	3.13	191	1,120	874	30	2.8	2,550	8.0	--
Oct. 23-28.....	33.2	--	--	--	--	171	--	227	1,010	--	--	--	.21	1,790	--	2.43	160	844	658	30	2.6	2,090	8.0	--
Oct. 29-Nov. 8..	68.3	--	--	--	--	142	--	285	840	--	--	--	.18	1,560	--	2.12	288	788	554	28	2.2	1,860	8.0	--
Nov. 9-11	177	--	--	--	--	104	--	280	655	--	--	--	.16	1,260	--	1.71	602	688	458	25	1.7	1,550	7.9	--
Nov. 12	200	--	--	--	--	252	--	236	1,290	--	--	--	.20	2,320	--	3.16	1,250	1,100	906	33	3.3	2,740	8.1	--
Nov. 13-24	180	--	--	--	--	146	--	273	760	--	--	--	.18	1,500	--	2.04	729	758	534	30	2.3	1,850	7.9	--
Nov. 25-Dec. 4 .	151	--	--	--	--	127	--	269	690	--	--	--	.18	1,370	--	1.86	559	700	479	28	2.1	1,700	7.9	--
Dec. 5-21	108	12	0.01	200	95	154	4.4	334	830	57	0.4	4.6	.17	1,650	1,520	2.24	481	888	614	27	2.2	2,000	8.0	12
Dec. 22-27	108	--	--	--	--	136	--	308	710	--	--	--	.19	1,430	--	1.94	417	742	489	29	2.2	1,790	7.9	--
Dec. 28-Jan. 3 1957.....	115	--	--	--	--	122	--	285	650	--	--	--	.15	1,320	--	1.80	410	684	450	28	2.0	1,660	7.9	--
Jan. 4-8.....	123	--	--	--	--	137	--	299	690	--	--	--	.23	1,440	--	1.96	478	738	493	29	2.2	1,790	8.0	--
Jan. 9-28.....	88.0	--	--	--	--	161	--	380	840	--	--	--	.22	1,750	--	2.38	416	908	596	28	2.3	2,120	8.0	--
Jan. 29.....	40.0	--	--	--	--	197	--	332	938	--	--	--	.23	1,880	--	2.56	203	926	654	32	2.8	2,250	8.2	--
Jan. 30-Feb. 10.	35.4	--	--	--	--	164	--	366	950	--	--	--	.21	1,820	--	2.48	174	932	632	28	2.4	2,160	7.9	--
Feb. 11-15	81.0	--	--	--	--	136	--	336	775	--	--	--	.23	1,560	--	2.12	341	808	532	27	2.1	1,900	8.0	--
Feb. 16-22	97.1	--	--	--	--	104	--	252	600	--	--	--	.19	1,240	--	1.69	325	640	433	26	1.8	1,550	7.9	--
Feb. 23-24	95.0	--	--	--	--	128	--	260	675	--	--	--	.18	1,380	--	1.88	354	700	487	28	2.1	1,740	8.0	--
Feb. 25-28	250	--	--	--	--	100	--	192	500	--	--	--	.13	1,060	--	1.44	716	527	370	29	1.9	1,360	7.7	--
Mar. 1-12.....	337	--	--	--	--	130	--	182	470	--	--	--	.15	1,090	--	1.48	992	529	380	35	2.5	1,460	7.8	--
Mar. 13-22.....	447	--	--	--	--	138	--	203	570	--	--	--	.16	1,190	--	1.62	1,440	579	413	34	2.5	1,550	7.8	--
Mar. 23-30.....	222	7.8	.01	160	64	153	6.4	228	651	66	.6	2.6	.12	1,350	1,220	1.84	809	664	477	33	2.6	1,720	7.9	10
Mar. 31-Apr. 11.	214	--	--	--	--	176	--	219	754	--	--	--	.17	1,440	--	1.96	832	677	497	36	2.9	1,840	7.7	--
Apr. 12-30	290	--	--	--	--	234	--	232	986	--	--	--	.23	1,740	--	2.37	1,360	772	582	40	3.7	2,170	7.4	--

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT MOORHEAD, MONT.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
May 1-10, 1957.	172	--	--	--	--	230	--	226	890	--	--	--	0.23	1,710	--	2.33	794	736	551	40	3.7	2,140	7.8	--
May 11-14.....	363	--	--	--	--	148	--	234	585	--	--	--	.21	1,250	--	1.70	1,230	608	416	35	2.6	1,600	7.9	--
May 15-16.....	576	--	--	--	--	100	--	218	423	--	--	--	.15	908	--	1.23	1,410	476	297	31	2.0	1,260	8.1	--
May 17-21.....	1,080	--	--	--	--	172	--	234	646	--	--	--	.20	1,320	--	1.80	3,850	600	408	38	3.1	1,710	7.8	--
May 22-28.....	589	--	--	--	--	126	--	192	519	--	--	--	.15	1,060	--	1.44	1,690	504	347	35	2.4	1,400	7.7	--
May 29.....	696	--	--	--	--	95	--	262	525	--	--	--	.18	1,090	--	1.48	2,050	608	393	25	1.7	1,390	7.8	--
May 30-June 2..	1,031	--	--	--	--	100	--	226	517	--	--	--	.22	1,090	--	1.48	3,030	574	389	27	1.8	1,380	7.9	--
June 3	2,000	--	--	--	--	162	--	262	750	--	--	--	.18	1,460	--	1.99	7,880	760	545	32	2.6	1,820	8.1	--
June 4	2,180	--	--	--	--	88	--	212	487	--	--	--	.11	956	--	1.30	5,630	540	366	26	1.6	1,240	8.1	--
June 5-6	1,985	--	--	--	--	50	--	190	246	--	--	--	.11	588	--	.80	3,150	328	172	25	1.2	815	8.2	--
June 7-10	3,138	--	--	--	--	80	--	206	720	--	--	--	.13	1,360	--	1.85	11,520	826	657	17	1.2	1,610	8.1	--
June 11-17	2,366	11	0.01	131	28	72	4.8	187	404	14	0.4	3.9	.11	799	--	1.09	5,100	441	288	26	1.5	1,060	7.5	25
June 18-21	2,330	--	--	--	--	56	--	166	259	--	--	--	.09	562	--	.76	3,540	299	163	29	1.4	797	7.9	--
June 22-23	2,630	--	--	--	--	83	--	194	364	--	--	--	.14	768	--	1.04	5,450	414	255	30	1.8	1,060	8.2	--
June 24-26	2,097	--	--	--	--	63	--	178	259	--	--	--	.11	596	--	.81	3,370	308	162	31	1.6	826	8.3	--
June 27-July 1..	1,514	--	--	--	--	42	--	150	188	--	--	--	.12	434	--	.59	1,770	242	119	27	1.2	641	7.5	--
July 2-13.....	808	--	--	--	--	56	--	174	305	--	--	--	.12	640	--	.87	1,400	367	224	25	1.3	891	7.2	--
July 14-20.....	192	--	--	--	--	105	--	178	505	--	--	--	.17	993	--	1.35	515	502	356	31	2.0	1,270	7.8	--
July 21-28.....	187	--	--	--	--	191	--	216	925	--	--	--	.24	1,730	--	2.35	873	848	671	33	2.9	2,070	7.5	--
July 29-31.....	89.0	--	--	--	--	133	--	145	894	--	--	--	.19	1,540	--	2.09	370	814	695	26	2.0	1,810	7.4	--
Aug. 1-12.....	16.9	--	--	--	--	224	--	161	1,220	--	--	--	.21	2,080	--	2.83	94.9	970	838	33	3.1	2,410	7.3	--
Aug. 13.....	42.0	--	--	--	--	78	--	230	508	--	--	--	.10	960	--	1.31	109	554	365	23	1.4	1,260	7.7	--
Aug. 14-26.....	103	--	--	--	--	180	--	206	1,070	--	--	--	.18	1,930	--	2.62	537	982	813	29	2.5	2,240	7.3	--
Aug. 27-29.....	228	--	--	--	--	79	--	162	507	--	--	--	.13	919	--	1.25	566	496	363	26	1.5	1,190	7.6	--
Aug. 30-Sept.19.	81.8	--	--	--	--	167	--	216	1,140	--	--	--	.16	1,480	--	2.01	327	1,060	883	26	2.2	2,210	7.5	--
Sept. 20-30.....	141	6.5	.00	152	72	143	6.9	224	730	38	.4	2.8	.17	1,350	1,260	1.84	514	676	492	31	2.4	1,680	7.0	15
Weighted average a.....	370	--	--	--	--	105	--	206	531	--	--	--	0.15	1,050	--	1.43	1,050	551	382	29	1.9	1,350	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT MOORHEAD, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 3 p.m. and 7 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	a 42	a 36	32	--	40	45	67	--	77	78	63
2	71	40	a 39	32	--	36	40	62	--	74	80	65
3	a 64	--	38	32	--	34	41	64	--	75	--	69
4	--	a 37	35	32	32	34	46	65	74	69	--	65
5	61	35	35	34	32	33	44	66	73	66	--	73
6	62	a 36	--	a 32	32	35	42	70	71	--	--	74
7	60	37	a 39	34	a 32	34	42	72	62	69	80	65
8	59	38	a 39	32	a 32	37	42	55	66	71	73	71
9	64	40	39	32	32	36	47	54	65	79	--	65
10	66	37	39	32	32	35	42	64	61	83	--	63
11	63	a 41	a 39	32	33	35	41	55	64	83	--	66
12	60	45	a 39	32	33	34	41	60	60	80	--	61
13	58	a 33	a 39	32	34	35	41	58	68	80	81	60
14	a 63	a 32	40	32	34	35	51	55	66	81	78	62
15	61	32	31	a 32	a 33	a 35	54	54	63	82	78	65
16	a 64	36	31	a 32	34	35	54	55	59	83	77	55
17	a 62	37	41	32	34	36	46	a 56	57	72	72	64
18	a 64	35	--	a 32	32	a 41	42	60	62	71	75	43
19	a 47	39	43	a 36	32	39	47	--	62	--	74	46
20	63	40	42	a 34	32	38	57	58	56	71	77	--
21	a 47	a 35	39	a 32	32	38	48	--	50	--	75	52
22	a 51	a 43	a 34	32	34	40	39	a 47	68	85	65	58
23	51	a 40	--	--	35	42	--	50	65	--	75	58
24	47	37	39	32	36	48	--	57	66	69	73	59
25	45	a 38	a 45	32	35	50	--	59	67	70	71	60
26	43	a 31	42	32	36	46	--	65	60	73	71	65
27	53	38	36	a 32	36	50	--	69	--	70	65	68
28	49	37	32	32	34	51	--	70	72	73	51	65
29	53	42	32	32	--	53	65	--	74	71	71	68
30	50	a 37	32	32	--	a 55	66	65	75	--	72	68
31	42	--	32	32	--	53	--	55	--	72	70	--
Average	57	38	37	32	33	40	--	61	65	75	--	63

a Measurement between 10 a.m. and 2 p.m.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 12, at present site of Locate (5 miles west of former site of Locate), Custer County, 3 miles upstream from Locate Creek and 25 miles east of Miles City.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1957.
Water temperatures: February 1951 to May 1954, October 1954 to September 1957.
Sediment records: March 1950 to September 1953.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 2,430 ppm Dec. 6-9; minimum, 510 ppm Feb. 28.
Hardness: Maximum, 1,090 ppm Dec. 6-9; minimum, 232 ppm Feb. 28.
Specific conductance: Maximum daily, 3,080 micromhos Dec. 8; minimum daily, 712 micromhos Mar. 1.
Water temperatures: Maximum, 82°F on several days during July and August; minimum, freezing point on many days during November to March.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 5,430 ppm Dec. 15-17, 1955; minimum, 278 ppm Mar. 29, 1952.
Hardness: Maximum, 2,120 ppm Dec. 15-17, 1955; minimum, 62 ppm Oct. 22-24, 1953.
Specific conductance: Maximum daily, 9,270 micromhos Dec. 16, 1955; minimum daily, 407 micromhos Feb. 14, 1952.
Water temperatures: Maximum (1951-53, 1954-57), 85°F on several days during July 1952, 1953; minimum, freezing point on many days during winter months each year.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 1-29, 1956..	7.36	--	--	--	--	327	--	296	1,100	--	--	--	--	1,950	--	2.65	38.8	655	412	51	5.6	2,520	8.0	--
Oct. 30-Nov. 9..	20.0	--	--	--	--	310	--	284	1,260	--	--	--	--	2,190	--	2.98	118	830	597	44	4.7	2,640	7.6	--
Nov. 10-17.....	94.4	--	--	--	--	190	--	275	825	--	--	--	--	1,520	--	2.07	387	682	456	38	3.2	1,890	7.6	--
Nov. 18-24.....	80.0	--	--	--	--	286	--	322	1,300	--	--	--	--	2,350	--	3.20	508	1,040	776	37	3.9	2,780	7.6	--
Nov. 25-29.....	69.0	--	--	--	--	261	--	308	1,050	--	--	--	--	1,950	--	2.65	363	828	575	41	3.9	2,400	7.6	--
Nov. 30-Dec. 5..	106	--	--	--	--	177	--	303	870	--	--	--	--	1,630	--	2.22	467	776	528	33	2.8	2,010	7.8	--
Dec. 6-9.....	91.3	--	--	--	--	280	--	421	1,260	--	--	--	--	2,430	--	3.30	599	1,090	745	36	3.7	2,830	8.0	--
Dec. 10-24.....	125	12	0.01	220	91	229	7.3	388	1,040	55	0.5	5.3	0.17	1,990	1,850	2.71	672	922	604	35	3.3	2,390	7.8	17
Dec. 25-30.....	118	--	--	--	--	196	--	356	875	--	--	--	--	1,760	--	2.39	561	830	538	34	3.0	2,110	8.1	--
Dec. 31-Jan. 4, 1957.....	100	--	--	--	--	176	--	320	765	--	--	--	--	1,540	--	2.09	416	735	473	34	2.8	1,910	8.1	--
Jan. 5-9.....	118	--	--	--	--	190	--	356	825	--	--	--	--	1,710	--	2.33	545	826	534	33	2.9	2,080	8.0	--
Jan. 10-14.....	89.0	--	--	--	--	218	--	400	938	--	--	--	--	1,930	--	2.62	464	920	592	34	3.1	2,310	8.2	--
Jan. 15-22.....	96.3	--	--	--	--	238	--	430	1,040	--	--	--	--	2,110	--	2.87	549	980	627	35	3.3	2,490	8.1	--
Jan. 23-31.....	47.8	--	--	--	--	256	--	450	1,180	--	--	--	--	2,320	--	3.16	299	1,080	711	34	3.4	2,690	8.0	--
Feb. 1-13.....	48.5	--	--	--	--	239	--	416	1,010	--	--	--	--	2,100	--	2.86	275	968	627	35	3.3	2,510	7.8	--
Feb. 14-16.....	78.3	--	--	--	--	198	--	348	838	--	--	--	--	1,720	--	2.34	364	778	493	36	3.1	2,100	7.9	--
Feb. 17.....	85.0	--	--	--	--	178	--	292	713	--	--	--	--	1,320	--	1.80	303	572	333	39	3.2	1,750	7.8	--
Feb. 18-20.....	95.0	--	--	--	--	145	--	250	575	--	--	--	--	1,110	--	1.51	285	476	271	39	2.9	1,480	7.7	--
Feb. 21-26.....	113	--	--	--	--	199	--	362	838	--	--	--	--	1,680	--	2.28	513	756	459	36	3.2	2,080	7.9	--
Feb. 27.....	200	--	--	--	--	110	--	204	415	--	--	--	--	846	--	1.15	457	368	201	39	2.5	1,170	7.7	--

Feb. 28.....	300	--	--	--	--	66	--	140	240	--	--	--	--	510	--	.69	413	232	117	38	1.9	753	7.4	--
Mar. 1-7.....	370	--	--	--	--	78	--	156	290	--	--	--	--	622	--	.85	621	292	64	37	2.0	894	7.7	--
Mar. 8-14.....	389	--	--	--	--	116	--	173	440	--	--	--	--	958	--	1.30	1,010	450	308	36	2.4	1,290	7.7	--
Mar. 15-22.....	549	7.9	.01	131	47	143	6.1	192	535	58	.5	3.2	.12	1,110	1,030	1.51	1,650	520	363	37	2.7	1,480	7.8	10
Mar. 23-29.....	384	--	--	--	--	157	--	227	630	--	--	--	--	1,280	--	1.74	1,330	598	412	36	2.8	1,640	7.8	--
Mar. 30-Apr. 14.	266	--	--	--	--	190	--	241	775	--	--	--	--	1,470	--	2.00	1,060	666	468	38	3.2	1,860	7.8	--
Apr. 15-23.....	289	--	--	--	--	228	--	238	890	--	--	--	--	1,630	--	2.22	1,270	712	517	41	3.7	2,080	7.7	--
Apr. 24-25.....	1,050	--	--	--	--	140	--	228	375	--	--	--	--	814	--	1.11	2,310	316	129	49	3.4	1,170	8.1	--
Apr. 26-28.....	459	--	--	--	--	198	--	a 226	750	--	--	--	--	1,310	--	1.78	1,620	656	471	40	3.4	1,830	8.3	--
Apr. 29-May 17.	237	--	--	--	--	240	--	250	875	--	--	--	--	1,720	--	2.34	1,100	696	491	43	4.0	2,130	8.2	--
May 18-21.....	825	--	--	--	--	140	--	b 236	560	--	--	--	--	1,180	--	1.60	2,630	530	336	36	2.6	1,480	8.3	--
May 22-26.....	789	--	--	--	--	175	--	b 230	688	--	--	--	--	1,350	--	1.84	2,880	558	369	41	3.2	1,680	8.3	--
May 27-June 6..	895	--	--	--	--	150	--	234	638	--	--	--	--	1,240	--	1.69	3,000	590	398	36	2.7	1,590	7.6	--
June 7-12	2,608	--	--	--	--	75	--	208	570	--	--	--	--	1,060	--	1.44	7,460	614	443	21	1.3	1,330	7.6	--
June 13-19	2,779	12	.00	123	29	98	6.2	198	423	14	.5	6.0	.13	827	--	1.12	6,210	428	266	33	2.1	1,140	7.4	33
June 20-25	3,220	--	--	--	--	83	--	180	273	--	--	--	--	586	--	.80	5,090	266	118	40	2.2	850	7.4	--
June 26-28	2,153	--	--	--	--	87	--	186	368	--	--	--	--	736	--	1.00	4,280	368	215	34	2.0	1,030	7.8	--
June 29-July 4..	1,627	--	--	--	--	64	--	84	253	--	--	--	--	553	--	.75	2,430	286	217	33	1.6	796	7.3	--
July 5-18.....	732	--	--	--	--	74	--	175	365	--	--	--	--	733	--	1.00	1,450	386	242	29	1.6	997	7.3	--
July 19-24.....	191	--	--	--	--	141	--	200	558	--	--	--	--	1,070	--	1.46	552	494	330	38	2.8	1,400	7.5	--
July 25-31.....	180	--	--	--	--	164	--	208	720	--	--	--	--	1,310	--	1.78	637	569	398	39	3.0	1,670	7.6	--
Aug. 1-26.....	58.0	--	--	--	--	232	--	223	920	--	--	--	--	1,750	--	2.38	274	760	577	40	3.7	2,150	7.6	--
Aug. 27-31.....	183	--	--	--	--	174	--	268	725	--	--	--	--	1,380	--	1.88	682	618	398	38	3.0	1,770	7.6	--
Sept. 1-6	196	--	--	--	--	98	--	210	386	--	--	--	--	764	--	1.04	404	357	185	37	2.3	1,060	7.6	--
Sept. 7-30.....	70.3	14	.00	216	72	200	10	242	1,010	31	.4	3.5	.17	1,770	1,680	2.41	336	836	638	34	3.0	2,100	7.7	25
Weighted average c.....	394	--	--	--	--	122	--	207	523	--	--	--	--	1,030	--	1.40	1,100	494	324	35	2.4	1,340	--	--

a Includes equivalent of 6 ppm of carbonate (CO_3).
b Includes equivalent of 4 ppm of carbonate (CO_3).
c Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 1 p.m. and 5 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	61	40	35	33	32	34	41	a 55	a 57	80	--	67
2	70	a 32	a 33	34	32	a 34	42	a 58	a 64	a 70	--	69
3	a 65	32	a 32	33	a 32	a 34	37	a 59	a 70	71	--	a 60
4	a 42	33	32	33	a 32	33	43	a 57	75	65	--	a 65
5	a 59	a 32	a 32	a 32	a 32	a 33	44	a 55	a 72	78	--	a 60
6	59	a 33	32	32	a 33	32	45	a 55	a 70	a 68	--	a 60
7	a 62	32	a 32	a 33	a 33	32	--	a 52	62	a 70	a 70	a 63
8	a 52	33	a 32	32	a 33	33	42	a 55	a 65	a 69	a 65	a 58
9	56	35	32	32	a 33	33	45	a 48	a 62	a 70	a 62	a 53
10	62	40	32	32	a 33	a 34	42	62	60	a 75	a 72	a 50
11	68	38	32	32	33	34	40	a 55	61	a 75	a 71	a 54
12	64	36	a 32	32	a 33	a 34	a 40	60	66	82	a 72	a 59
13	54	a 37	32	32	a 33	34	44	60	a 59	a 81	82	a 46
14	a 45	36	32	32	a 34	a 34	52	60	61	a 82	--	a 49
15	a 43	32	32	32	33	34	54	--	a 58	a 72	a 65	a 52
16	a 42	31	a 32	32	a 33	35	44	62	60	a 70	82	a 50
17	a 52	33	32	a 32	a 33	a 35	38	a 59	58	--	80	a 50
18	62	32	32	32	32	a 35	42	a 56	a 55	--	80	a 48
19	52	32	a 32	33	a 32	a 34	45	55	75	75	80	a 43
20	50	32	32	32	32	a 34	44	52	70	a 62	--	44
21	52	a 32	35	32	a 32	a 34	a 52	a 50	65	82	82	50
22	50	32	33	32	a 32	35	50	a 48	a 60	80	62	55
23	45	a 32	32	32	a 33	36	58	58	a 60	82	72	65
24	42	32	33	32	a 33	a 35	a 54	62	a 61	a 72	a 71	a 54
25	--	32	34	32	a 33	45	52	a 52	a 62	80	a 62	a 55
26	39	a 32	34	32	a 33	45	51	a 55	a 61	--	a 60	62
27	--	a 32	35	32	a 33	46	a 53	a 62	a 62	80	62	63
28	38	a 32	34	32	a 34	46	a 54	72	a 62	--	66	65
29	40	32	35	32	--	42	a 53	a 63	a 63	a 78	65	68
30	42	32	33	a 33	--	a 40	a 57	a 65	70	--	75	66
31	33	--	33	a 32	--	a 42	--	a 62	--	a 70	a 65	--
Average	52	33	33	32	33	36	47	57	64	75	--	57

a Measurement between 7 a.m. and 12 m.

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4½ miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: January 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 755 ppm Jan. 16-29; minimum, 231 ppm July 1-12.
Hardness: Maximum, 380 ppm Jan. 16-29; minimum, 138 ppm July 1-12.
Specific conductance: Maximum daily, 1,090 micromhos Jan. 18-21; minimum daily, 355 micromhos July 2.
Water temperatures: Maximum, 79°F July 15-17; minimum, freezing point on many days during December to March.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 1,370 ppm Jan. 2-3, 1954; minimum, 173 ppm June 5-16, 1956.
Hardness: Maximum, 649 ppm Jan. 2-3, 1954; minimum, 102 ppm June 5-16, 1956.
Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 257 micromhos June 15, 1956.
Water temperatures: Maximum, 82°F July 14, 15, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. No appreciable inflow between gaging station and sampling station Discharge records for gaging station near Sidney for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	6,500	--	--	--	--	76	--	203	--	--	--	--	--	574	0.78	10,070	269	103	38	2.0	837	7.7	--
Nov. 1-17.....	8,688	--	--	--	--	73	--	199	--	--	--	--	--	551	.75	12,930	270	107	37	1.9	814	7.5	--
Nov. 18-19.....	8,600	--	--	--	--	43	--	131	--	--	--	--	--	356	.48	8,270	177	70	35	1.4	542	7.4	--
Nov. 20-30.....	7,875	--	--	--	--	67	--	202	--	--	--	--	--	538	.73	11,440	272	106	35	1.8	801	7.5	--
Dec. 1.....	7,310	--	--	--	--	68	--	204	--	--	--	--	--	536	.73	10,580	274	107	35	1.8	793	7.9	--
Dec. 2.....	7,400	--	--	--	--	54	--	162	--	--	--	--	--	436	.59	8,710	218	85	35	1.6	649	7.9	--
Dec. 3-6.....	6,668	--	--	--	--	76	--	225	--	--	--	--	--	602	.82	10,840	304	119	35	1.9	876	7.8	--
Dec. 7-23.....	5,429	14	0.03	85	32	90	4.4	261	298	12	0.5	1.1	0.26	687	.93	10,070	342	128	36	2.1	988	7.9	2
Dec. 24-Jan. 15, 1957.....	5,870	--	--	--	--	69	--	214	--	--	--	--	--	561	.76	8,890	285	110	34	1.8	823	8.0	--
Jan. 16-29.....	3,643	--	--	--	--	93	--	282	--	--	--	--	--	755	1.03	7,430	380	149	35	2.1	1,070	8.0	--
Jan. 30-Feb. 14...	4,156	--	--	--	--	72	--	246	--	--	--	--	--	642	.87	7,200	331	129	32	1.7	921	7.9	--
Feb. 15-27.....	5,162	--	--	--	--	63	--	204	--	--	--	--	--	538	.73	7,500	276	109	33	1.7	799	7.7	--
Feb. 28-Mar. 12...	6,592	--	--	--	--	60	--	169	--	--	--	--	--	463	.63	8,240	223	84	37	1.7	693	7.9	--
Mar. 13-19.....	7,429	--	--	--	--	74	--	180	--	--	--	--	--	563	.77	11,290	273	125	37	1.9	825	7.8	--
Mar. 20-Apr. 1....	10,480	11	.01	62	25	69	3.3	184	219	13	.5	1.5	.18	556	.76	15,730	257	106	36	1.9	788	7.9	7
Apr. 2-25.....	6,560	--	--	--	--	89	--	212	--	--	--	--	--	622	.85	11,020	294	120	40	2.3	915	7.9	--
Apr. 26-May 1.....	10,920	--	--	--	--	92	--	202	--	--	--	--	--	601	.82	17,720	262	96	43	2.5	880	7.7	--
May 2-8.....	6,683	--	--	--	--	94	--	227	--	--	--	--	--	664	.90	11,980	314	128	39	2.3	965	7.8	--

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
May 9-11, 1957	11,830	--	--	--	--	59	--	195	--	--	--	--	--	480	0.65	15,330	243	83	35	1.6	708	7.7	--
May 12-31.....	24,310	--	--	--	--	45	--	176	--	--	--	--	--	365	.50	23,960	194	50	34	1.4	569	7.7	--
June 1-7	43,760	--	--	--	--	26	--	156	--	--	--	--	--	272	.37	32,140	162	34	26	.9	425	7.9	--
June 8-14	65,490	--	--	--	--	23	--	143	--	--	--	--	--	252	.34	44,560	153	36	25	.8	394	7.9	--
June 15-30	54,420	12	0.00	46	11	35	3.0	158	102	4.3	0.4	1.3	0.08	302	.41	44,370	162	32	31	1.2	464	7.6	10
July 1-12.....	46,960	--	--	--	--	25	--	136	--	--	--	--	--	231	.31	29,290	138	25	28	.9	378	7.5	--
July 13-22.....	24,640	--	--	--	--	34	--	130	--	--	--	--	--	266	.36	17,700	143	36	34	1.2	431	7.5	--
July 23-Aug. 7.....	13,760	--	--	--	--	42	--	144	--	--	--	--	--	327	.44	12,150	165	47	36	1.4	518	7.4	--
Aug. 8-20.....	6,753	--	--	--	--	65	--	172	--	--	--	--	--	431	.59	7,860	204	63	41	2.0	667	7.5	--
Aug. 21-Sept. 30...	7,010	12	.00	61	23	78	4.4	198	228	10	.6	1.0	.16	512	.70	9,690	248	86	40	2.1	781	7.7	5
Weighted average a.....	13,730	--	--	--	--	48	--	171	--	--	--	--	--	389	0.53	14,420	202	62	34	1.5	591	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 3 p.m. and 8 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	49	a 37	a 32	32	32	34	a 60	68	66	78	65
2	56	47	a 35	a 32	32	34	--	64	68	67	77	a 66
3	56	44	a 34	a 32	32	32	36	a 64	69	67	a 75	68
4	56	40	a 33	a 32	32	32	--	65	a 69	68	75	65
5	55	38	a 32	a 32	32	32	43	65	a 68	68	75	65
6	55	37	a 32	a 32	--	32	44	a 66	67	69	a 74	66
7	54	36	a 32	a 32	32	32	46	a 65	a 66	70	73	66
8	53	37	a 32	a 32	--	32	46	a 60	67	73	73	--
9	53	37	a 32	a 32	32	33	45	a 61	67	76	74	66
10	54	38	a 32	a 32	32	33	46	a 60	68	76	74	64
11	55	38	a 32	a 32	--	34	43	60	67	77	75	61
12	54	38	a 32	a 32	32	34	43	60	64	78	76	--
13	54	41	a 32	--	32	33	46	a 60	63	78	76	60
14	54	39	a 32	--	32	33	a 47	62	64	78	75	--
15	54	38	a 32	--	32	33	49	a 63	65	79	75	--
16	53	37	a 32	--	--	33	48	64	65	79	75	--
17	a 54	36	32	32	32	34	47	62	65	79	--	59
18	a 53	35	33	32	32	34	47	60	66	78	74	58
19	a 53	35	33	32	32	34	49	60	65	78	74	58
20	a 53	34	34	32	32	--	51	56	65	78	73	56
21	a 53	35	35	32	32	35	53	55	64	77	72	55
22	a 52	35	32	--	32	34	53	54	64	--	--	--
23	a 51	35	32	32	32	35	54	56	65	77	69	57
24	a 49	36	32	32	32	--	53	59	65	78	68	57
25	a 49	35	33	--	32	35	53	58	67	78	--	56
26	a 47	35	33	32	32	34	54	a 59	66	78	--	a 55
27	a 46	34	33	--	33	--	54	a,60	67	78	64	57
28	a 45	33	33	32	33	34	--	a 64	--	78	65	--
29	a 45	36	33	32	--	34	61	a 66	66	77	64	--
30	a 42	36	34	--	--	33	60	a 67	67	77	65	--
31	a 41	--	33	32	--	--	--	a 67	--	a 76	a 65	--
Average	52	37	33	b 32	32	33	48	61	66	75	--	--

a Measurement between 7 a.m. and 9 a.m.
b Includes estimated temperature, 32° F, on missing days.

YELLOWSTONE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN YELLOWSTONE RIVER BASIN IN WYOMING

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
WIND RIVER AT RIVERTON			
Oct. 3, 1956	199	9	5
Oct. 10, 8:40 a.m.	566	164	251
Oct. 10, 12:50 p.m.	517	88	123
Nov. 9	596	45	72
Dec. 6	a 400	24	26
Dec. 11	407	62	68
Jan. 15, 1957	a 430	17	20
Feb. 14	409	30	33
Feb. 26	a 350	141	133
Mar. 11	a 300	31	25
Mar. 20	a 320	31	27
Apr. 9	276	13	10
Apr. 23	490	139	184
Apr. 29	391	48	51
May 7	884	457	1,090
May 13	1,940	3,640	19,100
May 17	1,950	1,430	7,530
June 3	6,090	3,570	58,700
June 6	8,080	1,740	38,000
June 8	9,530	1,580	40,700
June 12	6,630	1,560	27,900
June 21	3,160	1,170	9,980
July 3	5,950	1,230	19,800
July 20	3,400	1,120	10,300
Aug. 8	219	13	8
Aug. 22	439	51	60
Sept. 17	336	50	45
POPO AGIE RIVER NEAR RIVERTON			
Oct. 1, 1956	95	19	5
Oct. 2	102	21	6
Oct. 3, 7:00 a.m.	128	19	7
Oct. 3, 2:50 p.m.	140	15	6
Oct. 4	148	14	6
Oct. 5	155	14	6
Oct. 10	165	13	6
Oct. 17	165	6	3
Nov. 8	256	20	14
Dec. 6	a 160	35	15
Dec. 11	193	41	21
Jan. 15, 1957	a 130	13	5
Feb. 14	a 170	4	2
Feb. 26	a 210	31	18
Mar. 11	a 220	106	63
Mar. 20	252	209	142
Apr. 9	310	326	273
Apr. 23, 11:30 a.m.	1,300	42,400	154,000
Apr. 23, 11:45 a.m.	1,300	39,700	145,000
Apr. 23, 2:35 p.m.	1,380	21,200	79,000
Apr. 23, 6:45 p.m.	1,960	17,000	90,000
Apr. 23, 10:15 p.m.	1,960	14,800	78,300
Apr. 24, 6:40 a.m.	1,550	10,100	42,300
Apr. 24, 10:35 a.m.	1,300	8,640	30,300
Apr. 24, 7:30 p.m.	922	7,140	17,800
Apr. 25	695	9,090	17,100
Apr. 26, 9:20 a.m.	591	4,330	5,860
Apr. 26, 5:15 p.m.	461	2,620	3,260
Apr. 29	349	1,010	952
May 13	1,360	2,720	9,990

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN YELLOWSTONE RIVER BASIN IN WYOMING--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
POPO AGIE RIVER NEAR RIVERTON--Continued			
May 17, 1957	1,500	1,820	7,760
June 6	5,530	738	11,000
June 8	7,230	391	7,630
June 21	3,300	521	4,640
July 3	4,600	226	2,800
July 20	1,410	113	430
Aug. 6	321	51	44
Aug. 22	a 164	62	31
Sept. 17	370	30	30

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN YELLOWSTONE RIVER BASIN IN WYOMING--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
WIND RIVER AT RIVERTON																
Mar. 7, 1957....	2:10 p.m.	644	--	457	1,490		39		56		74	80	92		100		VPWCM
May 13	10:30 a.m.	1,940	49	3,640	4,360	4	11		63		88	91	96		100		VPW
May 13	10:30 a.m.	1,940	49	3,640	4,400		56		79		88	91	96		100		VPWCM
May 17	10:40 a.m.	1,950	46	1,430	2,640		37		54		70	75	88		100		VPWCM
June 3	5:15 p.m.	6,090	64	3,570	2,910		16		32		72	87	96		100		VPWCM
June 6.....	10:20 a.m.	8,060	58	1,740	5,410		16		31		58	73	92		100		VPWCM
June 8.....	7:30 a.m.	9,530	56	1,560	4,970		21		38		63	76	93		100		VPWCM
June 21.....	5:40 p.m.	3,160	--	1,170	3,350		7		17		71	85	95		100		VPWCM
July 3	11:45 a.m.	5,950	64	1,230	3,620		8		16		44	68	89		99	10	VPWCM
July 20.....	4:00 p.m.	3,400	67	1,120	4,640		27		48		72	81	93		100		VPWCM
POPO AGIE RIVER NEAR RIVERTON																	
Apr. 23, 1957...	11:30 a.m.	1,300	40	42,400	4,400	2	4		62		99	100	--		--		VPN
Apr. 23.....	11:30 a.m.	1,300	40	42,400	4,250		57		81		99	100	--		--		VPWCM
Apr. 23.....	2:35 p.m.	1,380	43	21,200	3,560		50		--		99	100	--		--		VPWCM
Apr. 23.....	6:45 p.m.	1,960	42	17,000	5,350		43		68		98	100	--		--		VPWCM
Apr. 24.....	6:40 a.m.	1,550	39	10,100	3,490		51		64		97	100	--		--		VPWCM
May 13	9:20 a.m.	1,360	51	2,720	3,390		44		60		92	99	100		--		VPWCM
May 17	9:50 a.m.	1,580	47	1,820	4,660		45		63		90	96	99		100		VPWCM
June 8	6:40 a.m.	7,230	56	391	1,550		25		35		54	62	81		92	100	VBWCM

MISCELLANEOUS ANALYSES OF STREAMS IN YELLOWSTONE RIVER BASIN IN WYOMING--Continued

Particle-size analyses of bed material, water years October 1955 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters											Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
POPO AGIE RIVER NEAR RIVERTON																
Aug. 20, 1956.....		222	3			4	12	39	67	88	96	100				SV
Sept. 17.....		121	3			3	12	27	71	96	100	--				SV
Mar. 20, 1957.....		252	3			1	6	11	48	84	95	100				SV
Apr. 23.....	2:35 p.m.	1,380	2			--	1	3	9	52	66	87	96	100		SV

MISSOURI RIVER MAIN STEM

MISSOURI RIVER NEAR WILLISTON, N. DAK.

LOCATION.--At gaging station at Lewis and Clark Highway bridge, 5 miles southwest of Williston, Williams County, and 25 miles downstream from Yellowstone River.

DRAINAGE AREA.--164,500 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.

Water temperatures: May 1951 to September 1957.

EXTREMES, 1956-57.--Dissolved solids: Maximum, 590 ppm Dec. 18-24; minimum, 252 ppm June 17-20.

Hardness: Maximum, 298 ppm Dec. 18-24; minimum, 124 ppm June 17-20.

Specific conductance: Maximum daily, 890 micromhos Dec. 20; minimum daily, 317 micromhos June 17.

Water temperatures: Maximum, 78°F July 11-13, 16; minimum, freezing point on several days during December to January.

EXTREMES, 1950-57.--Dissolved solids: Maximum, 604 ppm Mar. 9, 1955; minimum, 206 ppm June 3, 1956.

Hardness: Maximum, 308 ppm Mar. 9, 1955; minimum, 122 ppm June 3, 1956.

Specific conductance: Maximum daily, 919 micromhos Jan. 9, 1955; minimum daily, 317 micromhos June 17, 1957.

Water temperatures (1951-57): Maximum, 79°F July 2, 1954; minimum (1954-55, 1956-57), freezing point on several days during winter months.

REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-30, 1956....	12,810	--	--	--	--	66	--	206	--	--	--	--	--	498	0.68	17,220	250	81	36	1.8	756	7.9	--
Oct. 31-Nov. 26 ...	14,390	--	--	--	--	67	--	206	--	--	--	--	--	507	.69	19,700	254	85	36	1.8	765	7.7	--
Nov. 27-Dec. 5....	14,300	--	--	--	--	67	--	223	--	--	--	--	--	540	.73	20,850	274	91	35	1.8	797	8.0	--
Dec. 18-24.....	15,290	--	--	--	--	72	--	239	--	--	--	--	--	590	.80	24,360	298	102	34	1.8	855	8.0	--
Dec. 25-Jan. 22, 1957.	13,340	16	0.00	41	39	61	4.0	217	188	11	0.9	1.8	0.15	514	.70	18,510	262	84	33	1.6	759	8.0	4
Jan. 23-Feb. 9	11,620	--	--	--	--	63	--	230	--	--	--	--	--	535	.73	16,790	283	94	33	1.6	799	7.8	--
Feb. 10-28.....	13,240	--	--	--	--	60	--	212	--	--	--	--	--	499	.68	17,840	262	88	33	1.6	743	7.8	--
Mar. 1-14.....	16,780	--	--	--	--	57	--	181	--	--	--	--	--	444	.60	20,120	220	72	36	1.7	678	7.8	--
Mar. 15-31.....	18,890	15	.00	39	33	63	4.1	179	200	14	.5	2.0	.10	476	.65	24,280	232	85	37	1.8	736	7.8	5
Apr. 1-13.....	18,650	--	--	--	--	67	--	199	--	--	--	--	--	508	.69	25,580	249	86	37	1.8	755	7.4	--
Apr. 14-23.....	14,130	--	--	--	--	70	--	211	--	--	--	--	--	526	.72	20,070	259	86	37	1.9	790	7.8	--
Apr. 24.....	15,400	--	--	--	--	60	--	196	--	--	--	--	--	494	.67	20,540	252	91	34	1.7	739	7.4	--
Apr. 25-30.....	16,670	--	--	--	--	83	--	200	--	--	--	--	--	556	.76	25,030	243	79	43	2.3	830	7.5	--
May 1-11.....	15,250	--	--	--	--	74	--	203	--	--	--	--	--	545	.74	22,440	252	86	39	2.0	795	8.1	--
May 12-26.....	31,210	--	--	--	--	50	--	168	--	--	--	--	--	397	.54	33,450	193	55	36	1.6	591	8.1	--
May 27-June 3.....	34,540	--	--	--	--	42	--	159	--	--	--	--	--	348	.47	32,450	172	42	35	1.4	518	7.5	--
June 4-13	64,780	19	.00	43	12	29	2.8	142	89	4.4	.4	2.5	.08	281	.38	49,150	158	42	28	1.0	426	7.7	10
June 14-16.....	68,270	--	--	--	--	38	--	167	--	--	--	--	--	339	.46	62,490	178	41	32	1.2	510	7.5	--
June 17-20	66,280	--	--	--	--	33	--	122	--	--	--	--	--	252	.34	45,100	124	24	37	1.3	394	7.5	--
June 21-30	61,600	--	--	--	--	38	--	149	--	--	--	--	--	310	.42	51,560	158	36	34	1.3	474	7.6	--
July 1-25.....	43,000	--	--	--	--	35	--	144	--	--	--	--	--	286	.39	33,200	150	32	34	1.2	452	7.7	--
July 26-Aug. 27....	15,580	--	--	--	--	53	--	178	--	--	--	--	--	396	.54	16,660	199	53	37	1.6	615	7.8	--
Aug. 28-Sept. 30 ...	14,010	18	.00	57	24	67	4.6	203	202	12	.7	1.6	.16	487	.66	18,420	240	74	37	1.9	742	7.8	10
Weighted average a.	21,590	--	--	--	--	51	--	178	--	--	--	--	--	407	0.55	23,730	206	60	35	1.6	617	--	--
Weighted average b.	21,210	--	--	--	--	52	--	178	--	--	--	--	--	409	0.56	23,420	207	61	35	1.6	620	--	--

a Represents 98 percent of runoff for water year October 1956 to September 1957.

b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1956 to September 1957.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER NEAR WILLISTON, N. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 5 p.m. and 8 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	45	--	a 35	33	33	37	63	70	72	75	65
2	58	43	--	b 34	a 33	a 34	38	64	70	71	75	65
3	57	42	32	34	a 33	a 33	36	64	70	72	73	65
4	58	41	32	a 34	33	33	37	65	70	71	73	67
5	58	40	32	a 34	33	34	38	65	71	72	74	--
6	56	38	--	a 34	33	33	40	62	69	71	74	65
7	56	38	--	34	33	34	40	60	69	73	73	65
8	55	40	--	33	33	34	40	58	69	74	72	65
9	53	47	--	33	33	a 36	40	59	65	74	74	65
10	53	42	--	32	33	a 37	40	--	66	76	75	65
11	55	43	--	32	33	36	--	64	66	78	74	65
12	55	43	--	a 32	33	36	--	60	65	78	73	64
13	54	40	--	--	33	40	--	60	65	78	--	64
14	53	40	--	32	34	40	--	64	65	77	73	--
15	52	39	--	32	33	39	--	62	68	77	71	65
16	53	--	--	32	a 33	a 38	--	64	64	78	70	65
17	53	38	--	32	a 33	38	--	64	65	75	71	63
18	52	35	--	33	33	38	--	63	68	75	71	57
19	52	--	--	a 34	33	38	48	64	70	73	72	53
20	52	--	35	b 34	33	38	48	64	69	74	75	50
21	--	--	35	34	33	38	--	--	65	73	75	50
22	50	--	35	--	33	40	53	64	70	73	75	50
23	50	--	35	--	a 33	a 38	52	65	70	73	73	59
24	--	--	35	--	a 33	a 38	55	64	69	74	72	59
25	48	35	35	--	33	38	55	64	67	74	67	57
26	47	35	a 35	--	33	38	58	64	68	75	62	57
27	45	--	a 35	--	33	38	a 60	64	68	75	--	60
28	45	--	b 35	--	33	38	63	a 64	68	75	b 62	62
29	45	--	35	--	--	38	65	68	71	75	64	63
30	44	33	35	--	--	38	a 65	69	73	75	64	65
31	44	--	35	--	--	38	--	69	--	75	66	--
Average	52	--	--	--	33	37	--	64	68	74	71	61

a Measurement between 1 p.m. and 4 p.m.
b Measurement between 10 a.m. and 11 a.m.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER BELOW GARRISON DAM, N. DAK.

LOCATION.--Temperature recorder at gaging station, 4.3 miles north of Stanton, Mercer County, 5 miles upstream from Knife River, and 9 miles downstream from Garrison Dam.
DRAINAGE AREA.--181,400 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: June 1952 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 64°F Aug. 23; minimum, freezing point on many days during December and January.
EXTREMES, 1952, 1954-57.--Water temperatures: Maximum, 76°F July 27, 28, 1954; minimum (1954-57), freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1	58	58	50	49	35	35	32	32	33	33	34	34	36	36	41	40	54	52	59	58	61	60	61	61
2	58	58	49	48	35	35	32	32	33	33	34	34	36	36	42	41	54	52	59	58	61	60	61	61
3	58	58	48	48	35	35	32	32	33	33	34	34	36	35	42	41	54	52	59	58	61	61	63	61
4	58	58	48	48	35	35	32	32	33	33	34	34	36	35	42	41	56	52	60	58	61	60	63	63
5	58	57	48	48	35	35	32	32	33	33	34	34	36	36	43	41	54	52	61	60	60	60	63	63
6	57	57	48	47	35	35	32	32	33	33	34	34	36	36	43	41	54	53	61	61	60	60	63	62
7	57	57	47	46	35	35	32	32	33	33	34	34	36	36	43	42	55	53	61	60	61	60	62	62
8	57	57	46	45	35	35	32	32	33	33	34	34	36	36	43	43	53	53	61	60	61	61	62	62
9	57	56	45	45	35	34	32	32	33	33	34	34	36	36	45	43	55	53	61	60	61	60	62	62
10	56	56	45	45	34	32	32	32	33	33	34	34	36	36	45	44	55	54	61	60	61	61	62	62
11	56	55	45	44	32	32	32	32	33	33	34	34	36	35	44	44	55	55	61	60	63	61	62	62
12	55	55	44	41	32	32	32	32	33	33	35	34	36	35	45	44	56	55	60	60	62	61	62	62
13	55	55	42	41	33	32	32	32	33	33	35	34	36	36	46	45	56	54	60	59	62	61	62	62
14	55	55	42	42	33	33	32	32	33	33	35	35	36	36	46	46	57	56	60	60	63	62	62	62
15	55	55	42	41	33	32	32	32	33	33	35	34	37	36	46	46	58	56	61	59	62	62	62	61
16	55	55	41	41	32	[illegible]	32	32	33	33	35	34	36	36	46	46	58	57	60	58	62	61	61	61
17	55	55	41	41	32	32	32	32	33	33	35	35	37	36	47	46	58	57	61	60	61	61	61	61
18	55	55	41	40	32	32	32	32	33	33	35	35	37	37	47	47	58	56	60	59	62	61	61	60
19	55	55	40	40	32	32	32	32	33	33	35	35	37	37	47	46	58	57	60	59	63	62	60	60
20	55	55	40	40	32	32	32	32	33	33	36	35	37	37	46	46	58	58	60	60	63	62	60	60
21	55	54	40	39	32	32	32	32	33	33	36	35	38	37	46	46	58	58	61	60	63	62	60	59
22	54	54	39	38	32	32	32	32	34	33	35	35	38	37	47	46	58	58	60	60	62	62	59	59
23	54	54	38	38	32	32	32	32	34	34	35	35	37	37	47	46	59	58	60	59	64	62	59	59
24	54	53	38	38	32	32	32	32	34	34	35	35	38	37	48	47	57	55	60	59	63	62	59	59
25	53	53	38	38	32	32	32	32	34	34	36	35	38	38	50	47	56	55	60	59	63	62	59	58
26	53	53	38	38	32	32	32	32	34	34	36	35	39	38	50	49	59	56	60	60	63	63	58	57
27	53	51	38	37	32	32	32	32	34	34	36	35	39	38	50	49	58	57	60	60	63	61	58	57
28	51	51	37	36	32	32	32	32	34	34	35	35	42	39	51	49	58	57	60	60	61	61	58	57
29	51	51	36	35	32	32	32	32	--	--	36	35	40	39	51	50	60	58	60	59	61	61	58	57
30	51	50	35	35	32	32	33	32	--	--	36	35	41	40	52	50	60	58	60	60	61	61	58	57
31	50	50	--	--	32	32	33	33	--	--	36	35	--	--	52	49	--	--	60	59	61	61	--	--
Average	55	55	42	42	33	33	32	32	33	33	35	34	37	37	46	45	57	55	60	59	62	61	61	60

MISCELLANEOUS ANALYSES OF LAKES IN TURTLE CREEK BASIN IN NORTH DAKOTA

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Lake elevation[a]	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
LAKE ORDWAY NEAR TURTLE LAKE																								
Sept. 23, 1956.	7.2	5.8	0.06	10	33	1,150	30	b 2,150	920	25	0.4	2.4	2.5	3,410	3,240	4.64		160	0	93	40	4,660	9.3	
Apr. 30, 1957.	6.40	11	.02	8.0	38	980	31	c 1,720	838	16	.4	3.9	1.9	2,740	2,760	3.73		175	0	91	32	3,840	9.0	

a Lake elevation, feet below reference mark.
b Includes equivalent of 305 ppm of carbonate (CO_3).
c Includes equivalent of 144 ppm of carbonate (CO_3).

GRAND RIVER BASIN

GRAND RIVER NEAR SHADEHILL, S. DAK.

LOCATION.--At spillway and irrigation outlets of Shadehill Reservoir, 1 mile upstream from gaging station, three-quarters of a mile west of Shadehill, Perkins County, and 4 miles downstream from confluence of North and South Forks of Grand River.
DRAINAGE AREA.--3,120 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April to October 1952, March 1953 to September 1957.
Water temperatures: August 1954 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 964 ppm Feb. 1-28 (irrigation outlet); minimum, 877 ppm Oct. 1-31 (irrigation outlet).
Hardness: Maximum, 156 ppm Feb. 1 to Mar. 26 (irrigation outlet); minimum, 142 ppm Aug. 1-30, Sept. 3-12 (spillway outlet), Sept. 1-30 (irrigation outlet).
Specific conductance: Maximum daily, 1,440 micromhos Mar. 1, 4-8, 11-15, 18-22 (irrigation outlet); minimum daily, 1,290 micromhos Oct. 1-5, 8-10 (irrigation outlet).
EXTREMES, 1954-57.--Dissolved solids: Maximum, 964 ppm Feb. 1-28, 1957 (irrigation outlet); minimum, 510 ppm Mar. 27, 1956 (spillway outlet).
Hardness: Maximum, 167 ppm Apr. 4-7, 1955 (irrigation outlet); minimum, 104 ppm Mar. 27, 1956 (spillway outlet).
Specific conductance: Maximum daily, 1,440 micromhos on several days during March 1957 (irrigation outlet); minimum daily, 790 micromhos Mar. 27, 1956 (spillway outlet).
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Flow is regulated by an ungated spillway and by a regulated irrigation outlet. Discharge records for gaging station at Shadehill for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1956	10.1	--	--	--	--	246	--	384	0	--	--	--	--	0.36	877	1.19	23.9	144	0	79	8.9	1,310	8.2
Nov. 1-Dec. 5	11.6	--	--	--	--	244	--	384	0	--	--	--	--	.35	889	1.21	27.8	148	0	78	8.7	1,330	7.9
Dec. 6-24	10.6	0.6	0.00	20	24	244	7.6	377	8	365	5.0	0.5	0.3	.41	908	1.23	26.0	150	0	77	8.7	1,350	8.4
Dec. 25-Jan. 20, 1957	10.0	--	--	--	--	256	--	401	0	--	--	--	--	.36	924	1.26	24.9	155	0	78	8.9	1,370	8.1
Jan. 21-31	10.0	--	--	--	--	254	--	406	5	--	--	--	--	.40	949	1.29	25.6	155	0	78	8.9	1,420	8.3
Feb. 1-28	10.0	--	--	--	--	266	--	406	7	--	--	--	--	.36	964	1.31	26.0	156	0	79	9.3	1,430	8.3
Mar. 1-26	10.0	.7	.01	29	20	270	8.5	408	6	380	5.5	.4	.3	.33	961	1.31	25.9	156	0	78	9.4	1,440	8.3
Mar. 27-Apr. 19	10.8	--	--	--	--	265	--	378	16	--	--	--	--	.34	932	1.27	27.2	151	0	79	9.4	1,410	8.7
Apr. 20-May 31	8.78	--	--	--	--	258	--	368	18	--	--	--	--	.34	921	1.25	21.8	149	0	79	9.2	1,380	8.6
June 1-24	24.7	.6	.01	32	16	260	7.4	401	0	353	5.5	.5	.3	.34	914	1.24	61.0	146	0	78	9.4	1,380	8.2
June 25-July 31	168	--	--	--	--	256	--	396	0	--	--	--	--	.42	914	1.24	415	146	0	79	9.2	1,360	8.1
June 25-July 31 a	168	--	--	--	--	256	--	396	0	--	--	--	--	.34	906	1.23	411	154	0	78	9.0	1,350	8.2
Aug. 1-31	39.5	--	--	--	--	264	--	382	6	--	--	--	--	.33	910	1.24	97.1	144	0	80	9.6	1,360	8.3
Aug. 1-30 a	39.9	--	--	--	--	262	--	380	8	--	--	--	--	.33	899	1.22	96.8	142	0	80	9.6	1,360	8.4
Sept. 1-30	17.3	2.0	.01	30	16	258	7.3	378	7	372	5.2	.3	.1	.35	903	1.23	42.2	142	0	79	9.4	1,360	8.5
Sept. 3-12 a	21.6	2.1	.02	29	17	258	7.3	384	5	378	5.5	.4	.2	.36	919	1.25	53.6	142	0	79	9.4	1,360	8.4
Weighted average b	30.2	--	--	--	--	257	--	c 397	--	--	--	--	--	0.39	915	1.24	74.6	147	0	79	9.2	1,360	--

a Samples collected at spillway outlet. Not included in weighted average.
b Represents 100 percent of runoff for water year October 1956 to September 1957.
c Includes carbonate as bicarbonate.

GRAND RIVER BASIN--Continued

GRAND RIVER NEAR SHADEHILL, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 9 a.m. and 12 m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	61	±7	37	--	35	a 38	±0	51	--	67	7±	--
2	60	±5	--	36	--	--	39	--	--	69	a 76	--
3	60	--	37	a 35	--	--	±0	--	a 60	70	7±	69
4	60	--	36	a 35	35	a 37	±0	--	--	--	--	67
5	60	±5	35	--	3±	37	a ±2	--	--	69	72	a 67
6	--	±5	35	--	35	38	--	52	60	--	--	68
7	--	--	3±	35	35	38	--	--	--	--	73	--
8	b 58	--	--	35	35	38	±2	a 52	61	69	b 73	--
9	56	--	--	a 3±	--	--	a ±2	a 53	--	a 71	7±	67
10	56	--	35	36	--	--	±0	52	--	70	--	67
11	57	--	3±	--	a 37	39	39	--	--	72	--	65
12	57	--	3±	--	37	a 39	--	--	6±	7±	75	a 65
13	--	--	3±	--	36	39	--	--	65	--	--	--
14	--	--	--	3±	37	39	--	--	--	--	b 75	--
15	--	±1	3±	33	37	±0	±1	--	--	72	7±	--
16	55	--	--	3±	--	--	a ±1	--	--	70	7±	6±
17	b 55	--	a 3±	35	--	--	±1	--	--	b 68	--	--
18	55	--	3±	36	37	±0	a ±1	--	--	72	--	61
19	50	±0	3±	--	37	±0	a ±3	--	a 65	a 72	72	--
20	--	39	35	--	37	a ±0	--	--	63	--	b 71	--
21	--	--	a 35	a 35	37	±0	--	--	66	--	b 73	--
22	52	--	--	35	--	a ±0	--	52	--	7±	--	--
23	52	--	--	35	--	--	a ±6	a 53	--	a 75	72	--
24	--	39	--	35	--	--	a ±6	55	--	--	--	--
25	--	--	--	35	37	±1	a ±6	--	67	7±	--	--
26	--	38	--	--	38	±2	±6	--	--	b 7±	--	--
27	--	38	36	--	39	a 39	--	b 5±	65	--	a 70	58
28	50	b 37	a 37	35	a 38	±1	--	b 56	a 6±	--	69	--
29	50	37	--	35	--	a ±1	±8	b 55	--	a 7±	69	--
30	--	37	--	a 36	--	--	±9	--	--	7±	a 70	62
31	--	--	--	35	--	--	--	a 58	--	7±	--	--
Average	--	--	--	--	--	--	--	--	--	--	--	--

a Measurement between 1 p.m. and 5 p.m.
b Measurement between 7 a.m. and 8 a.m.

GRAND RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN GRAND RIVER BASIN IN SOUTH DAKOTA.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
NORTH FORK GRAND RIVER NEAR WHITE BUTTE																								
Oct. 13, 1955...	0.03	4.3	0.03	17	51	418	10	466	760	8.5	0.8	1.7	0.87	1,560	1,520	2.12		254	0	77	11	2,200	8.0	
Nov. 14, 1956 ..	4.0	4.3	.01	41	32	336	8.8	430	620	7.5	.6	2.2	.68	1,290	1,270	1.75		236	0	75	9.5	1,860	8.0	15
SHADEHILL RESERVOIR AT SHADEHILL																								
June 15, 1957 a .	b 2,271.97	7.5	0.01	31	17	272	7.6	c 405	388	5.0	0.4	0.7	0.31	921		1 25		148	0	79	9.7	1,380	8.3	8
June 26 a	b 2,273.38	5.6	.02	31	17	266	7.6	d 404	393	5.0	.4	.7	.37	920		1.25		147	0	79	9.5	1,390	8.4	

a Composite of samples from all ranges.
b Pool elevation, in feet.
c Includes equivalent of 3 ppm of carbonate (CO_3).
d Includes equivalent of 9 ppm of carbonate (CO_3).

BEAVER CREEK NEAR NEWCASTLE, WYO.

LOCATION.--At gaging station at bridge on county road, 1 mile downstream from Sheep Creek and 23 miles south of Newcastle, Weston County.
DRAINAGE AREA.--1,320 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1952, December 1952 to August 1953.
Sediment records: March 1950 to September 1957 (discontinued).
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 35,300 ppm May 22; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 90,800 tons May 25; minimum daily, 0 tons on many days.
EXTREMES, 1950-57.--Sediment concentrations: Maximum daily, 35,300 ppm May 22, 1957; minimum daily, no flow on many days during 1950, 1952-57.
Sediment loads: Maximum daily, 90,800 tons May 25, 1957; minimum daily, 0 tons on many days during 1950, 1952-57.
REMARKS.--Flow affected by ice Nov. 3 to Mar. 20. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	8.4			2.6		
2	0	--	0	8.4			3.0		
3	2.9	453	s 11	6.0			2.8		
4	7.8	480	a 10	4.0			3.0		
5	9.1			4.5			2.5		
6	8.8			6.0			1.5		
7	8.1			5.5			1.1		
8	7.8			6.0	94	2	1.1		
9	7.8			5.5			1.2		
10	7.8			6.0			1.3		
11	9			6.5			1.4		
12	11			7.0			1.5		
13	11			7.0			1.6		
14	11			6.0			1.7		
15	11			4.5			1.8		
16	11			2.5			1.9	63	(t)
17	12	60	2	3.3			2.0		
18	12			3.5			2.1		
19	11			3.5			2.2		
20	11			3.3			2.3		
21	9.9			3.5			2.3		
22	9.9			4.0			2.0		
23	9.5			4.5	58	1	1.5		
24	9.5			5.0			1.6		
25	10			4.5			1.7		
26	11			3.5			1.8		
27	10			3.1			1.7		
28	10			2.7			1.8		
29	10			2.5			1.9		
30	9.9			2.6			1.9		
31	9.1			--	--	--	1.8		
Total	278.9	--	75	143.3	--	45	58.6		9

s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from estimated concentration graph.

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1.7			1.7			300	4,600	b 3,700
2	1.6			1.8			200	2,900	a 1,600
3	1.6			1.9			120	2,400	a 800
4	1.6			2.1			77	2,200	b 460
5	1.6			2.3	92	1	50	2,000	a 280
6	1.8			2.4			45	1,700	b 200
7	2.3			3.5			40	900	a 95
8	2.2			5.0			35		
9	2.1			7.5			32		
10	2.0			11			29		
11	2.0			15			26		
12	2.0			20	221	14	25		
13	1.9			25			23		
14	1.7			30			23		
15	1.6			35			25		
16	1.5	61	(t)	80	--	e 60	24	314	20
17	1.7			100	--	e 100	23		
18	2.0			55			25		
19	2.5			46			28		
20	3.0			35			30		
21	3.5			30			27		
22	3.0			25	227	24	20		
23	2.0			25			11		
24	1.5			35			15		
25	1.0			40			12		
26	1.1			60			4.9	--	e 2
27	1.2			100	300	b 80	5.8	208	3
28	1.3			170	3,700	a 1,700	4.0		
29	1.4			--	--	--	3.1	150	b 1
30	1.5			--	--	--	2.1		
31	1.6			--	--	--	1.4		
Total	57.5		9	965.2	--	2,249	1,286.3	--	7,504

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.7			0.4			9.5	130	a 3
2	.6	150	(t)	.3			18	--	e 30
3	.7			.3			344	14,700	s 24,000
4	.7			.4			362	12,000	a 12,000
5	1.3			1.5			200	6,500	s 4,160
6	1.5	190	b 1	1.3	80	(t)	39	2,100	a 220
7	1.6			.4			37	--	e 200
8	1.5			.6			78	850	sa 220
9	1.3			.6			192	13,300	s 7,720
10	11	280	sb 10	.6			293	13,000	s 12,900
11	34	500	a 46	.6			779	22,900	s 67,800
12	17	382	18	5.2	1,200	sa 42	290	9,670	s 8,150
13	8.4	260	a 6	12	2,200	sb 75	120	5,530	s 2,320
14	3.0	170	a 1	11	900	28	50	1,410	190
15	1.3			2.4	138	1	30	220	a 18
16	.9			6.4	600	sa 26	31	100	a 8
17	.9			17	520	24	52	160	22
18	1.2			5.8	340	a 5	30	100	a 8
19	2.1	85	(t)	2.1	190	a 1	31	151	13
20	1.0			59	3,230	s 558	27	131	10
21	.8			36	7,720	s 2,050	26	156	11
22	.8			134	35,300	s 15,000	94	1,900	sa 550
23	.7			28	8,100	a 600	242	4,180	s 3,070
24	6.5	158	3	211	22,900	s 26,200	222	6,680	4,000
25	1.7	118	1	780	32,300	s 90,800	44	2,300	a 280
26	1.4			130	1,500	sa 600	30	290	24
27	.8			172	10,300	4,780	24	160	a 10
28	.6	65	(t)	39	7,100	748	20	139	8
29	.4			19	1,240	64	17	130	a 6
30	.4			15	400	a 16	15	120	a 5
31	--	--	--	21	320	b 19	--	--	--
Total	104.8	--	94	1,712.9	--	141,638	3,746.5	--	147,956

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from estimated concentration graph.
b Computed from partly estimated concentration graph.

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	13	108	4	15	236	10	0.1		(t)
2	13	--	e 3	7.8	160	a 3	.1		(t)
3	21	41	2	5.8	130	a 2	0		0
4	15	--	e 2	5.3			0		0
5	9.5			4.6	90	a 1	.1		
6	6.8			3.7			.1		(t)
7	6.1			1.6			.1		
8	4.9			.7			.1		
9	4.0	48	1	.5			0		0
10	4.2			.4	50	(t)	0		0
11	3.5			.5			0		0
12	2.2			.5			0		0
13	2.1			.6			.2		
14	6.1	102	s 4	2.8	90	b 1	.2		
15	11	72	2	2.2			.1		
16	6.1			.5	26	(t)	.1	12	(t)
17	4.9			.4			.1		
18	7.4	32	1	61	1,350	s 522	.1		
19	7.4			366	8,450	s 8,860	.1		
20	6.5			256	6,570	s 6,080	0		0
21	96	859	s 249	23	2,080	129	0		0
22	36	428	s 47	12	800	a 26	0		0
23	175	9,560	s 5,170	6.5	188	3	0		0
24	100	7,560	s 2,690	3.3	100	a 1	0		0
25	24	2,300	a 150	1.3			0		0
26	18	291	14	.6			0		0
27	18	170	a 8	.4			0		0
28	12	140	a 5	.4	54	(t)	0		0
29	8.4	135	3	.2			0		0
30	6.8	130	a 2	.1			0		0
31	38	344	s 42	.1			--		--
Total	686.9	--	8,411	783.8	--	15,642	1.5		(t)

Total discharge for year (cfs-days) 9,826.2

Total load for year (tons) 323,632

e Estimated.

s Computed by subdividing day.

t Less than 0.50 ton.

a Computed from estimated concentration graph.

b Computed from partly estimated concentration graph.

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 4, 1957	3:40 p.m.	77	33	2,150	4,490		84		100								PWCM
May 14	12:50 p.m.	15	--	842	1,300		91		98								BWCM
May 22	3:35 p.m.	143	54	29,300	4,100		1		100								PN
May 22	3:35 p.m.	143	54	29,300	4,060	62	80		100								PWC
May 28	11:40 a.m.	37	65	7,170	4,250		90		100								PWCM
June 5	3:50 p.m.	143	73	5,250	2,720		85		100								PWCM
June 9	9:45 a.m.	258	--	22,500	3,790		80		99		100						VPWCM
June 24	1:15 p.m.	206	67	8,010	3,080		84		100								PWCM
July 24	3:05 p.m.	42	77	5,500	4,420		93		100								PWCM

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 87, a quarter of a mile downstream from Cascade Creek and 10 miles southwest of Hot Springs, Fall River County.
DRAINAGE AREA.--8,710 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1951.
Water temperatures: July 1947 to September 1949, April 1951 to September 1957.
Sediment records: April 1946 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 86°F July 1.
Sediment concentrations: Maximum daily, 29,900 ppm July 21; minimum daily, not determined.
Sediment loads: Maximum daily, 364,000 tons May 25; minimum daily, not determined.
EXTREMES, 1946-57.--Water temperatures: Maximum (1947-49, 1951-55, 1956-57), 89°F June 12, 1952; minimum (1947-49, 1951-56), freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 55,000 ppm June 19, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 612,000 tons June 28, 1952; minimum daily, 0.1 ton or less on several days during some years.
REMARKS.--Maximum observed sediment concentration during water year, 41,100 ppm Sept. 15.
Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 4 p.m. and 7 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	52	--	53	--	45	--	--	a 60	86	--	--
2	--	50	49	--	46	--	--	71	a 66	--	--	--
3	--	b 51	50	--	--	40	--	--	a 66	--	--	73
4	--	50	--	a 46	--	a 36	50	54	a 72	--	--	--
5	--	--	--	b 47	--	--	--	54	a 72	--	--	b 72
6	--	--	--	--	54	41	--	--	a 72	77	--	--
7	--	--	--	--	--	40	50	--	a 67	72	--	70
8	60	--	--	40	58	42	--	62	--	--	79	--
9	62	--	--	--	--	48	54	--	a 72	--	--	--
10	60	--	--	--	53	52	--	67	a 63	--	79	--
11	a 59	--	--	--	--	51	--	--	a 66	--	--	--
12	60	55	--	b 44	--	55	43	64	a 64	--	--	--
13	61	--	49	--	56	45	a 43	--	a 69	76	b 82	a 60
14	62	--	--	--	--	50	a 46	60	67	--	80	--
15	b 64	--	--	--	--	51	--	52	--	84	--	--
16	a 63	--	--	a 47	--	--	a 51	--	a 58	b 82	--	a 59
17	62	b 52	--	--	40	41	a 42	a 47	a 56	--	--	--
18	61	--	a 51	--	40	--	54	--	a 62	--	a 63	--
19	61	--	--	--	--	52	54	--	72	--	77	a 60
20	b 64	--	--	49	--	--	64	a 57	a 68	--	80	--
21	61	--	46	--	--	--	--	a 50	a 71	--	a 70	--
22	60	--	--	--	--	42	59	a 51	--	83	--	63
23	--	--	--	b 42	b 45	b 54	--	--	68	--	79	--
24	57	52	--	--	41	53	59	--	--	--	--	70
25	52	--	54	--	--	52	--	--	--	a 69	--	--
26	56	--	--	--	40	53	b 68	--	--	--	--	62
27	60	--	--	43	45	b 64	--	66	70	--	70	--
28	53	48	--	--	45	--	64	a 66	78	--	--	--
29	52	50	54	--	--	--	--	a 67	--	77	--	--
30	56	--	--	46	--	59	67	a 70	--	82	--	a 71
31	60	--	--	--	--	--	--	a 64	--	85	--	--
Average	--	--	--	--	--	--	--	--	--	--	--	--

a Measurement between 8 a.m. and 11 a.m.
b Measurement between 1 p.m. and 3 p.m.

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	16			18			33	--	e 15
2	16			20			29	110	9
3	16			18			31	65	5
4	17			14			33	--	e 10
5	17			14			28		
6	14			18			28		
7	13			17			24		
8	14			16			23	25	2
9	14			18			23		
10	15			18			23		
11	16			17	55	3	23		
12	16			18			21		
13	14			18			20		
14	14			21			20		
15	14			18			18		
16	15	50	2	17			18		
17	15			18			18		
18	16			18			18		
19	16			20			20		
20	17			20			20		
21	17			23			21	10	1
22	16			24			21		
23	17			28	--	e 6	22		
24	18			30	110	9	22		
25	15			24	--	e 6	22		
26	12			21	--	e 4	22		
27	12			18	--	e 2	23		
28	12			21	50	3	23		
29	13			31	200	17	22		
30	13			33	--	e 25	22		
31	17			--	--	--	22		
Total	467		62	609	--	138	713	--	73

Day	January			February			March		
1	21			18			116	1,610	s 618
2	22			18			366	5,280	5,220
3	22			18			300	4,820	3,900
4	22			18			168	3,550	1,610
5	23			17			99	1,520	406
6	22			17			55	685	s 96
7	21			17	20	1	49	1,460	193
8	21			18			69	1,130	s 226
9	20			18			97	850	s 234
10	20			18			83	830	s 194
11	18			18			66	850	151
12	18			21			52	870	122
13	18			22			50	320	43
14	18			30	65	5	46	420	52
15	18			29	324	s 31	40	285	31
16	18	20	1	40	400	s 47	47	330	42
17	18			43	375	s 50	40	250	27
18	18			57	480	s 88	30	90	7
19	18			51	465	64	46	190	s 23
20	18			46	--	e 30	75	495	100
21	18			41	--	e 15	46	180	22
22	18			41	--	e 10	46	110	14
23	18			52	100	14	46	75	9
24	18			64	255	44	47	230	29
25	18			76	200	41	43	125	15
26	18			93	400	s 115	44	80	10
27	18			99	595	s 201	41		
28	18			101	775	s 248	37	45	5
29	18			--	--	--	41		
30	18			--	--	--	41		
31	18			--	--	--	54	--	e 10
Total	592		31	1,101	--	1,016	2,380	--	13,424

e Estimated.
s Computed by subdividing day.

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	61	125	21	22	--	e 2	891	11,000	26,500
2	80	--	e 500	20	70	4	1,050	16,300	46,200
3	70	--	e 100	20	--	e 5	595	9,600	15,400
4	66			41	410	s 52	604	9,330	s 16,900
5	55			49	265	35	798	8,120	17,500
6	64	215	a 36	66	260	a 46	673	9,500	17,300
7	58			52	140	20	438	5,700	6,740
8	66			46	75	9	412	3,350	3,730
9	82	475	105	40	60	a 6	559	9,800	14,800
10	82	1,000	sa 240	35	40	4	535	8,950	12,900
11	184	8,550	4,250	31	30	a 3	976	11,000	s 40,700
12	190	5,780	2,970	28	20	2	2,610	20,200	s 150,000
13	141	2,350	895	34	--	e 2	1,260	12,900	43,900
14	114	1,070	329	230	6,030	s 5,450	686	7,900	14,600
15	89	780	187	408	6,100	6,720	481	4,800	6,230
16	189	4,790	s 2,980	468	9,400	11,900	402	2,750	2,990
17	342	7,420	6,850	632	19,200	32,800	310	2,350	1,970
18	233	3,530	2,220	1,500	19,800	80,200	333	2,200	1,980
19	146	1,860	733	1,300	16,600	58,300	456	2,940	s 4,140
20	130	1,120	393	1,020	12,900	35,500	412	8,200	9,120
21	105	420	a 120	3,610	13,000	127,000	333	6,000	5,390
22	76	345	71	1,810	6,800	33,200	388	5,780	s 6,470
23	60	260	a 42	1,090	5,800	17,100	868	18,000	42,200
24	50	160	22	793	5,800	12,400	740	16,200	32,400
25	40	80	a 9	6,750	18,300	s 364,000	594	10,800	17,300
26	31	40	3	8,270	11,000	246,000	357	6,000	5,780
27	28			3,970	13,000	139,000	265	3,300	2,360
28	27			1,430	8,800	34,000	209	1,550	875
29	27	10	1	786	6,900	14,600	162	800	350
30	26			571	3,500	5,400	130	460	161
31	--	--	--	571	2,900	4,470	--	--	--
Total	2,912	--	23,224	35,693	--	1,228,230	18,527	--	566,886

Day	July			August			September		
1	113	320	98	31	220	a 18	20		
2	98	250	66	36	270	26	19		
3	91	240	a 60	32	--	e 18	17		
4	93	230	58	24			17		
5	89	280	a 70	26			17		
6	82	520	115	28			16		
7	72	415	81	22			14	25	1
8	69	220	a 40	19			14		
9	64	130	a 22	17			14		
10	51	105	14	17	65	3	15		
11	48	100	13	16			19		
12	108	390	114	15			21		
13	49	290	38	15			26	45	3
14	92	--	e 100	14			31	--	e 5
15	47	145	18	14			134	15,500	s 12,700
16	37	110	11	14			211	21,000	12,000
17	37	100	a 10	165	3,700	s 9,240	108	6,300	1,840
18	35	90	9	1,360	26,200	s 107,000	60	2,350	381
19	27	85	a 6	433	12,900	15,100	51	950	131
20	35	390	s 47	347	10,100	9,460	44	370	44
21	412	29,900	s 35,200	405	9,300	10,200	34	270	25
22	255	16,800	11,600	141	2,000	761	30	175	14
23	277	11,800	8,830	70	360	68	27	--	e 8
24	249	12,700	8,540	48	190	a 24	24		
25	247	8,000	5,340	32	130	11	23		
26	151	3,700	a 1,500	25			22		
27	107	395	114	22			22	30	2
28	72	260	a 50	23			22		
29	69	590	110	23	60	4	23		
30	62	510	85	21			22		
31	41	255	28	21			--	--	--
Total	3,279	--	72,387	3,476	--	151,989	1,117	--	27,177

Total discharge for year (cfs-days) 70,866

Total load for year (tons) 2,084,637

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

CHEYENNE RIVER BASIN--Continued

CHENENNE RIVER NEAR HOT SPRINGS, S. DAK.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 2, 1957	8:45 a.m.	354	--	5,480	3,270		61		75		79	87	98		100	--	VPWCM
Apr. 11	6:00 p.m.	187	--	9,880	3,950		78		98		98	99	100		--	--	VPWCM
Apr. 17	11:15 a.m.	381	44	8,040	4,950		66		90		94	96	100		--	--	VPWCM
May 15	2:45 p.m.	445	54	4,530	2,920		74		92		95	97	100		--	--	VPWCM
May 17	7:00 p.m.	658	--	18,300	5,270		72		86		86	87	90		96	100	VPWCM
May 18	3:30 p.m.	1,740	--	16,000	5,380		66		81		88	93	99		100	--	VPWCM
May 19	7:00 p.m.	1,120	--	14,600	5,470		66		91		95	96	99		100	--	VPWCM
May 21	8:15 a.m.	4,710	50	16,200	4,250		53		66		79	80	89		93	100	VPWCM
May 21	6:00 p.m.	3,230	--	9,530	2,800		63		72		80	87	97		100	--	VPWCM
May 23	12:10 p.m.	1,120	58	5,610	3,730		--		95		96	98	100		--	--	VPN
May 23	12:10 p.m.	1,120	58	5,610	4,010	63	78		93		96	98	100		--	--	VPWCM
May 27	7:00 p.m.	2,830	66	12,100	4,660		66		84		93	96	100		--	--	VPWCM
May 30	12:05 p.m.	583	72	3,260	5,200		84		92		95	96	100		--	--	VPWCM
June 3	12:20 p.m.	595	72	9,500	3,010		74		87		91	91	94		97	100	VPWCM
June 14	12:00 m.	673	64	8,030	4,870		75		92		97	98	100		--	--	VPWCM
June 21	8:40 a.m.	329	71	6,920	6,740		58		68		68	69	80		97	100	VPWCM
July 21	11:30 a.m.	422	--	31,600	3,040		69		89		91	91	92		95	100	VPWCM
Aug. 18	10:00 a.m.	1,450	63	26,900	5,220		54		77		95	98	100		--	--	VPWCM
Sept. 15	6:00 p.m.	300	--	41,100	3,930		78		99		99	100	--		--	--	VPWCM
Sept. 16	10:30 a.m.	213	60	21,600	4,390		80		--		100	--	--		--	--	VPWCM
Sept. 19	10:45 a.m.	62	60	904	3,600		95		100		--	--	--		--	--	PWCM

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER AT ANGOSTURA RESERVOIR OUTLET, S. DAK.

LOCATION.--At outlet to powerplant below Angostura Dam, 800 feet upstream from gaging station, 4¾ miles upstream from Fall River, and 6½ miles southeast of Hot Springs, Fall River County.
DRAINAGE AREA.--9,100 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1951 to September 1953, October 1954 to September 1957.
REMARKS.--Discharge records for gaging station below Angostura Dam for water year October 1956 to September 1957 given in WSP 1509.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1956 to September 1957

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)[a]	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	27.9	55	0.3	0.01			4	
November	36.8	73	.6	.02			5	
December	31.3	62	.9	.03			10	
January	37.3	74	1.6	.05			15	
February	35.9	71	1.4	.05			15	
March	38.9	77	1.6	.05			15	
April	31.0	61	.9	.03			10	
May	14,171.1	28,110	984	31.7			26	
June	17,071	33,860	979	32.6			21	
July	964.6	1,910	14.6	.5			6	
August	52.1	103	1.2	.04			10	
September	45.6	90	1.2	.04			10	
Water year	32,543.5	64,550	1,987.3	5.45			23	

a Based on infrequent samples.

CHEYENNE RIVER BASIN--Continued

RAPID CREEK NEAR FARMINGDALE, S. DAK.

LOCATION.--At gaging station at highway bridge, 2 miles southeast of Farmingdale, Pennington County, and 4¾ miles (revised) downstream from Antelope Creek.
DRAINAGE AREA.--602 square miles.
RECORDS AVAILABLE.--Chemical analyses: February to September 1953, October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,210 ppm Oct. 1-7, 9-26; minimum, 320 ppm Nov. 5-9.
Hardness: Maximum, 690 ppm Oct. 1-7, 9-26; minimum, 220 ppm Nov. 5-9.
Specific conductance: Maximum daily, 1,650 micromhos Oct. 16; minimum daily, 461 micromhos Nov. 7.
Water temperatures: Maximum, 88°F July 12; minimum, freezing point on several days during January to March.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 1,210 ppm Oct. 1-7, 9-26, 1956; minimum, 320 ppm Nov. 5-9, 1956.
Hardness: Maximum, 690 ppm Oct. 1-7, 9-26, 1956; minimum, 220 ppm Nov. 5-9, 1956.
Specific conductance: Maximum daily, 1,650 micromhos Oct. 16, 1956; minimum daily, 461 micromhos Nov. 7, 1956.
Water temperatures: Maximum, 93°F June 12, 1956; minimum, freezing point on several days during winter months each year.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-7, 9-26, 1956	2.12	--	--	150	77	99	--	a 332	595	22	--	--	--	1,210	1.65	6.93	690	418	23	1.6	1,540	8.3	--
Oct. 27-Nov. 4	8.31	--	--	105	72	79	--	222	500	20	--	--	--	987	1.34	22.1	557	375	24	1.5	1,280	8.1	--
Nov. 5-9	52.0	--	--	64	15	13	--	116	140	3.0	--	--	--	320	.44	44.9	220	125	11	.4	477	8.0	--
Nov. 10-12	61.7	--	--	79	36	30	--	220	203	11	--	--	--	500	.68	83.3	346	166	16	.7	750	8.2	--
Nov. 13	56	--	--	60	19	16	--	140	140	4.0	--	--	--	326	.44	49.3	228	113	13	.5	503	8.2	--
Nov. 14	54	--	--	71	29	27	--	180	188	8.0	--	--	--	436	.59	63.6	298	150	16	.7	656	8.2	--
Nov. 15-Dec. 5	42.9	--	--	107	43	42	--	263	300	14	--	--	--	683	.93	79.1	444	228	17	.9	960	8.2	--
Dec. 6-26	31.6	10	0.00	113	46	40	5.3	285	285	16	0.2	8.9	0.17	692	.94	59.0	471	237	15	.8	988	8.1	3
Dec. 27-31	34.8	--	--	92	35	40	--	227	256	11	--	--	--	598	.81	56.2	374	188	19	.9	848	8.0	--
Jan. 1-11, 1957	27.0	--	--	112	49	40	--	296	293	17	--	--	--	719	.98	52.4	482	239	15	.8	1,010	7.8	--
Jan. 12-Feb. 5	24.0	--	--	112	44	37	--	288	253	18	--	--	--	675	.92	43.7	462	226	15	.8	953	7.6	--
Feb. 6-15	29.2	--	--	80	34	35	--	204	221	13	--	--	--	534	.73	42.1	338	171	18	.8	767	8.1	--
Feb. 16-19	32.0	--	--	88	35	35	--	224	222	14	--	--	--	570	.78	49.2	364	180	17	.8	800	8.1	--
Feb. 20-24	33.0	--	--	99	36	36	--	252	244	15	--	--	--	616	.84	54.9	395	188	16	.8	885	7.9	--
Feb. 25-28	65.0	--	--	72	24	32	--	186	185	11	--	--	--	446	.61	78.3	280	127	19	.8	668	7.9	--
Mar. 1-3	54.3	--	--	76	29	33	--	197	183	13	--	--	--	473	.64	69.3	310	148	19	.8	719	7.7	--
Mar. 4-15	33.5	--	--	81	38	39	--	207	253	13	--	--	--	570	.78	51.6	360	190	19	.9	821	7.7	--
Mar. 16-31	23.0	3.3	.00	100	48	48	4.4	258	298	19	.5	5.8	.17	689	.94	42.8	447	235	19	1.0	988	7.7	13
Apr. 1-16	43.3	--	--	95	42	74	--	175	375	16	--	--	--	751	1.02	87.8	411	267	28	1.6	1,050	7.5	--
Apr. 17-25	38.6	--	--	97	47	70	--	214	395	16	--	--	--	788	1.07	82.1	437	262	25	1.5	1,090	7.5	--

Apr. 26-May 19...	24.9	--	--	129	55	65	--	172	501	16	--	--	--	962	1.31	64.7	548	407	21	1.2	1,210	7.4	--
May 20-27.....	600	--	--	105	35	34	--	196	293	7.4	--	--	--	636	.86	1,030	406	245	15	.7	873	7.8	--
May 28-June 30...	108	13	.01	113	44	39	5.9	232	319	12	.4	3.3	.17	717	.98	209	464	274	15	.8	969	7.6	8
July 1-15.....	40.3	--	--	101	47	48	--	204	352	15	--	--	--	722	.98	78.6	446	279	19	1.0	997	7.7	--
July 16-19.....	85.0	--	--	83	27	24	--	172	216	6.9	--	--	--	478	.65	110	320	179	14	.6	703	7.6	--
July 20-Aug. 1....	16.9	--	--	97	47	47	--	201	335	16	--	--	--	701	.95	32.0	435	270	19	1.0	974	7.6	--
Aug. 2-26.....	9.94	--	--	101	57	58	--	213	402	19	--	--	--	805	1.09	21.6	487	312	20	1.1	1,090	7.7	--
Aug. 27-Sept. 30..	21.3	7.9	.00	101	51	45	10	252	317	16	.4	.8	.25	723	.98	41.6	462	255	17	.9	1,000	7.7	5
Weighted average b.....	47.6	--	--	104	41	41	--	219	305	12	--	--	--	674	0.92	86.6	428	248	17	0.9	930	--	--

a Includes equivalent of 6 ppm of carbonate (CO_3).
b Represents 100 percent of runoff for water year October 1956 to September 1957.

CHEYENNE RIVER BASIN--Continued

RAPID CREEK NEAR FARMINGDALE, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 3 p.m. and 6 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	47	39	--	--	39	49	--	68	84	a 82	73
2	70	--	a 37	37	--	40	45	--	a 76	84	86	--
3	68	--	a 36	35	--	a 37	42	--	69	86	75	74
4	66	--	a 37	41	--	37	41	62	77	77	--	75
5	74	--	a 35	32	--	38	--	66	--	84	84	73
6	68	--	34	b 33	--	35	42	67	--	83	85	74
7	--	51	b 33	34	--	31	--	72	--	b 86	84	--
8	--	--	b 34	36	--	35	--	66	--	--	81	--
9	66	--	b 34	--	--	--	45	62	--	83	82	74
10	68	--	34	31	--	--	a 42	--	--	--	86	a 72
11	71	49	a 34	33	--	44	43	65	--	87	85	70
12	69	--	33	b 33	36	43	42	--	70	b 88	83	64
13	60	a 39	36	--	--	42	--	--	--	80	82	62
14	b 59	38	--	--	b 34	41	--	--	72	--	83	--
15	65	37	a 35	--	--	--	53	59	--	b 77	78	--
16	57	a 34	a 34	--	--	--	52	--	--	a 78	76	--
17	57	a 35	35	31	a 38	b 37	--	--	b 68	b 81	--	60
18	58	--	--	36	39	38	52	--	72	80	--	55
19	56	a 37	34	--	a 39	48	--	--	76	76	85	53
20	54	a 37	34	a 32	31	a 37	b 54	--	--	76	86	69
21	53	35	34	a 31	32	55	53	--	--	a 78	83	--
22	51	--	34	32	--	42	--	--	--	b 82	--	a 54
23	47	a 33	--	35	a 33	41	a 62	64	--	85	76	65
24	47	34	42	b 35	a 33	--	65	--	--	80	79	64
25	b 51	a 34	a 39	37	--	47	62	--	74	80	79	64
26	48	37	41	b 35	37	46	--	64	70	a 75	--	62
27	--	40	a 40	b 34	41	45	--	66	74	a 78	--	63
28	49	37	36	b 34	37	42	--	68	75	--	--	--
29	46	41	a 36	b 34	--	45	--	a 68	76	b 81	75	--
30	48	39	37	34	--	48	--	--	81	85	78	67
31	50	--	b 38	--	--	a 45	--	--	--	85	74	--
Average	59	--	36	--	--	41	--	--	--	81	--	--

a Measurement between 9 a.m. and 11 a.m.
b Measurement between 12 m. and 2 p.m.

CHEYENNE RIVER NEAR WASTA, S. DAK.

LOCATION.--At gaging station at bridge on U.S. Highway 16, 200 feet downstream from Chicago and North Western Railway bridge, 3 miles east of Wasta, Pennington County, and 7 miles downstream from Box Elder Creek.
DRAINAGE AREA.--12,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957 (discontinued).
Water temperatures: October 1955 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 2,060 ppm Jan. 22-27; minimum, 350 ppm Nov. 10-13.
Hardness: Maximum, 1,060 ppm Jan. 22-27; minimum, 96 ppm Nov. 10-13.
Specific conductance: Maximum daily, 2,490 micromhos Jan. 22-24; minimum daily, 454 micromhos Nov. 10.
Water temperatures: Maximum, 81°F June 2; minimum, freezing point on many days during November to March.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 2,060 ppm Jan. 22-27, 1957; minimum, 350 ppm Nov. 10-13, 1956.
Hardness: Maximum, 1,060 ppm Jan. 22-27, 1957; minimum, 70 ppm Aug. 7, 1956.
Specific conductance: Maximum daily, 2,490 micromhos Jan. 22-24, 1957; minimum daily, 454 micromhos Nov. 10, 1956.
Water temperatures: Maximum, 85°F July 10, 24, Aug. 5, 1956; minimum, freezing point on many days during winter months each year.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1956..	65.3	--	--	198	62	200	--	140	938	85	--	--	--	1,710	--	2.33	301	750	635	36	3.2	2,130	8.0	--
Nov. 1-9.....	126	--	--	160	43	164	--	188	685	56	--	--	--	1,310	--	1.78	446	575	421	38	3.0	1,720	7.9	--
Nov. 10-13.....	535	--	--	33	3.3	76	--	152	123	7.0	--	--	--	350	--	.48	506	96	0	63	3.4	540	8.2	--
Nov. 14.....	573	--	--	133	32	126	--	a 212	510	41	--	--	--	998	--	1.36	1,540	464	290	36	2.5	1,370	8.3	--
Nov. 15.....	356	--	--	58	5.7	96	--	208	185	13	--	--	--	494	--	.67	475	168	0	55	3.2	750	8.1	--
Nov. 16.....	194	--	--	135	31	127	--	b 214	505	40	--	--	--	1,010	--	1.37	529	464	289	36	2.6	1,370	8.3	--
Nov. 17.....	128	--	--	52	6.9	60	--	140	153	10	--	--	--	390	--	.53	135	158	43	45	2.1	583	8.0	--
Nov. 18-Dec. 4..	167	--	--	135	34	125	--	204	525	39	--	--	--	1,030	--	1.40	464	476	309	35	2.5	1,390	7.7	--
Dec. 5-27.....	91.7	14	0.03	208	60	149	9.8	270	770	61	0.6	3.6	0.27	1,530	1,410	2.08	379	765	544	29	2.3	1,900	7.9	5
Dec. 28-Jan. 2, 1957...	217	--	--	130	47	118	--	194	530	36	--	--	--	1,060	--	1.44	621	498	339	34	2.3	1,380	7.7	--
Jan. 3-5.....	113	--	--	213	57	143	--	260	770	60	--	--	--	1,520	--	2.07	464	764	551	28	2.2	1,870	8.1	--
Jan. 6-17.....	53.8	--	--	263	83	182	--	335	988	81	--	--	--	1,960	--	2.67	285	996	721	28	2.5	2,320	7.9	--
Jan. 18-21.....	62.5	--	--	255	71	149	--	309	875	72	--	--	--	1,780	--	2.42	300	928	675	26	2.1	2,140	7.8	--
Jan. 22-27.....	40.8	--	--	293	80	186	--	353	1,010	87	--	--	--	2,060	--	2.80	227	1,060	771	28	2.5	2,410	7.8	--
Jan. 28-31.....	41.3	--	--	250	84	172	--	332	940	80	--	--	--	1,860	--	2.53	207	970	698	27	2.4	2,210	8.0	--
Feb. 1-11.....	59.1	--	--	238	62	155	--	278	825	72	--	--	--	1,650	--	2.24	263	850	622	28	2.3	2,000	7.9	--
Feb. 12-14.....	323	--	--	112	28	108	--	168	438	32	--	--	--	866	--	1.18	755	396	258	37	2.4	1,180	7.7	--
Feb. 15-16.....	500	--	--	102	25	95	--	162	390	25	--	--	--	768	--	1.04	1,040	358	225	36	2.2	1,070	7.9	--
Feb. 17-19.....	300	--	--	163	42	126	--	208	615	47	--	--	--	1,190	--	1.62	964	578	407	31	2.3	1,530	8.0	--
Feb. 20-23.....	243	--	--	203	59	151	--	250	738	60	--	--	--	1,470	--	2.00	964	750	545	30	2.4	1,830	8.1	--

a Includes equivalent of 12 ppm of carbonate (CO_3).
b Includes equivalent of 4 ppm of carbonate (CO_3).

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR WASTA, S. DAK.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Feb. 24-25, 1957	360	--	--	173	47	139	--	256	630	45	--	--	--	1,250	--	1.70	1,220	625	415	33	2.4	1,610	8.0	--
Feb. 26.....	700	--	--	120	28	112	--	172	482	32	--	--	--	922	--	1.25	1,740	415	274	35	2.4	1,250	7.8	--
Feb. 27-28.....	750	--	--	95	20	87	--	160	360	21	--	--	--	700	--	.95	1,420	318	187	37	2.1	981	7.8	--
Mar. 1-5	400	--	--	133	41	118	--	167	510	37	--	--	--	1,020	--	1.39	1,100	500	363	34	2.3	1,340	7.7	--
Mar. 6-11	209	--	--	157	70	146	--	216	705	54	--	--	--	1,370	--	1.86	773	680	503	32	2.4	1,740	7.8	--
Mar. 12-21	126	13	0.00	163	68	157	9.2	212	730	55	0.5	2.7	0.24	1,390	1,300	1.89	473	686	512	33	2.6	1,760	7.8	8
Mar. 22	275	--	--	70	16	150	--	166	360	31	--	--	--	768	--	1.04	570	240	104	58	4.2	1,130	8.1	--
Mar. 23-27	383	--	--	109	69	166	--	206	635	49	--	--	--	1,240	--	1.69	1,280	554	385	39	3.1	1,620	8.0	--
Mar. 28-31	94.0	--	--	183	53	178	--	207	745	58	--	--	--	1,430	--	1.94	363	674	504	36	3.0	1,810	7.9	--
Apr. 1-6.....	140	--	--	145	46	169	--	171	645	52	--	--	--	1,220	--	1.66	461	550	410	40	3.1	1,600	7.8	--
Apr. 7-8.....	374	--	--	59	10	152	--	204	285	22	--	--	--	684	--	.93	691	188	21	64	4.8	1,020	8.1	--
Apr. 9.....	1,150	--	--	47	10	160	--	254	270	10	--	--	--	652	--	.89	2,020	160	0	69	5.5	946	7.8	--
Apr. 10.....	1,440	--	--	38	6.1	112	--	196	183	5.0	--	--	--	480	--	.65	1,870	120	0	67	4.4	698	7.9	--
Apr. 11-14.....	444	--	--	96	27	159	--	192	485	26	--	--	--	924	--	1.26	1,110	351	194	49	3.7	1,290	7.9	--
Apr. 15-17 :...	1,003	--	--	57	10	127	--	180	305	8.0	--	--	--	640	--	.87	1,730	184	36	58	4.1	923	8.0	--
Apr. 18-23.....	278	--	--	105	41	170	--	190	565	30	--	--	--	1,090	--	1.48	818	431	275	46	3.6	1,470	7.9	--
Apr. 24-May 14.	96.4	--	--	168	55	211	--	173	830	66	--	--	--	1,520	--	2.07	396	647	505	42	3.6	1,920	7.6	--
May 15-19	872	--	--	69	11	182	9.2	247	370	17	--	--	--	804	--	1.09	1,890	218	15	63	5.3	1,160	7.8	--
May 20-26	6,056	--	--	67	12	121	8.8	222	310	5.7	--	--	--	646	--	.88	10,560	218	36	51	3.5	938	7.6	--
May 27-28	5,805	--	--	206	49	144	--	174	769	59	--	--	--	1,380	--	1.88	21,630	714	571	30	2.3	1,760	7.8	--
May 29-June 14.	1,645	--	--	165	40	131	--	175	638	45	--	--	--	1,170	--	1.59	5,200	576	432	33	2.4	1,530	7.7	--
June 15-30.....	1,223	16	.00	126	33	112	9.0	161	495	32	.6	.6	.16	927	--	1.26	3,060	450	318	35	2.3	1,250	7.6	7
July 1-14	271	--	--	150	46	130	--	157	637	45	--	--	--	1,180	--	1.60	863	562	433	33	2.4	1,510	7.7	--
July 15-17	786	--	--	114	25	112	--	178	452	27	--	--	--	866	--	1.18	1,840	388	242	37	2.5	1,210	7.9	--
July 18-26	197	--	--	153	42	136	--	153	656	42	--	--	--	1,200	--	1.63	638	554	429	34	2.5	1,550	7.5	--
July 27-Aug. 1 .	441	--	--	54	9.6	66	--	163	168	10	--	--	--	428	--	.58	510	174	40	44	2.2	636	7.3	--
Aug. 2-23.....	145	--	--	134	37	162	--	159	640	47	--	--	--	1,180	--	1.60	462	486	356	41	3.2	1,560	7.3	--
Aug. 24-Sept.30.	107	12	.00	167	57	188	13	169	790	65	.5	.2	.36	1,460	1,380	1.99	422	652	513	38	3.2	1,840	7.7	5
Weighted average c.....	453	--	--	123	31	132	--	192	511	32	--	--	--	982	--	1.34	1,200	436	279	39	2.8	1,310	--	--

c Represents 100 percent of runoff for water year October 1956 to September 1957.

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR WASTA, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 4 p.m. and 7 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	a 41	35	a 33	32	35	a 43	69	76	74	b 73	50
2	66	--	a 32	a 32	a 32	38	44	61	81	76	65	49
3	64	--	34	a 32	--	b 34	35	60	a 70	75	b 60	51
4	66	--	32	a 32	32	32	37	b 64	74	70	b 65	52
5	63	--	b 32	a 32	b 32	b 32	b 47	59	80	73	71	54
6	b 60	--	32	32	32	32	a 35	67	76	74	73	52
7	61	--	32	32	33	32	b 40	72	56	70	69	59
8	58	33	a 32	32	33	32	45	69	68	75	61	47
9	63	35	a 32	b 32	33	32	42	51	65	b 77	61	53
10	64	a 33	a 32	a 32	a 33	33	40	66	60	b 78	70	50
11	62	a 34	a 32	a 32	b 33	35	40	a 71	62	77	71	47
12	66	a 34	32	32	34	36	43	63	67	77	69	43
13	b 67	36	32	b 32	35	36	44	57	60	78	71	40
14	61	38	a 32	32	35	37	44	51	60	69	70	43
15	64	32	32	32	33	37	45	53	56	64	68	47
16	65	33	32	32	35	36	51	40	59	78	58	51
17	60	35	32	32	34	35	44	b 41	55	73	60	40
18	59	a 32	b 33	32	33	35	46	49	68	65	62	36
19	50	32	b 33	b 32	32	a 34	48	a 43	70	a 54	--	35
20	a 43	32	a 34	32	32	a 36	a 45	54	71	68	--	38
21	51	a 32	b 33	32	32	a 39	b 58	50	70	71	--	36
22	50	a 34	32	32	32	40	60	a 47	66	74	52	41
23	51	b 33	a 33	32	b 32	35	53	50	67	76	59	--
24	44	34	32	a 32	33	40	58	55	69	61	60	a 32
25	45	35	32	a 32	34	44	55	58	67	68	56	34
26	43	34	a 32	a 32	36	a 39	54	a 56	63	72	a 46	36
27	51	34	32	a 32	38	b 47	61	a 58	66	73	46	45
28	50	34	33	32	35	46	63	b 62	65	74	51	53
29	45	36	33	32	--	a 36	70	65	73	a 68	63	52
30	49	33	38	32	--	50	72	66	75	72	58	b 53
31	50	--	33	32	--	a 41	--	64	--	66	61	--
Aver-age	57	34	33	32	33	37	49	58	67	72	62	45

a Measurement between 8 a.m. and 11 a.m.
b Measurement between 1 p.m. and 3 p.m.

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER BELOW MOORCROFT, WYO.

LOCATION.--At gaging station, 100 feet upstream from Trail Creek, three-quarters of a mile downstream from Donkey Creek, and 2.8 miles northwest of Moorcroft, Crook County.
DRAINAGE AREA.--1,670 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1950, October 1954 to August 1957 (discontinued).
Water temperatures: November 1950 to September 1951.
Sediment records: May 1950 to September 1951.
REMARKS.--No flow during October, November, and January and practically no flow during December and February. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, December 1956 to August 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Dec. 20, 1956..	0.05	15	0.00	134	69	408	7.0	618	950	11	0.8	1.2	0.17	1,960	1,900	2.67		620	113	59	7.1	2,590	7.5	5
Mar. 4, 1957..	.42	5.3	.02	56	41	219	6.3	322	530	6.0	.4	1.5	.07	1,050	1,020	1.43		310	46	60	5.4	1,510	7.6	10
May 8.....	.03	--	--	--	--	412	--	548	945	11	--	--	--	--	--	--		530	81	63	7.8	2,500	7.8	--
May 25.....	328	--	--	--	--	65	--	162	180	.5	--	--	--	--	--	--		166	33	46	2.2	618	7.0	--
May 26.....	66.5	12	.13	30	13	59	6.1	113	160	.1	.4	3.2	.06	348	--	.47		128	35	49	2.3	521	6.8	--
June 4.....	222	--	--	70	33	80	--	116	395	1.5	--	1.2	.08	693	--	.94		312	217	34	2.0	980	7.0	--
July 23.....	6.96	--	--	63	27	112	--	152	378	2.0	--	--	--	693	--	.94		268	143	48	3.0	988	8.1	--
Aug. 20.....	9.63	--	--	29	11	20	--	88	90	2.5	--	--	--	223	--	.30		116	44	27	.8	341	7.9	--

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 24, half a mile upstream from Bear Butte Creek and 20 miles northeast of Sturgis, Meade County.
DRAINAGE AREA.--5,870 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1954 to September 1957.
Water temperatures: August 1954 to September 1957.
Sediment records: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 3,830 ppm Feb. 20-24; minimum, 1,550 ppm July 1-7.
Hardness: Maximum, 1,950 ppm Jan. 22-25; minimum, 787 ppm May 22-27.
Specific conductance: Maximum daily, 4,030 micromhos Feb. 20, 21, 24; minimum daily, 1,530 micromhos May 28.
Water temperatures: Maximum, 79°F July 14; minimum, freezing point on several days during November to February.
Sediment concentrations: Maximum daily, 60,000 ppm May 21; minimum daily, not determined.
Sediment loads: Maximum daily, 130,000 tons May 21; minimum daily, not determined.
EXTREMES, 1954-57.--Dissolved solids: Maximum, 5,170 ppm May 22, 1955; minimum, 966 ppm July 5-8, 1956.
Hardness: Maximum, 1,960 ppm Nov. 16-17, 1955; minimum, 505 ppm July 5-8, 1956.
Specific conductance: Maximum daily, 5,440 micromhos May 22, 1955; minimum daily, 1,120 micromhos July 5, 1956.
Water temperatures: Maximum, 84°F Aug. 29, 1954, July 12, Aug. 5, 1956; minimum, freezing point on several days during winter months each year.
Sediment concentrations (1955-57): Maximum daily, 60,000 ppm May 21, 1957; minimum daily, not determined.
Sediment loads (1955-57): Maximum daily, 130,000 tons May 21, 1957; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Flow affected by ice Nov. 3-10, 16-22, Dec. 4 to Mar. 24, Apr. 11, 12. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1956..	66.8	--	--	273	126	147	--	226	1,230	22	--	9.6	0.44	2,220	--	3.02	400	1,200	1,020	21	1.8	2,430	7.9	--
Nov. 1-6.....	55.7	--	--	260	129	180	--	200	1,330	27	--	14	.43	2,290	--	3.11	344	1,180	1,020	24	2.3	2,510	8.1	--
Nov. 7-19.....	106	--	--	260	151	232	--	215	1,460	36	--	23	.44	2,590	--	3.52	741	1,270	1,090	28	2.8	2,820	7.9	--
Nov. 20-Dec. 4..	94.5	--	--	258	130	192	--	226	1,330	28	--	19	.37	2,290	--	3.11	584	1,180	995	26	2.4	2,550	7.9	--
Dec. 5-9.....	51.0	--	--	348	183	254	--	320	1,800	38	--	21	.52	3,170	--	4.31	437	1,620	1,360	25	2.7	3,330	8.1	--
Dec. 10-27.....	38.3	8.0	0.02	325	160	212	14	328	1,580	29	0.7	12	.49	2,740	2,500	3.73	283	1,470	1,200	23	2.4	2,950	8.1	5
Dec. 28-Jan. 1, 1957...	43.0	--	--	255	137	207	--	256	1,380	37	--	25	.36	2,450	--	3.33	284	1,200	990	26	2.6	2,640	8.0	--
Jan. 2-6.....	30.0	--	--	325	151	244	--	296	1,650	44	--	32	.43	2,920	--	3.97	237	1,430	1,190	26	2.8	3,130	7.9	--
Jan. 7.....	25	--	--	340	207	312	--	314	2,030	53	--	35	.50	3,520	--	4.79	238	1,700	1,440	27	3.3	3,660	8.0	--
Jan. 8-21.....	20.0	--	--	350	182	213	--	345	1,800	35	--	15	.49	3,060	--	4.16	165	1,620	1,340	21	2.3	3,160	7.9	--
Jan. 22-25.....	16.3	--	--	430	213	232	--	425	2,080	35	--	12	.64	3,590	--	4.88	158	1,950	1,600	20	2.3	3,610	7.9	--
Jan. 26-29.....	20.0	--	--	395	179	184	--	427	1,730	29	--	12	.48	3,010	--	4.09	163	1,720	1,370	18	1.9	3,130	8.0	--
Jan. 30-Feb. 12.	23.6	--	--	305	194	186	--	378	1,580	31	--	13	.50	2,830	--	3.85	180	1,560	1,250	20	2.0	2,960	8.0	--
Feb. 13-16.....	45.0	--	--	250	118	179	--	236	1,180	27	--	32	.94	2,170	--	2.95	264	1,110	916	26	2.3	2,390	7.7	--
Feb. 17	40	--	--	253	136	246	--	246	1,380	38	--	42	.49	2,500	--	3.40	270	1,190	988	31	2.6	2,720	8.2	--

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Feb. 18, 1957..	40	--	--	255	159	332	--	252	1,610	53	--	79	0.46	2,980	--	4.05	322	1,290	1,080	36	4.0	3,230	8.0	--
Feb. 19.....	35	--	--	185	121	280	--	268	1,190	45	--	63	.76	2,230	--	3.03	211	960	740	39	3.9	2,600	7.9	--
Feb. 20-24.....	27.0	--	--	295	220	448	--	332	2,160	70	--	83	.49	3,830	--	5.21	279	1,640	1,370	36	4.8	4,010	7.9	--
Feb. 25-26.....	37.5	--	--	273	189	304	--	326	1,720	43	--	26	.49	3,070	--	4.18	311	1,460	1,190	31	3.5	3,230	8.0	--
Feb. 27-Mar. 6.	43.1	--	--	195	111	216	--	194	1,080	35	--	33	.31	2,040	--	2.77	237	944	785	33	3.1	2,340	7.7	--
Mar. 7-11	46.0	--	--	263	154	288	--	264	1,510	40	--	31	.42	2,690	--	3.66	334	1,290	1,070	33	3.5	2,920	8.0	--
Mar. 12-13	52.5	--	--	198	116	189	--	202	1,090	30	--	23	.38	1,950	--	2.65	276	970	804	30	2.6	2,240	7.7	--
Mar. 14-19	48.3	--	--	243	149	288	--	250	1,400	44	--	34	.38	2,620	--	3.56	342	1,220	1,020	34	3.6	2,870	7.8	--
Mar. 20-22	61.7	--	--	225	126	194	--	246	1,190	27	--	16	.38	2,100	--	2.86	350	1,080	878	28	2.6	2,360	7.9	--
Mar. 23-31	56.7	8.4	0.01	238	145	230	19	250	1,350	37	0.6	23	.34	2,430	2,170	3.30	372	1,190	985	29	2.9	2,680	7.6	2
Apr. 1-5.....	60.6	--	--	228	134	200	--	248	1,260	31	--	18	.34	2,180	--	2.96	357	1,120	917	28	2.6	2,460	7.6	--
Apr. 6-16.....	62.7	--	--	268	163	304	--	268	1,680	45	--	33	.37	2,800	--	3.81	474	1,340	1,120	32	3.6	3,090	7.7	--
Apr. 17-22.....	56.7	--	--	238	121	199	--	200	1,240	29	--	6.7	.34	2,150	--	2.92	329	1,090	926	28	2.6	2,450	7.6	--
Apr. 23-30.....	57.1	--	--	193	96	146	--	225	931	22	--	6.0	.25	1,660	--	2.26	256	878	693	27	2.1	1,960	7.8	--
May 1-20.....	69.7	--	--	195	92	150	--	216	922	20	--	2.1	.27	1,610	--	2.19	303	866	689	27	2.2	1,890	7.9	--
May 21	826	--	--	245	136	390	--	238	1,710	62	--	3.2	.37	2,880	--	3.92	6,420	1,170	975	42	5.0	3,280	7.7	--
May 22-27	423	--	--	169	89	204	--	216	988	29	--	.9	.29	1,730	--	2.35	1,980	787	610	36	3.2	2,090	7.7	--
May 28-June 30.	102	6.8	.00	184	101	175	17	185	994	25	.6	11	.30	1,750	1,610	2.38	482	873	721	30	2.6	2,040	7.6	4
July 1-7	54.7	--	--	190	95	108	--	164	919	18	--	3.5	.31	1,550	--	2.11	229	865	731	21	1.6	1,830	7.5	--
July 8	120	--	--	244	149	242	--	264	1,420	39	--	.1	.49	2,480	--	3.37	804	1,220	1,000	30	3.0	2,710	7.5	--
July 9-20	153	--	--	228	107	146	--	214	1,080	22	--	2.7	.34	1,900	--	2.58	785	1,010	835	24	2.0	2,160	7.5	--
July 21-Aug. 8 .	227	--	--	229	89	108	--	185	979	15	--	2.3	.37	1,670	--	2.27	1,020	939	787	20	1.5	1,920	7.5	--
Aug. 9-Sept. 5 .	201	--	--	233	94	122	--	186	995	17	--	3.4	.34	1,750	--	2.38	950	966	813	22	1.7	2,000	7.6	--
Sept. 6-30	126	6.6	.00	236	107	152	16	200	1,100	20	.5	5.9	.35	1,930	1,740	2.62	657	1,030	866	24	2.1	2,170	7.5	8
Weighted average a	95.7	--	--	232	112	171	--	214	1,150	25	--	9.2	0.36	2,010	--	2.73	519	1,040	865	26	2.3	2,270	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	45	34	35	35	34	40	54	58	68	75	65
2	51	40	a 40	35	35	34	35	54	69	70	74	60
3	54	35	34	33	b 35	35	34	56	67	70	66	58
4	b 57	b 34	34	33	36	33	33	50	65	60	68	62
5	55	32	b 33	34	35	a 33	33	48	69	62	65	60
6	47	a 34	33	34	35	a 33	37	49	70	63	72	60
7	51	a 32	a 33	34	35	33	35	64	58	69	70	60
8	51	33	a 33	32	35	33	37	58	57	65	70	60
9	42	34	32	32	36	33	38	48	63	75	68	55
10	41	a 35	b 34	b 33	36	36	40	48	65	69	68	a 65
11	50	b 35	34	b 34	36	35	34	52	60	70	70	55
12	50	33	a 33	34	34	34	33	54	65	74	72	59
13	53	35	33	b 32	b 36	33	35	54	64	75	70	54
14	45	36	33	32	35	33	37	54	58	79	69	54
15	44	b 33	33	33	b 34	33	44	50	57	67	68	56
16	45	b 35	34	b 33	34	33	45	50	56	75	63	55
17	47	a 34	a 33	b 34	34	33	40	48	55	72	65	55
18	46	34	34	b 35	b 34	35	40	49	54	70	63	56
19	57	b 36	b 34	--	34	35	43	48	60	67	64	b 50
20	a 51	b 35	b 34	b 35	34	35	43	50	68	65	78	48
21	48	35	b 35	35	34	35	43	52	65	70	72	50
22	43	b 37	33	b 37	a 34	b 35	45	47	55	a 77	b 67	49
23	b 47	a 40	a 33	35	32	36	52	49	60	a 78	b 60	50
24	a 43	34	34	a 35	a 34	a 38	54	52	60	70	64	52
25	b 45	36	35	34	34	35	45	54	64	67	66	53
26	38	34	34	33	34	38	44	52	65	67	63	52
27	38	a 35	35	34	34	36	46	56	64	72	56	49
28	b 45	a 34	a 35	a 35	34	35	b 68	60	60	74	60	48
29	38	34	36	35	--	b 45	49	65	64	69	62	51
30	40	38	a 35	b 35	--	42	54	69	78	70	67	55
31	b 50	--	35	35	--	40	--	60	--	72	65	--
Average	47	35	34	34	35	35	42	53	62	70	67	55

a Measurement between 11 a.m. and 1 p.m.
b Measurement between 2 p.m. and 5 p.m.

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	126	2,000	680	62	630	110	67	580	100
2	108	1,400	410	72	280	54	65	1,000	180
3	102	1,400	390	60	260	42	65	1,300	230
4	92	1,500	370	50	770	100	65	660	120
5	88	920	220	40	450	49	60	240	39
6	78	820	170	50	900	120	55	260	39
7	70	610	120	70	2,300	430	50		
8	62	440	74	80	330	71	45		
9	60	320	52	90	240	58	45		
10	62	530	89	110	1,000	300	50	330	39
11	62	530	89	133	2,600	930	45		
12	60	430	70	154	4,600	1,900	40		
13	59	500	80	152	4,400	1,800	35		
14	70	600	110	141	5,000	1,900	30		
15	64	640	110	123	3,400	1,100	30	250	20
16	64	620	110	95	2,000	510	30		
17	65	1,100	190	85	1,400	320	30		
18	59	1,300	210	75	950	190	40		
19	60	1,800	290	70	470	89	45		
20	57	1,100	170	85	1,400	320	40		
21	60	1,100	180	100	720	190	40		
22	60	1,300	210	130	1,200	420	35	150	16
23	53	1,200	170	138	4,400	1,600	35		
24	51	950	130	136	4,500	1,700	35		
25	60	2,300	370	126	4,200	1,400	40		
26	48	2,300	300	102	3,000	830	45		
27	46	2,200	270	95	2,700	690	45		
28	59	1,500	240	82	2,500	550	45		
29	53	1,200	170	84	1,100	250	50	340	41
30	57	800	120	78	1,900	400	45		
31	57	860	130	--	--	--	40		
Total	2,072	--	6,294	2,868	--	18,423	1,387	--	1,410

Day	January			February			March		
1	35	220	21	20			45	260	32
2	35			20			45	280	34
3	35			20			40	1,100	120
4	30			20			40	340	37
5	25			20			40	210	23
6	25			25	120	8	35	630	60
7	25			20			30	2,000	160
8	25			25			35	940	89
9	20	190	12	25			45	1,800	220
10	20			30			60	680	110
11	20			30			60	850	140
12	20			35			55	420	62
13	20			40	--		50	490	66
14	15			45	170		45	260	32
15	15			50	--		45	230	28
16	20			45	80	e 20	45	350	43
17	20			40	100		50	430	58
18	20	110	6	40	--		50	920	120
19	25			35	--		55	940	140
20	20			30			60	1,200	190
21	20			25			65	3,900	680
22	20			20			60	6,000	970
23	15			25			60	3,500	570
24	15			35	280	26	60	2,800	450
25	15			35			62	2,800	470
26	20			40			67	5,200	940
27	20	160	8	50			54	3,700	540
28	20			50			56	3,400	510
29	20			--	--	--	45	2,100	260
30	20			--	--	--	52	2,100	290
31	20			--	--	--	54	2,000	290
Total	675	--	307	895	--	470	1,565	--	7,734

e Estimated.

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	54	3,000	440	51	12,000	1,700	112	900	270
2.....	56	3,000	450	39	9,200	970	75	870	180
3.....	62	2,500	420	45	5,100	620	73	500	99
4.....	71	2,600	500	52	3,900	550	64	490	85
5.....	60	4,000	650	48	5,500	710	64	450	78
6.....	75	2,800	570	48	6,400	830	54	340	50
7.....	75	3,600	730	56	9,700	1,500	54	400	58
8.....	74	4,300	860	48	4,000	520	75	740	150
9.....	85	8,300	1,900	51	5,800	800	80	1,400	300
10.....	75	9,100	1,800	45	4,200	510	84	1,000	230
11.....	55	8,500	1,300	45	5,900	720	93	910	230
12.....	50	6,800	920	52	7,100	1,000	84	1,000	230
13.....	50	3,300	450	56	4,200	640	93	1,700	430
14.....	54	3,800	550	58	5,500	860	98	1,000	260
15.....	51	3,700	510	77	8,600	1,800	86	900	210
16.....	46	3,600	450	112	14,000	4,200	96	1,000	260
17.....	48	7,200	930	115	14,000	4,400	137	2,500	920
18.....	64	8,500	1,500	145	20,000	7,800	196	4,700	2,500
19.....	67	7,800	1,400	98	10,000	2,600	129	3,000	1,000
20.....	65	9,200	1,600	152	16,000	6,600	88	1,200	290
21.....	44	6,600	780	826	60,000	130,000	80	820	180
22.....	52	5,700	800	848	20,000	46,000	82	1,100	240
23.....	84	7,500	1,700	452	11,000	13,000	146	2,400	950
24.....	71	7,700	1,500	245	4,200	2,800	143	2,600	1,000
25.....	58	5,200	810	334	6,800	6,100	102	2,100	580
26.....	51	1,600	220	378	8,000	8,200	88	1,400	330
27.....	52	7,800	1,100	278	3,400	2,600	82	1,200	270
28.....	45	4,600	560	265	2,000	1,400	69	1,000	190
29.....	48	4,400	570	159	1,400	600	67	880	160
30.....	48	8,800	1,100	169	4,200	1,900	62	720	120
31.....	--	--	--	120	1,200	390	--	--	--
Total.	1,790	--	27,070	5,467	--	252,320	2,756	--	11,850

Day	July			August			September		
1.....	51	840	120	265	3,600	2,600	211	2,000	1,100
2.....	48	450	58	257	4,400	3,100	377	4,500	s 5,200
3.....	71	1,000	190	226	3,300	2,000	234	3,800	2,400
4.....	53	1,300	190	200	1,600	860	166	1,700	760
5.....	42	630	71	193	2,700	1,400	123	1,100	370
6.....	48	620	80	234	2,800	1,800	112	1,600	480
7.....	70	1,800	s 590	179	1,400	680	102	2,700	740
8.....	120	4,100	1,300	170	2,100	960	105	1,100	310
9.....	78	1,300	270	182	2,300	1,100	95	900	230
10.....	105	1,200	340	179	1,900	920	110	840	250
11.....	65	820	140	175	1,500	710	108	730	210
12.....	60	420	68	182	2,000	980	98	640	170
13.....	75	860	170	186	2,300	1,200	102	550	150
14.....	126	3,100	1,100	149	2,000	800	108	740	220
15.....	253	9,400	6,400	134	1,600	580	110	1,000	300
16.....	222	7,600	4,600	151	1,700	690	112	980	300
17.....	189	3,900	2,000	169	1,600	730	120	1,100	360
18.....	186	6,000	3,000	175	1,700	800	120	1,000	320
19.....	222	11,000	6,600	162	1,800	790	162	1,100	480
20.....	257	15,000	10,000	149	1,200	480	182	2,000	980
21.....	257	4,200	2,900	132	1,700	610	152	1,600	660
22.....	257	6,500	4,500	149	1,500	600	159	2,000	860
23.....	241	4,800	3,100	211	6,000	3,400	151	2,200	900
24.....	204	2,100	1,200	214	2,200	1,300	134	1,300	470
25.....	189	3,400	1,700	196	3,600	1,900	115	1,000	310
26.....	186	2,700	1,400	200	3,000	1,600	108	1,100	320
27.....	196	3,200	1,700	311	5,900	5,000	123	1,500	500
28.....	230	2,200	1,400	363	5,800	5,700	162	2,000	870
29.....	294	3,300	2,600	316	3,300	2,800	166	2,000	900
30.....	269	5,900	4,300	249	2,700	1,800	143	1,700	660
31.....	257	4,800	3,300	196	2,700	1,400	--	--	--
Total.	4,921	--	65,387	6,254	--	49,290	4,270	--	21,780

Total discharge for year (cfs-days)..... 34,920
Total load for year (tons)..... 462,335

s Computed by subdividing day.

CHEYENNE RIVER BASIN--Continued

BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 3, 1956	2:30 p.m.	99	65	1,200	5,640		26		88		99	--	--				SPWCM
Mar. 27, 1957	2:35 p.m.	50	50	2,900	4,130		0		20		99	--	--				SPN
Mar. 27	2:35 p.m.	50	50	2,900	4,800		29		92		99	--	--				SPWCM
Apr. 5	1:20 p.m.	50	52	4,300	2,980		31		91		100	--	--				SPWCM
May 9	11:30 a.m.	51	50	6,900	3,940		12		40		94	99	100				VPWCM
May 31	4:05 p.m.	112	72	1,100	3,730		36		79		96	98	100				VPWCM
June 17	6:50 p.m.	149	62	3,400	4,700		23		72		97	100	--				VPWCM
July 22	3:35 p.m.	257	83	9,600	4,170		6		21		90	99	100				VPWCM
Aug. 5	3:15 p.m.	204	81	3,700	5,640		10		29		87	99	100				VPWCM
Aug. 21	4:30 p.m.	132	81	2,200	3,040		14		48		88	98	100				VPWCM
Sept. 5	3:05 p.m.	120	73	950	2,980		22		53		85	96	100				VPWCM

BELLE FOURCHE RIVER NEAR ELM SPRINGS, S. DAK.

LOCATION.--At gaging station at highway bridge, 4¼ miles northwest of Elm Springs, Meade County, and 5½ miles downstream from Hay Creek.
DRAINAGE AREA.--7,210 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1956 to September 1957.
REMARKS.--Determinations of manganese, copper, lead, zinc, arsenic, selenium, cyanides, and sulfides available in district office at Lincoln, Nebr.
Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, November 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
														Residue at 180°C	Sum								
Nov. 13, 1956..	127	5.9	0.03	258	134	210	13	230	1,350	29	0.5	21	0.34	2,410	2,130	3.28		1,190	1,000	27	2.6	2,610	7.8
Dec. 4.....	34	6.5	.04	260	132	240	14	248	1,460	31	.7	25	.53	2,470	2,290	3.36		1,190	987	30	2.5	2,740	7.8
Dec. 29.....	40	5.8	.19	243	118	212	11	238	1,250	29	.6	14	.38	2,260	2,000	3.07		1,090	895	29	2.8	2,540	7.8
Mar. 26, 1957.	54	5.2	.04	237	133	209	16	206	1,350	40	.5	20	.32	2,360	2,110	3.21		1,140	971	28	2.7	2,620	7.8
May 9.....	52	5.5	.44	183	93	153	23	149	965	23	.7	6.2	.27	1,670	1,530	2.27		839	717	28	2.3	1,950	7.8
June 17.....	375	9.2	.10	135	50	176	13	131	773	16	.6	1.2	.38	1,320	1,240	1.80		543	436	41	3.3	1,680	7.8
July 22.....	236	6.7	.35	225	92	125	24	206	992	18	.7	1.6	.32	1,690	1,590	2.30		938	769	22	1.8	1,970	7.5
Aug. 21.....	139	7.2	.04	225	96	130	18	160	1,050	18	.6	1.2	.33	1,770	1,630	2.41		956	825	22	1.8	2,010	7.6
Sept. 25.....	109	5.6	.04	238	111	171	16	188	1,190	23	.6	11	.36	2,020	1,860	2.75		1,050	896	26	2.3	2,270	7.6

CHEYENNE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN CHEYENNE RIVER BASIN IN WYOMING

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
LANCE CREEK AT SPENCER			
Mar. 4, 1957	0.4	59	0.1
Mar. 25	.1	38	.01
Apr. 8	.6	112	.2
Apr. 17	4.3	282	3.3
Apr. 25	.5	60	.1
May 8, 11:50 a.m.	3.6	498	4.8
May 8, 1:55 p.m.	4.3	608	7.1
May 15	98	23,000	6,090
May 17	680	23,500	43,100
May 20	470	16,500	20,900
May 22	156	5,850	2,460
May 24	644	34,200	61,700
May 25, 12:10 a.m.	1,250	33,100	116,000
May 25, 2:00 a.m.	2,380	25,300	163,000
May 25, 12:20 p.m.	2,760	18,000	134,000
May 27	291	7,040	5,530
May 29	112	1,310	396
May 30	398	8,150	8,760
May 31, 5:00 a.m.	716	16,600	32,100
May 31, 7:30 a.m.	1,330	26,000	93,400
June 5	64	1,090	188
June 9	56	720	109
June 10	143	28,800	11,100
June 11, 7:05 a.m.	620	29,100	48,700
June 11, 7:55 a.m.	1,230	41,300	142,000
June 11, 3:20 p.m.	1,070	40,200	120,000
June 14	102	3,440	947
June 18	100	3,900	1,050
June 20	71	5,820	1,120
June 21	98	6,360	1,680
June 24	102	4,770	1,310
July 3	56	14,700	2,220
July 11	1.9	71	.4
July 19, 5:00 p.m.	69	30,400	5,660
July 19, 5:05 p.m.	217	30,100	17,600
July 19, 7:30 p.m.	560	40,200	63,000
July 19, 10:35 p.m.	1,200	41,000	138,000
July 22	28	3,460	262
Aug. 1	2.4	128	.8
Aug. 17	2,840	27,200	209,000
Aug. 20	54	2,790	407
Sept. 13	2.4	322	2.1
Sept. 16	54	5,760	840
Sept. 23	2.1	168	1.0

MISCELLANEOUS ANALYSES OF STREAMS IN CHEYENNE RIVER BASIN IN WYOMING--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
LANCE CREEK AT SPENCER																
May 15, 1957	12:20 p.m.	98	51	23,000	3,050	3	6		96		98	99	100				VPN
May 15	12:20 p.m.	98	51	23,000	3,190	69	85		96		98	99	100				VPWCM
May 22	1:00 p.m.	156	55	5,850	5,090	--	72		85		90	95	100				VPWCM
May 29	1:55 p.m.	112	77	1,310	5,110	--	70		81		89	95	100				VBWCM
June 5	12:25 p.m.	64	82	1,090	2,460	--	42		47		50	53	76		98	100	VBWCM
June 14	7:10 a.m.	102	55	3,440	3,570	--	84		91		94	97	100				VPWCM
June 20	11:00 a.m.	71	73	5,820	3,000	--	91		--		96	98	100				VPWCM
Sept. 16	3:25 p.m.	54	69	5,760	3,080	--	92		--		99	100	--				VPWCM

MISSOURI RIVER MAIN STEM

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At gaging station at Chicago and North Western Railway bridge at Pierre, Hughes County, 1.2 miles upstream from Bad River.
DRAINAGE AREA.--243,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 872 ppm May 25-26; minimum, 347 ppm Oct. 1 to Nov. 9.
Hardness: Maximum, 354 ppm May 25-26; minimum, 170 ppm Oct. 1 to Nov. 9.
Specific conductance: Maximum daily, 1,150 micromhos May 25-26; minimum daily, 496 micromhos Oct. 29.
Water temperatures: Maximum, 81°F July 17, 18, 28; minimum, freezing point on many days during November to February.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 872 ppm May 25-26, 1957; minimum, 264 ppm June 18-26, 1952.
Hardness: Maximum, 354 ppm May 25-26, 1957; minimum, 134 ppm July 9, 1951.
Specific conductance: Maximum daily, 1,150 micromhos May 25-26, 1957; minimum daily, 394 micromhos July 3, 1951.
Water temperatures: Maximum, 81°F July 17, 18, 28, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-Nov. 9, 1956	16,170	--	--	--	--	41	--	152	--	--	--	--	--	347	0.47	15,150	170	45	34	1.4	513	7.9	--
Nov. 10-Dec. 11....	12,830	--	--	--	--	47	--	168	--	--	--	--	--	367	.50	12,710	188	50	35	1.5	563	7.9	--
Dec. 12-28.....	10,060	9.1	0.00	50	18	51	3.2	182	150	8.0	0.4	0.1	0.15	394	.54	10,700	198	49	35	1.6	607	8.0	7
Dec. 29-Jan. 11, 1957.....	10,750	--	--	--	--	48	--	172	--	--	--	--	--	368	.50	10,680	188	47	36	1.5	577	8.0	--
Jan. 12-31.....	10,150	--	--	--	--	57	--	204	--	--	--	--	--	438	.60	12,000	224	57	36	1.7	671	8.0	--
Feb. 1-28.....	13,210	--	--	--	--	62	--	199	--	--	--	--	--	463	.63	16,510	226	63	37	1.8	695	7.5	--
Mar. 1-31.....	14,680	11	.01	57	22	67	4.2	195	191	11	.7	.2	.14	472	.64	18,710	232	72	38	1.9	715	8.0	4
Apr. 1-9.....	17,830	--	--	--	--	65	--	196	--	--	--	--	--	467	.64	22,480	231	70	38	1.9	713	7.9	--
Apr. 10-30.....	19,110	--	--	--	--	73	--	205	--	--	--	--	--	517	.70	26,680	252	84	39	2.0	792	7.8	--
May 1-17	17,170	--	--	--	--	70	--	212	--	--	--	--	--	508	.69	23,550	249	75	38	1.9	773	7.9	--
May 18-24	29,300	--	--	--	--	91	--	195	--	--	--	--	--	592	.81	46,830	257	97	44	2.5	874	8.0	--
May 25-26	43,100	--	--	--	--	124	--	a 178	--	--	--	--	--	872	1.19	101,500	354	208	43	2.9	1,150	8.3	--
May 27-June 11....	24,290	12	.00	75	21	84	7.0	185	287	12	.6	.8	.15	601	.82	39,420	273	121	39	2.2	875	7.6	7
June 12-18.....	21,210	--	--	--	--	88	--	197	--	--	--	--	--	659	.90	37,740	302	140	39	2.2	942	7.9	--
June 19-July 5.....	20,410	--	--	--	--	77	--	197	--	--	--	--	--	538	.73	29,650	252	90	40	2.1	807	7.5	--
July 6-31	17,480	--	--	--	--	68	--	195	--	--	--	--	--	492	.67	23,220	232	72	39	2.0	743	7.8	--
Aug. 1-Sept. 3	21,200	--	--	--	--	65	--	192	--	--	--	--	--	476	.65	27,250	232	75	38	1.9	721	7.5	--
Sept. 4-30	17,320	8.8	.00	55	19	57	4.3	182	174	10	.5	.2	.20	440	.60	20,580	216	67	36	1.7	667	7.5	5
Weighted average b	16,660	--	--	--	--	65	--	188	--	--	--	--	--	476	0.65	21,410	229	75	38	1.9	714	--	--

a Includes equivalent of 4 ppm of carbonate (CO_3).
b Represents 100 percent of runoff for water year October 1956 to September 1957.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.--Continued

Temperature (° F) of water, November 1956 to September 1957
/Once-daily measurement between 8 a.m. and 9 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		--	a 34	33	32	33	38	58	65	72	78	b 70
2		--	a 34	33	32	33	37	61	66	74	79	b 68
3		--	33	33	32	33	36	61	68	75	75	--
4		--	32	32	32	33	35	58	68	72	72	--
5		--	32	32	32	33	35	57	71	71	71	--
6		--	32	32	32	33	36	59	71	73	73	--
7		--	32	32	32	33	36	59	69	72	75	66
8		--	33	32	32	33	36	63	64	73	77	66
9		--	34	32	32	33	37	57	72	74	74	65
10		--	34	32	32	33	39	58	69	75	b 76	63
11		--	33	32	32	33	36	58	66	75	b 78	63
12		--	33	32	32	33	36	58	67	78	76	63
13		--	32	32	33	33	36	58	69	74	71	60
14		--	33	32	33	33	38	51	68	76	75	63
15		--	33	32	32	33	40	52	66	76	66	63
16		--	33	32	32	33	44	53	66	80	66	58
17		b 32	32	32	32	33	45	51	65	81	b 72	60
18		--	32	32	32	33	46	52	65	81	b 74	61
19		a 32	33	32	32	33	48	50	67	74	68	53
20		a 32	33	32	32	33	51	50	70	74	71	52
21		a 32	33	32	32	34	52	51	70	75	63	b 55
22		--	33	32	32	34	53	50	65	76	68	b 57
23		32	b 33	32	32	34	55	52	66	77	60	58
24		--	33	32	32	34	55	54	67	75	b 70	57
25		--	33	32	32	34	56	52	68	74	71	57
26		32	34	32	32	34	55	57	68	74	53	56
27		32	33	32	32	35	54	56	68	76	54	56
28		33	33	32	33	35	55	59	68	81	56	62
29		33	33	32	--	36	55	61	70	74	69	63
30		33	33	32	--	36	58	68	71	78	--	65
31		--	33	32	--	36	--	65	--	80	b 69	--
Average		--	33	32	32	34	44	56	68	75	70	61

a Measurement between 2 p.m. and 5 p.m.
b Measurement between 10 a.m. and 12 m.

BAD RIVER BASIN

BAD RIVER NEAR MIDLAND, S. DAK.

LOCATION.--At gaging station at highway bridge, three-fifths of a mile downstream from Ash Creek, 1¼ miles east of Midland, Haakon County, and 2½ miles downstream from Mitchell Creek.
DRAINAGE AREA.--1,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1950 to December 1953, October 1955 to September 1957 (discontinued).
Water temperatures: October 1955 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,920 ppm July 25 to Aug. 11; minimum, 327 ppm May 22-24.
Hardness: Maximum, 606 ppm July 25 to Aug. 11; minimum, 64 ppm May 17-18.
Specific conductance: Maximum daily, 2,710 micromhos Aug. 5; minimum daily, 455 micromhos May 28.
Water temperatures: Maximum, 88°F July 17.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 1,920 ppm July 25 to Aug. 11, 1957; minimum, 228 ppm Aug. 9, 1956.
Hardness: Maximum, 606 ppm July 25 to Aug. 11, 1957; minimum, 64 ppm May 17-18, 1957.
Specific conductance: Maximum daily, 2,710 micromhos Aug. 5, 1957; minimum daily, 332 micromhos Aug. 11, 1956.
Water temperatures: Maximum, 88°F July 17, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, November 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Nov. 17-Dec. 10, 1956	7.40	16	0.03	31	2.8	113	3.4	248	112	18	0.5	1.6	0.21	429	0.58	8.57	89	0	72	5.2	667	7.6	20
Dec. 11-19	.21	--	--	77	11	213	--	323	378	61	--	2.2	.40	933	1.27	.53	238	0	62	6.0	1,400	7.8	--
Mar. 8-18, 1957	3.46	11	.02	47	5.7	124	3.5	181	213	23	.6	1.4	.24	540	.73	5.04	141	0	65	4.5	824	7.8	20
Mar. 19-27	.33	--	--	61	12	165	--	160	360	41	--	.3	.27	744	1.01	.66	200	69	64	5.1	1,120	7.6	--
Apr. 10-15	15.0	--	--	73	8.8	165	--	236	325	25	--	4.7	.29	752	1.02	30.5	218	24	62	4.8	1,110	8.1	--
Apr. 16	194	--	--	73	10	78	--	192	221	5.8	--	.9	.15	524	.71	274	224	67	43	2.3	769	7.8	--
Apr. 17	244	--	--	105	15	114	--	182	390	9.5	--	4.4	.18	772	1.05	509	322	173	44	2.8	1,070	7.8	--
Apr. 18-19	135	--	--	44	4.9	76	--	184	125	5.0	--	.6	.17	384	.52	140	130	0	56	2.9	570	8.1	--
Apr. 20	54	--	--	62	8.1	79	--	190	190	6.6	--	.2	.13	468	.64	68.2	188	32	48	2.5	702	7.9	--
Apr. 21-22	87.0	--	--	83	11	110	--	156	333	11	--	1.2	.19	644	.88	151	252	124	49	3.0	928	7.8	--
Apr. 23-25	32.0	--	--	52	8.9	87	--	156	203	9.4	--	.5	.26	484	.66	41.8	166	38	53	2.9	715	7.8	--
Apr. 26-May 9	4.33	--	--	71	9.5	138	--	197	329	20	--	.6	.27	680	.92	7.95	216	54	58	4.1	1,010	7.6	--
May 17-18	97.5	--	--	23	1.6	108	--	252	75	5.0	--	3.7	.28	372	.51	97.9	64	0	79	5.9	570	8.0	--
May 19	326	--	--	47	4.5	124	--	180	220	9.0	--	2.0	.25	540	.73	475	136	0	66	4.6	802	8.2	--
May 20	184	--	--	27	.6	105	--	268	66	4.0	--	5.4	.25	364	.50	181	70	0	77	5.5	482	8.0	--
May 21	514	--	--	95	15	148	--	184	414	13	--	.5	.37	442	.60	613	298	147	52	3.7	1,180	7.9	--
May 22-24	1,407	--	--	39	3.8	64	--	167	119	2.0	--	2.1	.14	327	.44	1,240	113	0	55	2.6	507	7.8	--
May 25	1,490	--	--	78	11	65	--	152	234	2.0	--	2.7	.15	498	.68	2,000	238	113	37	1.8	721	8.1	--
May 26-31	1,777	--	--	51	7.1	49	--	146	137	1.5	--	1.3	.12	341	.46	1,640	156	36	41	1.7	519	7.5	--

June 1-5	145	--	--	59	8.3	62	--	162	179	5.0	--	.4	.18	428	.58	168	181	48	41	2.0	632	7.7	--
June 6-10	227	--	--	110	17	73	--	186	334	9.0	--	.7	.21	682	.93	418	345	192	31	1.7	946	7.6	--
June 11-21	1,233	15	.02	69	10	51	5.8	158	191	4.0	.4	1.2	.14	443	.60	1,470	213	83	33	1.5	643	7.4	--
June 22-25	58.3	--	--	102	20	126	--	196	426	16	--	.6	.27	833	1.13	131	336	175	44	3.0	1,150	7.7	--
June 26-July 24	4.18	--	--	142	25	192	--	225	645	30	--	.2	.38	1,220	1.66	13.8	458	273	48	3.9	1,630	7.8	--
July 25-Aug. 11	8.09	--	--	173	42	340	--	171	1,090	62	--	.2	.64	1,920	2.61	41.9	606	466	55	6.0	2,460	7.6	--
Aug. 12-14, 17, 19-22	1.35	--	--	72	15	116	--	178	320	23	--	.0	.30	684	.93	2.49	242	96	49	3.3	991	7.9	--
Aug. 23-28	63.9	11	.00	61	9.2	57	7.2	128	205	6.5	.4	.6	.18	420	.57	72.5	190	85	38	1.8	636	7.3	20
Sept. 5-16, 18-20, 23-24	2.16	8.6	.00	93	17	120	8.0	160	390	21	.3	.2	.28	737	1.00	4.30	300	169	46	3.0	1,070	7.7	10
Weighted average a	96.9	--	--	62	8.6	61	--	159	184	4.1	--	1.4	0.15	424	0.58	111	190	60	41	1.9	632	--	--

a Represents 99.96 percent of runoff for water year October 1956 to September 1957.

BAD RIVER BASIN--Continued

BAD RIVER NEAR MIDLAND, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 4 p.m. and 7 p.m. Many days of no flow/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		--	a 41			33	--	70	a 71	a 87	87	--
2		--	37			--	--	72	69	a 83	84	--
3		--	a 36			--	--	64	a 71	a 79	77	--
4		--	a 33			a 33	--	56	a 77	76	76	--
5		--	a 33			--	--	a 60	a 81	83	81	71
6		--	a 33			a 33	--	66	a 78	85	83	a 73
7		--	a 33			--	--	75	--	78	84	a 68
8		--	a 34			a 34	--	70	--	82	81	b 67
9		--	34			a 36	--	65	a 72	84	83	69
10		--	a 35			b 37	--	--	71	85	85	a 70
11		--	a 33			a 36	43	--	67	85	87	a 68
12		--	a 33			a 41	a 38	--	71	86	83	a 64
13		--	a 33			a 35	a 48	--	b 68	85	82	b 62
14		--	a 33			a 34	51	--	a 68	84	--	b 62
15		--	a 33			a 37	58	--	a 68	87	--	a 62
16		--	a 33			34	49	--	--	85	--	b 61
17		a 33	a 33			a 35	47	a 52	a 67	88	--	--
18		33	a 33			a 37	49	a 49	a 69	81	--	a 58
19		34	b 33			--	a 51	a 48	a 74	77	81	a 58
20		a 33	--			--	a 53	52	b 76	87	84	a 56
21		a 33	--			55	a 54	53	--	85	84	--
22		a 33	--			39	a 57	a 52	a 73	84	78	--
23		34	--			34	58	a 56	a 74	82	81	b 57
24		b 35	--			a 37	59	a 57	b 71	77	76	--
25		37	--			a 41	54	58	74	84	74	--
26		a 38	--			48	59	a 58	b 75	82	76	--
27		a 34	--			a 44	a 61	a 60	b 77	87	70	--
28		a 33	--		a 33	--	60	b 68	a 79	84	82	--
29		a 36	--			--	60	71	a 78	86	--	--
30		a 38	--			--	58	a 71	a 79	87	--	--
31		--	--			--	--	69	--	84	--	--
Average		--	--			--	--	--	73	84	--	--

a Measurement between 12 m. and 3 p.m.
b Measurement between 8 a.m. and 11 a.m.

MISCELLANEOUS ANALYSES OF STREAMS IN MEDICINE CREEK BASIN IN SOUTH DAKOTA

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
MEDICINE CREEK NEAR BLUNT																								
Apr. 1, 1957...	0.64	13	0.03	26	16	77	7.2	212	85	35	0.2	1.0	0.25	376		0.51		129	0	55	2.9	615	7.6	29
Apr. 22	2.99	23	.14	38	21	120	9.8	289	130	64	.3	.6	.28	552		.75		182	0	57	3.9	878	7.7	
May 6.....	.52	26	.03	60	31	200	13	436	142	144	.5	.4	.58	836		1.14		279	0	60	5.2	1,330	7.6	
June 14	3.77	31	.30	28	15	150	11	343	142	34	.3	2.2	.40	619		.84		133	0	69	5.7	895	7.4	
July 5.....	4.08	29	.01	30	16	102	12	270	99	38	.2	3.0	.35	466		.63		141	0	59	3.7	730	7.2	

WHITE RIVER BASIN

WHITE RIVER NEAR OGLALA, S. DAK.

LOCATION.--At gaging station at bridge on U. S. Highway 18, 3 miles downstream from Blacktail Creek and 7 miles northwest of Oglala, Shannon County.
DRAINAGE AREA.--2,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1946 to August 1947, December 1949 to September 1952, April to September 1957 (discontinued).
Water temperatures: April 1949 to September 1952.
Sediment records: March 1947 to September 1952.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, April to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Selenium (Se)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180° C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
Apr. 12, 1957...	150	20	0.02	a 0.01	78	17	134	7.4	178	400	8.4	0.5	3.6	0.14	787		1.07	264	118	52	3.6	1,100	7.6	10
May 6.....	138	18	.01	a .01	58	21	100	4.2	152	310	4.0	.4	2.0	.08	621		.84	231	106	48	2.9	908	7.6	18
May 17.....	512	31	.04	a .01	52	9.4	108	9.2	185	234	4.5	.5	.9	.09	549		.75	168	16	57	3.6	788	7.7	11
May 20.....	1,480	26	.04	--	45	5.7	64	9.4	156	147	2.0	.4	.2	.07	384		.52	136	8	48	2.4	561	7.6	11
May 21.....	1,750	19	.03	a .01	103	17	75	10	139	348	1.5	.5	5.9	.10	655		.89	325	211	33	1.8	907	7.6	15
June 3.....	161	37	.01	a .00	80	13	84	11	257	228	.9	.6	2.5	.19	604		.82	254	43	41	2.3	859	7.8	--
July 1.....	108	35	.05	.00	113	21	131	12	299	360	13	.7	2.1	.17	864		1.18	368	123	43	3.0	1,190	8.0	--
July 31.....	42	24	.01	.04	187	27	98	16	184	590	8.5	.5	3.3	.15	1,080	1,050	1.47	576	425	26	1.8	1,360	7.5	45
Sept. 19.....	28	29	.01	.00	79	17	135	13	254	338	15	.7	2.5	.21	757		1.03	268	60	51	3.6	1,070	7.5	--
Sept. 30.....	16	32	.02	.00	68	14	89	14	252	204	11	.7	1.5	.15	563		.77	226	19	44	2.6	811	7.5	--

a Selenium in sediment in suspension at time of sampling was 0.00 ppm.

SOUTH FORK WHITE RIVER BELOW WHITE RIVER, S. DAK.

LOCATION.--At gaging station, 1 mile upstream from small tributary, 2 miles downstream from Pine Creek, and 2½ miles northeast of town of White River, Mellette County.
DRAINAGE AREA.--1,570 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: February 1951 to September 1954, August 1955 to September 1957.
Sediment records: December 1950 to September 1954, October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 376 ppm Feb. 27; minimum, 236 ppm Dec. 12-31.
Hardness: Maximum, 174 ppm Feb. 27; minimum, 112 ppm Nov. 1-29.
Specific conductance: Maximum daily, 513 micromhos June 28; minimum daily, 279 micromhos Nov. 24.
Water temperatures: Maximum, 91°F July 3; minimum daily, freezing point Feb. 12 and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 4,200 ppm June 17; minimum daily, not determined.
Sediment loads: Maximum daily, 8,130 tons Apr. 20; minimum daily, not determined.
EXTREMES, 1950-57.--Dissolved solids (1952-54, 1955-57): Maximum, 948 ppm Aug. 3, 1953; minimum, 226 ppm Aug. 9-31, 1956.
Hardness (1952-54, 1955-57): Maximum, 435 ppm June 15, 1953; minimum, 102 ppm Aug. 9-31, 1956.
Specific conductance (1952-54, 1955-57): Maximum daily, 1,200 micromhos Aug. 3, 1953; minimum daily, 243 micromhos Aug. 14, 1956.
Water temperatures (1951-54, 1955-57): Maximum, 97°F June 18, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations (1950-54, 1955-57): Maximum daily, 19,300 ppm May 29, 1951; minimum daily, not determined.
Sediment loads (1950-54, 1955-57): Maximum daily, 99,600 tons Mar. 29, 1952; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Flow affected by ice Dec. 7 to Mar. 14. Flow partly regulated by small powerplant reservoir 3 miles upstream. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Selenium (Se)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	62.1	--	0.01	0.00	38	5.1	21	7.9	186	14	0.5	--	--	--	248	0.34	41.6	116	0	27	0.8	322	8.0	--
Nov. 1-29.....	76.9	--	.01	.00	38	4.1	21	6.8	170	20	.5	--	--	--	243	.33	50.5	112	0	27	.9	317	7.7	--
Nov. 30-Dec. 4....	107	--	--	.00	43	2.3	21	6.4	a 180	19	.7	--	--	--	246	.33	71.1	117	0	27	.8	338	8.4	--
Dec. 5-11.....	85.6	--	.00	.00	52	6.0	27	8.9	b 228	26	1.0	--	--	--	310	.42	71.6	154	0	26	.9	420	8.3	--
Dec. 12-31.....	87.0	59	.01	.00	38	4.6	19	7.4	170	19	.7	0.4	1.7	0.09	236	.32	55.4	114	0	25	.8	315	8.2	8
Jan. 1-8, 1957.....	87.3	--	.01	--	44	5.1	26	8.1	208	21	1.1	--	--	--	284	.39	66.9	131	0	29	1.0	359	8.2	--
Jan. 9-28	86.1	--	.02	.00	50	6.1	29	9.8	240	23	.6	--	--	--	324	.44	75.3	150	0	28	1.0	415	8.1	--
Jan. 29-Feb. 26...	98.3	--	.02	.00	41	5.7	24	9.0	196	23	.4	--	--	--	268	.36	71.1	126	0	27	.9	351	8.0	--
Feb. 27.....	170	--	.04	--	57	7.8	38	9.1	180	104	1.4	--	--	--	376	.51	173	174	26	31	1.3	502	7.8	--
Feb. 28-Mar. 4....	168	--	.02	--	42	2.2	23	7.8	170	28	.2	--	--	--	238	.32	108	114	0	29	.9	329	7.8	--
Mar. 5-31.....	170	43	.08	.00	39	4.5	21	8.2	172	25	.2	.5	2.0	.07	246	.33	113	116	0	26	.8	325	7.8	--
Apr. 1-30.....	269	--	.04	.00	43	5.5	25	10	192	29	.4	--	--	--	272	.37	198	130	0	28	1.0	367	7.7	--
May 1-31.....	256	59	.03	.00	44	6.3	35	12	219	35	.5	.6	1.7	.10	316	.43	218	136	0	33	1.3	416	8.0	--
June 1-11	218	--	.03	.00	45	7.7	40	13	242	39	.3	--	--	--	352	.48	207	144	0	35	1.4	455	8.1	--
June 12-30	221	51	.01	.00	46	6.1	31	12	208	43	.2	.6	2.0	.09	308	.42	184	140	0	30	1.1	422	8.1	23
July 1-Aug. 6.....	74.3	--	.01	.00	42	6.6	39	12	c 227	24	2.0	--	--	--	311	.42	62.4	132	0	37	1.5	398	8.3	--
Aug. 7-Sept. 5.....	92.4	--	.00	.00	40	5.8	26	12	187	34	1.0	--	--	--	275	.37	68.6	124	0	29	1.0	366	7.9	--
Sept. 6-30.....	64.8	78	.00	.00	37	6.7	23	10	193	20	2.0	.5	1.2	.08	278	.38	48.6	120	0	27	.9	346	8.1	10
Weighted average d	131	--	0.03	0.00	42	5.8	28	10	200	29	0.6	--	--	--	285	0.39	101	129	0	30	1.1	376	--	--

a Includes equivalent of 5 ppm of carbonate (CO_3).
b Includes equivalent of 4 ppm of carbonate (CO_3).
c Includes equivalent of 3 ppm of carbonate (CO_3).
d Represents 100 percent of runoff for water year October 1956 to September 1957.

WHITE RIVER BASIN--Continued

SOUTH FORK WHITE RIVER BELOW WHITE RIVER, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 3 p.m. and 7 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	63	45	--	a 35	--	--	45	70	--	--	a 76	--
2	64	--	--	--	a 33	--	42	73	--	--	82	a 62
3	60	40	--	--	--	--	42	63	--	91	--	77
4	62	a 39	--	--	--	--	--	--	--	a 73	--	73
5	60	40	33	--	33	--	a 35	--	--	--	79	--
6	--	40	33	a 34	33	--	38	66	71	86	81	a 62
7	a 54	38	34	34	--	--	--	74	65	79	86	a 60
8	54	37	34	a 34	--	33	47	63	a 67	a 70	--	a 65
9	52	38	--	a 33	33	--	47	55	a 80	a 73	--	--
10	55	48	--	--	a 33	--	40	65	70	a 72	a 80	a 55
11	57	a 46	--	--	--	--	--	a 65	a 64	--	90	69
12	62	42	33	a 33	32	--	47	a 61	a 65	a 76	a 75	a 60
13	a 58	44	--	33	33	--	43	a 57	70	--	a 75	--
14	--	--	33	--	33	--	--	a 56	71	a 82	a 76	66
15	--	--	--	33	33	--	--	52	a 60	a 75	a 70	68
16	58	42	34	--	34	35	--	49	a 61	83	a 68	--
17	57	34	--	--	a 33	--	47	a 47	64	82	a 70	70
18	58	--	a 35	a 33	33	36	55	53	a 57	a 75	a 68	--
19	64	35	a 36	--	33	--	50	a 51	--	a 71	80	59
20	50	--	--	a 33	33	47	56	57	a 73	a 73	a 72	60
21	a 54	35	a 34	a 33	33	--	a 57	a 53	76	a 77	a 75	a 50
22	52	--	--	a 33	33	40	65	55	a 64	a 75	a 68	60
23	48	a 34	--	a 33	a 33	a 35	60	62	a 68	--	--	65
24	50	35	--	a 33	a 33	40	57	60	63	a 72	a 65	--
25	--	34	--	--	34	35	--	62	a 67	a 82	a 69	a 56
26	48	--	--	33	34	47	66	a 59	a 62	a 71	--	a 62
27	a 47	--	a 35	a 33	34	45	60	70	74	a 75	62	68
28	a 49	--	a 34	--	34	--	a 59	75	a 64	a 73	66	a 58
29	47	--	a 34	a 33	--	43	--	75	a 68	--	76	73
30	46	--	--	--	--	45	67	75	85	85	--	70
31	49	--	a 34	a 33	--	47	--	--	--	85	a 72	--
Average	53	--	--	--	--	--	--	62	68	--	--	--

a Measurement between 7 a.m. and 11 a.m.

WHITE RIVER BASIN--Continued

SOUTH FORK WHITE RIVER BELOW WHITE RIVER, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	60	150	24	61	310	51	127	520	a 180
2	52	160	22	89	520	s 141	107	410	a 120
3	55	170	25	97	750	196	97	300	a 80
4	57	150	23	79	880	188	96	240	a 60
5	57	145	22	76	560	s 130	96	180	a 45
6	54	120	17	82	565	125	78	80	a 17
7	54	120	17	61	440	72	85	130	a 30
8	54	120	17	68	465	85	85		
9	63	190	32	60	410	66	85	215	49
10	57	215	33	55	1,600	s 305	85		
11	62	280	47	61	460	76	85	--	e 36
12	57	240	37	43	355	41	90		
13	70	170	32	69	375	70	90		
14	70	140	26	68	325	60	87	85	20
15	71	130	25	68	220	40	87		
16	63	150	26	51	135	18	90		
17	59	170	27	73	215	42	85	--	e 17
18	61	160	26	91	--	e 66	90	495	118
19	59	145	23	118	--	e 96	87		
20	61	165	27	83	260	58	85		
21	70	240	s 59	57	200	31	87		
22	49	310	s 52	76	375	77	87		
23	65	400	70	83	360	81	87		
24	61	400	66	131	655	232	87		
25	83	400	90	113	535	163	85	140	32
26	90	380	92	89	460	110	87		
27	59	520	83	85	420	96	87		
28	44	550	65	54	340	50	85		
29	59	280	45	88	480	114	85		
30	76	360	74	106	520	a 150	85		
31	74	340	68	--	--	--	87		
Total	1,926	--	1,292	2,335	--	3,030	2,766	--	1,452

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	87			82			170	470	
2	87			84			166	--	
3	90			85	75	17	166	--	
4	87			86			166	--	
5	87			88			162	--	
6	85			90	95	23	162	--	e 260
7	85			92			158	--	
8	90			95			162	725	
9	87	255	60	100			158	--	
10	90			107			158	--	
11	85			107			143	--	e 230
12	82			107			131	560	198
13	87			103			127	510	175
14	87			103			127	--	e 180
15	87			107	115	33	169	1,230	s 716
16	90			103			133	970	s 403
17	100			107			199	1,000	s 656
18	107	110	30	107			169	1,210	s 630
19	103			113			138	800	298
20	95			110			154	830	345
21	90			95			207	1,150	643
22	85			80	110	26	246	1,610	1,070
23	80			85			226	1,450	885
24	75			100			180	1,130	s 586
25	70			130			160	800	346
26	72	135	28	150	555	217	186	1,020	512
27	74			170			210	970	550
28	75			170			204	730	402
29	76			--	--	--	192	760	394
30	78			--	--	--	175	670	316
31	80			--	--	--	166	650	291
Total	2,653	--	1,388	2,956	--	1,719	5,270	--	12,426

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.

WHITE RIVER BASIN--Continued

SOUTH FORK WHITE RIVER BELOW WHITE RIVER, S. DAK.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	150	500	202	210	540	306	307		
2.....	158	520	222	203	600	329	286		
3.....	179	500	242	236	900	573	271	--	e 500
4.....	206	610	339	225	900	547	266		
5.....	184	570	283	230	850	528	227		
6.....	158	450	192	207	860	s 506	171	530	245
7.....	182	750	368	169	950	433	166	540	242
8.....	256	1,020	705	184	710	353	171	510	235
9.....	307	3,860	s 3,290	255	920	633	158	470	200
10.....	351	2,700	2,560	244	740	487	170	940	431
11.....	291	1,650	1,300	225	760	462	208	1,500	s 907
12.....	237	980	627	222	710	426	221	1,900	1,130
13.....	220	770	457	179	660	319	207	1,400	782
14.....	215	810	470	184	500	248	190	1,000	513
15.....	244	1,750	s 1,420	175	440	208	192	800	415
16.....	275	1,600	1,190	198	880	s 829	476	3,100	s 5,270
17.....	221	750	448	249	2,950	1,980	422	4,200	4,780
18.....	260	1,750	s 1,420	214	1,900	1,100	270	2,000	1,460
19.....	390	3,300	s 3,850	202	1,200	654	236	950	605
20.....	608	3,600	s 8,130	252	1,800	s 1,420	250	1,070	722
21.....	453	3,300	4,040	357	2,400	2,310	253	2,220	s 1,610
22.....	350	2,500	2,360	271	950	695	206	1,430	795
23.....	343	1,900	1,760	292	1,050	828	184	760	378
24.....	309	970	809	334	1,220	s 1,200	158	580	247
25.....	286	630	486	343	1,560	1,440	163	750	330
26.....	276	760	566	382	1,740	1,790	146	500	197
27.....	259	750	524	359	1,230	1,190	162	420	184
28.....	244	650	428	351	840	796	193	610	318
29.....	230	560	348	346	890	831	147	410	163
30.....	225	550	334	330	750	668	120	300	97
31.....	--	--	--	313	--	e 592	--	--	--
Total.	8,067	--	39,370	7,941	--	24,681	6,597	--	24,756

Day	July			August			September		
1.....	107	400	116	64	290	50	66	260	46
2.....	103	380	106	58	470	74	48	230	30
3.....	97	400	105	76	410	84	47	200	25
4.....	87	320	75	73	270	53	51	210	29
5.....	78	320	67	70	280	53	51	230	32
6.....	75	270	55	57	250	38	44	240	28
7.....	70	270	51	58	250	39	75	400	81
8.....	64	350	60	60	190	31	70	420	79
9.....	56	270	41	62	260	44	70	430	81
10.....	64	270	47	61	330	54	75	510	103
11.....	65	300	53	54	340	50	73	400	79
12.....	72	300	58	112	380	115	80	350	76
13.....	65	330	58	137	640	237	77	350	73
14.....	61	210	34	116	560	175	64	280	48
15.....	67	150	27	126	760	258	73	320	63
16.....	85	360	83	127	930	319	57	100	15
17.....	69	200	37	184	980	s 751	68	310	57
18.....	71	240	46	150	1,140	s 576	66	240	43
19.....	75	260	53	112	760	230	65	250	44
20.....	100	330	89	98	660	175	64	250	43
21.....	84	350	79	79	680	145	57	270	42
22.....	130	380	133	80	990	s 236	53	290	41
23.....	72	260	50	98	1,060	280	66	300	53
24.....	64	250	43	98	750	198	55	320	48
25.....	72	430	s 134	63	390	66	56	240	36
26.....	62	450	s 85	200	1,900	s 2,060	51	230	32
27.....	67	280	51	167	3,400	1,530	67	210	38
28.....	72	270	52	71	650	125	55	310	46
29.....	66	180	32	66	320	57	72	350	68
30.....	64	270	47	77	250	52	66	260	46
31.....	66	300	53	52	250	35	--	--	--
Total.	2,351	--	2,020	2,906	--	8,190	1,882	--	1,525

Total discharge for year (cfs-days)..... 47,650
Total load for year (tons)..... 121,849

e Estimated.
s Computed by subdividing day.

SOUTH FORK WHITE RIVER BELOW WHITE RIVER, S. DAK.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 30, 1956	11:45 a.m.	76	47	2,100	3,590		73		90		92	94	100		--		VPWCM
Nov. 10	12:00 m.	201	41	3,640	5,370		13		21		65	85	100		--		VPWCM
Nov. 10	2:15 p.m.	71	41	7,860	3,710		54		81		97	98	100		--		VPWCM
Mar. 12, 1957	12:50 p.m.	a 131	38	530	956		39		57		67	82	95		100		VBWCM
May 2	12:00 m.	192	70	410	3,030		36		55		70	84	100		--		VPWCM
June 6	5:45 p.m.	220	70	1,050	1,720		28		39		46	53	78		100		VBWCM
June 18	4:50 p.m.	270	76	1,010	1,470		33		43		57	84	99		100		VBWCM
July 31	4:50 p.m.	70	88	235	523		24		35		56	65	96		100		VBWCM
Aug. 12	2:40 p.m.	101	87	354	262		35		40		61	73	100		--		VBWCM
Aug. 27	6:00 p.m.	264	62	7,400	4,050		80		91		94	96	100		--		VPWCM
Sept. 4	7:55 p.m.	80	67	306	402		31		42		57	69	100		--		VBWCM

a Daily mean discharge.

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.004	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
Nov. 10, 1956	2:15 p.m.	71	18	1	4	7	42	67	74	75	78	84	92	--	--	SV
May 2, 1957	12:00 m.	192	20		1	5	44	67	73	74	75	80	87	97	--	SV
June 6	5:45 p.m.	220	16		0	2	44	88	95	96	97	98	99	100	--	SV
June 18	4:50 p.m.	270	21		1	3	43	91	97	98	98	99	100	--	--	SV
July 3	3:10 p.m.	108	16		0	1	52	80	83	84	85	88	95	99	100	SV
July 18	6:50 a.m.	80	16		1	6	50	88	95	96	97	98	98	100	--	SV
July 31	4:50 p.m.	70	13		1	3	50	87	95	96	97	97	98	99	100	SV
Aug. 12	2:40 p.m.	101	21		20	27	71	95	99	99	100	--	--	--	--	SV
Sept. 4	7:55 p.m.	80	22		9	12	69	97	99	100	--	--	--	--	--	SV

WHITE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN WHITE RIVER BASIN IN NEBRASKA

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
WHITE RIVER AT CRAWFORD																								
Apr. 12, 1957 a.	24	48	0.01	56	6.9	14	5.8	228	12	3.2	0.6	2.9	0.04	268		0.36		168	0	15	0.5	385	7.9	4
May 16 a.....	30	58	.01	55	8.5	15	6.6	229	11	2.5	.5	3.7	.00	265		.36		172	0	15	.5	393	7.5	6
May 21 a.....	37	58	.01	57	9.0	15	7.3	242	13	3.5	.6	2.4	.01	276		.38		179	0	15	.5	410	7.8	5
July 2 a.....	21	54	.01	53	7.8	10	7.0	225	11	3.0	.5	1.3	.04	250		.34		164	0	11	.3	381	8.2	--
Sept. 19 a.....	17	58	.01	54	7.4	14	7.1	229	11	2.8	.6	1.4	.04	267		.36		165	0	15	.5	375	7.9	--
Sept. 30 a.....	11	57	.01	52	7.7	14	7.3	221	11	2.7	.6	1.0	.04	258		.35		161	0	15	.5	367	7.9	--

a Selenium (Se), 0.00 ppm.

MISCELLANEOUS ANALYSES OF STREAMS IN NIOBRARA RIVER BASIN IN NEBRASKA

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
NIOBRARA RIVER NEAR HAY SPRINGS			
Oct. 8, 1956	21	61	3.5
Nov. 12	46	312	39
Nov. 21	a 23	146	9.1
Dec. 11	25	21	1.4
Dec. 28	29	232	18
Jan. 3, 1957	a 50	579	78
Jan. 22	21	72	4.1
Feb. 8	a 21	112	6.4
Feb. 19	25	83	5.6
Mar. 6	16	51	2.2
Mar. 18	a 29	67	5.2
Apr. 11	40	201	22
Apr. 18	34	219	20
May 6	40	144	16
May 16	97	640	168
May 21	80	5,080	1,100
June 4	43	255	30
June 19	46	218	27
June 20	37	348	35
July 2	30	138	11
July 17	19	132	6.8
NIOBRARA RIVER NEAR NORDEN			
Oct. 2, 1956	798	756	1,630
Oct. 30	973	1,280	3,360
Nov. 14	1,020	1,420	3,910
Dec. 11	1,040	2,100	5,900
Jan. 8, 1957	843	1,950	4,440
Feb. 19	1,110	946	2,840
Mar. 12	1,020	1,160	3,190
Apr. 2	1,080	1,060	3,090
Apr. 9	1,070	1,400	4,040
Apr. 16	1,210	1,440	4,700
Apr. 30	1,270	1,600	5,490
May 15	1,290	1,320	4,600
May 28	1,620	1,580	6,910
June 4	1,090	1,160	3,410
June 25	980	1,080	2,860

a Daily mean discharge.

NIOBRARA RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN NIOBRARA RIVER BASIN IN NEBRASKA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
NIOBRARA RIVER NEAR HAY SPRINGS																	
Apr. 11, 1957.....	4:40 p.m.	40	48	201	292		11		16		26	45	93		100		V
May 6.....	6:20 p.m.	40	65	144							28	56	94		100		V
June 4.....	8:50 a.m.	43	69	255							28	44	87		100		V
June 19.....	9:35 a.m.	46	70	218							40	57	94		100		V
NIOBRARA RIVER NEAR NORDEN																	
Oct. 2, 1956.....	9:05 a.m.	798	56	756							14	30	82		100	--	V
Oct. 30.....	11:10 a.m.	973	47	1,280							18	36	84		100	--	V
Nov. 14	9:30 a.m.	1,020	41	1,420							11	28	76		99	100	V
Dec. 11	10:45 a.m.	1,040	33	2,100							2	10	64		97	100	V
Jan. 8, 1957.....	11:10 a.m.	843	32	1,950							2	12	74		99	100	V
Feb. 19	10:30 a.m.	1,110	32	946							4	11	68		100	--	V
Mar. 12.....	10:20 a.m.	1,020	40	1,160							16	33	82		100	--	V
Apr. 2	10:15 a.m.	1,080	43	1,060							13	30	73		99	100	V
Apr. 9	10:15 a.m.	1,070	45	1,400							14	31	79		100	--	V
Apr. 16	10:15 a.m.	1,210	54	1,440							11	27	74		99	100	V
Apr. 30	10:35 a.m.	1,270	60	1,600							14	28	79		100	--	V
May 15	10:00 a.m.	1,290	53	1,320							15	32	74		99	100	V
May 28	10:15 a.m.	1,620	66	1,580							21	36	78		99	100	V
June 4.....	4:15 p.m.	1,090	80	1,160							13	28	79		99	100	V
June 25.....	9:55 a.m.	980	--	1,060							11	22	81		100	--	V

MISCELLANEOUS ANALYSES OF STREAMS IN NIOBRARA RIVER BASIN IN NEBRASKA--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
NIOBRARA RIVER NEAR HAY SPRINGS																
Apr. 11, 1957	4:40 p.m.	40	20			0	2	33	83	93	95	97	98	99		SV
May 6	6:20 p.m.	40	21			0	1	25	85	96	97	99	100	--		SV
May 16	5:55 p.m.	97	16			0	1	25	85	96	97	98	100	--		SV
June 4	8:50 a.m.	43	16			0	1	26	85	96	98	99	99	100		SV
June 19	9:35 a.m.	46	18			0	1	33	87	98	98	99	100	--		SV
NIOBRARA RIVER NEAR NORDEN																
Oct. 2, 1956	9:05 a.m.	798	8			0	3	41	96	100	--	--	--			V
Oct. 30	11:10 a.m.	973	7			1	7	41	95	100	--	--	--			V
Dec. 11	10:45 a.m.	1,040	6			0	1	12	78	90	92	98	100			SV
Jan. 8, 1957	11:10 a.m.	843	10			0	4	38	88	94	97	99	100			SV
Feb. 19	10:30 a.m.	1,110	7			2	7	56	94	98	99	100	--			SV

MISSOURI RIVER MAIN STEM

MISSOURI RIVER AT YANKTON, S. DAK.

LOCATION.--At gaging station at Meridian Highway Bridge on U. S. Highway 81 in Yankton, Yankton County, 5.8 miles upstream from James River, and 6.1 miles downstream from Gavins Point Dam.
DRAINAGE AREA.--279,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, October 1956 to September 1957.
Water temperatures: October 1956 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 559 ppm Aug. 29 to Sept. 30; minimum, 327 ppm Mar. 16-31.
Hardness: Maximum, 250 ppm Aug. 29 to Sept. 30; minimum, 168 ppm Mar. 16-31.
Specific conductance: Maximum daily, 839 micromhos Aug. 24-25, Sept. 5-8; minimum daily, 479 micromhos Mar. 30.
Water temperatures: Maximum, 79°F July 21, July 30 to Aug. 2; minimum, freezing point on many days during December to February.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	25,890	15	0.00	53	17	54	3.9	172	172	8.0	0.5	0.2	0.22	407	0.55	28,450	202	61	36	1.7	623	8.1	7
Nov. 1-30.....	11,810	12	.00	48	17	43	4.0	162	148	6.5	.4	.1	.11	359	.49	11,450	190	57	32	1.4	562	7.8	6
Dec. 1-31.....	9,197	14	.00	52	15	43	3.5	165	140	7.0	.4	.0	.10	356	.48	8,840	191	56	32	1.4	558	7.8	4
Jan. 1-31, 1957....	9,222	14	.02	49	16	41	3.7	163	138	6.5	.4	.5	.13	357	.49	8,890	187	53	32	1.3	548	7.9	2
Feb. 1-21.....	8,417	11	.01	53	15	47	3.7	169	148	7.8	.5	.4	.12	376	.51	8,540	194	55	34	1.5	586	7.8	5
Feb. 22.....	10,000	12	.01	52	16	48	3.8	168	147	7.4	.6	.2	.12	370	.50	9,990	194	56	34	1.5	572	8.1	--
Feb. 23-Mar. 15...	8,099	15	.00	50	14	43	3.6	163	134	7.2	.4	.4	.11	354	.48	7,740	182	48	33	1.4	538	7.6	6
Mar. 16-31.....	8,177	17	.00	46	13	38	3.5	154	118	6.2	.9	.5	.10	327	.44	7,220	168	42	32	1.3	493	7.6	7
Apr. 1-19.....	11,730	17	.01	48	14	41	4.6	160	131	6.5	.4	.3	.09	333	.45	10,550	176	45	33	1.3	511	7.8	10
Apr. 20-30.....	28,130	16	.00	48	18	44	5.2	173	134	7.5	.5	.3	.10	367	.50	27,870	192	50	32	1.4	564	7.7	10
May 1-9.....	31,160	11	.01	47	21	51	4.5	179	155	8.0	.5	.2	.13	391	.53	32,900	202	55	35	1.6	609	7.7	4
May 10-31.....	24,850	10	.00	56	19	56	4.3	184	166	9.0	.7	.1	.13	417	.57	27,980	216	65	36	1.7	648	7.7	6
June 1-8.....	25,850	13	.00	58	17	52	8.8	184	159	9.5	.6	.2	.18	422	.57	29,450	215	64	33	1.5	644	7.6	6
June 9-25.....	21,170	9.0	.00	59	19	58	4.6	186	179	10	.6	.3	.13	453	.62	25,890	227	74	35	1.7	691	7.8	2
June 26-July 12....	24,350	11	.00	59	18	61	5.5	182	194	9.5	.5	.3	.15	458	.62	30,110	222	73	37	1.8	684	7.9	8
July 13-Aug. 28....	30,160	10	.01	65	20	81	5.7	180	253	11	.6	.2	.17	544	.74	44,300	244	96	41	2.2	806	7.5	8
Aug. 29-Sept. 30...	28,530	9.8	.00	66	21	80	6.3	186	258	11	.6	.2	.20	559	.76	43,060	250	97	40	2.2	819	7.8	8
Weighted average a	18,940	12	0.00	57	18	60	5.0	176	191	9.0	0.5	0.2	0.15	447	0.61	22,860	217	73	37	1.8	676	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT YANKTON, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 1 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	53	34	a 34	32	35	a 39	a 60	--	72	79	--
2	a 63	53	35	a 35	32	36	36	--	62	72	79	a 72
3	a 63	--	34	35	32	a 35	37	a 56	64	73	77	71
4	a 62	51	34	34	32	35	36	56	66	--	77	71
5	a 60	50	33	35	32	37	36	56	a 69	--	75	69
6	a 60	50	a 32	35	32	a 36	--	57	68	76	a 75	70
7	a 60	48	a 32	a 35	--	36	38	58	65	a 77	a 76	69
8	a 60	a 47	33	a 34	--	37	38	60	a 65	a 77	a 76	70
9	a 60	46	32	--	a 35	a 36	38	56	a 66	76	76	a 76
10	a 58	47	33	33	a 34	a 37	a 40	56	66	--	--	a 68
11	a 58	48	32	32	35	a 37	39	57	67	a 77	78	68
12	a 58	45	32	32	35	37	39	--	68	77	a 76	67
13	--	45	32	--	35	--	40	58	67	77	78	66
14	57	45	32	32	a 35	35	a 41	a 58	70	77	78	66
15	58	41	32	32	35	35	43	55	--	a 77	a 78	65
16	58	39	33	a 32	35	37	43	54	--	76	a 78	a 66
17	60	39	32	a 32	a 35	35	44	53	66	77	a 78	a 66
18	60	42	32	32	a 35	a 36	a 44	53	--	a 77	78	67
19	61	40	32	32	33	a 37	46	--	67	77	--	65
20	60	39	a 33	a 34	a 33	35	46	52	69	78	76	a 63
21	--	--	34	32	33	37	--	53	70	79	75	62
22	59	35	34	--	a 33	36	52	53	69	78	75	61
23	57	35	33	a 32	33	38	--	54	67	77	74	61
24	57	36	--	32	--	37	a 55	53	68	76	74	62
25	57	35	--	a 32	37	35	a 56	a 53	70	76	75	63
26	55	35	a 36	32	a 37	--	a 56	52	69	76	a 74	62
27	55	35	34	32	36	36	57	a 56	70	76	a 72	62
28	55	33	35	32	36	38	57	58	72	76	71	62
29	55	33	36	32	--	36	49	58	a 72	78	--	--
30	54	a 35	32	32	--	38	60	58	72	79	a 74	64
31	a 52	--	a 36	32	--	39	--	60	--	79	--	--
Average	58	42	33	33	34	36	45	56	68	77	76	66

a Measurement between 2 p.m. and 6 p.m.

JAMES RIVER BASIN

JAMES RIVER AT LA MOURE, N. DAK.

LOCATION.--Temperature recorder at gaging station, downstream from bridge on State Highway 13, half a mile west of La Moure, La Moure County, and 12 miles upstream from Cottonwood Creek.
DRAINAGE AREA.--5,740 square miles, approximately, of which about 2,800 square miles is probably noncontributing.
RECORDS AVAILABLE.--Water temperatures: June 1953 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 91°F July 12-13; minimum, 33°F Mar. 20-22.
EXTREMES, 1953-57.--Water temperatures: Maximum, 91°F July 12-13, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Temperature (° F) of water, water year October 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1	60	57	46	45	39	38	38	37	37	36	36	35	39	36	67	65	78	69	81	76	83	80	74	67
2	60	57	45	45	39	39	37	36	36	36	37	36	41	37	66	64	75	69	87	78	81	79	74	66
3	60	58	47	45	40	39	37	37	37	35	36	36	40	38	66	62	80	69	90	82	79	77	66	64
4	60	57	47	47	40	39	37	36	36	36	36	35	38	37	64	60	78	72	84	78	80	75	66	62
5	60	58	47	46	39	39	36	36	36	36	36	36	39	37	66	60	81	73	81	77	78	76	65	63
6	59	55	46	44	39	38	37	36	36	35	36	36	39	37	66	62	77	72	81	78	77	74	67	63
7	56	53	44	40	38	38	36	36	36	36	36	35	41	38	73	66	74	70	83	80	78	75	69	64
8	55	53	42	39	38	37	37	36	36	36	35	35	40	39	70	63	74	70	88	79	80	76	67	64
9	55	51	42	41	37	36	37	37	36	36	36	35	42	39	63	61	75	72	86	81	83	77	69	64
10	51	50	42	40	36	36	37	37	36	35	35	34	41	40	69	60	75	72	84	80	81	77	70	64
11	53	51	40	39	38	36	37	37	36	35	35	35	41	40	67	62	74	70	86	82	83	77	66	64
12	55	51	40	40	38	37	37	37	35	35	35	35	43	40	68	65	74	70	91	84	81	78	65	63
13	57	55	41	39	38	37	37	37	36	35	35	35	43	41	66	63	75	72	91	86	81	77	66	62
14	56	54	41	39	37	37	37	37	36	35	35	35	45	43	63	60	73	69	89	85	79	77	62	61
15	56	53	39	37	37	37	37	37	36	35	35	35	45	43	62	58	73	67	87	84	78	75	61	58
16	56	53	39	37	37	36	37	37	36	36	35	35	48	44	62	59	70	68	87	83	78	74	59	56
17	56	54	39	38	37	37	37	36	36	35	36	35	48	47	62	61	75	68	86	81	81	74	58	57
18	57	54	40	39	37	36	36	36	36	36	35	34	48	47	63	60	73	67	85	81	80	74	58	53
19	58	56	39	38	36	36	36	35	37	36	35	34	49	48	64	60	75	70	81	77	77	73	53	50
20	58	56	39	38	37	36	36	36	36	36	34	33	51	48	60	56	78	74	84	76	75	72	52	51
21	56	54	38	38	36	36	37	36	37	36	35	33	53	49	56	55	77	75	86	79	75	72	54	51
22	55	51	39	38	36	36	37	37	37	36	34	33	58	53	56	53	75	67	88	80	74	73	55	52
23	51	49	39	38	37	36	37	37	37	36	34	34	58	58	62	53	70	66	85	81	73	70	55	52
24	50	48	38	37	37	36	37	37	36	35	34	34	61	58	62	57	74	68	81	80	73	68	58	54
25	50	48	38	37	36	36	37	37	36	35	35	34	63	58	62	60	76	72	87	79	74	68	58	57
26	49	47	39	38	36	36	37	37	36	35	35	34	61	59	60	57	79	72	84	79	73	66	57	54
27	48	48	39	38	36	36	37	36	36	35	35	34	66	58	63	58	76	73	84	79	66	64	56	53
28	48	47	38	38	36	36	37	36	35	35	35	35	63	59	71	62	79	73	88	80	64	63	59	55
29	48	47	39	38	36	36	37	36	--	--	37	35	66	60	74	66	81	75	89	81	63	63	62	58
30	47	46	39	38	37	36	36	36	--	--	37	36	67	63	75	69	80	78	88	82	67	63	62	59
31	46	46	--	--	38	37	36	36	--	--	37	35	--	--	75	71	--	--	88	80	71	67	--	--
Average	54	52	41	40	37	37	37	36	36	35	35	35	49	46	65	61	76	71	86	80	76	73	62	59

JAMES RIVER NEAR COLUMBIA, S. DAK.

LOCATION.--At bridge on county road, 3.5 miles north of Columbia, Brown County, approximately 5 miles upstream from gaging station, and 0.1 mile downstream from Columbia Road Reservoir.
DRAINAGE AREA.--7,050 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1952, November 1954 to September 1957.
REMARKS.--No flow during October to February. Discharge records for gaging station at Columbia for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, March to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
														Residue at 180°C	Sum								
Mar. 22, 1957.	0.18	8.3	0.02	50	28	246	9.6	132	545	85	0.8	2.7	0.45	1,110	1,040	1.51		240	132	68	6.9	1,610	7.3
Apr. 8.....	15.1	--	--	57	46	140	--	359	233	67	--	--	--	769	--	1.05		331	37	48	3.4	1,170	7.5
Apr. 24.....	31.0	--	--	--	--	129	--	355	218	61	--	--	--	--	--	--		306	15	48	3.2	1,110	7.7
May 28.....	78.0	--	--	--	--	126	--	357	210	58	--	--	--	--	--	--		307	14	47	3.1	1,080	7.9
June 12.....	76.0	15	.02	53	42	128	14	343	213	60	.6	3.3	.40	725	--	.99		306	25	46	3.2	1,100	7.7
July 2.....	50.4	--	--	--	--	132	--	304	217	59	--	--	--	--	--	--		271	22	51	3.5	1,060	7.5
July 25.....	2.18	20	.07	35	31	97	13	194	210	52	.3	3.6	.33	564	--	.77		216	57	48	2.9	870	7.7
Sept. 4.....	18.6	38	.43	80	67	171	10	536	275	93	.4	1.1	.48	1,010	1,000	1.37		476	36	43	3.4	1,500	7.7

JAMES RIVER BASIN--Continued

LAKE BYRON NEAR HURON, S. DAK.

LOCATION.--Thirteen miles north and three miles east of Huron, Beadle County, in sec. 27, T. 113 N., R. 61 W.
RECORDS AVAILABLE.--Chemical analyses: September 1956 to September 1957 (discontinued).

Chemical analyses, in parts per million, September 1956 to September 1957

Date of collection	Pool elevation (feet)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
														Residue at 180°C	Sum								
Sept. 28, 1956..	1,247.45	29	0.02	88	92	385	42	308	1,010	141	0.5	3.5	1.6	2,020	1,940	2.75		598	345	56	6.8	2,700	7.8
Nov. 9.....	1,247.37	32	.00	87	101	410	45	322	1,100	159	.6	2.1	1.6	2,170	2,100	2.95		632	368	56	7.1	2,900	7.9
Dec. 6.....	1,247.25	33	.01	98	109	465	46	348	1,200	169	.5	3.4	1.6	2,330	2,300	3.17		692	407	57	7.7	3,120	7.8
Jan. 3, 1957 ...	1,247.29	35	.02	105	116	497	47	368	1,290	180	.6	3.9	1.8	2,500	2,460	3.40		740	438	57	7.9	3,270	8.0
Feb. 7.....	1,247.25	35	.01	115	134	544	55	414	1,360	205	.6	1.6	1.8	2,910	2,660	3.96		840	501	57	8.2	3,690	7.8
Apr. 25.....	1,249.17	16	.24	81	79	340	42	291	863	127	.5	.2	1.2	1,730	1,690	2.35		526	287	56	6.5	2,400	7.8
May 1	1,249.18	19	.00	78	86	313	35	269	850	116	.6	2.8	1.1	1,690	1,630	2.30		548	327	53	5.8	2,330	7.5
May 9	1,249.14	11	.24	88	83	378	37	308	910	131	.5	.3	1.2	1,820	1,790	2.48		560	307	58	6.9	2,500	8.0
May 29	1,249.69	18	.05	81	54	218	25	272	580	80	.4	.5	.69	1,240	1,190	1.69		425	202	51	4.6	1,740	7.4
June 13.....	1,249.30	21	.03	86	67	278	32	300	713	96	.5	6.0	.89	1,460	1,450	1.99		488	242	53	5.5	2,040	7.5
July 2	1,249.06	20	.02	74	75	315	34	216	838	111	.6	4.2	1.0	1,630	1,580	2.22		492	315	56	6.2	2,250	7.6
July 30.....	1,248.55	29	.00	77	79	312	37	257	863	116	.5	4.4	1.1	1,670	1,650	2.27		517	306	55	6.0	2,320	7.4
Aug. 16.....	1,248.09	25	.23	95	91	372	42	386	954	135	.5	1.9	1.4	1,940	1,910	2.64		612	295	55	6.6	2,650	7.8
Sept. 3	1,248.04	15	.43	65	88	414	38	396	938	146	.6	.9	1.4	1,940	1,900	2.64		524	199	61	7.9	2,690	7.8

JAMES RIVER UPSTREAM FROM DIVERSION, AT HURON, S. DAK.

LOCATION.--Just upstream from Chicago and North Western Railway bridge, 135 feet upstream from gaging station, 150 feet upstream from city dam at Huron, Beadle County, and 300 feet upstream from bridge on U. S. Highway 14.
DRAINAGE AREA.--16,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 1,580 ppm Mar. 6-15; minimum, 340 ppm Mar. 29 to Apr. 4.
Hardness: Maximum, 764 ppm Mar. 6-15; minimum, 172 ppm Mar. 29 to Apr. 4.
Specific conductance: Maximum daily, 2,270 micromhos Mar. 9; minimum daily, 483 micromhos Mar. 30.
Water temperatures: Maximum, 83°F July 17; minimum, freezing point on several days during January and February.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Discharge records for gaging station at Huron, for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Aug. 13-24, 1956 a	85.8	20	0.02	49	26	84	13	262	150	38	0.2	0.4	0.32	509	--	0.69	118	230	15	43	2.4	794	7.8	--
Aug. 25-Sept. 16 a	14.2	17	.00	43	23	62	11	225	125	28	.3	.5	.28	428	--	.58	16.4	202	17	38	1.9	677	7.9	17
Oct. 6, 8, 30-31, Nov. 2, 4-15	10.5	9.1	.00	59	29	83	12	265	181	38	.2	.7	.28	545	--	.74	15.5	265	48	39	2.2	861	8.2	15
Nov. 28, Dec. 12-13, 16-17, 21-31	1.91	17	.01	75	42	112	13	345	260	56	.3	1.7	.37	752	--	1.02	3.88	359	76	39	2.6	1,150	7.9	15
Jan. 1-17, 1957	2.71	18	.02	86	48	126	14	373	308	64	.2	1.7	.72	884	--	1.20	6.47	412	106	39	2.7	1,300	7.9	4
Jan. 18, 20-26	1.00	23	.03	100	58	146	15	421	373	71	.3	2.3	.67	1,050	996	1.43	2.84	486	141	39	2.9	1,500	7.8	2
Jan. 27-Feb. 1	1.00	25	.01	108	65	174	17	462	430	80	.4	1.9	.54	1,160	1,130	1.58	3.13	536	157	40	3.3	1,650	7.8	20
Feb. 2-18	4.24	27	.01	118	73	200	18	488	495	90	.5	2.4	.59	1,310	1,260	1.78	15.0	596	196	41	3.6	1,820	8.1	17
Feb. 19-Mar. 5	12.2	28	.00	130	82	208	20	542	555	101	.5	2.3	.63	1,430	1,390	1.94	47.1	660	216	40	3.5	1,990	8.0	14
Mar. 6-15	20.2	26	.00	153	93	240	20	650	575	106	.7	1.9	.71	1,580	1,540	2.15	86.2	764	231	40	3.8	2,170	8.1	8
Mar. 16-19	24.8	19	.01	140	76	200	18	561	495	89	.5	2.9	.56	1,360	1,320	1.85	91.1	664	204	39	3.4	1,890	8.0	11
Mar. 20-22	53.3	19	.01	130	66	172	19	499	440	79	.4	2.1	.52	1,210	1,170	1.65	174	594	185	38	3.1	1,710	8.0	12
Mar. 23	140	15	.05	105	46	135	16	378	350	58	.4	3.1	.41	922	--	1.25	349	450	140	38	2.8	1,350	8.0	11
Mar. 24	111	12	.06	70	40	100	13	270	265	38	.4	1.4	.30	668	--	.94	206	338	117	38	2.4	1,030	7.7	11
Mar. 25-26	69.0	11	.05	61	27	71	13	200	213	28	.3	2.3	.25	534	--	.73	99.5	264	100	36	1.9	812	7.8	11
Mar. 27-28	43.0	10	.06	48	19	45	13	132	175	13	.3	1.9	.18	408	--	.55	47.4	198	90	31	1.4	625	7.8	18
Mar. 29-Apr. 4	34.0	12	.02	42	16	36	12	128	135	12	.2	1.8	.15	340	--	.46	31.2	172	67	30	1.2	520	7.4	35
Apr. 5-7	60.7	11	.01	49	21	54	11	172	165	22	.3	.5	.20	429	--	.58	70.3	208	67	34	1.6	660	7.8	30
Apr. 8-16	52.0	9.1	.01	50	30	72	10	210	195	31	.3	.5	.24	512	--	.70	71.9	248	76	37	2.0	795	7.6	20

a Not included in weighted average.

JAMES RIVER BASIN--Continued

JAMES RIVER UPSTREAM FROM DIVERSION, AT HURON, S. DAK.--Continued

Chemical anayses, in parts per million, August 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Apr. 17-20, 1957	142	12	0.03	65	33	86	10	256	223	40	0.3	0.7	0.30	606	--	0.82	232	296	86	38	2.2	927	8.0	20
Apr. 21-23.....	282	15	.01	69	36	130	12	316	245	70	.4	.8	.37	743	--	1.01	566	324	65	45	3.1	1,150	7.9	18
Apr. 24-25.....	524	13	.04	57	26	100	12	232	203	51	.3	.4	.29	592	--	.81	838	248	58	45	2.8	916	8.0	25
Apr. 26.....	504	9.8	.04	55	30	138	13	224	243	97	.4	.3	.36	710	--	.97	966	260	76	52	3.7	1,100	7.6	--
Apr. 27-30.....	333	13	.01	41	31	93	13	188	218	49	.4	1.3	.33	572	--	.78	514	230	76	45	2.7	874	7.6	30
May 1-10	155	15	.01	52	26	145	14	236	222	96	.4	1.7	.44	710	--	.97	297	238	44	55	4.1	1,130	7.7	17
May 11-23	187	13	.01	54	26	90	12	222	192	53	.3	.6	.28	569	--	.77	287	243	61	43	2.5	901	7.7	17
May 24-June 20.	363	16	.01	69	41	138	17	267	334	60	.4	.4	.43	840	--	1.14	823	342	123	45	3.3	1,230	7.6	22
June 21-26.....	321	16	.01	74	44	150	17	306	329	69	.4	.6	.43	878	--	1.19	761	364	113	46	3.4	1,300	7.9	22
June 27-July 22 .	242	16	.01	66	37	137	16	299	264	69	.4	.3	.41	783	--	1.06	512	318	73	47	3.3	1,180	7.8	18
July 23-Aug. 19, 22-24, 26-28 ..	29.7	9.6	.01	73	43	166	18	366	287	89	.5	.5	.51	901	--	1.23	72.3	358	58	49	3.8	1,370	8.1	20
Aug. 29-Sept. 16, 18-27, 30...	6.46	11	.00	65	43	191	20	390	303	97	.4	.5	.58	940	--	1.28	16.4	340	20	53	4.5	1,440	7.8	20
Weighted average b.....	82.8	15	0.01	66	37	130	15	275	282	64	0.4	0.6	0.40	772	--	1.05	173	318	92	46	3.2	1,160	--	--

b Represents 100 percent of runoff for water year October 1956 to September 1957.

JAMES RIVER BASIN--Continued

JAMES RIVER UPSTREAM FROM DIVERSION, AT HURON, S. DAK.--Continued

Temperature (° F) of water, August to September 1956
(Once-daily measurement between 7 a.m. and 8 a.m.)

Day	August	Day	August	Day	September	Day	September
2	--	17	78	1	64	16	
3	--	18	74	2	--	17	
4	--	19	69	3	64	18	
5	--	20	69	4	62	19	
6	--	21	75	5	62	20	
7	--	22	70	6	57	21	
8	--	23	72	7	57	22	
9	--	24	70	8	59	23	
10	--	25	72	9	--	24	
11	--	26	72	10	63	25	
12	--	27	74	11	67	26	
13	--	28	73	12	66	27	
14	76	29	72	13	63	28	
15	78	30	72	14	65	29	
16	77	31	--	15	--	30	

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 8 a.m. Many days of no flow)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	--	--	38	a 32	41	44	62	69	75	81	70
2	--	48	--	37	33	39	45	62	67	75	81	70
3	--	--	--	35	a 34	a 41	43	61	67	76	78	68
4	--	--	--	37	32	42	39	59	70	74	75	67
5	--	46	--	37	35	41	40	59	70	72	74	66
6	--	45	--	a 38	35	40	41	59	72	75	70	67
7	--	45	--	37	35	40	a 41	60	70	76	--	67
8	--	40	--	37	35	42	39	64	69	77	74	--
9	--	42	--	a 35	36	42	45	60	67	77	74	64
10	--	41	--	35	a 34	43	45	58	68	76	76	63
11	--	44	--	35	35	43	41	60	67	79	76	62
12	--	44	36	35	38	44	41	61	68	81	77	62
13	--	--	35	a 34	38	45	41	60	70	81	78	62
14	--	40	--	33	37	42	a 44	58	69	81	75	60
15	--	34	--	34	38	42	45	56	69	82	75	61
16	--	--	38	33	37	44	49	53	66	82	74	59
17	--	--	35	a 34	37	a 42	50	53	66	83	74	--
18	--	--	--	34	38	41	51	52	66	80	73	--
19	--	--	--	--	37	44	51	50	68	82	72	55
20	--	--	--	a 35	38	41	54	50	71	81	--	55
21	--	--	39	35	36	45	54	50	73	80	--	56
22	--	--	38	34	35	46	55	50	71	77	--	55
23	--	--	36	33	36	45	59	50	65	80	72	56
24	--	--	37	32	a 37	a 37	59	54	67	78	71	55
25	--	--	39	32	--	39	56	68	69	76	--	56
26	--	--	40	32	39	48	56	55	69	75	72	56
27	--	--	39	a 33	39	41	57	57	69	77	65	--
28	--	33	40	35	41	43	57	60	68	81	64	--
29	--	--	40	33	--	42	59	64	71	81	65	--
30	50	--	41	32	--	41	61	64	73	81	68	--
31	46	--	40	33	--	44	--	68	--	82	69	--
Average	--	--	--	35	36	42	49	58	69	78	73	--

a Measurement at 9 a.m.

JAMES RIVER BASIN--Continued

JAMES RIVER NEAR SCOTLAND, S. DAK.

LOCATION.--At gaging station, 50 feet upstream from highway bridge, 500 feet upstream from Dawson Creek, and 5 miles northeast of Scotland, Bon Homme County.
DRAINAGE AREA.--21,550 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: January 1953 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 90°F Aug. 1, 2; minimum, freezing point on many days during January to March.
EXTREMES, 1953-57.--Water temperatures: Maximum, 90°F Aug. 1, 2, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 25, 1956...	3.5	12	0.02	111	51	103	18	321	395	44	0.3	1.0	0.52	936	--	1.27		488	225	30	2.0	1,310	7.8	
Nov. 23.....	29	16	.00	220	78	115	15	303	830	48	.5	1.8	.64	1,570	1,470	2.14		868	620	22	1.7	1,890	7.8	
Dec. 21.....	21	12	.01	213	98	131	19	354	850	56	.5	1.0	.61	1,690	1,560	2.30		936	646	23	1.9	2,040	7.6	
Jan. 21, 1957...	19	7.6	.22	163	87	139	20	291	765	72	.5	.3	.66	1,500	1,400	2.04		766	527	28	2.2	1,910	7.3	
Feb. 26.....	24	7.3	.00	198	82	152	16	314	763	78	.6	2.5	.68	1,650	1,460	2.24		832	575	28	2.3	2,010	7.8	
Mar. 16.....	51	4.9	.01	173	85	174	15	242	780	110	.5	2.8	.62	1,640	1,460	2.23		780	582	32	2.7	2,040	7.5	
Mar. 31.....	396	11	.15	95	52	160	13	234	480	110	.5	.3	.46	1,100	1,040	1.50		452	260	43	3.3	1,560	7.6	
Apr. 3.....	285	14	.10	81	38	122	13	228	341	64	.4	.2	.42	819	--	1.11		358	171	41	2.8	1,180	7.5	
May 8.....	232	8.0	.02	79	32	124	14	269	270	77	.4	3.2	.38	760	--	1.03		330	109	44	3.0	1,160	7.4	
June 4.....	836	14	.40	79	38	110	14	250	335	43	.3	.2	.34	779	--	1.06		355	150	39	2.5	1,140	7.6	
July 11.....	764	12	.01	73	35	115	16	272	280	53	.3	3.7	.38	739	--	1.01		326	103	42	2.8	1,110	7.4	
Sept. 17.....	18	6.2	.00	104	52	154	18	277	473	82	.5	1.7	.56	1,070	1,030	1.46		474	247	40	3.1	1,520	7.4	
Sept. 26.....	20	8.9	.01	110	53	152	18	258	482	74	.6	2.5	.54	1,060	1,030	1.44		492	280	39	3.0	1,490	7.3	

JAMES RIVER NEAR SCOTLAND, S. DAK.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
[Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph]

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1	61	60	49	48	33	33	33	33	32	32	32	32	46	45	68	67	76	74	82	81	90	86	78	77
2	64	60	48	48	33	33	33	33	32	32	33	32	45	44	69	68	76	74	82	80	90	86	77	74
3	68	63	48	46	33	33	33	33	32	32	33	33	44	41	70	68	75	74	84	81	89	84	74	70
4	66	62	46	46	33	33	33	33	32	32	34	33	41	39	68	65	76	74	84	81	84	80	71	69
5	65	62	46	45	34	33	33	33	32	32	34	34	40	38	68	64	79	76	82	74	82	79	69	68
6	64	60	45	44	33	33	33	33	32	32	34	33	40	38	69	65	80	78	84	79	80	77	69	68
7	61	57	44	40	33	33	33	33	32	32	34	33	40	39	71	67	80	76	87	83	81	78	69	68
8	60	59	40	38	34	33	33	33	32	32	34	34	42	39	74	69	76	74	87	84	82	81	69	69
9	59	56	39	38	34	33	33	33	32	32	34	34	44	41	73	67	75	73	87	84	82	81	69	68
10	56	54	39	38	34	33	34	33	32	32	35	34	44	43	69	65	77	74	86	84	83	80	68	67
11	55	53	41	39	33	33	34	34	32	32	38	35	43	41	70	66	78	76	87	85	83	80	68	67
12	60	55	41	40	33	33	34	34	32	32	39	38	43	40	70	67	78	76	88	86	84	81	69	68
13	62	60	40	40	33	33	34	34	32	32	39	39	46	42	69	68	78	76	88	87	84	83	68	65
14	62	59	41	40	33	33	34	34	32	32	39	34	48	43	68	67	78	77	87	85	64	81	65	65
15	60	58	40	35	33	33	34	34	32	32	34	34	52	46	68	64	77	73	85	85	83	82	66	64
16	60	59	35	34	33	33	34	34	32	32	34	34	51	49	64	61	73	70	87	85	82	81	65	63
17	60	60	34	34	33	33	34	33	33	32	34	33	52	47	61	61	70	69	87	87	81	79	67	63
18	62	60	34	34	33	33	33	33	33	33	33	33	57	51	62	60	71	69	88	87	79	76	70	67
19	62	61	35	34	33	33	33	33	33	33	33	33	60	57	60	59	74	71	88	88	77	76	69	62
20	61	58	35	35	33	33	33	33	33	32	37	33	60	56	59	58	78	74	88	87	77	77	62	61
21	58	54	35	33	33	33	33	33	32	32	40	37	61	56	63	58	80	77	87	84	77	75	61	60
22	56	53	34	33	33	33	33	33	32	32	41	39	62	60	63	60	80	76	84	83	76	75	61	61
23	53	50	34	34	33	33	33	33	32	32	41	41	62	61	65	61	76	73	84	83	75	74	63	61
24	53	50	34	33	33	33	33	33	32	32	42	40	62	59	65	63	75	71	84	83	74	71	63	62
25	53	50	33	33	33	33	33	32	32	32	40	38	63	61	69	63	76	73	85	83	76	72	64	62
26	50	48	37	33	33	33	33	32	32	32	40	36	63	61	68	65	76	75	85	83	77	75	64	63
27	51	50	33	33	33	33	33	33	32	32	41	38	64	60	69	65	76	75	85	82	75	71	63	61
28	52	49	35	33	33	33	33	33	32	32	41	39	65	61	72	67	79	76	82	81	71	71	64	61
29	54	52	34	34	33	33	33	33	--	--	44	40	67	64	72	71	80	77	85	81	72	71	63	61
30	54	52	34	33	33	33	33	32	--	--	45	44	67	66	74	70	82	79	86	84	76	72	65	63
31	52	49	--	--	33	33	32	32	--	--	45	44	--	--	76	73	--	--	88	85	78	75	--	--
Average	59	56	39	38	33	33	33	33	32	32	37	36	52	50	68	65	77	74	86	83	80	78	67	65

JAMES RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN JAMES RIVER BASIN

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
BEAR CREEK NEAR OAKES, N. DAK.																								
Sept. 26, 1956.	a 0.1	16	0.00	53	41	210	19	561	223	55	0.5	4.0	0.93	973		1.32		302	0	58	5.3	1,450	7.8	
Apr. 27, 1957.	2.6	11	.00	59	30	86	12	276	185	31	.3	3.3	.40	563		.77		269	43	40	2.3	882	7.5	

a Estimated.

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Discharge (tons per day)
WEST BRANCH SNAKE CREEK AT ATHOL, S. DAK.			
June 14, 1957, 9:00 p.m.	e 0.1	29	0.01
June 14, 9:30 p.m.	1.1	39	.12
June 15	14.0	47	1.8
July 2	4.8	8	.10
July 26	.2	18	.01
July 30	.1	14	.005

e Estimated.

LITTLE SIOUX RIVER BASIN

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA

LOCATION.--At gaging station at bridge on U. S. Highway 20, 0.2 mile upstream from Bacon Creek, 0.5 mile west of Correctionville, Woodbury County, and 0.8 mile downstream from Pierson Creek.
DRAINAGE AREA.--2,500 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1954 to June 1955.
Water temperatures: May 1951 to September 1957.
Sediment records: May 1950 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 83°F July 19; minimum, freezing point probably on many days during November to March.
Sediment concentrations: Maximum daily, 13,300 ppm June 22; minimum daily, not determined.
Sediment loads: Maximum daily, 146,000 tons June 22; minimum daily, less than 0.50 ton Feb. 18-25.
EXTREMES, 1950-57.--Water temperatures (1951-57): Maximum, 84°F July 31, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 13,300 ppm June 22, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 257,000 tons June 19, 1954; minimum daily, less than 0.50 ton Feb. 18-25, 1957.
REMARKS.--Maximum observed sediment concentration during water year, 22,600 ppm June 16. Flow affected by ice Nov. 22, 23, 26, 27, Dec. 6 to Mar. 4, Mar. 14. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 7 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	54	52	34	--	--	--	44	64	68	73	--	76
2	54	53	--	a 34	32	32	42	65	65	75	81	71
3	56	49	--	--	--	--	40	60	66	78	--	--
4	56	48	34	--	--	--	36	55	61	75	80	66
5	56	48	--	--	--	a 36	36	54	80	74	70	--
6	56	46	38	--	a 34	a 32	37	56	72	76	--	64
7	50	43	--	--	--	a 36	38	61	72	80	70	62
8	54	34	--	--	--	a 32	39	61	64	80	--	--
9	48	35	--	--	32	a 35	40	57	66	80	75	64
10	48	36	--	--	--	34	45	54	71	79	--	62
11	52	40	--	a 32	--	34	40	55	70	79	74	--
12	56	40	35	a 32	--	36	38	58	69	--	--	61
13	62	39	--	--	--	38	39	59	70	82	80	--
14	59	39	--	--	34	38	42	a 58	70	--	--	58
15	60	--	34	--	--	a 32	45	56	69	79	79	--
16	58	--	--	--	32	a 36	47	52	67	--	--	54
17	59	33	--	a 32	--	33	48	52	67	82	70	--
18	60	--	--	--	--	32	52	52	68	--	--	59
19	60	--	a 34	32	--	--	61	51	70	83	70	--
20	60	32	--	--	a 34	35	57	50	72	80	--	55
21	54	--	--	--	--	39	56	54	74	--	69	--
22	53	32	34	--	--	--	60	56	66	72	--	56
23	50	--	--	a 32	32	40	62	56	68	74	70	--
24	50	33	--	--	--	41	62	60	67	--	--	55
25	56	--	--	--	--	36	60	65	66	72	67	--
26	46	--	34	a 32	--	--	62	60	70	--	--	59
27	49	35	--	--	34	40	57	57	70	78	66	--
28	49	--	--	--	--	a 40	57	63	69	--	67	53
29	52	a 34	--	--	--	a 40	58	68	70	78	--	--
30	56	--	--	a 32	--	a 41	60	68	72	--	70	58
31	52	--	--	--	--	43	--	69	--	80	--	--
Average	54	--	--	--	--	36	49	58	69	--	--	--

a Measurement between 1 p.m. and 4 p.m.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	6.3			20	83	4	35	22	
2	7.0			21	110	6	37	--	
3	5.9	67	1	23	112	7	36	--	e 2
4	4.8			28	85	6	35	22	
5	5.1			43	90	10	31	--	
6	4.6			56	65	10	30	29	
7	4.8			54	40	6	30	--	
8	4.3	52	1	49			30	29	e 2
9	4.0			51			29	--	
10	4.3			57	23	3	29	--	
11	8.3	110	a 3	62			28	--	
12	4.0	103	1	57			25	34	
13	5.6	133	2	54	42	6	25	--	e 2
14	8.3	130	sa 4	51	53	7	23	--	
15	6.6	100	2	46	--		21	34	
16	6.3	90	2	38	--		21	--	
17	5.9	113	2	37	41		21	--	
18	5.9	98	2	43	--		21	--	
19	5.1	108	1	46	--		21	26	
20	5.3	120	2	46	31		21	--	
						e 4			e 2
21	8.7	110	a 3	38	--		23	--	
22	7.0	75	1	34	40		23	26	
23	7.0	68	1	30	--		23	--	
24	9.0	73	2	31	--		23	--	
25	18	160	a 8	28	--		23	--	
26	22	75	4	30	--		24	10	
27	16	70	3	35	88	8	25	--	
28	11	70	2	33	--	e 5	26	--	
29	12	75	2	31	49	4	25	10	e 1
30	17	100	5	36	--	e 3	24	--	
31	18	85	4	--	--	--	23	--	
Total	258.1	--	66	1,208	--	145	811	--	56

Day	January			February			March		
1	22	--		12	--		60	--	e 2
2	24	12		12	51		65	12	2
3	23	--		12	--		70	--	e 3
4	22	--		12	--		85	21	5
5	22	12	e 1	12	--	e 2	84	18	4
6	22	--		13	46		60	12	2
7	23	--		14	--		50	12	2
8	23	--		15	--		47	11	1
9	22	--		16	32		63	11	2
10	21	--		19	--	e 2	84		
11	20	38		23	--		84	15	3
12	18	38	e 2	28	--		80		
13	16	--		34	16		69	18	3
14	14	--		34	--		60		
15	16	--		32	--	e 1	51	38	6
16	16	--		30	13		41		
17	16	39		28	--		43	22	3
18	16	--	e 2	26	--		49		
19	15	39		24	--		55		
20	14	--		23	7		67	29	5
21	14	--		20	--	(t)	76		
22	14	--		18	--		85		
23	14	34	e 1	18	6		89	45	11
24	14	--		20	--		104	45	13
25	14	--		24	--		125	53	18
26	14	24		30	--	e 1	168	105	48
27	14	--		40	8	1	209	135	76
28	14	--		55	--	e 1	342	350	s 359
29	13	--	e 1	--	--	--	650	605	1,060
30	12	24		--	--	--	822	600	1,330
31	12	--		--	--	--	840	495	1,120
Total	534	--	43	644	--	34	4,777	--	4,117

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	770	417	867	99	87	23	340	475	436
2.....	710	335	642	96	89	23	342	420	388
3.....	680	283	520	89	88	21	440	595	707
4.....	590	233	371	82	71	16	478	505	652
5.....	515	180	250	79	69	15	440	460	546
6.....	440	155	184	74	81	16	440	450	535
7.....	378	133	136	72	94	18	428	445	514
8.....	320	105	91	79	460	sa 300	402	420	456
9.....	280	112	85	562	9,100	sa 16,000	378	387	395
10.....	246	116	77	116	1,350	423	320	380	b 320
11.....	227	114	70	81	430	94	280	357	270
12.....	208	66	37	79	340	73	250	343	232
13.....	199	73	39	129	1,600	sa 550	319	6,000	sa 11,000
14.....	197	73	39	283	2,900	sa 2,300	686	4,200	sa 8,600
15.....	194	97	51	161	680	296	330	1,500	1,340
16.....	185	85	42	112	265	80	933	8,400	s 28,500
17.....	182	79	39	148	393	157	1,330	6,400	sa 24,000
18.....	169	70	32	137	435	161	1,230	3,920	s 13,800
19.....	161	76	33	143	250	97	746	1,750	s 3,630
20.....	152	82	34	176	700	sa 800	544	1,080	1,590
21.....	148	75	30	871	4,810	s 11,800	833	1,540	s 4,360
22.....	140	85	32	362	1,400	s 1,400	4,120	13,300	s 146,000
23.....	136	86	32	330	690	615	2,540	3,780	s 27,000
24.....	132	62	22	330	525	468	1,530	2,050	s 8,680
25.....	129	64	22	415	535	599	1,850	7,700	sa 41,000
26.....	126	68	23	428	453	523	2,540	4,200	s 28,700
27.....	120	66	21	378	360	367	1,720	2,000	s 9,580
28.....	113	75	23	330	348	310	1,780	2,050	s 10,200
29.....	108	88	26	310	350	293	1,430	1,480	5,710
30.....	104	89	25	290	337	264	1,110	1,100	3,300
31.....	--	--	--	355	342	328			
Total.	8,059	--	3,895	7,196	--	38,430	30,109	--	382,441

	July			August			September		
1.....	929	730	1,830	197	220	b 120	202	800	sa 800
2.....	832	620	1,390	178	205	99	560	1,800	sa 3,000
3.....	815	1,900	s 4,320	235	850	sa 550	270	360	b 260
4.....	2,010	5,900	s 34,900	170	420	b 190	212	245	140
5.....	1,650	3,170	s 14,400	156	210	88	194	220	b 120
6.....	1,110	1,650	4,950	142	150	b 60	272	320	sa 240
7.....	962	930	2,420	131	145	51	285	300	a 240
8.....	962	1,200	3,120	126	145	49	217	190	b 110
9.....	1,220	1,980	s 6,650	121	163	53	180	142	69
10.....	800	1,110	2,400	114	--	e 50	178	170	82
11.....	631	625	1,060	108	168	49	166	110	b 50
12.....	616	600	b 1,000	103	--	e 48	149	87	35
13.....	586	570	902	99	186	50	138	75	b 30
14.....	561	800	b 1,200	119	300	sb 100	175	280	sa 140
15.....	474	560	717	121	230	75	184	95	b 48
16.....	405	480	b 500	108	180	b 50	156	50	
17.....	353	360	343	98	167	44	142	--	
18.....	304	300	b 240	96	--	e 40	132	64	e 20
19.....	270	280	204	89	160	38	132	--	
20.....	260	275	193	87	--	e 32	137	53	
21.....	298	600	sb 650	88	124	29	142	--	
22.....	899	4,400	sa 11,000	89	--	e 30	138	53	
23.....	360	1,140	s 1,200	101	222	61	130	--	e 18
24.....	237	300	b 190	93	--	44	126	47	
25.....	206	150	83	84	150	34	120	--	
26.....	244	380	b 260	83	--	e 34	114	71	
27.....	366	650	sa 700	99	340	a 90	109	--	
28.....	551	1,300	sb 2,000	151	320	a 130	105	46	e 15
29.....	353	990	944	201	380	sb 220	100	--	
30.....	250	500	b 340	158	200	85	97	52	
31.....	217	275	161	163	190	b 85	--	--	--
Total.	19,731	--	100,267	3,908	--	2,678	5,262	--	5,629

Total discharge for year (cfs-days)..... 82,497.1
Total load for year (tons)..... 537,801

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000
Apr. 2, 1957	4:00 p.m.	695	44	312	1,860		52		76		96	98	100		--		SPWCM
May 9	2:30 p.m.	490	57	6,740	2,840		56		88		100	--	--		--		SPWCM
June 5	3:00 p.m.	428	80	416	2,390		33		67		93	98	100		--		SPWCM
June 5	3:00 p.m.	428	80	416	2,070		14		62		93	98	100		--		SPNM
June 13	7:45 p.m.	320	70	22,300	2,140		53		62		96	98	99		100		SPWCM
June 16	1:00 p.m.	1,430	67	17,200	3,330		37		70		98	99	100		--		SPWCM
June 17	7:30 p.m.	1,550	67	6,600	2,610		55		89		97	99	100		--		SPWCM
June 22	1:45 p.m.	4,560	66	9,260	2,100		49		78		98	99	100		--		SPWCM
July 4	6:45 a.m.	2,060	75	7,690	2,640		44		74		99	100	--		--		SPWCM
July 10	4:10 p.m.	768	83	848	3,220		48		76		95	96	99		100		SPWCM
July 10	4:10 p.m.	768	83	848	2,980		24		76		95	96	99		100		SPNM

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA

LOCATION.--At gaging station at highway bridge, 1.1 miles south of Kennebec, Monona County, 5.5 miles northeast of Onawa, and 6.2 miles upstream from Maple River.
DRAINAGE AREA.--2,738 square miles.
RECORDS AVAILABLE.--Water temperatures: May 1951 to September 1955.
Sediment records: May 1950 to September 1957 (discontinued).
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 21,200 ppm June 14; minimum daily, not determined.
Sediment loads: Maximum daily, 132,000 tons June 14; minimum daily, not determined.
EXTREMES, 1950-57.--Sediment concentrations: Maximum daily, 40,800 ppm June 18, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 520,000 tons June 18, 1950; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 38,400 ppm July 4. Flow affected by ice Nov. 20-29, Dec. 6 to Mar. 6, Mar. 15, 16. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	14	55		29			54	--	e 15
2	17	--		30			57		
3	14	--		32	--	e 7	59	--	e 13
4	13	--		32			59		
5	13	--		46	--	e 19	58		
6	12	--		54	--	e 30	47	--	e 8
7	12	--	e 2	70	--	e 48	36	--	
8	13	--		64			35	--	
9	13	--		66			35	53	
10	12	--		70	--	e 40	35	--	
11	11	--		75			35	--	
12	12	--		72			35	--	
13	13	--		65	--	e 36	36	--	
14	20	--	e 3	55	--	e 22	36	--	
15	31	700	sa 65	50	--	e 14	36	--	e 5
16	17	200	b 9	45	--		37	--	
17	17	--	e 6	40	--		37	--	
18	15			45	--		37	53	
19	14			46	86	e 10	37	--	
20	13	--	e 4	46	--		37	--	
21	14			40	--		37	--	
22	14			37			36	--	
23	17	200	a 9	35			35	--	
24	19	180	b 9	37	--	e 8	35	--	
25	23	--	e 7	37			35	--	
26	26			39			35	--	e 3
27	28			41	--	e 10	35	--	
28	31			43	--	e 12	36	--	
29	29	--	e 6	47	139	18	36	--	
30	31			50	--	e 19	36	--	
31	28			--	--	--	36	33	
Total	556	--	194	1,438	--	556	1,230	--	180

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	36	--	e 5	20	--	e 5	62	--	e 16
2	36			20			66	87	
3	36			20			70	--	
4	35	--	e 10	20	50	3	80	62	e 13
5	35	--		20			80	--	
6	35	104		20	--	e 2	60	--	e 8
7	35	--	e 8	21			56		
8	35			22			55		
9	35			24	19	1	54		
10	33			26	--	e 1	71	141	e 28
11	31	--	e 6	30			75	--	
12	29			35			80	--	
13	27			45	7	1	80	119	26
14	25			55	--	e 3	77	120	b 24
15	22	--	e 4	55	--		70	300	sb 60
16	22	--		50	23		68	500	sa 95
17	22	--		47	--		68	220	b 40
18	22	72		44	--	e 2	86	345	80
19	22	--		40			98	200	b 55
20	22	--		36			81	160	35
21	22	--	e 6	33	--	e 1	70	160	b 30
22	22	--		31	--		75	159	32
23	22	--		29	7		82	--	e 36
24	22	93		31	--	e 1	90	--	e 38
25	22	--		35	29	3	105	158	45
26	22	--	e 6	40	--	e 6	130	160	b 55
27	22	--		45			158	327	s 145
28	22	--		55			215	662	384
29	22	--		--	--	--	344	2,180	s 2,190
30	21	104		--	--	--	630	3,540	6,020
31	20	--	e 5	--	--	--	807	2,690	5,860
Total	834	--	190	949	--	77	4,143	--	15,440

Day	April			May			June		
1	824	2,180	4,850	110	--	e 28	368	740	735
2	773	1,550	3,240	110			368	650	b 650
3	722	1,240	2,420	102			380	660	677
4	688	900	1,670	94	--	e 19	452	750	b 900
5	601	800	b 1,300	84	79		476	920	1,180
6	524	650	b 900	82	--		440	830	986
7	464	550	b 700	80	127	27	440	885	1,050
8	392	460	487	80	110	24	440	710	843
9	344	400	b 380	121	320	sb 260	428	550	b 650
10	310	380	b 320	455	4,600	sa 6,000	392	530	561
11	260	340	b 240	140	1,530	578	356	600	b 600
12	241	315	205	92	700	174	333	750	674
13	229	--	e 190	88	600	143	322	700	sb 750
14	217	--		153	1,200	496	1,850	21,200	s 132,000
15	223	--		276	1,430	1,070	618	4,600	s 8,050
16	219	315	e 170	179	650	314	888	11,600	s 39,900
17	209	--		125	370	125	1,480	11,900	s 48,300
18	205	--		140	700	b 260	1,520	8,200	33,700
19	201	--		140	460	b 170	1,100	4,100	12,200
20	181	278	136	150	850	sa 360	616	2,300	3,830
21	169	260	b 120	344	4,660	s 4,530	548	2,000	b 3,000
22	162	240	b 100	756	4,600	s 9,650	2,000	7,770	s 62,400
23	155	200	b 85	392	1,950	2,060	3,770	9,670	s 93,400
24	150	170	b 70	368	1,000	994	2,350	4,700	29,800
25	150	155	63	368	840	835	2,030	14,800	s 90,300
26	155	201	84	428	930	1,070	2,600	9,200	64,600
27	150	150	b 60	428	840	971	2,600	5,300	37,200
28	136	120	e 42	404	700	b 750	1,900	2,750	14,100
29	125	--		356	620	596	1,850	2,700	13,500
30	125	--		322	580	504	1,440	2,000	7,780
31	--	--	--	322	550	b 480	--	--	--
Total	9,304	--	18,826	7,289	--	32,582	34,355	--	704,316

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	1,130	1,500	4,580	276	500	b 380	193	390	203
2.....	960	1,100	2,850	251	475	322	1,380	12,200	s 52,900
3.....	858	900	2,080	746	6,720	s 20,100	500	3,020	s 4,340
4.....	2,050	14,800	s 111,000	298	2,800	s 2,480	310	1,000	b 850
5.....	2,300	6,550	s 41,500	221	650	388	251	273	185
6.....	1,560	3,750	15,800	203	440	b 240	394	5,310	s 5,830
7.....	1,100	2,520	7,480	189	300	153	324	1,810	s 1,610
8.....	1,100	2,810	8,350	169	240	b 110	298	1,000	b 800
9.....	1,170	2,110	s 6,810	153	200	b 85	237	300	b 190
10.....	1,210	2,110	s 7,250	146	190	b 75	205	144	80
11.....	790	940	2,010	136	182	67	203	100	b 55
12.....	644	900	b 1,600	136			178	60	29
13.....	644	850	b 1,500	131	--	e 50	155	50	b 20
14.....	688	1,280	2,380	121			271	2,000	a 1,500
15.....	601	1,300	2,110	134	208	75	235	250	159
16.....	500	800	b 1,100	148	--	e 80	205	120	b 65
17.....	452	550	b 650	131			178	76	37
18.....	404	440	b 480	126	--	e 55	158	50	b 22
19.....	368	430	427	112	160	48	160	850	sa 380
20.....	344	380	b 360	110	140	b 42	146	150	b 60
21.....	333	340	306	150	340	sb 150	146	76	30
22.....	626	2,100	sa 5,400	112	260	b 80	146		
23.....	756	1,100	sb 2,400	114	240	74	141		
24.....	392	700	b 750	140	260	b 100	131	--	e 26
25.....	310	580	485	120	200	b 65	128		
26.....	276	500	b 380	104	195	55	117	66	21
27.....	356	3,100	sa 3,400	121	270	88	110	--	e 18
28.....	440	1,200	b 1,400	181	380	sb 200	104	63	
29.....	560	2,000	3,020	211	600	sa 360	102	--	e 17
30.....	404	600	b 650	223	600	b 360	96	--	
31.....	322	550	b 480	187	460	b 240	--	--	--
Total.	23,648	--	238,988	5,600	--	26,677	7,202	--	69,539

Total discharge for year (cfs-days)..... 96,548
Total load for year (tons)..... 1,107,565

e Estimated.
s Computed by subdividing day.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000
Apr. 2, 1957	11:50 a.m.	773	44	1,500	2,300		27		43		89	95	99		100		SPWCM
Apr. 2	11:50 a.m.	773	44	1,500	2,280		26		44		89	95	99		100		SPNM
May 10	6:45 a.m.	630	58	6,140	2,510		55		80		98	99	100		--		SPWCM
June 6	9:30 a.m.	452	72	821	2,690		33		57		96	99	100		--		SPWCM
June 6	9:30 a.m.	452	72	821	2,560		21		52		96	99	100		--		SPNM
June 14	7:10 a.m.	3,110	64	31,600	3,100		39		74		94	97	99		100		SPWCM
June 17	5:45 a.m.	1,360	66	12,200	4,390		36		70		98	99	99		100		SPWCM
June 23	5:00 a.m.	4,360	67	11,300	4,210		41		70		93	96	99		100		SPWCM
July 10	9:00 a.m.	1,320	80	3,230	3,560		41		72		91	96	99		100		SPWCM
July 10	9:00 a.m.	1,320	80	3,230	3,120		27		72		91	96	99		100		SPNM
Aug. 3	3:45 p.m.	1,130	76	14,700	3,340		38		69		100	--	--		--		SPWCM
Sept. 2	6:15 a.m.	2,260	76	20,000	4,120		31		57		97	99	100		--		SPWCM
Sept. 6	7:00 a.m.	368	62	8,160	2,990		34		67		100	--	--		--		SPWCM

ROCK CREEK AT ATLANTIC CITY, WYO.

LOCATION.--At gaging station, 500 feet below Slate Creek and 1.4 miles northwest of Atlantic City, Fremont County.
DRAINAGE AREA.--21.3 square miles.
RECORDS AVAILABLE.--Chemical analyses: April to June 1957.
Water temperatures: June to September 1957.
Sediment records: June to September 1957.
EXTREMES, June to September 1957.--Water temperatures: Maximum, 68°F Aug. 8.
Sediment concentrations: Maximum daily, 22 ppm July 6; minimum daily, not determined.
Sediment loads: Maximum daily, 4.7 tons June 14; minimum daily, not determined.
REMARKS.--Records of discharge for June to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, April to June 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Apr. 30, 1957.....	5.6	16	0.27	16	1.9	3.3	1.1	64	0	5.0	0.5	0.1	0.3	0.06	75	0.10		48	0	13	0.2	113	7.3
May 24.....	32	14	.18	8.5	1.9	2.7	.9	34	0	6.3	.5	.1	.3	.02	59	.08		29	1	16	.2	65.6	7.1
June 6.....	a 250	11	.09	5.5	1.8	2.1	.9	20	0	5.0	.5	.3	.5	.03	41	.06		21	5	17	.2	44.9	6.8
June 24.....	56	13	.11	8.5	.7	2.4	1.1	31	0	7.0	.0	.1	.2	.02	50	.07		24	0	17	.2	62.6	7.1

a Estimated.

PLATTE RIVER BASIN--Continued

ROCK CREEK AT ATLANTIC CITY, WYO.--Continued

Temperature (° F) of water, June to September 1957
/Once-daily measurement between 6 p.m. and 9 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1									--	61	66	--
2									--	64	66	--
3									--	54	65	56
4									--	59	65	a 50
5									--	60	65	--
6									--	60	65	--
7									--	60	64	--
8									--	65	a 68	--
9									--	63	67	--
10									--	60	64	--
11									--	62	62	--
12									--	61	62	a 52
13									--	64	62	--
14									47	63	63	--
15									38	64	64	--
16									42	64	62	--
17									46	63	a 64	a 51
18									54	60	65	--
19									56	64	a 59	--
20									53	64	60	--
21									48	65	a 64	--
22									52	62	54	--
23									54	62	a 63	a 45
24									56	61	60	--
25									51	a 62	a 60	--
26									56	a 58	--	--
27									58	64	--	--
28									61	64	a 56	--
29									63	a 66	--	--
30									63	66	--	a 50
31									--	66	--	--
Average									--	62	--	--

a Measurement between 11 a.m. and 5 p.m.

PLATTE RIVER BASIN--Continued

ROCK CREEK AT ATLANTIC CITY, WYO.--Continued

Suspended sediment, June to September 1957

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1							--	--	--
2							--	--	--
3							--	--	--
4							--	--	--
5							--	--	--
6							--	--	--
7							--	--	--
8							--	--	--
9							--	--	--
10							--	--	--
11							--	--	--
12							--	--	--
13							--	--	--
14							91	19	4.7
15							97	14	3.7
16							110	13	3.9
17							99	12	3.2
18							89	15	3.6
19							74	11	2.2
20							71	19	3.6
21							71	10	1.9
22							66	12	2.1
23							63	13	2.2
24							66	15	2.7
25							60	12	1.9
26							57	12	1.8
27							51	14	1.9
28							48	14	1.8
29							43	12	1.4
30							39	10	1.1
31							--	--	--
Total							1,195	--	43.7

	July			August			September		
1	38	18	1.8	8.7			4.9	--	
2	32	10	.9	8.8			4.9	--	
3	29	14	1.1	8.0			5.2	7	
4	28	10	.8	8.6	8	0.2	4.7	7	
5	26	11	.8	7.8			4.4	--	
6	25	22	1.5	7.4			4.4	--	
7	27	21	1.5	6.8			4.4	--	
8	26	10	.7	6.4			3.7	--	
9	23	7	.4	6.4			4.2	--	
10	22	11	.7	5.9			4.7	--	
11	24	8	.5	5.9			4.9	--	
12	21	6	.3	6.1			4.4	7	
13	22	8	.5	5.9			6.9	--	
14	19	9	.5	5.4	6	.1	7.8	--	
15	15	7	.3	5.4			8.7	--	
16	15	9	.4	6.4			7.2	--	e 0.1
17	14	14	.5	5.9			6.1	6	
18	15			5.6			5.6	--	
19	16			5.2			9.0	--	
20	14			4.7			9.0	--	
21	13			5.4	4	.1	7.8	--	
22	13	8	.3	9.3	11	.3	6.9	--	
23	13			17	8	.4	6.1	8	
24	14			7.8	7	.1	6.6	--	
25	13			5.9	4		5.2	--	
26	12			4.9	--		5.2	--	
27	11			4.4	--		4.9	--	
28	9.3			4.9	5	e .1	4.9	--	
29	9.3			4.7	--		4.7	--	
30	9.0	6	.1	4.7	--		4.4	7	
31	8.7			4.7	--		--	--	--
Total	576.3	--	16.6	205.0	--	4.2	171.8	--	3.0

Total discharge for period June 14 to Sept. 30, 1957 (cfs-days) 2,148.1

Total load for period June 14 to Sept. 30, 1957 (tons) 67.5

e Estimated.

PLATTE RIVER BASIN--Continued

BATES CREEK NEAR ALCOVA, WYO.

LOCATION.--At gaging station, 2.8 miles above mouth and 10.5 miles northeast of Alcova, Natrona County.
DRAINAGE AREA.--377 square miles.
RECORDS AVAILABLE.--Sediment records: October 1956 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 13,000 tons Aug. 27; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Nov. 3, 4, 6, 8, 9, 14-30, Dec. 5-21, Jan. 1-22, 26-28, Feb. 6-10, 14-24. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1956 to September 1957

Month	Discharge (cfs-feet)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	0.1	0.20	(t)	--	--	0		--
November	45.6	90	e 24	0.8	e 1	0		--
December	92.0	182	e 76	2.4	e 10	e 1		328
January	46.8	93	e 17	.5	e 3	(t)		198
February	87.1	173	a 343	12	a 150	e 1		16,600
March	79.2	157	a 1,024	33	a 900	1		60,000
April	19.2	38	a 742	25	e 480	0		6,120
May	401.0	795	a 12,952	418	a 6,600	(t)		83,100
June	154.8	307	a 16,121	537	a 7,000	0		45,400
July	54.5	108	a 9,791	316	e 6,800	0		58,600
August	94.0	186	a 17,656	570	a 13,000	0		54,300
September	57.5	114	a 2,697	90	e 1,500	0		781
Water year	1,131.8	2,240	61,443	168	a 13,000	0		83,100

e Estimated.
t Less than 0.50 ton.
a Partly estimated.

BATES CREEK NEAR ALCOVA, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 18, 1957....	1:40 p.m.	12	--	3,760	2,720	--	57		95		99	100	--	--	--	--	VPWCM
May 25.....	11:00 a.m.	44	52	26,300	8,920	--	53		83		98	100	--	--	--	--	VPWCM
May 31.....	2:15 p.m.	59	--	70,000	2,790	2	4		88		100	--	--	--	--	--	VPN
May 31.....	2:15 p.m.	59	--	70,000	2,690	50	63		89		100	--	--	--	--	--	VPWCM
July 26.....	6:10 p.m.	44	74	48,200	3,110	--	57		80		86	86	87	90	98	100	VPWCM
Aug. 28.....	9:00 a.m.	112	55	20,500	3,050	--	59		76		86	88	91	94	99	100	VPWCM

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO

LOCATION.--At gaging station, 0.3 mile downstream from Cottonwood Creek, 2½ miles downstream from Poison Spring Creek, 4 miles southwest of Goose Egg, Natrona County, and 13 miles southwest of Casper.
DRAINAGE AREA.--11,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to August 1951.
Water temperatures: June 1950 to September 1952, April to September 1953, August 1956 to September 1957.
Sediment records: June 1950 to September 1953, August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Water temperatures: Minimum, freezing point Nov. 18, Dec. 9, 21, Jan. 3, 22, and probably on many other days during November to February.
Sediment concentrations: Maximum daily, 15,000 ppm June 17; minimum daily, not determined.
Sediment loads: Maximum daily, 35,000 tons June 22; minimum daily, less than 0.50 ton on many days during October, January, and April.
EXTREMES, 1950-53, 1956-57.--Water temperatures (1950-52, 1956-57): Minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 15,000 ppm June 17, 1957; minimum daily, 1 ppm Oct. 5, 9, 1952.
Sediment loads: Maximum daily, 191,000 tons May 29, 1953; minimum daily, less than 0.50 ton on several days each year.
REMARKS.--Flow affected by ice Nov. 18-25, Dec. 5 to Mar. 29. Records of discharge for August and September 1956 given in WSP 1440 and for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, August to September 1956
/Once-daily measurement between 5 p.m. and 8 p.m./

Day	August	Day	August	Day	September	Day	September
2	--	17	66	1	66	16	62
3	70	18	66	2	65	17	64
4	70	19	64	3	60	18	66
5	71	20	70	4	60	19	66
6	69	21	70	5	61	20	63
7	70	22	72	6	65	21	60
8	70	23	70	7	65	22	57
9	70	24	70	8	63	23	57
10	68	25	69	9	67	24	58
11	70	26	68	10	65	25	60
12	68	27	66	11	70	26	60
13	72	28	68	12	66	27	60
14	70	29	64	13	66	28	54
15	71	30	62	14	65	29	54
16	68	31	65	15	65	30	55
Average			69	Average			62

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 5 p.m. and 8 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	36	--	--	--	--	--	--	--	55	69	64
2	a 57	--	44	--	--	--	--	--	73	59	67	--
3	--	--	a 34	a 32	--	39	--	--	--	57	67	67
4	57	34	--	--	--	--	--	--	--	59	65	67
5	--	--	--	--	--	--	--	57	--	60	67	66
6	--	--	--	--	--	--	--	--	--	60	66	65
7	60	--	--	--	--	--	42	--	--	58	67	67
8	--	36	--	--	--	--	--	--	--	61	66	59
9	--	--	32	--	--	--	--	--	68	--	68	64
10	--	--	--	--	35	43	a 48	--	--	59	68	57
11	54	44	--	--	--	--	--	--	--	62	67	--
12	--	--	--	--	--	--	--	57	--	59	68	60
13	--	--	--	--	--	--	--	--	--	66	69	56
14	50	--	--	--	--	--	--	--	--	64	67	62
15	--	33	--	--	--	--	--	--	--	63	66	63
16	--	--	36	--	--	--	--	--	61	63	68	64
17	--	--	--	--	39	46	--	--	--	64	65	63
18	55	32	--	--	--	--	--	--	--	54	69	55
19	--	--	--	--	--	--	--	56	--	63	65	49
20	--	--	--	34	--	--	--	--	--	--	68	51
21	47	--	32	--	--	--	60	--	--	68	65	51
22	--	36	--	a 32	--	--	--	--	--	61	67	49
23	--	--	33	--	--	--	--	--	56	68	63	57
24	--	--	--	--	50	43	--	--	57	68	61	58
25	38	a 37	--	--	--	--	--	--	54	67	64	60
26	--	--	--	--	--	--	--	67	54	67	64	61
27	--	--	--	--	--	--	--	--	53	64	64	60
28	44	--	--	--	--	--	60	--	57	67	64	63
29	--	--	--	--	--	--	--	--	56	65	66	63
30	--	--	36	--	--	--	--	--	57	64	64	63
31	--	--	--	--	--	47	--	--	--	69	67	--
Average	--	--	--	--	--	--	--	--	--	62	66	60

a Measurement between 1 p.m. and 4 p.m.

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Suspended sediment, August to September 1956

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				5,340	--	e 1,300	3,450	98	913
2				5,150	84	1,170	3,500	111	1,050
3				4,850	74	969	2,330	74	466
4				4,860	66	866	394	51	54
5				4,700	46	584	659	66	117
6				4,540			516	104	145
7				4,560			343	76	70
8				4,560			348	70	66
9				4,570			278	64	48
10				4,650	45	564	276	49	37
11				4,720			256	42	29
12				4,720			215	42	24
13				4,720			210	32	18
14				4,720			204	20	11
15				4,390	34	403	199	16	9
16				3,850	34	353	203	14	8
17				3,910	45	475	200	15	8
18				4,040	500	a 5,500	198	14	7
19				4,000	119	1,290	83	10	2
20				4,070	220	a 2,400	68		
21				3,980	104	1,120	63		
22				3,970	112	1,200	61		
23				3,930	95	1,010	55		
24				3,930	76	806	54		
25				3,670	86	852	52	9	1
26				3,730	87	876	52		
27				3,660	72	712	49		
28				3,700	80	799	49		
29				3,690	72	717	47		
30				3,560	90	865	46		
31				3,560	92	884	--	--	--
Total				132,300	--	30,227	14,458	--	3,093

Total discharge for period Aug. 1 to Sept. 30, 1956 (cfs-days) 146,758

Total load for period Aug. 1 to Sept. 30, 1956 (tons) 33,320

e Estimated.

a Computed from partly estimated concentration graph.

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	44	7		27	98		24	--	
2	43	4		25	--		23	33	
3	40	--		22	--		24	4	
4	39	6		27	35		25	--	
5	39	--		30	--		24	--	
6	37	--		32	--		21	--	
7	36	2		32	--		22	--	
8	36	--		30	22		20	--	
9	36	--		29	--		22	36	
10	35	--		30	--		24	--	
11	35	6		29	97		25	--	
12	34	--		27	--		25	--	
13	34	--		26	--		25	--	
14	32	2		30	--		25	--	
15	32	--		30	54	e 3	25	--	
16	32	--	(t)	28	--		25	17	e 1
17	32	--		28	--		25	--	
18	32	4		25	10		25	--	
19	30	--		21	--		25	--	
20	28	--		19	--		24	--	
21	28	3		26	--		22	7	
22	29	--		26	23		22	--	
23	27	--		26	--		22	14	
24	36	--		26	--		23	--	
25	35	2		25	40		24	--	
26	34	--		25	--		24	--	
27	30	--		25	--		24	--	
28	29	27		25	--		24	--	
29	28	--		24	28		24	--	
30	27	--		24	--		24	13	
31	27	--		--	--	--	23	--	
Total	1,036	--	12	799	--	90	734	--	31

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	22	--		18	--		26	--	
2	22	--		20	--		26	--	
3	22	19		21	23	e 1	25	66	
4	22	--		22	--		25	--	
5	22	--		24	20		24	38	e 3
6	22	32		25	--		21	--	
7	22	--		26	--		22	--	
8	22	--	e 1	27	--		24	--	
9	20	--		28	--		26	--	
10	18	--		28	48		27	120	a 9
11	20	--		28	--		26	160	b 11
12	21	--		28	--		27	--	
13	21	16		28	--		26	--	
14	19	--		28	--		25	--	
15	15	--		28	--		26	--	
16	12	--		27	--		27	--	
17	15	--		26	107	e 6	27	67	e 5
18	16	--		25	--		26	--	
19	17	--		23	--		25	--	
20	16	51		22	--		26	--	
21	15	4		21	--		24	--	
22	14	10		23	--		22	--	
23	13	--	(t)	25	--		20	--	
24	12	--		28	84		19	47	
25	11	--		28	--		20	--	
26	12	--		26	--		21	--	e 4
27	13	--		27	--		22	--	
28	14	--		26	--		22	--	
29	14	--		--	--	--	22	44	
30	16	--		--	--	--	22	--	
31	17	--		--	--	--	22	97	
Total	537	--	21	706	--	143	743	--	137

e Estimated.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	23			14	--		55	4,400	sb 700
2	25			18	--		36	250	24
3	24	--	e 5	18	--		24	--	e 10
4	25			24	--		17	--	
5	23			26	70		14	68	
6	26	--	e 8	23	--		13	--	
7	34	120	a 11	20	--		13	--	
8	29	--	e 5	18	--		21	--	
9	24	--		17	--		17	92	e 4
10	23	6	(t)	17	--		16	--	
11	24	--		17	--		21	--	
12	24	--		17	83		21	--	
13	22	--	e 3	17	--	e 5	22	--	
14	22	101		18	--		17	--	
15	22	--		22	--		21	--	
16	23	--		24	--		27	1,400	sa 130
17	22	--		28	--		122	15,000	sb 8,800
18	20	--	e 5	27	--		81	11,000	b 2,400
19	18	--		24	96		43	4,500	b 500
20	17	--		21	--		34	3,200	sb 440
21	17	115		17	--		60	7,100	sb 1,600
22	17	--		18	--		1,460	9,000	b 35,000
23	21	--	e 10	19	--		1,490	1,500	6,030
24	22	--	e 15	22	--		1,880	1,930	s 12,900
25	24	--	e 20	44	130	b 15	3,470	1,900	17,800
26	21	--	e 10	81	200	a 44	4,110	1,000	11,100
27	18	--		98	180	b 48	4,150	490	5,490
28	17	78	e 4	64	--	e 20	4,150	355	3,980
29	16	--		44	--	e 10	4,180	260	2,930
30	14	--		35	950	sb 95	4,180	197	2,220
31	--	--	--	42	2,900	sb 440	--	--	--
Total	657	--	170	894	--	792	29,765	--	112,102

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	4,200	168	1,910	2,440	41	270	3,520	48	456
2	4,190	151	1,710	2,460	42	279	3,350	48	434
3	4,480	300	a 3,600	2,460	47	312	2,860	36	278
4	5,070	255	3,490	2,470	70	467	2,210	42	251
5	5,110	183	2,520	3,410	180	sa 2,100	1,440	32	124
6	5,210	220	a 3,100	4,970	102	1,370	1,440	34	132
7	5,450	182	2,680	4,960	82	1,100	1,420	38	146
8	5,510	150	2,230	5,130	94	1,300	1,420	58	222
9	5,620	123	1,870	5,420	96	1,400	2,020	75	sa 460
10	5,600	135	2,040	5,580	84	1,270	3,800	2,700	sa 30,000
11	5,580	140	2,110	5,570	81	1,220	3,510	340	3,220
12	5,580	110	1,660	5,570	90	1,350	3,470	95	890
13	5,690	105	1,610	5,570	87	1,310	3,700	1,100	sa 12,000
14	5,920	105	1,680	5,570	91	1,370	3,520	350	3,330
15	5,920	95	1,520	5,580	99	1,490	2,860	115	888
16	5,920	95	1,520	5,650	95	1,450	1,520	75	308
17	5,880	118	1,870	5,680	84	1,290	1,480	63	252
18	6,040	140	2,280	5,680	71	1,090	1,290	64	223
19	6,110	260	a 4,300	5,690	56	860	239	48	31
20	6,110	360	a 5,900	5,700	64	985	141	36	14
21	6,060	120	a 2,000	5,100	86	1,180	121	28	9
22	5,650	130	a 2,000	4,400	220	a 2,600	112	20	6
23	5,150	65	904	4,310	124	1,440	104	28	8
24	5,170	47	656	4,290	62	718	95	28	7
25	5,000	37	500	4,290	60	695	91	21	5
26	4,710	50	a 650	4,260	83	955	85		
27	4,680	220	a 2,800	4,440	1,600	sa 22,000	79		
28	4,510	190	a 2,300	4,370	800	a 9,400	68	13	3
29	4,290	110	a 1,300	4,290	35	405	76		
30	2,870	54	418	4,300	36	418	72		
31	2,490	50	336	3,960	39	417	--	--	--
Total	159,770	--	63,464	143,570	--	62,511	46,113	--	53,709

Total discharge for year (cfs-days) 385,324

Total load for year (tons) 293,182

e Estimated.

s Computed by subdividing day.

t Less than 0.50 ton.

a Computed from partly estimated concentration graph.

b Computed from estimated concentration graph.

NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 25, 1957	2:30 p.m.	3,480	56	1,280	3,440		44		68		95	99	100				VPWCM
June 25	5:40 p.m.	4,050	55	2,300	2,890		40		61		94	99	100				VPWCM
Sept. 10	7:05 p.m.	3,710	57	4,260	6,500		66		91		100	--	--				PWCM

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--At bridge on U. S. Highway 26 at Guernsey, Platte County, 0.9 mile downstream from gaging station and 2 miles downstream from Guernsey Dam.
DRAINAGE AREA.--16,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: October 1951, April to September 1952, March to September 1953, May 1954 to September 1957.
Sediment records: April 1947 to June 1953.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,010 ppm Mar. 1-5; minimum, 277 ppm May 24 to June 18.
Hardness: Maximum, 470 ppm Mar. 1-5; minimum, 145 ppm May 24 to June 18.
Specific conductance: Maximum daily, 1,430 micromhos Mar. 1; minimum daily, 404 micromhos May 29.
Water temperatures: Maximum, 74°F Aug. 8; minimum, freezing point on several days during January.
EXTREMES, 1951-57.--Dissolved solids: Maximum (1954-57), 1,010 ppm Mar. 1-5, 1957; minimum, 226 ppm June 27, 1955.
Hardness: Maximum (1954-57), 470 ppm Mar. 1-5, 1957; minimum, 132 ppm June 27, 1955.
Specific conductance: Maximum daily (1954-57), 1,430 micromhos Mar. 1, 1957; minimum daily, 354 micromhos June 27, 1955.
Water temperatures (1954-57): Maximum, 90°F Aug. 20, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Worland, Wyo. No appreciable inflow between gaging station and sampling station except during periods of heavy local precipitation. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-16, 1956....	11.0	--	--	--	--	77	--	172	270	--	--	--	--	595	0.81	17.7	284	143	37	2.0	878	7.9	--
Oct. 17-Nov. 3	11.0	--	--	--	--	86	--	202	310	--	--	--	--	666	.91	19.8	322	156	37	2.1	961	8.0	--
Nov. 4-Dec. 7.....	11.7	--	--	--	--	88	--	210	310	--	--	--	--	678	.92	21.4	334	162	36	2.1	991	7.9	--
Dec. 8-31.....	12.6	12	0.00	76	50	108	5.1	244	385	35	0.4	3.3	0.17	832	1.13	28.3	397	197	37	2.4	1,170	8.2	5
Jan. 1-31, 1957....	15.2	--	--	--	--	116	--	260	415	--	--	--	--	914	1.24	37.5	430	217	37	2.4	1,260	8.0	--
Feb. 1-28.....	21.3	--	--	--	--	131	--	266	430	--	--	--	--	949	1.29	54.6	448	230	39	2.7	1,300	7.8	--
Mar. 1-5.....	838	--	--	--	--	134	--	266	415	--	--	--	--	1,010	1.37	2,290	470	252	38	2.7	1,390	7.9	--
Mar. 6-10.....	989	--	--	--	--	129	--	243	--	--	--	--	--	930	1.26	2,480	434	235	39	2.7	1,300	8.0	--
Mar. 11-31.....	711	10	.00	84	36	112	5.5	198	370	36	.5	1.4	.12	791	1.08	1,520	359	197	40	2.6	1,130	7.8	3
Apr. 1-25.....	11.4	--	--	--	--	107	--	200	357	--	--	--	--	780	1.06	24.0	351	187	40	2.5	1,100	7.9	--
Apr. 26-May 14....	102	--	--	--	--	115	--	189	370	--	--	--	--	751	1.02	207	334	179	43	2.7	1,080	8.0	--
May 15-19.....	1,483	--	--	--	--	84	--	161	270	--	--	--	--	596	.81	2,390	266	134	41	2.2	868	7.8	--
May 20-23.....	2,278	--	--	--	--	48	--	132	148	--	--	--	--	377	.51	2,320	182	74	36	1.5	572	7.7	--
May 24-June 18....	1,381	16	.01	41	10	30	3.2	113	100	7.5	.3	.7	.06	277	.38	1,030	145	52	31	1.1	425	7.5	18
June 19-27.....	1,347	--	--	--	--	38	--	148	125	--	--	--	--	353	.48	1,280	185	64	31	1.2	526	7.9	--
June 28-July 2.....	3,226	--	--	--	--	51	--	171	194	--	--	--	--	465	.63	4,050	248	108	31	1.4	693	7.5	--
July 3-23.....	4,949	--	--	--	--	35	--	155	126	--	--	--	--	338	.46	4,520	194	67	28	1.1	526	7.6	--
July 24-Aug. 31....	4,284	--	--	--	--	46	--	164	171	--	--	--	--	418	.57	4,830	229	95	30	1.3	639	7.6	--
Sept. 1-30.....	2,276	18	.00	53	16	36	3.9	156	136	11	.4	.2	.18	357	.49	2,190	196	68	28	1.1	545	7.6	10
Weighted average a	1,229	--	--	--	--	46	--	159	164	--	--	--	--	408	0.55	1,350	218	88	31	1.3	618	--	--

a Includes estimate where datum is missing. Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 4 p.m. and 6 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	69	51	55	40	--	41	49	67	56	70	72	66
2	69	45	55	43	--	40	44	70	57	70	72	66
3	68	45	56	38	--	42	48	65	58	70	72	65
4	68	45	55	33	--	42	44	64	59	70	72	65
5	68	47	49	34	--	43	44	60	59	70	72	65
6	68	50	49	34	--	43	42	65	60	70	73	64
7	68	50	50	35	41	43	52	66	61	69	73	64
8	65	52	50	34	41	44	52	62	62	70	74	64
9	62	55	55	33	44	44	58	54	61	70	73	64
10	67	55	55	31	46	44	59	57	63	70	72	63
11	67	57	53	33	46	45	51	55	64	71	72	63
12	63	56	53	33	48	44	42	61	65	71	72	62
13	62	56	55	32	47	43	42	54	66	71	72	59
14	62	47	55	32	47	43	54	53	--	71	72	59
15	63	49	54	32	45	42	59	53	66	71	71	63
16	66	50	55	32	47	42	60	53	66	71	69	57
17	63	52	54	--	48	42	54	54	66	71	69	57
18	63	51	42	32	49	41	60	55	66	71	69	53
19	67	47	43	32	46	42	56	55	--	71	68	53
20	64	50	52	32	45	42	62	55	64	71	69	59
21	64	52	44	32	42	43	64	54	63	71	69	53
22	65	50	44	32	45	42	59	54	63	71	67	59
23	65	54	44	32	42	41	--	54	63	70	62	59
24	51	55	40	32	49	43	58	54	63	71	67	53
25	56	55	40	32	46	43	54	54	63	71	67	57
26	56	55	--	32	49	43	59	56	68	71	--	57
27	61	54	39	32	49	44	58	55	68	71	--	59
28	52	56	35	32	44	52	63	55	69	71	--	60
29	53	56	35	32	--	55	65	56	70	71	--	63
30	57	55	35	32	--	49	67	56	70	71	--	63
31	59	--	35	32	--	49	--	56	--	71	--	--
Average	63	52	48	33	--	44	54	57	64	71	70	60

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.

LOCATION.--At gaging station at private bridge, 7½ miles east of Uva, Platte County, and 9½ miles downstream from Chugwater Creek.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to June 1957, September 1957 (discontinued).
Water temperatures: October 1952 to September 1957 (discontinued).
Sediment records: October 1952 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 658 ppm Jan. 11; minimum, 308 ppm May 29 to June 6.
Hardness: Maximum, 408 ppm Jan. 11; minimum, 184 ppm May 29 to June 6.
Specific conductance: Maximum daily, 1,040 micromhos Nov. 25; minimum daily, 414 micromhos May 28.
Water temperatures: Minimum, freezing point Feb. 2, 20.
Sediment concentrations: Maximum daily, 826 ppm May 29; minimum daily, not determined.
Sediment loads: Maximum daily, 3,450 tons May 29; minimum daily, not determined.
EXTREMES, 1952-57.--Water temperatures: Minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 7,720 ppm June 27, 1955; minimum daily, not determined.
Sediment loads: Maximum daily, 19,400 tons June 27, 1955; minimum daily, less than 0.50 ton Sept. 13-28, 1956.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Nov. 2-4, 20, 21, Dec. 6-9, Jan. 4, 5, 14-18, 25-30. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to June 1957, September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-13, 1956....	3.35	38	0.04	94	28	61	6.2	319	198	20	0.6	0.8	0.12	614	0.84	5.55	348	86	27	1.4	887	8.2	7
Oct. 14-31	15.1	40	.06	94	26	57	6.8	306	183	19	.6	2.8	.11	590	.80	24.1	340	89	26	1.3	851	8.2	7
Nov. 1-23	46.0	41	.01	93	25	52	5.5	292	181	19	.6	4.1	.07	573	.78	71.2	335	96	25	1.2	830	8.0	5
Nov. 24-28	62.0	35	.01	110	28	62	5.0	354	202	22	.7	2.3	.08	652	.89	109	388	98	25	1.4	949	8.0	5
Nov. 29-Jan. 1, 1957	55.5	38	.01	93	23	51	4.8	278	180	19	.6	3.2	.06	554	.75	83.0	325	97	25	1.2	809	7.9	5
Jan. 2	52	39	.18	69	15	51	5.0	a 164	188	19	.7	4.6	.08	474	.64	66.5	232	98	32	1.5	675	8.3	--
Jan. 3-10	46.4	40	.04	69	36	50	4.4	276	178	18	.7	4.6	.09	548	.75	68.7	320	94	25	1.2	799	8.0	8
Jan. 11	68	35	.16	108	34	62	4.9	356	225	21	.8	3.3	.10	658	.89	121	408	116	25	1.3	957	8.1	--
Jan. 12-26	52.7	39	.04	92	26	51	4.4	300	178	18	.7	4.4	.09	583	.79	83.0	336	90	25	1.2	833	8.0	20
Jan. 27-Feb. 5	72.8	41	.00	94	25	52	5.1	296	183	18	.7	4.5	.10	573	.78	113	338	95	25	1.2	825	7.9	4
Feb. 6-28	58.2	38	.00	91	24	50	4.7	284	177	18	.7	3.4	.10	552	.75	86.7	326	93	25	1.2	798	8.1	5
Mar. 1-31.....	49.2	39	.00	46	49	50	5.3	275	168	18	.7	3.6	.05	535	.73	71.1	316	90	25	1.2	790	7.9	3
Apr. 1-20	57.3	36	.01	29	60	53	5.8	277	165	17	.8	2.9	.13	535	.73	82.8	318	91	26	1.3	797	8.1	10
Apr. 21	56	37	.04	62	53	68	8.1	288	235	24	.8	2.2	.08	654	.89	98.9	374	138	28	1.5	940	8.1	15
Apr. 22-May 6.....	76.0	36	.01	78	20	42	9.6	255	145	16	.7	2.6	.13	472	.64	96.9	278	69	24	1.1	701	7.7	9
May 7-28	397	24	.02	56	14	28	4.3	190	92	10	.5	2.1	.09	336	.46	360	198	42	23	.9	499	7.7	20
May 29-June 6	442	25	.02	52	13	26	3.7	187	73	9.0	.4	1.6	.08	308	.42	368	184	31	23	.8	458	7.7	18
June 7-19	222	31	.01	64	16	35	4.2	230	96	12	.5	2.1	.10	387	.53	232	227	38	25	1.0	569	7.9	11
June 20-30	68.7	33	.01	70	19	39	4.7	257	107	13	.5	1.3	.09	417	.57	77.3	251	40	25	1.1	627	7.8	6
Sept. 14-30.....	87.5	33	.00	85	24	54	5.7	284	167	18	.8	1.8	.60	546	.74	129	310	77	27	1.3	784	7.8	5
Weighted average b	98.7	31	0.02	66	22	39	4.8	235	125	14	0.6	2.5	0.12	431	0.59	115	253	60	25	1.1	633	--	--
Weighted average c	91.1	32	0.01	69	22	40	5.0	242	131	14	0.6	2.6	0.12	447	0.61	110	262	64	24	1.1	655	--	--

a Includes equivalent of 8 ppm of carbonate (CO_3).
b Represents 86 percent of runoff for water year October 1956 to September 1957.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 1 p.m. and 6 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	64	a 54	46	a 38	a 36	a 42	48	a 55	64	a 73		--
2	62	a 50	a 44	a 36	32	--	48	55	67	--		--
3	62	45	a 43	36	33	42	46	67	67	--		--
4	a 62	33	a 40	36	a 33	44	46	60	67	--		--
5	62	a 38	a 40	36	--	40	a 50	48	--	--		--
6	64	40	a 38	a 36	33	40	50	48	--	--		--
7	65	40	a 38	38	a 33	40	56	63	66	--		--
8	65	40	--	a 37	--	40	a 57	a 60	--	--		--
9	66	46	--	34	34	46	54	a 52	--	--		--
10	65	42	--	a 33	35	48	58	54	a 65	--		--
11	64	47	48	a 37	36	48	48	56	a 64	--		--
12	67	48	a 40	a 37	36	48	57	52	a 65	--		--
13	60	a 48	a 44	36	38	48	48	56	a 61	--		--
14	a 58	46	46	34	a 38	48	58	48	a 58	--		--
15	60	a 34	42	34	38	48	a 48	48	a 53	--		--
16	60	40	a 42	a 36	36	48	a 48	48	--	--		--
17	--	40	a 37	36	a 40	48	a 48	48	a 54	--		--
18	58	a 36	a 38	34	38	48	a 55	48	a 58	--		--
19	58	36	38	34	a 34	48	57	61	72	--		--
20	56	36	38	33	32	48	57	60	a 67	--		60
21	60	a 34	38	33	34	50	58	58	a 63	--		58
22	57	a 40	a 36	33	38	48	58	52	a 60	76		58
23	52	44	38	33	42	48	58	52	64	--		a 58
24	46	44	38	--	48	44	58	52	a 60	--		--
25	45	44	a 36	34	52	a 46	58	58	70	--		60
26	48	42	a 38	34	48	50	a 52	56	--	--		64
27	48	46	42	33	48	50	60	62	--	--		62
28	a 42	48	a 40	a 33	48	46	60	64	--	--		a 60
29	44	46	40	35	--	46	64	55	--	--		64
30	42	48	38	--	--	a 42	64	a 64	--	--		65
31	a 55	--	38	33	--	55	--	--	--	--		--
Average	58	43	40	35	38	46	54	55	--	--		--

a Measurement between 8 a.m. and 12 m.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2.3			32			62		
2	1.0			28			62		
3	1.0			25			62		
4	1.1	128	1	45			62		
5	1.3			52			58		
6	2.1			52			38		
7	4.5			46			52		
8	5.0			43			53		
9	3.4			44			55		
10	4.2			43			58		
11	7.0			42			54		
12	6.0			42			64		
13	4.7			42			66		
14	6.5			43			64		
15	6.0			52	68	9	58		
16	7.0	126	2	52			58	51	8
17	8.5			52			56		
18	4.7			54			54		
19	3.4			54			58		
20	4.2			44			50		
21	7.0			55			50		
22	6.5			56			54		
23	8.5			60			52		
24	14			64			52		
25	12			62			52		
26	10			60			50		
27	22			62			52		
28	36			62			52		
29	40	90	8	62			52		
30	38			62			52		
31	37			--		--	52		
Total	314.9	--	86	1,492		270	1,714		248

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	50			84	--		48		
2	52			86	--		48		
3	44			80	--		50		
4	46			74	--		50		
5	50			76	--	e 10	52		
6	52			70	--		52		
7	54	74	10	74	62		48		
8	58			78	--		56		
9	21			80	--		56		
10	46			60			56		
11	68			54			52		
12	70			60			50		
13	58			62			50		
14	50			62			48		
15	45			62			48		
16	40			60			48	67	9
17	50			58			48		
18	60			56			48		
19	64			54	64	9	48		
20	66			54			48		
21	60			52			46		
22	54			50			46		
23	56		e 10	52			46		
24	42			50			46		
25	40			50			48		
26	35			48			50		
27	50			46			48		
28	60			46			48		
29	65			--	--	--	48		
30	73			--	--	--	48		
31	80			--	--	--	48		
Total	1,659		310	1,738	--	261	1,526		279

e Estimated.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	48			60	142	23	470	460	a 600
2	50			58	110	17	416	380	a 420
3	54			64	120	a 20	356	300	a 280
4	58			80	140	30	312	288	243
5	58			119	160	52	305	326	269
6	58			135	240	88	302	450	368
7	58			143	126	49	408	770	849
8	62			146	100	40	293	630	499
9	60			146	105	42	251	460	a 320
10	56			159	180	78	232	300	a 190
11	56			157	238	101	208	198	112
12	54	90	14	230	243	151	275	561	417
13	58			242	240	157	220	450	268
14	62			260	280	197	182	256	126
15	66			296	270	216	170	264	122
16	62			400	226	245	165	225	101
17	56			610	219	362	174	240	a 110
18	56			488	229	302	157	198	84
19	56			610	437	721	146	161	64
20	58			565	290	443	126	184	63
21	56			474	250	320	104	121	34
22	54			412	185	206	94	95	a 24
23	60			420	178	202	92	87	22
24	84			447	260	314	92	89	22
25	82			560	253	383	80	74	16
26	72	130	26	684	350	647	66	56	10
27	70			684	230	425	42	60	7
28	70			590	250	399	23		
29	68			822	826	s 3,340	21	86	4
30	64			520	800	1,120	16		
31	--	--	--	474	540	692	--	--	--
Total	1,826	--	504	11,055	--	11,382	5,798	--	5,652

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	15	122		56			70		
2	14			40		e 10	64		
3	12			44			62		
4	12		e 2	58			62		
5	13			226		e 200	56		e 8
6	11			159		e 90	54		
7	10			132		e 60	52		
8	16		e 5	115			52		
9	54		e 22	94			48		
10	28		e 10	108			46		
11	16			104		e 24	64		
12	13			92			64		
13	15			74			66		
14	12			64			88		
15	12		e 5	64			96		e 22
16	9.5			66			94		
17	7.5			62			88		
18	21			68			82		
19	12			72			86		
20	15			82			94		
21	37		e 15	70			96		
22	66		e 44	72		e 10	94		
23	122		e 80	64			94		
24	86		e 36	70			98		
25	146		e 100	74			94	74	17
26	100			68			84		
27	90			64			80		
28	80			68			76		
29	76		e 20	124		e 50	74		
30	74			90		e 24	70		
31	66			72		e 14	--		--
Total	1,261.0		496	2,616		800	2,248		465

Total discharge for year (cfs-days) 33,247.9

Total load for year (tons) 20,753

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 7, 1957	12:15 p.m.	143	62	107	973		52		77		98	100					VBWCM
June 4	3:35 p.m.	308	72	278	1,080		25		34		60	99	100				VBWCM
June 19	3:35 p.m.	143	72	155	725		40		61		85	100					VBWCM

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
May 7, 1957	12:15 p.m.	143	18			10	15	18	45	65	71	75	80	87		SV
June 4	3:35 p.m.	308	12			2	20	28	56	75	81	87	92	94		SV
June 19	3:35 p.m.	143	10			5	46	56	69	85	89	92	94	96		SV

SOUTH PLATTE RIVER AT HENDERSON, COLO.

LOCATION.--At gaging station at bridge on State Highway 22, and 0.2 mile northwest of Henderson, Adams County.
DRAINAGE AREA.--4,740 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1955 to September 1957 (discontinued).
Water temperatures: July 1955 to September 1957 (discontinued).
EXTREMES, 1956-57.--Dissolved solids: Maximum, 874 ppm Apr. 12-18; minimum, 147 ppm June 26 to July 14.
Hardness: Maximum, 378 ppm Nov. 11 to Dec. 31, Apr. 12-18; minimum, 64 ppm June 26 to July 14.
Specific conductance: Maximum daily, 1,380 micromhos Oct. 4; minimum daily, 207 micromhos July 2-4.
Water temperatures: Maximum, 78°F Sept. 6, 7; minimum, freezing point on several days during December and January.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 874 ppm Apr. 12-18, 1957; minimum, 147 ppm June 26 to July 14, 1957.
Hardness: Maximum, 378 ppm Nov. 11 to Dec. 31, 1956, Apr. 12-18, 1957; minimum, 64 ppm June 26 to July 14, 1957.
Specific conductance: Maximum daily, 1,380 micromhos Oct. 4, 1956; minimum daily, 207 micromhos July 2-4, 1957.
Water temperatures: Maximum (1955, 1956-57), 80°F July 21, 22, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-13, 1956	87.8	28	0.18	72	25	146	14	436	0	109	145	0.8	0.5	0.52	738	1.00	175	284	0	51	3.8	1,310	7.5
Oct. 14-31	50.1	24	.07	90	25	123	9.0	378	0	164	115	.8	.3	.38	722	.98	97.7	326	16	44	3.0	1,230	7.3
Nov. 1-10	26.6	24	.01	106	25	109	5.1	296	0	213	100	1.0	8.7	.29	758	1.03	54.4	366	123	39	2.5	1,160	7.6
Nov. 11-30	37.9	22	.02	109	26	122	5.7	300	0	245	100	.9	22	.29	825	1.12	84.4	378	152	41	2.7	1,250	7.4
Dec. 1-31	56.9	19	.00	110	25	121	6.3	288	0	243	100	.9	34	.48	833	1.13	128	378	142	41	2.7	1,240	8.0
Jan. 1-19, 1957	43.2	17	.01	101	26	126	6.7	282	0	250	88	1.2	26	.27	814	1.11	94.9	357	126	43	2.9	1,230	7.8
Jan. 20-31	134	17	.01	85	22	123	8.6	210	0	215	104	1.2	50	.33	767	1.04	278	302	130	46	3.1	1,170	7.2
Feb. 1-28	143	18	.01	78	21	128	10	197	0	185	108	1.3	49	.38	727	.99	281	279	117	49	3.3	1,130	8.0
Mar. 1-7	173	17	.02	72	20	123	9.8	202	0	165	102	1.3	40	.34	674	.92	315	260	94	50	3.3	1,060	7.9
Mar. 8-11	150	18	.02	81	23	135	9.3	198	0	198	140	1.2	50	.38	776	1.06	314	298	136	49	3.4	1,220	7.6
Mar. 12-Apr. 11	158	17	.02	79	22	124	8.9	204	0	203	96	1.4	45	.34	714	.97	305	286	119	48	3.2	1,100	7.2
Apr. 12-18	103	16	.00	99	32	142	7.2	266	0	305	75	1.0	26	.23	874	1.19	243	378	160	44	3.2	1,270	7.6
Apr. 19-May 1	78.5	16	.01	88	24	119	6.8	238	0	233	70	1.0	20	.25	696	.95	148	318	123	44	2.9	1,090	7.4
May 2-7	201	15	.01	72	16	86	7.5	181	0	179	59	1.0	13	.21	568	.77	308	246	98	42	2.4	863	7.7
May 8-11	2,976	21	.01	72	9.8	38	10	194	0	120	19	.7	1.5	.12	402	.55	3,230	220	61	26	1.1	604	7.6
May 12-30	2,465	17	.01	39	7.7	29	3.7	85	0	93	18	.8	6.7	.07	269	.37	1,790	129	59	32	1.1	410	7.5
May 31-June 15	2,583	15	.01	22	5.4	18	3.0	49	0	58	14	.6	4.2	.07	171	.23	1,190	77	37	33	.9	260	7.2
June 16-25	1,435	13	.01	22	6.6	21	2.5	53	0	54	15	.5	5.4	.06	177	.24	686	82	39	35	1.0	275	7.2
June 26-July 14	1,497	11	.01	18	4.6	17	2.1	49	0	43	12	.4	2.4	.06	147	.20	594	64	24	36	.9	225	7.2
July 15-Aug. 6	1,328	13	.01	27	6.0	25	3.1	80	0	56	17	.3	3.0	.11	197	.27	706	92	26	36	1.1	309	6.9
Aug. 7-26	975	14	.01	37	8.4	35	3.5	116	0	69	25	.6	3.7	.11	258	.35	679	127	32	37	1.3	415	7.4
Aug. 27-31	645	16	.00	46	11	56	4.5	141	0	98	45	.8	7.6	.16	361	.49	629	160	44	42	1.9	583	7.5
Sept. 1-10	246	15	.01	56	14	71	5.1	171	0	124	55	.8	2.6	.21	453	.62	301	196	56	43	2.2	706	7.3
Sept. 11-20	309	15	.01	56	13	63	4.5	166	0	120	48	.8	5.8	.18	416	.57	347	195	59	41	2.0	665	7.2
Sept. 21-30	174	16	.01	67	15	88	6.7	194	0	152	68	1.0	16	.44	540	.73	254	230	71	45	2.5	844	7.3
Weighted average a	615	15	0.01	37	8.4	36	4.1	98	--	83	26	0.6	7.2	0.11	277	0.38	460	127	47	37	1.4	428	--

a Represents 100 percent of runoff for water year October 1956 to September 1957

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT HENDERSON, COLO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 9 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	55	50	35	a 38	a 48	a 58	55	64	62	68	76
2	60	56	40	35	a 42	a 54	a 56	54	64	62	70	76
3	60	55	35	32	a 44	a 52	a 55	54	64	64	70	76
4	55	53	35	--	a 46	a 51	a 55	55	64	62	70	76
5	60	60	--	31	a 48	a 50	a 55	57	66	63	72	76
6	55	56	35	--	a 48	a 51	a 54	56	64	63	72	78
7	60	50	35	--	a 50	a 50	a 56	58	66	64	72	78
8	55	55	--	37	a 52	a 47	a 54	57	66	64	70	76
9	60	60	40	36	a 48	a 51	a 55	54	64	66	72	76
10	55	55	36	39	a 47	a 54	a 58	52	66	66	74	76
11	60	50	--	37	a 49	a 57	a 55	55	62	68	74	77
12	62	54	40	38	a 50	a 58	a 56	58	58	68	68	77
13	60	50	35	38	a 52	a 55	a 55	58	60	67	68	74
14	60	60	40	36	a 52	a 47	a 58	60	58	68	68	74
15	65	55	35	a 32	a 54	a 48	a 56	54	54	68	67	75
16	60	50	32	a 31	a 54	a 50	a 58	50	54	68	67	76
17	60	55	35	--	a 55	a 55	a 54	52	56	67	66	76
18	50	60	40	38	a 57	a 56	a 52	50	60	67	68	76
19	45	55	45	40	a 58	a 58	a 54	52	60	66	66	76
20	60	55	40	42	a 56	a 58	a 58	54	60	66	70	76
21	50	50	35	43	a 57	a 56	a 60	58	60	68	70	76
22	45	60	35	--	a 54	a 56	a 57	58	60	68	68	76
23	60	50	35	36	a 54	a 52	a 54	60	62	65	68	75
24	60	--	35	34	a 58	a 50	a 56	62	62	65	68	76
25	55	55	32	31	a 58	a 53	a 52	64	64	68	66	76
26	55	55	35	--	a 57	a 55	a 54	64	64	65	66	77
27	60	55	35	a 35	a 55	a 57	a 54	66	65	65	65	76
28	60	60	40	a 33	a 56	a 57	a 56	68	68	65	65	75
29	55	--	35	a 32	--	a 58	a 58	68	68	68	66	77
30	60	--	35	a 32	--	a 57	a 56	66	70	70	66	--
31	--	--	35	a 38	--	a 58	--	58	--	70	65	--
Average	57	55	37	36	52	54	56	58	62	66	69	76

a Measurement between 12 m. and 1 p.m.

SOUTH PLATTE RIVER NEAR KERSEY, COLO.

LOCATION.--At gaging station at bridge on State Highway 37, 1.9 miles north of railroad in Kersey, Weld County, and 2½ miles downstream from Cache la Poudre River.
DRAINAGE AREA.--9,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1953, August 1954 to August 1957 (discontinued).
Water temperatures: December 1950 to September 1953.
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to August 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 5, 1956....	90.4	20	0.01	175	76	147	5.8	341	688	41	1.1	13	0.30	1,490	1,340	2.03		750	470	30	2.3	1,840	7.9	--
Oct. 22.....	185	--	--	--	--	143	--	376	--	--	--	--	--	--	--	--		772	464	29	2.2	1,850	7.5	--
Nov. 20.....	310	27	.14	137	91	135	10	476	560	32	1.0	.2	.31	1,340	1,230	1.82		715	325	29	2.2	1,760	7.9	7
Dec. 11.....	405	17	.00	160	76	139	8.9	485	570	52	1.0	.2	.31	1,340	1,260	1.82		710	312	30	2.3	1,770	7.4	5
Jan. 8, 1957....	360	--	--	--	--	135	--	380	--	--	--	--	--	--	--	--		700	388	30	2.2	1,730	7.5	--
Feb. 5.....	437	--	--	--	--	132	--	346	--	--	--	--	--	--	--	--		608	324	32	2.3	1,590	7.4	--
Mar. 6.....	459	14	.38	124	59	128	6.3	330	465	65	1.0	2.4	.27	1,120	1,030	1.52		552	281	33	2.4	1,520	7.8	7
Apr. 23.....	600	--	--	--	--	146	--	279	--	--	--	--	--	--	--	--		597	368	35	2.6	1,570	7.6	--
June 4.....	5,300	14	.09	41	14	28	3.6	96	116	12	.7	6.6	.08	298	--	.41		159	80	27	1.0	452	7.1	--
July 24.....	1,670	--	--	75	35	67	--	172	295	22	--	--	--	627	--	.85		330	187	30	1.6	891	7.4	--
Aug. 22.....	1,680	--	--	87	43	88	--	208	353	32	--	--	--	770	--	1.05		394	233	33	1.9	1,070	7.5	--

PLATTE RIVER BASIN--Continued

KIOWA CREEK AT ELBERT, COLO.

LOCATION.--At gaging station, a quarter of a mile southeast of Elbert, Elbert County, and half a mile upstream from West Kiowa Creek.
DRAINAGE AREA.--28.6 square miles.
RECORDS AVAILABLE.--Sediment records: April 1956 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 6,500 ppm July 31; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1,320 tons July 31; minimum daily, 0 tons on many days.
REMARKS.--No flow during period April 1956 to June 1957; record is omitted. Maximum observed sediment concentration during water year, 19,600 ppm July 31. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, July to September 1957

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	5.0	1,440	sa 31			
2	0	--	0	0		0			
3	0	--	0	.3		e 3.6			
4	0	--	0	.2		e .8			
5	0	--	0	0		0			
6	0	--	0	0		0			
7	0	--	0	0		0			
8	0	--	0	0		0			
9	0	--	0	0		0			
10	0	--	0	0		0			
11	0	--	0	0		0			
12	0	--	0	0		0			
13	0	--	0	0		0			
14	0	--	0	0		0			
15	0	--	0	0		0			
16	0	--	0	0		0			
17	0	--	0	0		0			
18	0	--	0	0		0			
19	0	--	0	0		0			
20	.1	--	e 1.4	0		0			
21	0	--	0	0		0			
22	0	--	0	0		0			
23	.1	--	e .3	0		0			
24	0	--	0	0		0			
25	0	--	0	0		0			
26	0	--	0	0		0			
27	0	--	0	0		0			
28	0	--	0	0		0			
29	0	--	0	0		0			
30	.1	61	sa 4.4	0		0			
31	59	6,500	s 1,320	0		0			
Total	59.3	--	1,326.1	5.5		35.4	0		0

Total discharge for year (cfs-days) 64.8
Total load for year (tons) 1,361.5

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.

KIOWA CREEK AT ELBERT, COLO.--Continued

Particle-size analyses of suspended sediment, July to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
July 31, 1957.....	6:00 a.m.	62	--	7,270	5,160	59	73	87	96	97	100						SPWCM
July 31	6:45 a.m.	59	53	7,200	4,830	56	69	80	90	95	100						SPWCM
July 31	6:45 a.m.	59	53	7,200	5,700	40	57	74	85	88	100						SPNM

PLATTE RIVER BASIN--Continued

KIOWA CREEK AT KIOWA, COLO.

LOCATION.--At gaging station, at cableway 0.7 miles upstream from bridge on State Highway 86 and 0.7 mile south of Kiowa, Elbert County.
DRAINAGE AREA.--111 square miles.
RECORDS AVAILABLE.--Sediment records: April 1956 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 13,000 ppm July 31; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 33,000 tons July 20; minimum daily, 0 tons on many days.
EXTREMES, April 1956 to September 1957.--Sediment concentrations: Maximum daily, 15,000 ppm Aug. 1, 1956; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 43,000 tons July 31, 1956; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 13,300 ppm July 20. Flow affected by ice Dec. 26 to Jan. 9, Jan. 13-15, 21, Feb. 4-12, Mar. 14, 23-26, Apr. 3-8. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0		0	0.1		
2				0		0	.1		
3				.2		(t)	.1		(t)
4				.1		(t)	.1		
5				0		0	.1		
6				0		0	0		0
7				0		0	0		0
8				0		0	0		0
9				0		0	0		0
10				0		0	0		0
11				0		0	0		0
12				0		0	0		0
13				0		0	0		0
14				0		0	0		0
15				0		0	0		0
16				0		0	0		0
17				0		0	0		0
18				0		0	0		0
19				0		0	0		0
20				0		0	.1		
21				0		0	.1		
22				.1		(t)	.1		
23				0		0	.1		
24				0		0	.1		
25				0		0	.1		(t)
26				0		0	.2		
27				.1			.2		
28				.1			.3		
29				.1		(t)	.4		
30				.1			.5		
31				--		--	.4		
Total	0		0	0.8		(t)	3.1		1

t Less than 0.50 ton.

PLATTE RIVER BASIN--Continued

KIOWA CREEK AT KIOWA, COLO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.4			0.1			0.6		
2	.5			.1			.6		
3	.4			.2			1.0		
4	.2			.2			.6		
5	.1		(t)	.3			.4		
6	.2			.3			.2		
7	.1			.4			.2		
8	.1			.5			.3		
9	0		0	.5			.5		
10	0		0	.4			.8		
11	.1			.6			.9		
12	.2			.8			.9	330	
13	.3			1.0			.8		
14	.3			1.0			.3		
15	.1			1.0		(t)	.7		
16	.5			.8			.7		e 1
17	.3			.5			.7		
18	.3		(t)	.6			.6		
19	.4			.7			.6		
20	.6			.6			.6		
21	.8			.7			.6		
22	.6			.7			.6		
23	.3			.6			.6		
24	.2			.6			.9		
25	.1			.6			1.0		
26	0		0	.6			1.0		
27	0		0	.6			1.0		
28	0		0	.6			1.8		
29	0		0	--			1.8		
30	0		0	--			4.2		
31	0		0	--			4.2		
Total	7.1		3	15.6		8	29.7		31

Day	April			May			June		
1	2.6	--		1.0	460	1	36	4,100	400
2	5.8	--		1.0	230	1	13	1,500	53
3	20	--		3.4	250	2	15	800	32
4	17	--		1.0	--	e 1	9.0	--	
5	12	--		.8	--	e 1	5.8	440	
6	6.0	--		1.0	--	e 1	5.8	--	
7	2.0	--		1.0	210	1	4.2	610	e 6
8	3.0	--	e 40	2.6	--	e 2	4.2	--	
9	3.4	--		189	10,000	s 12,000	.9	--	
10	5.8	2,400		13	2,200	77	1.0	--	
11	9.0	1,500		5.0	--	e 11	7.3	1,100	22
12	4.2	--		1.8	--	e 1	26	1,300	91
13	5.0	--		14	3,900	s 210	18	1,000	49
14	6.6	--		5.0	1,100	15	20		
15	20			33	4,000	s 650	20	--	e 40
16	39			41	4,900	540	26		
17	42	--	e 240	82	6,000	s 2,300	11		
18	28			86	11,000	s 4,200	4.2	--	
19	31			8.2	3,000	66	2.6	170	
20	24			17	2,000	92	1.8	--	
21	6.6			17	1,900	87	1.0	--	
22	11			13	1,400	49	1.0	--	
23	8.2			18	750	36	1.0	--	
24	9.0			28	4,000	300	.8	60	(t)
25	8.2	--	e 8	24	1,200	78	.7	--	
26	1.8			15	750	30	.6	--	
27	3.4			5.8	500	8	.5	--	
28	4.2			5.8	500	8	.4	--	
29	3.4			26	2,000	s 320	.4	--	
30	2.6			18	1,000	49	.3	--	
31	--	--	--	43	4,000	s 1,400	--	--	--
Total	344.8	--	2,080	720.4	--	22,537	238.5	--	853

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.

PLATTE RIVER BASIN--Continued

KIOWA CREEK AT KIOWA, COLO.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.2	--	(t)	39	--	e 160	0	--	0
2	.1	--	(t)	5.8	880	14	0	--	0
3	0	--	0	48	--	e 2,600	0	--	0
4	0	--	0	32	--	e 870	0	--	0
5	0	--	0	.9	440	1	0	--	0
6	0	--	0	.9	--	e 1	0	--	0
7	0	--	0	2.6	330	2	0	--	0
8	.1	--	(t)	.8			0	--	0
9	0	--	0	.7			0	--	0
10	0	--	0	.6			0	--	0
11	0	--	0	.5			0	--	0
12	0	--	0	.4			0	--	0
13	0	--	0	.3			.1	--	
14	0	--	0	.1	--	(t)	.8	650	
15	0	--	0	.1			.8	--	
16	0	--	0	.2			.6	--	
17	0	--	0	.2			.4	--	
18	0	--	0	.1			.3	--	
19	0	--	0	.1			.5	--	
20	419	6,200	s 33,000	0	--	0	.6	--	
21	20	1,600	86	.1			.7	--	(t)
22	76	6,200	s 5,500	.1	--	(t)	.6	--	
23	30	3,300	s 360	.1			.6	--	
24	39	--	e 120	0	--	0	.6	--	
25	98	4,900	s 3,800	0	--	0	.5	--	
26	35	1,500	s 220	0	--	0	.6	--	
27	7.4	--	e 10	.4	140		.6	28	
28	7.4	--	e 6	.2	--	(t)	.6	--	
29	17	250	11	.1	--		.6	--	
30	154	5,000	s 16,000	0	--	0	.6	--	
31	185	13,000	s 12,000	0	--	0	--	--	--
Total	1,088.2	--	71,113	134.3	--	3,649	10.1	--	3

Total discharge for year (cfs-days) 2,592.6
Total load for year (tons) 100,278

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.

KIOWA CREEK AT KIOWA, COLO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 12, 1957	3:10 p.m.	0.8	51	329	1,240	41	53	64	77	90	96	98	99		100	--	SBWCM
Apr. 11	11:45 a.m.	6.6	47	1,510	1,890	34	41	51	60	75	89	95	100		--	--	VPWCM
May 9	10:25 a.m.	160	43	12,600	5,840	44	52	63	72	80	90	96	99		100	--	VPWCM
May 9	10:25 a.m.	160	43	12,600	6,120	29	39	55	68	78	90	96	99		100	--	VPNM
May 9	11:25 a.m.	156	44	12,300	5,880	42	51	61	70	79	89	95	99		100	--	VPWCM
May 9	6:25 p.m.	43	47	7,670	4,810	51	60	68	76	84	94	98	99		100	--	VPWCM
May 10	1:45 p.m.	11	55	1,260	820	51	57	69	77	88	93	97	100		--	--	VPWCM
May 13	9:50 a.m.	29	45	4,540	3,890	37	45	54	64	72	80	86	94		98	100	VPWCM
May 13	9:50 a.m.	29	45	4,540	3,940	26	37	49	60	67	80	86	94		98	100	VPNM
May 15	3:32 p.m.	110	33	11,200	5,000	30	38	44	52	65	83	92	98		100	--	VPWCM
May 16	12:20 p.m.	51	42	6,380	5,940	32	39	48	58	71	86	93	98		100	--	VPWCM
May 17	5:55 p.m.	249	60	14,900	8,570	25	28	39	47	58	76	86	96		100	--	VPWCM
May 17	5:55 p.m.	249	60	14,900	8,590	18	26	35	45	57	76	86	96		100	--	VPNM
May 18	9:55 a.m.	67	62	4,250	3,980	44	54	63	72	79	90	94	99		100	--	VPWCM
May 18	3:25 p.m.	224	68	17,600	6,200	--	50	--	68	--	88	92	97		100	--	VPWCM
May 31	9:05 p.m.	266	48	19,800	4,670	35	40	48	56	67	84	90	96		99	100	VPWCM
May 31	9:05 p.m.	266	48	19,800	4,560	22	29	43	54	68	84	90	96		99	100	VPNM
June 1	5:28 a.m.	6.6	45	6,140	4,670	24	36	48	58	69	79	86	95		100	--	VPWCM
July 20	1:20 p.m.	2,690	47	73,300	4,340	--	25	--	36	--	60	73	90		99	100	VPWCM
July 20	2:30 p.m.	4,090	--	26,800	7,190	34	42	51	61	70	80	86	95		100	--	VPWCM
July 20	2:30 p.m.	4,090	--	26,800	7,400	24	33	45	58	70	80	86	95		100	--	VPNM
July 20	6:18 p.m.	150	59	8,960	--	49	57	65	74	85	92	96	100		--	--	VPWCM
July 21	7:55 a.m.	26	51	2,290	3,470	54	62	67	71	77	85	89	97		100	--	VPWCM
July 22	4:55 p.m.	556	42	46,200	6,230	32	37	45	55	64	80	91	97		100	--	VPWCM

PLATTE RIVER BASIN--Continued

KIOWA CREEK AT KIOWA, COLO.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
July 22, 1957.....	4:55 p.m.	556	42	46,200	6,570	19	27	36	47	59	80	91	97		100	--	VPNM
July 23	6:10 p.m.	75	58	15,500	4,130	--	49	--	68	--	93	96	99		100	--	VPWCM
July 23	6:44 p.m.	59	58	17,900	6,170	51	61	73	84	92	97	99	100		--	--	VPWCM
July 30	6:36 p.m.	421	68	29,600	4,100	--	37	--	51	--	73	80	92		100	--	VPWCM
July 30	11:20 p.m.	2,200	--	50,400	5,990	--	45	--	66	--	85	89	96		100	--	VPWCM
July 31	12:12 a.m.	1,190	58	41,600	6,610	43	52	62	74	84	92	95	98		100	--	VPWCM
July 31	1:50 p.m.	79	84	6,980	4,570	--	65	--	82	--	96	97	99		100	--	SPWCM

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000			
Mar. 12, 1957.....	3:10 p.m.	0.8	6	2	5	14	46	79	91	98	100	--	--			SV
Apr. 11.....	11:45 a.m.	6.6	8	1	3	12	42	73	87	96	100	--	--			SV
May 9	10:25 a.m.	160	3	--	0	4	33	76	90	97	100	--	--			SV
May 9	11:25 a.m.	156	3	0	1	8	46	88	96	99	100	--	--			SV
May 9	6:25 p.m.	43	1	--	0	4	31	70	88	96	99	100	--			SV
May 10	1:45 p.m.	11	2	--	0	6	44	82	94	98	100	--	--			SV
May 13	9:50 a.m.	29	3	--	0	8	42	76	89	97	100	--	--			SV
May 15	3:32 p.m.	110	2	0	1	8	50	92	96	99	100	--	--			SV
May 16	12:20 p.m.	51	3	0	1	11	60	92	100	--	--	--	--			V
May 17	5:55 p.m.	249	2	--	0	11	48	78	88	96	100	--	--			SV
May 18	9:55 a.m.	67	3	--	0	10	40	73	90	98	100	--	--			SV
June 1.....	5:28 a.m.	6.6	18	0	1	9	41	75	89	96	99	99	100			SV
July 20	6:50 p.m.	117	15	--	0	3	23	47	62	83	96	99	100			SV
July 21	7:55 a.m.	28	14	--	0	6	42	72	86	96	99	100	--			SV
July 23	6:44 p.m.	59	2	--	0	7	38	69	86	98	100	--	--			SV

SOUTH PLATTE RIVER AT BALZAC, COLO.

LOCATION.--At gaging station at highway bridge at Balzac siding and 2¾ miles northeast of Union, Morgan County.
DRAINAGE AREA.--17,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1951, August 1954 to August 1957 (discontinued).
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to August 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 23, 1956..	183	--	--	185	70	163	--	326	763	53	--	--	--	1,520	--	2.07		750	483	31	2.6	1,900	8.1	--
Nov. 21.....	3.8	24	0.09	152	84	144	7.8	308	715	55	0.8	2.0	0.21	1,420	1,340	1.93		724	471	30	2.3	1,810	8.1	2
Dec. 12.....	121	--	--	--	--	148	--	340	--	--	--	--	--	--	--	--		722	443	31	2.4	1,840	7.6	--
Jan. 9, 1957...	78	--	--	174	78	148	--	358	710	55	--	--	--	1,470	--	2.00		755	461	30	2.3	1,860	7.8	--
Feb. 6.....	24	--	--	195	65	144	--	318	725	53	--	--	--	1,500	--	2.04		754	493	29	2.3	1,850	8.0	--
Mar. 7.....	34	17	.00	198	66	143	8.6	332	735	55	.8	1.6	.23	1,510	1,390	2.05		764	492	29	2.2	1,880	8.1	2
Apr. 24.....	9.6	--	--	--	--	172	--	306	--	--	--	--	--	--	--	--		734	483	34	2.8	1,840	7.7	--
June 5.....	2,720	15	.03	71	25	61	4.5	147	253	22	.7	5.1	.10	545	--	.74		279	158	32	1.6	793	7.3	--
July 23.....	822	--	--	123	41	105	--	220	452	35	--	--	--	938	--	1.28		474	294	33	2.1	1,260	7.6	--
Aug. 21.....	724	--	--	--	--	116	--	234	--	--	--	--	--	988	--	1.34		490	298	34	2.3	1,320	7.7	--

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER NEAR CROOK, COLO.

LOCATION.--At gaging station, 0.1 mile upstream from bridge on State Highway 25 and 1 mile south of Crook, Logan County.
DRAINAGE AREA.--19,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: September 1955 to August 1957 (discontinued).
REMARKS.--Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to August 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 12, 1956..	41	--	--	--	--	262	--	327	--	--	--	--	--	--	--	--		854	586	40	3.9	2,470	8.0	--
Nov. 18.....	166	28	0.00	214	69	198	17	360	870	68	0.7	1.3	0.35	1,720	1,640	2.34		818	523	34	3.0	2,180	7.7	8
Nov. 21.....	145	--	--	--	--	197	--	380	--	--	--	--	--	1,700	--	2.31		814	502	34	3.0	2,160	7.8	--
Dec. 28.....	26	29	.00	208	57	196	14	312	815	72	.6	1.8	31	1,630	1,550	2.22		754	498	36	3.1	2,060	8.0	--
Jan. 12, 1957...	172	24	.01	215	65	190	15	338	845	66	.7	4.6	.28	1,680	1,590	2.28		804	527	33	2.9	2,110	7.9	5
Feb. 18.....	24	--	--	210	57	206	--	312	813	73	--	--	--	1,670	--	2.27		760	504	37	3.2	2,070	7.9	--
Mar. 16.....	5.4	39	.01	183	48	178	12	276	694	60	.5	2.3	.23	1,450	1,340	1.97		652	426	37	3.0	1,840	8.0	2
June 4	1,660	19	.14	119	30	94	7.9	207	390	31	.9	8.5	.15	842	--	1.15		422	252	32	2.0	1,140	7.3	--
June 13	3,300	15	.06	82	25	71	3.9	165	280	23	.9	3.2	.12	604	--	.82		309	174	33	1.8	870	7.6	--
July 14.....	54	--	--	--	--	193	--	274	--	--	--	--	--	1,430	--	1.94		634	409	40	3.3	1,850	7.7	--
July 30.....	465	--	--	146	47	144	--	248	601	47	--	--	--	1,180	--	1.60		558	355	35	2.6	1,560	7.6	--
Aug. 13.....	32	--	--	--	--	198	--	292	--	--	--	--	--	1,470	--	2.00		662	423	39	3.4	1,890	8.1	--

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, 0.9 mile (revised) southeast of Julesburg, Sedgwick County, 3 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek.
DRAINAGE AREA.--22,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1957.
Water temperatures: October 1945 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 1,650 ppm Oct. 24 to Dec. 31; minimum, 724 ppm June 5-21.
Hardness: Maximum, 820 ppm Dec. 1-31; minimum, 356 ppm June 5-21.
Specific conductance: Maximum daily, 2,250 micromhos Jan. 15; minimum daily, 882 micromhos May 15.
Water temperatures: Maximum, 86°F Aug. 13; minimum, freezing point on several days during January.
EXTREMES, 1945-57.--Dissolved solids: Maximum, 1,860 ppm Apr. 13, 1955; minimum, 429 ppm June 18, 1956.
Hardness: Maximum, 846 ppm Feb. 20, 1955; minimum, 173 ppm Mar. 1-12, 1947.
Specific conductance: Maximum daily, 2,350 micromhos Apr. 13, 1955; minimum daily, 617 micromhos Aug. 19, 1953.
Water temperatures: Maximum (1946-49, 1950-57), 93°F July 28, Aug. 1, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-23, 1956.	25 7	--	--	--	--	147	--	--	--	--	--	--	--	--	--	--	--	706	--	31	2.4	1,840	--	--
Oct. 24-Nov. 30.	157	--	--	--	--	178	--	440	--	--	--	--	--	1,610	--	2.19	682	804	443	32	2.7	2,060	7.7	--
Dec. 1-31.....	108	36	0.01	235	57	177	17	392	790	74	0.4	5.3	0.23	1,650	1,580	2.24	481	820	499	31	2.7	2,070	7.8	5
Jan. 1-20, 1957.	78.5	--	--	--	--	178	--	318	--	--	--	--	--	1,650	--	2.24	350	785	524	33	2.8	2,040	8.0	--
Jan. 21.....	202	--	--	--	--	130	--	230	--	--	--	--	--	1,220	--	1.66	665	595	406	32	2.3	1,580	7.9	--
Jan. 22-Feb. 28.	124	--	--	--	--	178	--	306	--	--	--	--	--	1,610	--	2.19	539	760	509	34	2.8	1,990	7.9	--
Mar. 1-6.....	79.5	--	--	--	--	188	--	292	--	--	--	--	--	1,540	--	2.09	331	736	497	36	3.0	1,960	8.0	--
Mar. 7.....	101	--	--	--	--	150	--	256	--	--	--	--	--	1,250	--	1.70	341	612	402	35	2.6	1,650	7.9	--
Mar. 8-21.....	52.9	--	--	--	--	172	--	279	--	--	--	--	--	1,470	--	2.00	210	718	489	34	2.8	1,880	7.9	--
Mar. 22.....	44	--	--	--	--	152	--	260	--	--	--	--	--	1,270	--	1.73	151	638	425	34	2.6	1,680	7.9	--
Mar. 23-31.....	85.3	30	.00	195	50	182	14	277	735	65	6	2 8	.17	1,470	1,410	2.00	339	694	467	36	3.0	1,890	7.8	4
Apr. 1-30.....	200	--	--	--	--	196	--	266	--	--	--	--	--	1,520	--	2.07	821	690	472	38	3.2	1,930	7.7	--
May 1-9.....	81.7	--	--	--	--	185	--	267	--	--	--	--	--	1,450	--	1.97	320	676	457	37	3.1	1,860	7.8	--
May 10-13.....	177	--	--	--	--	208	--	280	--	--	--	--	--	1,580	--	2.15	755	692	462	40	3.4	2,020	7.9	--
May 14.....	53[illegible]	--	--	--	--	132	--	256	--	--	--	--	--	1,090	--	1.48	1,580	528	318	35	2.5	1,460	7.7	--
May 15-27.....	5,599	--	--	--	--	93	--	194	--	--	--	--	--	824	--	1.12	12,460	404	245	33	2.0	1,140	7.6	--
May 28-June 4..	1,20[illegible]	--	--	--	--	139	--	260	--	--	--	--	--	1,160	--	1.58	3,780	560	347	35	2.6	1,530	8.0	--
June 5-21.....	2,872	16	.01	94	30	85	7.1	180	329	30	.7	.7	.14	724	--	.98	5,610	356	208	34	2.0	1,020	7.7	14
June 22-27.....	2,04[illegible]	--	--	--	--	135	--	236	--	--	--	--	--	1,060	--	1.44	5,860	514	320	36	2.6	1,410	8.0	--
June 28-July 14.	426	--	--	--	--	141	--	248	--	--	--	--	--	1,180	--	1.60	1,360	568	365	35	2.6	1,550	7.5	--

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
July 15-18, 1957	62.0	--	--	--	--	164	--	260	--	--	--	--	--	1,320	--	1.80	221	626	413	36	2.9	1,720	7.7	--
July 19-27.....	432	--	--	--	--	136	--	232	--	--	--	--	--	1,110	--	1.51	1,290	530	340	36	2.6	1,470	7.6	--
July 28-Aug. 25.	163	--	--	--	--	160	--	260	--	--	--	--	--	1,350	--	1.84	594	640	427	35	2.8	1,730	7.9	--
Aug. 26.....	83	--	--	--	--	114	--	224	--	--	--	--	--	944	--	1.28	212	460	276	35	2.3	1,270	7.7	--
Aug. 27-Sept. 18	92.2	--	--	--	--	168	--	254	--	--	--	--	--	1,390	--	1.89	346	638	430	36	2.9	1,780	7.7	--
Sept. 19-30.....	262	25	0.01	182	59	197	14	273	757	63	0.9	1.7	0.27	1,520	1,430	2.07	1,080	697	473	37	3.3	1,930	7.6	--
Weighted average a.....	525	--	--	--	--	115	--	222	--	--	--	--	--	984	--	1.34	1,390	477	295	34	2.3	1,320	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 4 p.m. and 7 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	68	55	a 44	46	34	52	44	67	70	80	84	78
2	72	--	b 43	46	a 35	50	45	68	70	83	83	76
3	68	b 34	a 46	44	34	b 47	44	57	74	83	72	78
4	64	36	a 47	40	37	51	41	52	72	81	73	75
5	65	36	40	a 46	37	43	46	54	77	82	77	74
6	64	46	39	a 38	37	46	47	64	74	83	82	73
7	b 58	40	39	38	37	43	47	72	74	79	80	72
8	68	56	37	38	36	45	a 49	71	74	79	82	b 73
9	65	43	38	32	36	46	58	50	74	80	79	70
10	58	a 60	a 40	34	b 40	b 52	53	55	74	83	84	66
11	70	49	40	34	42	52	48	57	71	84	a 81	72
12	67	56	a 40	35	52	53	46	57	--	84	78	69
13	61	50	43	a 33	54	52	43	a 58	72	82	86	69
14	65	47	40	33	54	43	52	68	70	83	85	69
15	64	46	a 45	33	52	46	58	64	60	81	77	69
16	66	a 48	a 45	33	48	52	59	56	b 68	85	76	74
17	65	43	40	35	b 46	a 35	55	57	65	82	72	78
18	64	44	41	35	44	46	65	59	70	83	78	78
19	55	37	a 44	a 36	43	56	55	a 58	75	83	84	64
20	63	36	44	35	41	56	b 62	62	77	a 80	84	a 58
21	a 66	a 36	a 43	34	40	55	55	61	67	80	78	60
22	64	b 35	a 40	33	a 36	46	55	56	72	84	80	66
23	66	40	b 40	32	40	--	66	61	b 68	80	76	64
24	57	a 40	a 42	32	b 48	a 44	68	60	77	79	81	69
25	58	43	a 41	32	54	45	56	64	76	77	b 74	65
26	56	45	44	a 32	59	46	60	70	75	79	72	64
27	54	43	45	a 32	--	45	b 54	68	72	80	78	67
28	b 56	40	45	33	51	51	64	72	74	85	72	69
29	57	41	46	33	--	48	65	76	78	82	81	70
30	56	43	b 44	33	--	47	65	75	a 78	83	79	71
31	57	--	--	34	--	b 45	--	68	--	84	a 80	--
Average	62	44	42	36	43	48	54	62	72	82	79	70

a Measurement between 12 m. and 3 p.m.
b Measurement between 8 a.m. and 11 a.m.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging stations at highway bridges, half a mile and 2½ miles south of Brady, Lincoln County, and 18 miles downstream from confluence of North Platte and South Platte Rivers.
DRAINAGE AREA.--56,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 754 ppm May 29 to June 2; minimum, 338 ppm Jan. 9-10.
Hardness: Maximum, 386 ppm May 29 to June 2; minimum, 173 ppm Feb. 7-18.
Specific conductance: Maximum daily, 1,130 micromhos May 21, 30 (chan. 1); minimum daily, 305 micromhos Jan. 10 (chan. 1).
Water temperatures: Maximum, 80°F July 28, 31 (chan. 1); minimum, freezing point on many days during November to March.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 896 ppm Feb. 19-22, 1953; minimum, 278 ppm Nov. 26, 1952.
Hardness: Maximum, 386 ppm May 29 to June 2, 1957; minimum, 151 ppm June 8, 1951.
Specific conductance: Maximum daily, 1,130 micromhos May 21, 30, 1957 (chan. 1); minimum daily, 305 micromhos Jan. 13, 1956, Jan. 10, 1957 (chan. 1).
Water temperatures: Maximum, 90°F July 19, 20, 1951 (chan. 1); minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis from each of two major channels composited by discharge. Composite periods normally identical to those of Supply Canal (Tri-County Diversion) near Maxwell, Nebr. Records of specific conductance of daily samples, taken at each of the two major channels, available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-24, 1956....	111	--	--	--	--	59	--	203	--	--	--	--	--	431	0.59	129	198	32	39	1.8	651	7.6	--
Oct. 25-Nov. 30 ...	131	--	--	--	--	54	--	224	--	--	--	--	--	422	.57	149	200	16	37	1.7	630	7.6	--
Dec. 1-31.....	142	40	0.00	45	21	43	8.1	220	102	13	0.5	1.7	0.10	384	.52	147	198	18	31	1.3	574	8.0	2
Jan. 1-8, 1957.....	137	--	--	--	--	42	--	214	--	--	--	--	--	385	.52	142	193	18	32	1.3	567	7.9	--
Jan. 9-10	74.5	--	--	--	--	30	--	204	--	--	--	--	--	338	.46	68.0	180	13	27	1.0	494	8.2	--
Jan. 11-13	90.0	--	--	--	--	51	--	242	--	--	--	--	--	444	.60	108	220	22	34	1.5	651	8.2	--
Jan. 14-17	76.0	--	--	--	--	46	--	227	--	--	--	--	--	407	.55	83.5	205	19	33	1.4	604	8.2	--
Jan. 18	89	--	--	--	--	51	--	238	--	--	--	--	--	428	.58	103	214	19	34	1.5	642	7.8	--
Jan. 19-Feb. 6	104	--	--	--	--	46	--	226	--	--	--	--	--	412	.56	116	207	22	33	1.4	605	8.0	--
Feb. 7-18.....	185	--	--	--	--	35	--	193	--	--	--	--	--	343	.47	171	173	15	31	1.2	507	7.8	--
Feb. 19-24.....	165	--	--	--	--	40	--	221	--	--	--	--	--	385	.52	172	202	21	30	1.2	571	8.1	--
Feb. 25-Mar. 22...	172	44	.00	54	13	36	8.5	205	81	12	.7	1.7	.08	361	.49	168	187	19	28	1.1	530	7.9	3
Mar. 23-31.....	225	--	--	--	--	40	--	212	--	--	--	--	--	383	.52	233	201	27	30	1.2	567	7.8	--
Apr. 1-30.....	223	--	--	--	--	40	--	219	--	--	--	--	--	375	.51	226	201	21	30	1.2	569	8.0	--
May 1-18.....	446	--	--	--	--	42	--	227	--	--	--	--	--	396	.54	477	203	17	31	1.3	584	8.1	--
May 19-28.....	4,013	--	--	--	--	77	--	218	--	--	--	--	--	688	.94	7,450	344	165	33	1.8	967	7.8	--
May 29-June 2.....	1,989	--	--	--	--	89	--	230	--	--	--	--	--	754	1.03	4,050	386	197	33	2.0	1,060	8.2	--
June 3-18	352	33	.00	68	18	55	10	213	164	19	.6	1.2	.09	489	.67	465	242	67	32	1.5	708	7.7	8
June 19-26	1,033	--	--	--	--	80	--	218	--	--	--	--	--	677	.92	1,890	334	155	34	1.9	967	8.0	--
June 27-July 16	1,761	--	--	--	--	58	--	214	--	--	--	--	--	486	.66	2,310	242	67	34	1.6	715	7.9	--
July 17-Aug. 8.....	1,089	--	--	--	--	68	--	236	--	--	--	--	--	460	.63	1,350	204	10	42	2.1	691	8.0	--
Aug. 9-26.....	957	--	--	--	--	68	--	236	--	--	--	--	--	452	.61	1,170	198	4	43	2.1	675	8.0	--
Aug. 27-Sept. 30...	225	28	.00	59	16	52	11	224	124	18	.6	.4	.17	439	.60	267	212	28	33	1.6	647	7.8	5
Weighted average a	433	--	--	--	--	64	--	223	--	--	--	--	--	530	0.72	620	258	75	35	1.7	768	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.--Continued

CHANNEL 1

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	54	43	33	32	a 32	a 40	45	57	56	73	78	71
2	52	42	33	32	a 32	a 38	42	60	62	75	78	63
3	54	39	35	34	a 32	a 39	a 44	51	63	76	76	60
4	51	39	35	32	a 32	a 40	a 39	50	65	66	70	63
5	52	38	32	34	a 32	a 37	36	50	65	65	69	62
6	50	33	32	33	34	a 34	39	55	68	69	70	63
7	48	39	32	32	a 35	a 32	38	58	65	73	73	a 70
8	52	32	32	34	a 34	34	a 41	58	64	70	74	59
9	47	33	32	a 32	34	a 34	41	52	65	70	75	57
10	47	36	32	a 32	a 35	39	42	48	66	71	72	58
11	51	39	33	a 32	a 34	a 43	a 39	54	66	74	74	54
12	52	37	32	32	--	42	a 40	55	65	75	74	56
13	52	37	32	a 32	a 35	a 41	39	56	67	73	75	56
14	49	39	a 35	a 32	a 35	a 33	a 43	55	63	71	72	53
15	56	32	33	a 32	a 35	a 35	41	55	67	74	75	57
16	52	32	34	a 32	a 34	a 42	50	48	64	75	69	a 62
17	55	33	32	a 32	a 34	37	48	48	64	74	69	62
18	54	36	33	a 32	a 34	a 32	a 53	52	63	73	69	62
19	51	35	34	a 32	a 33	33	55	54	66	74	70	52
20	46	32	33	a 32	a 32	39	52	56	68	74	70	52
21	44	32	32	32	a 32	44	52	56	69	76	73	51
22	45	32	33	a 32	a 32	40	58	56	67	74	71	50
23	41	35	32	a 32	a 32	a 38	56	56	67	74	67	50
24	49	33	32	a 32	a 33	a 34	53	56	65	72	65	53
25	42	35	32	a 32	a 35	34	53	56	69	71	68	56
26	39	32	34	a 32	a 35	35	49	57	65	74	70	57
27	44	32	34	a 32	34	39	48	59	62	76	68	56
28	46	32	36	a 32	a 41	38	50	64	64	80	68	56
29	54	32	35	a 32	--	40	53	67	70	78	67	58
30	45	33	35	a 32	--	40	56	64	71	78	71	58
31	41	--	35	a 32	--	--	--	68	--	80	68	--
Average	49	35	33	32	34	38	47	56	65	73	71	58

a Measurement between 11 a.m. and 1 p.m.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.--Continued

CHANNEL 4

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	45	37	36	a 32	42	43	55	57	72	75	70
2	54	44	39	34	a 32	a 41	45	58	60	74	75	64
3	56	41	40	37	a 32	42	46	60	63	74	73	63
4	53	42	39	34	32	43	39	50	65	68	69	64
5	55	39	35	37	34	40	37	49	65	67	69	64
6	53	35	32	37	35	a 39	41	53	67	69	69	65
7	51	40	32	35	38	37	39	57	65	72	72	a 67
8	55	35	33	37	40	39	40	59	65	71	72	60
9	52	38	32	32	42	39	41	55	65	70	73	60
10	51	41	34	a 32	39	42	45	48	66	70	69	58
11	55	42	36	32	38	a 45	42	54	67	74	72	55
12	57	40	35	32	a 45	43	38	55	67	74	72	56
13	60	40	34	a 32	40	43	38	55	65	73	72	57
14	50	41	39	a 32	40	a 38	41	55	64	70	69	55
15	58	35	37	a 32	40	38	42	56	67	74	72	57
16	56	34	39	a 32	37	44	52	49	64	74	68	59
17	57	35	35	a 32	38	40	50	50	64	74	66	62
18	57	39	35	32	39	36	52	57	62	74	66	65
19	55	38	38	a 32	37	38	55	54	65	74	67	56
20	52	33	35	32	35	46	49	56	66	72	69	54
21	48	35	34	32	a 32	45	53	55	69	74	71	52
22	50	35	36	a 32	32	43	58	54	67	72	70	52
23	47	37	34	32	32	a 39	55	54	65	71	67	52
24	51	36	35	a 32	37	a 37	54	56	64	70	66	54
25	45	39	35	a 32	42	36	53	55	67	71	68	56
26	43	35	37	a 32	41	37	49	57	66	72	69	58
27	47	36	37	a 32	38	40	49	58	61	74	68	56
28	48	35	40	a 32	43	40	49	63	63	78	67	58
29	56	36	39	a 32	--	40	53	64	69	75	68	59
30	50	37	39	a 32	--	41	55	62	71	75	71	59
31	44	--	38	a 32	--	42	--	65	--	76	70	--
Average	52	38	36	33	37	40	47	56	65	73	70	59

a Measurement between 12 m. and 2 p.m.

SUPPLY CANAL (TRI-COUNTY DIVERSION) NEAR MAXWELL, NEBR.

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 808 ppm May 29 to June 2; minimum, 394 ppm Apr. 1-30.
Hardness: Maximum, 402 ppm May 19-28; minimum, 186 ppm Oct. 1-24.
Specific conductance: Maximum daily, 1,210 micromhos May 30; minimum daily, 403 micromhos Jan. 9.
Water temperatures: Maximum, 85°F July 27, 31; minimum, 33°F on many days during November to March.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 808 ppm May 29 to June 2, 1957; minimum, 368 ppm May 15, 1951.
Hardness: Maximum, 402 ppm May 19-28, 1957; minimum, 171 ppm May 15, 1951.
Specific conductance: Maximum daily, 1,210 micromhos Mar. 26, Apr. 6, 14, 15, 1952, May 30, 1957; minimum daily 403 micromhos Jan. 9, 1957.
Water temperatures: Maximum, 85°F June 13, 15, 1952, July 27, 31, 1957; minimum, freezing point on several days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Composite periods normally identical to those of Platte River at Brady, Nebr. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in reports of State Engineer.

Chemical analysis, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-24, 1956....	1,436	--	--	--	--	71	--	223	--	--	--	--	--	444	0.60	1,720	186	3	45	2.3	669	8.0	--
Oct. 25-Nov. 30 ...	684	--	--	--	--	54	--	209	--	--	--	--	--	415	.56	766	192	21	38	1.7	619	7.7	--
Dec. 1-31.....	657	35	0.00	48	18	53	8.6	210	120	16	0.6	1.6	0.14	409	.56	726	196	24	36	1.7	609	7.9	2
Jan. 1-8, 1957.....	659	--	--	--	--	48	--	202	--	--	--	--	--	406	.55	722	193	27	35	1.5	592	7.8	--
Jan. 9-10.....	572	--	--	--	--	54	--	188	--	--	--	--	--	428	.58	661	198	44	37	1.7	631	7.9	--
Jan. 11-13	651	--	--	--	--	70	--	232	--	--	--	--	--	533	.72	937	242	52	39	2.0	772	8.1	--
Jan. 14-17	597	--	--	--	--	59	--	218	--	--	--	--	--	463	.63	746	218	39	37	1.7	688	7.8	--
Jan. 18	620	--	--	--	--	59	--	228	--	--	--	--	--	480	.65	804	228	41	36	1.7	708	7.9	--
Jan. 19-Feb. 6	668	--	--	--	--	60	--	219	--	--	--	--	--	483	.66	871	228	48	36	1.7	713	7.7	--
Feb. 7-18.....	692	--	--	--	--	46	--	195	--	--	--	--	--	398	.54	744	195	35	34	1.4	593	7.8	--
Feb. 19-24.....	631	--	--	--	--	55	--	210	--	--	--	--	--	464	.63	791	220	48	35	1.6	671	7.9	--
Feb. 25-Mar. 22...	618	42	.00	56	14	45	8.5	197	115	17	.5	1.4	.09	407	.55	679	196	34	32	1.4	592	7.8	2
Mar. 23-31.....	690	--	--	--	--	48	--	198	--	--	--	--	--	396	.54	738	196	34	35	1.5	591	7.8	--
Apr. 1-30.....	708	--	--	--	--	45	--	202	--	--	--	--	--	394	.54	753	196	30	33	1.4	590	7.8	--
May 1-18.....	1,276	--	--	--	--	59	--	212	--	--	--	--	--	469	.64	1,620	226	52	36	1.7	701	7.7	--
May 19-28.....	1,939	--	--	--	--	89	--	216	--	--	--	--	--	799	1.09	4,180	402	225	32	1.9	1,110	8.0	--
May 29-June 2.....	1,956	--	--	--	--	95	--	236	--	--	--	--	--	808	1.10	4,270	390	196	35	2.1	1,130	8.1	--
June 3-18	1,534	26	.00	83	24	78	10	209	263	26	.6	1.2	.13	633	.86	2,620	305	134	35	1.9	905	7.7	--
June 19-26	1,921	--	--	--	--	95	--	218	--	--	--	--	--	783	1.06	4,060	376	197	35	2.1	1,100	8.2	--
June 27-July 16....	1,348	--	--	--	--	85	--	208	--	--	--	--	--	668	.91	2,430	312	141	37	2.1	952	7.8	--
July 17-Aug. 8.....	2,009	--	--	--	--	94	--	206	--	--	--	--	--	697	.95	3,780	322	153	39	2.3	1,010	8.0	--
Aug. 9-26.....	1,996	--	--	--	--	83	--	216	--	--	--	--	--	562	.76	3,030	244	67	43	2.3	830	8.0	--
Aug. 27-Sept. 30...	1,293	29	.00	59	17	73	10	218	161	20	.6	.8	.14	493	.67	1,720	218	39	41	2.1	737	7.7	5
Weighted average[a]	1,110	--	--	--	--	72	--	212	--	--	--	--	--	547	0.74	1,640	255	81	38	2.0	798	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN--Continued

SUPPLY CANAL (TRI-COUNTY DIVERSION) NEAR MAXWELL, NEBR.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement at 8 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 66	44	36	33	33	36	a 49	a 67	a 67	a 77	78	a 76
2	a 65	a 43	a 41	a 35	a 34	a 42	45	60	60	72	a 83	66
3	59	39	39	34	33	35	a 37	a 60	a 72	a 82	76	a 75
4	a 63	a 43	a 42	a 33	a 33	a 44	34	54	67	71	a 79	66
5	57	41	36	33	33	38	a 45	a 64	a 75	a 76	71	a 73
6	a 62	a 42	a 33	a 36	a 34	a 37	39	55	69	72	a 79	65
7	55	42	33	33	33	33	a 40	a 65	a 69	a 82	74	a 70
8	a 60	a 38	a 33	a 35	a 37	a 40	36	59	--	74	a 79	63
9	52	36	33	33	36	35	a 52	a 52	a 70	a 77	74	a 64
10	a 61	a 47	a 34	a 33	a 39	a 46	43	50	67	72	a 78	60
11	54	43	33	33	34	40	a 42	a 53	a 70	a 82	74	a 64
12	a 63	--	33	a 33	a 38	a 46	36	51	66	76	a 80	59
13	60	a 48	a 36	33	35	43	a 41	a 53	a 72	a 79	77	a 60
14	a 59	43	--	a 33	a 39	a 36	41	50	67	74	a 82	58
15	56	a 35	a 38	33	35	35	a 50	a 50	a 69	a 78	74	a 62
16	a 62	33	34	a 33	a 38	a 46	51	47	60	76	a 77	58
17	58	a 39	a 34	33	34	38	a 56	a 52	a 65	a 84	73	a 69
18	a 63	40	33	a 33	a 42	a 36	51	51	62	74	a 75	65
19	56	a 38	a 39	33	34	36	a 55	a 52	a 74	a 80	69	a 54
20	a 57	33	33	a 33	a 34	a 48	52	51	69	74	a 77	53
21	49	a 34	a 38	a 33	33	43	a 62	a 57	a 75	a 78	72	a 59
22	a 56	34	35	33	a 33	a 42	58	49	66	71	a 80	54
23	47	a 40	a 33	a 33	33	37	a 58	a 54	a 71	a 79	69	a 62
24	a 56	36	33	33	a 35	a 34	51	51	65	75	a 78	56
25	46	a 40	a 35	a 33	36	35	a 59	a 58	a 74	a 79	72	a 68
26	a 51	34	34	33	a 42	a 43	48	56	67	74	a 79	58
27	47	a 39	a 38	a 33	38	38	a 56	a 67	a 72	a 85	69	a 62
28	a 57	36	35	33	a 44	a 44	52	64	64	77	a 74	60
29	48	a 39	a 42	a 33	--	41	a 65	a 67	a 74	a 82	68	a 67
30	a 53	37	35	33	--	a 42	58	63	66	78	a 75	60
31	46	--	a 39	a 33	--	40	--	a 66	--	a 85	69	--
Average	56	39	36	33	36	40	49	56	68	77	75	63

a Measurement at 4 p.m.

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Boron (B)	Dissolved solids (residue at 180° C) Parts per million	Dissolved solids (residue at 180° C) Tons per acre-foot	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
SOUTH PLATTE RIVER AT WATERTON, COLO.																									
Aug. 30, 1955....	240	8.1	--	0.00	--	26	10	26	1.9	94	40	35	0.7	0.4	--	0.02	198	0.27	108	31	34	1.1	357	7.9	8
May 14, 1957	465	6.4	0.2	.08	0.00	14	3.4	6.7	2.0	41	17	6.3	1.1	1.0	0.00		91	.12	49	15	22	.4	130	6.8	2
June 11.....	968	11	--	.04	.01	8.2	1.8	4.3	.6	27	9.2	3.2	.7	.4	.00		55	.07	28	6	25	.4	83.9	7.2	3
July 3.....	954	11	--	.06	.00	12	3.9	7.2	1.2	42	14	7.5	.9	.7	.05		88	12	46	12	25	.5	131	7.0	3
July 18.....	1,050	10	.0	.30	.00	18	5.8	15	1.6	59	22	18	.9	.8	.05		138	.19	69	20	32	.8	218	7.3	3
BEAR CREEK AT MORRISON, COLO.																									
Aug. 30, 1955....	101	11	--	0.28	--	6.5	1.5	3.3	1.2	26	7.5	0.5	0.2	0.6	--	0.01	49	0.07	22	1	23	0.3	60.4	7.1	45
May 14, 1957	339	17	0.1	.04	0.00	10	2.4	5.8	1.4	29	22	.8	.2	.1	0.15		94	.13	35	11	26	.4	96	6.8	2
June 11.....	444	15	.7	1.3	.00	6.4	1.9	3.2	.6	25	5.8	1.5	.5	1.4	.00		51	.07	24	3	22	.3	65.8	7.2	3
July 3.....	217	12	.1	.04	.00	4.8	1.0	2.3	.8	20	2.9	.5	.5	.4	.00		43	.06	16	0	23	.3	48.6	6.9	5
July 18.....	160	12	.5	.71	.00	6.0	1.0	2.3	.6	25	.9	.0	.3	.2	.05		49	.07	19	0	20	.2	54.7	7.1	4
CLEAR CREEK NEAR GOLDEN, COLO.																									
May 15, 1957	578	15	0.0	0.03		22	8.3	4.7	2.0	4	90	1.8	0.6	2.1	0.15		153	0.21	89	86	10	0.2	224	6.1	2
June 11.....	1,740	14	--	.01		3.4	2.2	2.4	1.4	17	21	.5	.3	.6	.00		55	.07	30	16	14	.2	87.9	7.1	3
July 3.....	1,810	7.7	.0	.30		5.6	1.9	1.5	1.4	16	10	1.0	.5	.7	.00		50	.07	22	9	12	.1	59.6	6.7	4
July 18.....	1,310	7.2	.2	.20	0.00	6.6	1.7	1.3	1.2	19	6.8	.0	.3	.3	.00		52	.07	23	8	10	.1	63.4	7.0	3
ST. VRAIN CREEK AT LYONS, COLO.																									
May 15, 1957	699	14	0.1	0.06	0.00	7.6	2.4	3.7	0.6	27	13	0.8	0.4	0.1	0.20		76	0.10	29	7	21	0.3	76	6.6	2
June 12.....	785	8.5	--	.03	.00	3.2	.5	1.8	.8	12	1.0	2.0	.3	.7	.00		27	.04	10	0	26	.2	31.8	7.0	3
July 3.....	1,010	5.5	.2	.03	.00	2.4	.2	1.1	.4	9	.7	.0	.3	.7	.00		23	.03	7	0	25	.2	21.5	6.7	3
July 18.....	600	4.8	.3	.26	.00	2.6	.4	.8	.4	11	1.0	.5	.3	.4	.00		25	.03	8	0	17	.1	23.6	6.8	3
LEFTHAND CREEK NEAR BOULDER, COLO.																									
May 15, 1957	340	14	0.2	0.11	0.00	14	3.9	3.7	2.4	38	24	0.2	1.2	2.8	0.20		100	0.14	51	20	13	0.2	127	7.0	2
June 12.....	113	11	--	.01	--	9.6	2.4	3.3	.8	22	19	.8	.7	.7	.00		61	.08	34	16	17	.2	94.6	7.3	3
July 3.....	190	6.5	.2	.03	.00	4.0	1.0	1.5	.6	14	3.7	.5	.7	.6	.00		37	.05	14	3	18	.2	41.8	6.8	2
July 18.....	173	5.5	.1	.03	.00	3.6	.7	1.3	.4	12	2.3	.5	.7	.6	.00		29	.04	12	2	19	.2	35.3	6.8	2

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Boron (B)	Dissolved solids (residue at 180° C)		Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
																	Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate					
BOULDER CREEK NEAR ORODELL, COLO.																									
May 15, 1957....	348	13	0.1	0.06	0.00	9.2	9.0	4.5	2.6	49	28	1.0	0.4	2.2	0.25		105	0.14	60	20	13	0.3	146	6.9	2
June 12	588	8.0	.8	.04	.00	4.8	.9	1.8	.8	18	3.9	.2	.3	1.0	.00		33	.04	16	1	19	.2	48.4	7.1	3
July 3.....	885	6.5	--	.01	.00	3.2	1.0	1.5	.6	14	2.9	.5	.3	.4	.00		30	.04	12	1	20	.2	33.1	6.8	2
July 18.....	606	6.2	.1	.03	.00	3.2	1.0	1.4	.4	16	.7	.5	.3	.3	.00		27	.04	12	0	19	.2	32.0	6.9	3
SOUTH BOULDER CREEK NEAR ELDORADO SPRINGS, COLO.																									
May 15, 1957....	339	12	0.1	0.03	0.08	8.4	2.9	3.6	1.8	32	14	1.0	0.2	0.1	0.15		72	0.10	33	7	18	0.3	95	6.7	2
June 12	359	11	--	.03	--	8.8	1.9	3.4	1.2	29	11	1.8	.3	1.4	.00		62	.08	30	6	19	.3	84.5	7.4	3
July 3.....	581	9.3	.2	.04	.00	4.8	1.5	1.9	1.0	17	6.5	1.0	.3	.7	.15		44	.06	18	4	18	.2	48.6	6.9	4
July 18.....	344	10	.1	.08	.00	5.6	1.9	2.4	1.0	21	13	1.0	.3	.4	.00		58	.08	22	5	18	.2	61.0	7.3	4
COAL CREEK NEAR PLAINVIEW, COLO.																									
May 15, 1957....	a 4.5	15	0.1	0.08	0.00	5.6	1.5	2.8	1.0	16	11	1.0	0.3	1.3	0.15		62	0.08	20	7	22	0.3	58	6.7	2
June 12	a 7	18	--	.04	.00	6.4	1.8	3.6	.8	28	5.0	1.8	.3	.6	.00		54	.07	23	0	24	.3	65.7	7.3	3
July 3.....	.16	18	--	.03	.00	9.2	2.7	4.2	1.2	42	6.7	1.0	.3	.3	.05		72	.10	34	0	20	.3	89.4	7.5	2
July 18.....	a .08	17	.1	.18	.00	9.6	2.9	4.2	1.4	48	.9	1.5	.3	.0	.00		75	.10	36	0	20	.3	98.2	7.8	5
DANE CREEK NEAR ORD, NEBR.																									
June 14, 1956....	a 0.1	26		0.04		54	10	7.8	18	b 228	20	0.4	0.4	3.9	0.09		267	0.36	177	0	8	0.3	405	8.4	22
June 18, 1957....	14.3	15		.11		29	6.0	4.0	15	113	23	.2	.2	4.5	.04		182	.25	97	4	7	.2	246	7.3	

a Estimated.
b Includes equivalent of 7 ppm of carbonate (CO_3).

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
ROCK CREEK NEAR ATLANTIC CITY, WYO.			
May 7, 1957	35	38	3.6
May 18	22	6	.4
May 24	33	4	.4
May 30	104	18	5.1
June 3	a 150	52	21
June 6	a 180	27	13
June 20	64	8	1.4
June 24	51	13	1.8
July 1	30	10	.8
July 10	a 17	25	1.1
SLATE CREEK NEAR ATLANTIC CITY, WYO.			
May 7, 1957	18	16	0.8
May 18	21	13	.7
May 24	16	6	.3
May 30	38	27	2.8
June 3	38	22	2.3
June 6	46	19	2.4
June 20	15	21	.9
June 24	a 12	9	.3
July 1	6.3	9	.2
July 10	3.9	16	.2
MIDDLE LOUP RIVER AT DUNNING, NEBR. (TOTAL-LOAD SECTION)			
Oct. 3, 1956	367	876	868
Oct. 4	381	998	1,020
Nov. 28, 2:45 p.m	360	2,190	2,130
Nov. 28, 4:30 p.m	345	1,660	1,550
Nov. 29	402	2,560	2,780
Nov. 30	320	1,980	1,710
DISMAL RIVER AT DUNNING, NEBR.			
Oct. 3, 1956	315	648	551
Oct. 4	327	657	580
Nov. 28	324	861	753
Nov. 29	333	1,220	1,100
Nov. 30	333	848	762
MIDDLE LOUP RIVER AT ARCADIA, NEBR.			
Oct. 5, 1956	714	608	1,170
Oct. 31	1,120	1,200	3,630
Nov. 27	856	1,640	3,790
Feb. 20, 1957	a 1,150	660	2,050
Mar. 13	882	1,240	2,950
Apr. 2	1,040	2,170	6,090
Apr. 10	956	2,000	5,160
Apr. 17	985	1,660	4,410
May 1	919	952	2,360
May 14	3,580	3,880	37,500
May 28	956	850	2,190
June 5	684	440	813
June 20	754	448	912
June 26	738	446	889
SOUTH LOUP RIVER AT ST. MICHAEL, NEBR.			
Oct. 5, 1956	61	129	21
Oct. 31	174	2,090	982
Nov. 15	139	714	268
Nov. 27	139	546	205
Feb. 20, 1957	a 208	591	332
Mar. 13	185	613	306
Mar. 18	214	820	474
Apr. 3	232	1,010	633
Apr. 10	251	1,010	684
Apr. 17	236	1,010	644

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
SOUTH LOUP RIVER AT ST. MICHAEL, NEBR.--Continued			
May 1, 1957	251	1,100	745
May 14, 3:20 p.m.	1,740	8,380	39,400
May 14, 6:10 p.m.	1,750	7,880	37,200
May 29	302	1,590	1,300
June 5	183	518	256
June 20	503	2,330	3,160
June 26	221	425	254
June 29	71	195	37
Aug. 20	88	203	48
Sept. 3	121	758	248
Sept. 16	392	1,760	1,860
OAK CREEK NEAR LOUP CITY, NEBR.			
May 14, 1957, 12:45 a.m	65	13,700	2,400
May 14, 3:00 a.m.	109	12,000	3,530
May 14, 3:30 a.m.	158	14,300	6,100
May 14, 3:45 a.m.	190	9,470	4,860
May 14, 4:00 a.m.	208	11,500	6,460
May 14, 7:30 a.m.	151	6,450	4,370
May 14, 9:50 a.m.	172	6,860	3,190
May 14, 12:30 p.m	90	5,370	1,350
May 14, 1:15 p.m.	79	5,450	1,160
May 14, 3:00 p.m.	46	4,430	574
May 14, 4:40 p.m.	29	3,230	253
May 16	126	6,500	2,210
May 25	97	12,700	3,330
June 16, 4:00 a.m	66	18,200	3,240
June 16, 4:30 a.m	114	11,500	3,540
June 16, 5:00 a.m	160	19,100	8,250
June 16, 5:15 a.m	136	11,000	5,520
June 16, 5:30 a.m	214	19,700	11,400
June 16, 5:45 a.m	255	15,300	10,500
June 16, 6:30 a.m	320	18,900	16,300
June 16, 6:45 a.m.	374	17,300	17,500
June 16, 7:15 a.m	410	11,000	12,200
June 16, 7:45 a.m	442	12,500	14,900
June 16, 11:30 a.m	489	10,600	14,000
June 16, 1:50 p.m	485	6,620	8,930
June 16, 4:50 p.m	484	5,940	7,760
June 17, 8:50 a.m	220	9,090	5,400
June 17, 12:40 p.m	219	5,260	3,100
Sept. 13, 1:15 p.m.	69	17,700	3,300
Sept. 13, 9:45 p.m.	113	14,000	4,270
Sept. 13, 10:45 p.m.	163	9,620	4,230
Sept. 14, 7:10 a.m.	154	2,580	1,070
Sept. 14, 9:10 a.m.	148	2,740	1,090
Sept. 14, 12:30 p.m.	126	2,550	868
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.			
Oct. 1, 1956	555	344	515
Oct. 29	846	542	1,240
Nov. 13	1,050	1,660	4,710
Dec. 10	247	650	567
Jan. 7, 1957	a 1,140	1,210	3,720
Feb. 18	1,610	943	4,610
Mar. 11	1,120	1,320	3,990
Apr. 1	1,220	1,500	4,940
Apr. 8	1,230	1,850	6,140
Apr. 15	1,340	1,460	5,280
Apr. 29	1,400	890	3,360
May 13	1,490	1,640	6,600

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.--Continued			
May 14, 1957	5,940	8,090	130,000
May 20	2,150	1,950	11,300
May 27	1,860	1,860	9,340
June 3	1,030	850	2,360
June 17	12,200	8,050	265,000
June 18	6,510	4,840	85,100
June 19	3,630	3,440	33,700
June 24	858	796	1,840
July 29	470	162	206
Aug. 19	700	359	679
Sept. 3	799	699	1,510
Sept. 16	1,810	2,040	9,970
Sept. 30	943	378	962
NORTH LOUP RIVER AT BURWELL, NEBR.			
Oct. 2, 1956	373	311	313
Oct. 30	573	546	845
Nov. 14	502	472	640
Jan. 7, 1957	502	923	1,250
Feb. 19	a 582	197	310
Mar. 12	519	456	639
Apr. 3	698	698	1,320
Apr. 9	564	418	637
Apr. 16	653	395	696
Apr. 30	626	346	585
May 13	599	360	582
May 29	743	419	841
June 4	528	300	428
June 25	434	196	229
DAVIS CREEK NEAR COTESFIELD, NEBR.			
Apr. 23, 1957	81	13,600	2,970
May 13	290	12,800	10,000
May 14, 6:30 a.m	500	10,300	13,900
May 14, 6:35 a.m	844	24,300	55,400
May 14, 6:45 a.m	964	39,000	107,000
May 14, 6:50 a.m	1,150	28,100	87,300
May 14, 11:20 a.m	690	19,200	35,800
May 14, 1:50 p.m	638	15,700	27,000
May 14, 7:20 p.m	307	10,400	8,620
May 17	63	8,010	1,360
May 20	10	1,840	50
May 25	216	19,600	11,400
June 16, 2:15 a.m	210	5,190	2,940
June 16, 7:45 a.m	356	22,900	22,100
June 16, 8:30 a.m	376	29,700	30,200
June 16, 9:30 a.m	534	36,300	57,300
June 16, 10:30 a.m	690	30,500	56,800
June 16, 10:50 a.m	630	26,200	63,200
June 16, 11:20 a.m	1,030	28,000	77,900
June 16, 2:15 p.m	780	19,800	41,700
June 17	162	9,500	4,290
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.			
Oct. 1, 1956	706	362	690
Oct. 29	870	364	855
Nov. 13	859	466	1,080
Dec. 10	410	528	584
Jan. 7, 1957	a 944	798	2,030
Feb. 18	a 1,420	292	1,120
Mar. 11	882	647	1,540
Apr. 1	1,180	509	1,620
Apr. 8	1,170	735	2,340

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.--Continued			
Apr. 15, 1957	1,240	612	2,050
Apr. 29	1,110	406	1,220
May 13	1,170	514	1,620
May 14	6,140	6,920	115,000
May 20	1,690	872	3,980
May 27	1,530	698	2,880
June 3	980	359	950
June 17	6,720	5,600	102,000
June 18	2,410	3,080	20,000
June 19	1,430	798	3,080
June 24	882	334	795
July 29	406	130	143
Aug. 19	428	136	157
Sept. 3	544	153	225
Sept. 16	1,160	536	1,680
Sept. 30	670	260	611
CEDAR RIVER NEAR FULLERTON, NEBR.			
Aug. 19, 1957	97	238	62
Sept. 4	130	440	154
Sept. 17	221	744	444

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
MIDDLE LOUP RIVER AT DUNNING, NEBR. (TOTAL-LOAD SECTION)																	
Oct. 3, 1956.....	9:00 a.m.	367	54	876							6	29	69	92	99	100	V
Oct. 4	8:30 a.m.	381	52	998							4	28	68	91	96	100	V
Nov. 28.....	2:45 p.m.	360	32	2,190							4	22	65	88	98	100	V
Nov. 28.....	4:30 p.m.	345	--	1,660							5	24	69	90	98	100	V
Nov. 29.....	11:00 a.m.	402	--	2,560							4	19	67	94	99	100	V
Nov. 30.....	9:35 a.m.	320	34	1,980							5	24	65	91	97	98	V
DISMAL RIVER AT DUNNING, NEBR.																	
Oct. 3, 1956.....	8:50 a.m.	315	54	648							14	59	95	100			V
Oct. 4	8:20 a.m.	327	50	657							8	48	90	100			V
Nov. 28.....	2:40 p.m.	324	33	861							18	57	96	100			V
Nov. 29.....	11:35 a.m.	333	34	1,220							20	57	94	100			V
Nov. 30.....	9:10 a.m.	333	36	846							14	48	96	100			V
MIDDLE LOUP RIVER AT ARCADIA, NEBR.																	
Oct. 5, 1956.....	10:00 a.m.	714	54	608							15	39	85	100	--		V
Oct. 31	11:30 a.m.	1,120	47	1,200							14	40	90	100	--		V
Nov. 27.....	2:30 p.m.	856	37	1,640							11	48	97	100	--		V
Feb. 20, 1957 ...	9:45 a.m.	a 1,150	32	660							7	17	69	99	100		V
Mar. 13.....	10:15 a.m.	882	41	1,240							17	61	94	100	--		V
Apr. 2.....	3:00 p.m.	1,040	41	2,170							8	34	83	98	100		V
Apr. 10.....	10:35 a.m.	956	47	2,000							13	45	91	100	--		V
Apr. 17.....	10:10 a.m.	985	50	1,660							14	42	86	99	100		V
May 1.....	10:25 a.m.	919	63	952							14	46	93	100	--		V
May 14.....	9:45 a.m.	3,580	--	3,880	3,610	14	16	18	19	23	42	73	96	100	--		VPWCM
May 28.....	3:20 p.m.	956	75	850							18	48	91	100	--		V
June 5	10:00 a.m.	684	72	440							21	59	94	100	--		V
June 20	9:40 a.m.	754	--	448							24	64	100	--	--		V
June 26	9:55 a.m.	738	67	446							18	54	100	--	--		V

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
SOUTH LOUP RIVER AT ST. MICHAEL, NEBR.																
Oct. 5, 1956	2:10 p.m.	61	65	129	--	--	--	--	--	--	85	93	100	--			V
Oct. 31	3:30 p.m.	174	53	2,090	--	46	56	64	69	74	82	92	100	--			VPWCM
Nov. 15	12:00 m.	139	36	714	5,960	27	35	43	51	61	74	89	99	100			VPWCM
Nov. 27	11:20 a.m.	139	32	546	5,420	21	28	--	40	--	62	79	98	100			VPWCM
Feb. 20, 1957	1:10 p.m.	a 208	32	591	--	--	--	--	--	--	41	67	95	100			V
Mar. 13	2:00 p.m.	165	50	613	6,390	20	25	--	38	--	64	82	100	--			VPWCM
Mar. 18	12:40 p.m.	214	35	820	6,220	17	21	--	33	--	54	71	95	100			VPWCM
Apr. 3	1:40 p.m.	232	37	1,010	1,180	12	24	25	--	39	61	78	98	100			VPWCM
Apr. 3	1:40 p.m.	232	37	1,010	1,270	11	16	26	--	36	61	78	98	100			VPN
Apr. 10	2:40 p.m.	251	57	1,010	2,700	13	17	22	31	44	73	92	100	--			VPWCM
Apr. 10	2:40 p.m.	251	57	1,010	2,680	2	4	10	24	44	73	92	100	--			VPN
Apr. 17	2:10 p.m.	236	61	1,010	2,470	13	15	20	27	40	68	87	99	100			VPWCM
Apr. 17	2:10 p.m.	236	61	1,010	2,590	3	4	8	24	42	68	87	99	100			VPN
May 1	2:30 p.m.	251	69	1,100	3,260	20	26	30	41	52	74	88	99	100			VPWCM
May 1	2:30 p.m.	251	69	1,100	3,030	15	28	30	38	50	74	88	99	100			VPN
May 14	3:20 p.m.	1,740	--	8,380	--	21	27	32	36	48	74	86	98	100			VPWCM
May 14	3:20 p.m.	1,740	--	8,360	8,310	14	22	28	34	46	74	86	98	100			VPN
May 14	6:10 p.m.	1,750	--	7,880	--	26	29	34	40	52	76	88	98	100			VPWCM
May 14	6:10 p.m.	1,750	--	7,880	8,450	16	22	29	35	46	76	88	98	100			VPN
May 29	1:55 p.m.	302	70	1,590	2,060	48	54	60	--	74	80	93	100	--			VPWCM
May 29	1:55 p.m.	302	70	1,590	2,180	16	43	63	--	71	80	93	100	--			VPN
June 5	2:00 p.m.	183	83	518	1,440	27	27	33	44	60	70	83	100	--			VPWCM
June 5	2:00 p.m.	183	83	518	1,580	8	18	32	41	52	70	83	100	--			VPN
June 20	2:30 p.m.	503	76	2,330	--	50	54	63	71	78	88	94	99	100			VPWCM
June 20	2:30 p.m.	503	76	2,330	--	17	41	59	70	79	88	94	99	100			VPN
June 26	1:50 p.m.	221	67	425	1,230	37	43	50	56	71	82	94	99	100			VPWCM
June 26	1:50 p.m.	221	67	425	1,360	8	24	44	54	69	82	94	99	100			VPN
July 29	3:30 p.m.	71	92	195	--	59	--	--	--	--	--	96	100	--			VPWCM

Aug. 20	11:40 a.m.	86	75	203	1,490	57	58	--	72	--	92	96	100	--			VPWCM
Sept. 3	6:00 p.m.	121	74	758	2,570	60	70	--	84	--	96	98	100	--			VPWCM
Sept. 16	4:00 p.m.	392	65	1,760	5,080	36	47	--	65	--	88	95	99	99	100		VPWCM
OAK CREEK NEAR LOUP CITY, NEBR.																	
May 14, 1957	3:30 a.m.	156		14,300	4,940	36	36	--	52	--	99	100					VPWCM
May 14	3:45 a.m.	190		9,470	5,740	38	46	--	61	--	99	100					VPWCM
May 14	7:30 a.m.	251		6,450	3,750	57	64	--	79	--	100	--					VPWCM
May 14	9:50 a.m.	172		6,860	4,590	47	53	--	66	--	99	100					VPWCM
May 14	12:30 p.m.	90		5,570	2,600	54	54	59	68	85	99	100					VPWCM
May 14	4:40 p.m.	29		3,230	1,680	70	70	--	86	--	100	--					VPWCM
May 16	6:15 p.m.	126		6,500	4,280	51	57	--	69	--	99	100					VPWCM
May 25	7:30 a.m.	97		12,700	4,220	53	56	--	73	--	99	100					VPWCM
June 16	4:00 a.m.	66		18,200	5,790	25	31	--	49	--	99	100					VPWCM
June 16	5:00 a.m.	160		19,100	7,260	34	44	--	62	--	100	--					VPWCM
June 16	5:30 a.m.	214		19,700	5,630	41	49	--	68	83	100	--					VPWCM
June 16	5:45 a.m.	255		15,300	5,160	40	52	--	77	--	100	--					VPWCM
June 16	6:30 a.m.	320		18,900	5,460	37	50	--	78	--	100	--					VPWCM
June 16	6:45 a.m.	374		17,300	5,120	32	43	--	62	--	100	--					VPWCM
June 16	7:15 a.m.	410		11,000	3,520	60	67	--	87	--	100	--					VPWCM
June 16	4:45 a.m.	442		12,500	3,900	55	63	--	87	--	100	--					VPWCM
June 16	11:30 a.m.	489		10,600	3,070	54	69	--	95	--	100	--					VPWCM
June 16	1:50 p.m.	485		6,820	2,040	76	83	--	--	--	--	--					PWCM
June 16	4:50 p.m.	484		5,940	1,620	77	83	--	--	--	--	--					PWCM
June 17	8:50 a.m.	220		9,090	5,440	52	58	--	74	--	100	--					VPWCM
June 17	12:40 p.m.	219		5,260	1,780	65	75	--	89	--	100	--					VPWCM
Sept. 13	1:15 p.m.	69		17,700	6,110	49	53	59	72	85	100	--					VPWCM
Sept. 13	9:45 p.m.	113		14,000	4,640	48	48	48	70	83	100	--					VPWCM
Sept. 13	10:45 p.m.	163		9,620	3,750	53	65	76	83	94	100	--					VPWCM
Sept. 14	7:10 a.m.	154		2,580	3,050	58	63	--	74	--	99	100					VPWCM
Sept. 14	12:30 p.m.	126		2,550	2,820	55	60	--	70	--	99	100					VPWCM
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.																	
Oct. 1, 1956	10:20 a.m.	555	60	344	--	--	--	--	--	--	34	52	88	99	100		V
Oct. 29	1:30 p.m.	646	58	542	--	--	--	--	--	--	39	60	94	100	--		V
Nov. 13	3:40 p.m.	1,050	53	1,660	--	--	--	--	--	--	22	48	88	100	--		V
Dec. 10	1:20 p.m.	247	32	850	--	--	--	--	--	--	31	44	91	100	--		V
Jan. 7, 1957	11:00 a.m.	a 1,140	32	1,210	--	--	--	--	--	--	21	44	89	100	--		V
Feb. 18	1:20 p.m.	1,810	--	943	--	--	--	--	--	--	25	53	94	100	--		V
Mar. 11	10:10 a.m.	1,120	42	1,320	--	--	--	--	--	--	36	59	90	100	--		V
Apr. 1	10:30 a.m.	1,220	45	1,500	--	--	--	--	--	--	28	60	95	100	--		V
Apr. 8	10:30 a.m.	1,230	40	1,650	--	--	--	--	--	--	26	53	90	100	--		V

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.--Continued																	
Apr. 15, 1957....	10:15 a.m.	1,340	46	1,460	--	--	--	--	--	--	30	58	95	100	--		V
Apr. 29	10:35 a.m.	1,400	63	890	--	--	--	--	--	--	32	60	94	100	--		V
May 13	12:35 p.m.	1,490	--	1,640	--	13	16	18	22	23	31	47	83	99	100		VPWCM
May 14	3:50 p.m.	5,940	60	8,090	--	12	16	18	22	30	50	66	84	98	100		VPWCM
May 14	3:50 p.m.	5,940	60	8,090	--	9	12	16	20	27	50	66	84	98	100		VPN
May 20	1:00 p.m.	2,150	59	1,950	--	12	14	16	17	22	34	59	95	100	--		VPWCM
May 27	10:30 a.m.	1,860	66	1,860	--	28	34	--	44	46	59	76	96	100	--		VPWCM
June 3.....	11:45 a.m.	1,030	73	850	--	--	--	--	--	--	30	50	87	100	--		V
June 17.....	12:30 p.m.	12,200	--	8,050	--	30	36	41	45	49	62	76	94	99	100		VPWCM
June 17.....	12:30 p.m.	12,200	--	8,050	--	26	35	40	44	50	62	76	94	99	100		VPN
June 18.....	11:15 a.m.	6,510	--	4,840	--	37	45	47	51	58	70	81	95	100	--		VPWCM
June 18.....	11:15 a.m.	6,510	--	4,840	--	32	40	49	53	58	70	81	95	100	--		VPN
June 19.....	11:45 a.m.	3,630	74	3,440	2,950	36	43	--	51	57	69	83	96	99	100		VPWCM
June 24.....	12:45 p.m.	856	78	796	--	--	--	--	--	--	37	61	95	100	--		V
Aug. 19	2:30 p.m.	700	63	359	--	--	--	--	--	--	71	81	96	100	--		V
Sept. 3.....	2:00 p.m.	799	76	699	2,070	33	40	--	44	--	57	62	77	99	100		VPWCM
Sept. 16.....	12:30 p.m.	1,810	62	2,040	2,590	22	27	--	35	--	47	64	93	100	--		VPWCM
Sept. 30.....	12:50 p.m.	943	71	378	--	--	--	--	--	--	37	62	93	100	--		V
NORTH LOUP RIVER AT BURWELL, NEBR.																	
Oct. 2, 1956.....	3:20 p.m.	373	66	311							34	60	88	100	--		V
Oct. 30.....	6:40 p.m.	573	51	546							16	36	69	96	100		V
Nov. 14	4:30 p.m.	502	44	472							18	37	84	100	--		V
Jan. 7, 1957.....	3:40 p.m.	502	33	923							19	39	85	100	--		V
Mar. 12.....	3:40 p.m.	519	49	456							22	43	81	99	100		V
Apr. 3	9:45 a.m.	698	36	698							14	42	86	100	--		V
Apr. 9	3:50 p.m.	564	52	418							14	44	87	100	--		V
Apr. 16	3:35 p.m.	653	55	395							18	48	91	100	--		V

Apr. 30	3:45 p.m.	626	61	346							18	44	87	100	--		V
May 13	3:45 p.m.	599	63	360							19	46	85	100	--		V
May 29	9:20 a.m.	743	65	419							21	48	88	100	--		V
June 4	9:50 a.m.	528	73	300							18	39	83	100	--		V
June 25	4:00 p.m.	432	60	196							25	44	83	100	--		V
DAVIS CREEK NEAR COTESFIELD, NEBR.																	
Apr. 23, 1957	8:00 a.m.	81	--	13,600	4,370	56	68	--	91	--	100	--	--	--	--		SPWCM
May 14	6:35 a.m.	844	--	24,300	15,900	20	25	31	41	64	98	100	--	--	--		VPWCM
May 14	6:50 a.m.	1,150	--	28,100	8,780	27	34	44	53	72	98	100	--	--	--		VPWCM
May 14	11:20 a.m.	690	--	19,200	5,110	30	36	45	52	69	97	99	100	--	--		VPWCM
May 14	11:20 a.m.	690	--	19,200	5,160	19	25	34	47	70	97	99	100	--	--		VPN
May 14	1:50 p.m.	638	--	15,700	5,260	32	41	49	57	73	98	100	--	--	--		VPWCM
May 14	1:50 p.m.	638	--	15,700	5,190	16	25	36	50	68	98	100	--	--	--		VPN
May 14	7:20 p.m.	307	--	10,400	3,700	41	49	56	63	80	98	100	--	--	--		VPWCM
May 17	11:10 a.m.	63	--	8,010	9,040	35	44	51	60	80	99	100	--	--	--		VPWCM
May 20	10:25 a.m.	10	--	1,640	2,520	40	50	62	79	94	100	--	--	--	--		VPWCM
May 25	12:15 p.m.	216	--	19,600	5,650	41	46	--	65	--	98	100	--	--	--		VPWCM
June 16	2:15 a.m.	210	--	5,190	1,680	31	34	--	51	--	96	98	100	--	--		VPWCM
June 16	7:45 a.m.	358	--	22,900	4,190	40	44	--	61	--	95	97	99	100	--		VPWCM
June 16	8:30 a.m.	376	--	29,700	3,800	33	39	--	52	--	95	97	98	100	--		VPWCM
June 16	8:30 a.m.	376	--	29,700	3,820	10	17	--	52	--	95	97	98	100	--		VPN
June 16	9:30 a.m.	534	--	38,300	12,000	30	36	--	56	--	98	99	100	--	--		VPWCM
June 16	10:30 a.m.	690	--	30,500	10,800	29	36	--	55	--	95	97	99	100	--		VPWCM
June 16	10:50 a.m.	830	--	28,200	9,050	35	40	--	56	--	95	96	99	100	--		VPWCM
June 16	11:20 a.m.	1,030	--	28,000	9,260	33	38	--	53	--	93	97	99	100	--		VPWCM
June 16	2:15 p.m.	780	--	19,800	5,220	42	51	--	64	--	94	96	98	99	100		VPWCM
June 16	2:15 p.m.	780	--	19,800	5,120	22	40	--	65	--	94	96	98	99	100		VPN
June 17	7:45 p.m.	162	65	9,800	4,630	45	53	--	71	--	97	99	100	--	--		VPWCM
June 17	7:45 p.m.	162	65	9,800	4,660	34	49	--	70	--	97	99	100	--	--		VPN
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.																	
Oct. 1, 1956	12:00 m.	706	61	362	--	--	--	--	--	--	52	70	97	100	--	--	V
Oct. 29	11:40 a.m.	870	56	364	--	--	--	--	--	--	41	58	89	100	--	--	V
Nov. 13	12:40 p.m.	859	--	466	--	--	--	--	--	--	29	44	72	99	100	--	V
Dec. 10	11:10 a.m.	410	32	528	--	--	--	--	--	--	11	29	80	99	100	--	V
Jan. 7, 1957	12:50 p.m.	a 944	32	798	--	--	--	--	--	--	26	49	83	98	100	--	V
Feb. 18	10:45 a.m.	a 1,420	32	292	--	--	--	--	--	--	21	31	66	99	100	--	V
Mar. 11	12:40 p.m.	882	42	647	--	--	--	--	--	--	35	61	87	99	100	--	V
Apr. 1	1:40 p.m.	1,180	49	509	--	--	--	--	--	--	30	51	86	100	--	--	V
Apr. 6	1:00 p.m.	1,170	--	735	--	--	--	--	--	--	26	47	85	99	100	--	V
Apr. 15	12:30 p.m.	1,240	51	612	--	--	--	--	--	--	31	50	88	100	--	--	V

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.--Continued																
Apr. 29, 1957	12:35 p.m.	1,110	--	406	--	--	--	--	--	--	37	62	90	100	--	--	V
May 13	11:00 a.m.	1,170	62	514	--	--	--	--	--	--	42	65	92	100	--	--	V
May 14	12:20 p.m.	6,140	58	6,920	--	12	14	16	21	26	50	72	87	96	99	100	VPWCM
May 14	12:20 p.m.	6,140	58	6,920	6,500	--	11	14	19	26	50	72	87	96	99	100	VPN
May 27	12:50 p.m.	1,530	70	696	--	--	--	--	--	--	47	62	89	99	100	--	V
June 17	3:45 p.m.	6,720	--	5,600	10,400	39	41	50	57	67	75	87	97	100	--	--	VPWCM
June 18	2:30 p.m.	2,410	73	3,000	--	30	45	50	56	62	72	79	90	99	100	--	VPWCM
June 19	3:20 p.m.	1,430	--	796	--	--	--	--	--	--	67	78	91	100	--	--	V
June 24	10:45 a.m.	632	75	334	--	--	--	--	--	--	52	68	93	100	--	--	V
July 29	12:30 p.m.	405	86	130	--	--	--	--	--	--	75	83	96	100	--	--	V
Aug. 19	4:50 p.m.	424	83	136	--	--	--	--	--	--	68	75	95	100	--	--	V
Sept. 16	10:25 a.m.	1,150	60	536	--	22	26	--	30	--	50	68	87	100	--	--	VPWCM
Sept. 30	4:25 p.m.	870	--	260	--	--	--	--	--	--	43	60	91	100	--	--	V
CEDAR RIVER NEAR FULLERTON, NEBR.																
Aug. 19, 1957	11:00 a.m.	97	76	236	1,100	17	9		72		100	--	--				SPWCM
Sept. 4	9:20 a.m.	130	66	440	2,600	34	26		34		95	98	100				VPWCM
Sept. 17	11:30 a.m.	221	61	724	3,990	10	24		39		83	87	99	100			VPWCM

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
DISMAL RIVER AT DUNNING, NEBR.																
Oct. 3, 1956......	[illegible] a.m.	315	14			1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	97	99	100		SV
Oct. 4	[illegible]	[illegible]	14			[illegible]	2	[illegible]	77	88	[illegible]	97	99	100		SV
Nov. 2[illegible]	[illegible] p.m.	324	14			0	4	40	95	99	100	--	--	--		SV
Nov. 29	11:35 a.m.	333	14			0	[illegible]	[illegible]	[illegible]	96	99	100	--	--		SV
Nov. 30	9:10 a.m.	333	12			0	1	34	[illegible]	93	96	99	100	--		SV
MIDDLE LOUP RIVER AT ARCADIA, NEBR.																
Oct. 5, 1956......	10:00 a.m.	714	21			[illegible]	5	[illegible]	91	99	100					SV
Nov. 27..........	[illegible]:30 p.m.	656	21			0	7	57	[illegible]	100	--					SV
Mar. 13, 1957....	10:15 a.m.	[illegible]	22			0	9	[illegible]	96	100	--					SV
Apr. 1[illegible]..........	10:35 a.m.	956	13			0	15	57	96	100	--					SV
Apr. 17..........	10:10 a.m.	985	14			0	4	57	95	100	--					SV
May 1............	10:25 a.m.	919	21			0	2	[illegible]	91	98	100					SV
May 2[illegible]..........	3:20 p.m.	956	20			0	2	62	97	100	--					SV
June 26	9:55 a.m.	73[illegible]	21			0	3	57	96	100	--					SV
SOUTH LOUP RIVER AT ST. MICHAEL, NEBR.																
Oct. 5, 1956......	2:10 p.m.	61	16			[illegible]	15	74	[illegible]	97	99	100				SV
Oct. 31..........	3:30 p.m.	174	--			0	[illegible]	77	95	99	99	100				SV
Nov. 15..........	12:00 m.	139	16			2	17	76	97	99	100	--				SV
Nov. 27..........	11:20 a.m.	139	21			1	9	55	91	97	99	100				SV
Feb. 20, 1957	1:10 p.m.	a 20[illegible]	15			2	10	62	91	96	99	100				SV
Mar. 13..........	2:00 p.m.	135	13			1	9	71	96	99	100	--				SV
Mar. 1[illegible]..........	12:40 p.m.	214	13			0	4	67	95	99	99	100				SV
Apr. 3...........	1:40 p.m.	232	17			0	[illegible]	61	92	96	99	100				SV
Apr. 10..........	2:40 p.m.	251	17			1	17	73	98	100	--	--				V
Apr. 17..........	2:10 p.m.	236	17			0	10	60	97	100	--	--				V
May 1............	2:30 p.m.	251	17			0	7	63	97	99	100	--				SV
May 29............	1:55 p.m.	302	11			7	33	93	100	--	--	--				V

a Daily mean discharge.

MISCELLANEOUS ANALYSES OF STREAMS IN THE PLATTE RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters											Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
SOUTH LOUP RIVER AT ST. MICHAEL, NEBR.--Continued																
June 5, 1957	2:00 p.m.	183	13			0	12	79	96	100	--	--				V
June 20	2:30 p.m.	503	13			4	16	74	97	100	--	--				V
June 26	1:50 p.m.	221	12			2	15	78	99	100	--	--				V
July 29	3:30 p.m.	71	15			1	8	74	98	99	100	--				SV
Aug. 20	11:40 a.m.	86	20			0	4	76	98	100	--	--				V
Sept. 3	6:00 p.m.	121	20			0	9	76	98	100	--	--				V
Sept. 16	4:00 p.m.	392	13			2	21	63	99	100	--	--				V
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.																
Oct. 1, 1956	10:20 a.m.	555	16			1	16	70	96	100	--	--				SV
Oct. 29	1:30 p.m.	546	23			2	7	52	93	99	100	--				SV
Nov. 13	3:40 p.m.	1,050	5			0	2	33	91	100	--	--				V
Dec. 10	1:20 p.m.	247	16			0	6	57	94	100	--	--				SV
Jan. 7, 1957	11:00 a.m.	a 1,140	35			0	2	46	92	99	99	100				SV
Mar. 11	10:10 a.m.	1,120	20			0	4	49	96	100	--	--				SV
Apr. 1	10:30 a.m.	1,220	19			0	5	46	89	98	99	100				SV
Apr. 8	10:30 a.m.	1,230	20			0	6	45	89	98	100	--				SV
Apr. 15	10:15 a.m.	1,340	25			0	9	65	96	99	100	--				SV
Apr. 29	10:35 a.m.	1,400	25			0	6	52	92	99	100	--				SV
May 20	1:00 p.m.	2,150	7			0	2	41	84	96	100	--				V
May 27	10:30 a.m.	1,860	34			5	13	59	96	99	100	--				SV
June 3	11:45 a.m.	1,030	23			5	19	67	95	99	100	--				SV
June 19	11:45 a.m.	3,630	7			1	16	69	98	100	--	--				SV
July 29	--	470	5			--	0	25	87	99	99	100				SV
Aug. 19	2:30 p.m.	700	31			4	11	49	86	97	99	100				SV
Sept. 3	2:00 p.m.	799	31			3	7	43	86	98	99	100				SV
Sept. 16	12:30 p.m.	1,810	7			0	5	55	87	96	98	99	100			SV
Sept. 30	12:50 p.m.	943	25			1	8	46	92	98	99	100				SV

NORTH LOUP RIVER AT BURWELL, NEBR.

Oct. 2, 1956.....	3:20 p.m.	373	15			0	1	36	90	97	99	100	--		SV
Nov. 14.....	4:30 p.m.	502	14			--	0	31	78	91	96	99	100		SV
Jan. 7, 1957.....	3:40 p.m.	502	14			0	5	33	77	89	94	98	100		SV
Mar. 12.....	3:40 p.m.	519	13			0	4	43	89	96	98	99	100		SV
Apr. 9.....	3:50 p.m.	564	16			1	5	34	76	90	95	99	100		SV
Apr. 30.....	3:45 p.m.	626	15			0	3	25	75	93	96	99	100		SV
May 29.....	9:20 a.m.	743	15			--	0	26	81	94	97	99	100		SV
June 25	4:00 p.m.	432	14			--	0	28	81	95	97	99	100		SV

NORTH LOUP RIVER NEAR ST. PAUL, NEBR.

Oct. 1, 1956.....	12:00 m.	706	16			0	3	38	81	93	96	97	98	99	SV
Oct. 29	11:40 a.m.	870	32			0	1	33	82	94	97	99	100	--	SV
Nov. 13.....	12:40 p.m.	859	5			0	1	16	72	95	98	100	--	--	SV
Dec. 10.....	11:10 a.m.	410	--			0	1	27	80	94	96	99	100	--	SV
Jan. 7, 1957.....	12:50 p.m.	944	11			0	6	32	82	95	98	99	99	100	SV
Mar. 11.....	12:40 p.m.	882	6			0	1	14	51	78	90	96	100	--	SV
Apr. 1.....	1:40 p.m.	1,180	8			--	0	16	76	91	93	94	96	100	SV
Apr. 8.....	1:00 p.m.	1,170	8			--	0	33	89	94	100	--	--	--	V
Apr. 15.....	12:30 p.m.	1,240	9			--	0	30	84	97	99	100	--	--	SV
Apr. 29.....	12:35 p.m.	1,110	14			0	1	30	82	94	97	99	100	--	SV
May 13.....	11:00 a.m.	1,170	27			1	3	26	70	86	94	98	99	100	SV
May 20.....	--	1,690	6			0	1	22	85	99	100	--	--	--	V
May 27.....	12:50 p.m.	1,530	10			0	1	29	85	97	100	--	--	--	V
June 3	--	980	17			0	1	27	79	95	97	99	100	--	SV
June 19	3:20 p.m.	1,430	12			--	0	21	70	86	91	96	99	100	SV
June 24	10:45 a.m.	882	13			--	0	24	73	91	96	98	100	--	SV
July 29	12:30 p.m.	406	14			--	0	18	64	84	90	96	99	100	SV
Aug. 19.....	4:50 p.m.	428	11			--	0	25	68	84	89	96	100	--	SV
Sept. 3.....	--	544	27			0	1	32	74	89	93	96	99	100	SV
Sept. 16.....	10:25 a.m.	1,160	6			--	0	20	89	96	98	98	100	--	SV
Sept. 30.....	4:25 p.m.	870	9			--	0	25	86	97	99	100	--	--	SV

CEDAR RIVER NEAR FULLERTON, NEBR.

Aug. 19, 1957	11:00 a.m.	97	18			7	14	54	93	97	98	99	100		SV
Sept. 4.....	9:20 a.m.	130	26			6	15	59	93	96	97	99	100		SV
Sept. 17.....	11:00 a.m.	221	9			4	12	62	92	97	98	100	--		SV

a Daily mean discharge.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION.--At gaging station at Waubonsie Highway Bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: May 1951 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 537 ppm July 31 to Aug. 27; minimum, 252 ppm June 18-19.
Hardness: Maximum, 238 ppm July 31 to Aug. 27; minimum, 142 ppm June 18-19.
Specific conductance: Maximum daily, 839 micromhos Sept. 17; minimum daily, 387 micromhos June 18.
Water temperatures: Maximum, 80°F on several days during August; minimum, 35°F on many days during December to March.
EXTREMES, 1951-57.--Dissolved solids: Maximum, 600 ppm Jan. 1-10, 1952; minimum, 252 ppm June 18-19, 1957.
Hardness: Maximum, 344 ppm Jan. 1-10, 1952; minimum, 142 ppm June 18-19, 1957.
Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 361 micromhos Mar. 29, 1951
Water temperatures: Maximum, 85°F July 25, 1952; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	30,370	--	--	--	--	57	--	177	--	--	--	--	--	429	0.58	35,180	208	63	37	1.7	665	7.9	--
Nov. 1-25.....	17,200	--	--	--	--	48	--	175	--	--	--	--	--	386	.52	17,930	195	51	35	1.5	606	7.6	--
Nov. 26-Dec. 9....	11,130	--	--	--	--	48	--	189	--	--	--	--	--	396	.54	11,900	204	49	34	1.5	608	7.7	--
Dec. 10-15.....	8,063	--	--	--	--	56	--	207	--	--	--	--	--	446	.61	9,710	233	63	34	1.6	685	7.7	--
Dec. 16-26.....	10,450	19	0.00	58	15	52	4.4	189	132	25	0.3	1.8	0.08	404	.55	11,400	208	53	35	1.6	628	7.6	5
Dec. 27-Jan. 9, 1957.	13,180	--	--	--	--	44	--	174	--	--	--	--	--	369	.50	13,130	188	45	34	1.4	572	7.8	--
Jan. 10-16	6,111	--	--	--	--	56	--	210	--	--	--	--	--	453	.62	7,470	236	64	34	1.6	695	8.0	--
Feb. 9-23.....	13,820	--	--	--	--	44	--	163	--	--	--	--	--	357	.49	13,320	176	42	35	1.4	556	7.9	--
Feb. 24.....	12,100	--	--	--	--	35	--	146	--	--	--	--	--	294	.40	9,600	154	34	33	1.2	465	7.8	--
Feb. 25-26.....	12,300	--	--	--	--	48	--	178	--	--	--	--	--	388	.53	12,890	198	52	35	1.5	603	8.0	--
Feb. 27-Mar. 1....	15,930	--	--	--	--	47	--	173	--	--	--	--	--	373	.51	16,040	186	44	35	1.5	574	7.9	--
Mar. 2-5.....	18,800	--	--	--	--	39	--	159	--	--	--	--	--	329	.45	16,700	165	35	34	1.3	499	8.0	--
Mar. 6-31.....	14,660	24	.00	50	14	44	8.8	173	102	22	.5	3.7	.09	355	.48	14,050	182	40	33	1.4	554	7.8	2
Apr. 1-30.....	21,850	--	--	--	--	40	--	175	--	--	--	--	--	355	.48	20,940	187	43	32	1.3	552	7.6	--
May 1-31.....	35,450	--	--	--	--	48	--	182	--	--	--	--	--	381	.52	36,470	200	51	34	1.5	600	7.9	--
June 1-16	37,790	16	.00	59	17	54	6.6	187	151	19	.6	2.2	.11	427	.58	43,570	217	64	34	1.6	654	7.7	7
June 17	87,800	--	--	--	--	35	--	162	--	--	--	--	--	300	.41	71,120	162	29	32	1.2	474	8.2	--
June 18-19	90,300	--	--	--	--	23	--	146	--	--	--	--	--	252	.34	61,440	142	22	26	.8	392	8.2	--
June 20-28	47,390	--	--	--	--	30	--	159	--	--	--	--	--	317	.43	40,560	172	42	28	1.0	486	7.9	--
June 29-July 8.....	43,010	--	--	--	--	34	--	175	--	--	--	--	--	350	.48	40,640	198	54	27	1.1	551	7.5	--
July 9-30.....	35,550	--	--	--	--	57	--	191	--	--	--	--	--	455	.62	43,670	228	71	35	1.6	698	7.5	--
July 31-Aug. 27....	33,480	--	--	--	--	77	--	182	--	--	--	--	--	537	.73	48,540	238	89	41	2.2	800	7.6	--
Aug. 28-Sept. 30...	33,860	13	.00	65	18	76	6.5	182	218	18	.6	1.2	.20	518	.70	47,360	236	87	40	2.2	780	7.5	5
Weighted average a.	26,380	--	--	--	--	54	--	179	--	--	--	--	--	418	0.57	29,770	207	60	36	1.6	643	--	--
Weighted average b.	25,370	--	--	--	--	54	--	179	--	--	--	--	--	418	0.57	28,630	207	60	36	1.6	642	--	--

a Represents 97 percent of runoff for water year October 1956 to September 1957.

b Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement at 8 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	52	35	a 34	--	33	37	a 56	63	73	79	73
2	a 58	52	35	a 34	--	33	a 37	56	63	a 74	79	73
3	a 58	52	35	34	--	33	a 37	56	63	a 74	80	a 73
4	a 57	51	a 35	34	--	33	37	56	64	74	80	a 71
5	a 57	51	35	33	--	a 34	37	58	65	74	80	71
6	a 57	a 51	34	33	--	a 34	37	58	67	74	a 80	70
7	a 57	a 51	34	33	--	a 34	36	a 59	68	74	a 80	67
8	a 56	50	34	a 33	--	34	36	a 59	68	74	80	66
9	a 56	49	33	a 33	33	34	a 36	a 60	69	a 74	80	66
10	a 56	49	33	33	33	34	a 36	a 60	69	a 75	80	a 65
11	55	49	33	33	33	35	36	a 60	a 69	75	80	a 65
12	55	49	33	33	a 33	a 35	35	a 61	a 70	75	80	63
13	55	49	33	33	a 33	a 35	35	a 61	70	75	a 80	63
14	55	49	33	--	33	35	35	a 61	70	75	a 80	62
15	55	48	33	--	33	34	35	61	70	75	80	62
16	a 55	47	33	--	33	35	a 35	61	70	a 75	80	60
17	a 55	--	33	--	33	35	a 35	61	70	a 76	80	a 60
18	54	--	a 33	--	34	36	36	61	a 70	77	80	a 60
19	54	44	a 33	--	a 34	a 36	36	62	a 70	77	78	60
20	54	a 44	33	--	a 34	a 36	37	a 62	71	77	a 78	60
21	54	a 43	33	--	34	36	39	a 62	71	77	a 77	59
22	54	40	33	--	33	36	42	63	71	77	77	59
23	a 53	40	33	--	33	36	a 47	62	71	a 77	77	57
24	a 53	39	33	--	33	37	a 50	62	71	a 77	74	a 57
25	53	39	a 33	--	33	37	53	62	a 71	77	72	a 57
26	53	39	a 33	--	a 33	a 37	53	a 62	a 71	77	72	57
27	52	a 39	33	--	a 33	a 37	54	a 62	71	77	a 72	56
28	52	a 38	34	--	33	37	54	62	71	78	a 71	56
29	52	35	34	--	--	37	54	62	71	78	71	56
30	a 52	35	34	--	--	37	a 54	62	72	a 78	71	56
31	a 52	--	34	--	--	37	--	63	--	a 79	71	--
Average	55	46	34	--	--	35	41	60	69	76	77	63

a Measurement at 4 a.m.

NISHNABOTNA RIVER BASIN

MULE CREEK NEAR MALVERN, IOWA

LOCATION.--At gaging station at highway bridge, 1.8 miles upstream from mouth and 4.4 miles south of Malvern, Mills County.
DRAINAGE AREA.--10.6 square miles.
RECORDS AVAILABLE.--Sediment records: July 1954 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 14,000 ppm June 17; minimum daily, not determined.
Sediment loads: Maximum daily, 14,400 tons May 29; minimum daily, less than 0.050 ton on many days.
EXTREMES, 1954-57.--Sediment concentrations: Maximum daily, 14,000 ppm June 17, 1957; minimum daily, no flow Jan. 20-25, 1956.
Sediment loads: Maximum daily, 22,000 tons Aug. 21, 1954; minimum daily, 0 tons Jan. 20-25, 1956.
REMARKS.--Maximum observed sediment concentration during water year, 88,900 ppm May 29. Flow affected by ice Nov. 15, 16, Nov. 20 to Dec. 1, Dec. 4-26, Jan. 1 to Mar. 6. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
		Suspended sediment			Suspended sediment			Suspended sediment	
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1	0.21			0.71	--		0.80	19	
2	.13			.71	--	(t)	.87	--	(t)
3	.17	--	(t)	.55	2		.71	--	
4	.17			1.7	--	e 2.2	.70	--	
5	.13			3.4	--	e .9	.46	--	
6	.10	4	(t)	1.7	--	e .5	.40	--	
7	.13			1.2	--	e .1	.30	--	
8	.17	--	(t)	1.2			.30	20	
9	.13			.87	--	(t)	.25	--	
10	.21			.55			.40	--	(t)
11	.21	--	(t)	.55	--		.40	--	
12	.21			.71	18		.35	--	
13	.42	20	(t)	.71	--		.25	--	
14	.33	--	(t)	.71	--		.25	--	
15	.21			.70	--	(t)	.30	20	
16	.17			.80	--		.20		
17	.17	--	(t)	1.2	18		.20	--	(t)
18	.21			1.0	--		.20		
19	.21			.87	--		.30		
20	.55	36	a 0.1	.60	--		.40		
21	.55	--	(t)	.50	--	(t)	.60	--	
22	.42	--	(t)	.50	--		.60	16	
23	.33			.50	--		.70	--	(t)
24	.33			.70	19		.60	--	
25	.33	--	(t)	1.0	--	e .1	.50	--	
26	.33			.60			.70	--	(t)
27	.33	2		.60			.87		
28	.33	--		.60	--	(t)	1.0	17	(t)
29	.42	--	(t)	.60			.87		
30	.71	--		.70			.87	--	(t)
31	.55	--		--	--	--	.87		
Total	8.87	--	0.2	26.74	--	4.6	16.22	--	0.9

e Estimated.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

MULE CREEK NEAR MALVERN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.50	--		0.20			0.58	--	
2	.45	--		.20			.54	--	
3	.70	--		.30			.52	--	
4	.60	--		.40			.52	--	
5	.50	26	(t)	.46			.50	--	(t)
6	.50	--		.50			.47	--	
7	.40	--		.50			.42	--	
8	.30	--		.54			.42	--	
9	.20	--		.54			.55	12	
10	.15	--		.54			.87		
11	.20	--		.60			1.0		
12	.10	24		.60			1.0	--	(t)
13	.10	--	(t)	.60			.87		
14	.10	--		.50			.87		
15	.10	--		.40		(t)	1.0		
16	.10	--		.50			.71	14	(t)
17	.20	--		.60			.55	--	
18	.30	--		.35			1.2	--	e 0.1
19	.35	19		.25			.71		
20	.40	--	(t)	.25			.55		
21	.40	--		.20			.71	--	(t)
22	.30	--		.15			.71		
23	.20			.20			.71		
24	.15			.30			1.9	600	sa 5.5
25	.10			.30			11	1,400	sb 44
26	.10			.21			3.7	1,300	sa 17
27	.10	--	(t)	.25			1.5	150	.6
28	.20			.34			1.5	--	e .4
29	.20			--			1.5		
30	.20			--			1.4	--	e .3
31	.20			--			1.4		
Total	8.40	--	0.6	10.78		0.6	39.88	--	69.2

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1.5	54	0.2	0.69	70	b 0.1	2.1	420	b 2.4
2	1.8	90	sa .5	.42	80	.1	1.4	340	1.3
3	7.6	2,300	sa 50	.32	--	(t)	1.2	--	e .6
4	4.7	650	8.2	.22	11		1.0	--	e .3
5	3.1	340	b 2.8	.22	--		.84	--	
6	2.2	100	.6	.22	--	(t)	.84	87	e .2
7	1.9			.22	9		75	6,000	sa 5,600
8	1.7	--	e .3	.22	12		16	3,000	sa 140
9	1.5			31	8,880	s 3,210	4.4	900	b 11
10	1.9			15	3,110	s 189	2.3	300	1.9
11	1.7	--		4.0	300	3.2	6.4	1,700	sa 75
12	1.5	--		2.3	320	2.0	3.7	950	b 9.5
13	1.4	--	e .2	2.3	235	1.5	2.6	440	b 3.0
14	1.2	--		5.3	--	e 6.5	11	2,000	sa 180
15	1.0	46		3.1	--	e 3.4	13	2,500	sb 650
16	1.0			2.1	--	e 2.0	59	4,600	sa 1,100
17	1.0			2.6	--	e 2.2	127	14,000	sa 9,300
18	1.0	--	e .1	2.3	270	1.7	14	2,000	b 75
19	1.0			1.8	--	e .7	5.3	1,000	b 14
20	1.0			1.8			3.7	500	b 5.0
21	.87	20		1.6	--	e .4	2.3	400	b 2.4
22	.71	--		1.0	70	.2	1.2	329	1.1
23	.71	--	(t)	.84	--	e .1	.69		
24	.69	--		.84	--	(t)	.55	--	e .3
25	.69	--		.84	19		.69		
26	1.0	--	e .1	1.2	--	e .2	1.2	154	.5
27	.69	18	(t)	.84	25	e .1	2.1	160	b .9
28	.42	66	.1	.55	--		2.1	174	1.0
29	.55	25	(t)	149	7,420	s 14,400	2.3	220	1.4
30	.69	45	.1	61	3,200	s 800	2.1	200	b 1.1
31	--	--	--	5.0	600	b 8.0	--	--	--
Total	46.72	--	65.6	298.84	--	18,632.3	366.01	--	17,178.7

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

MULE CREEK NEAR MALVERN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	125	3,780	s 3,070	0.42	--		0.76	--	e 0.2
2	13	1,100	39	.55	--		3.4	280	2.6
3	5.0	450	6.1	.55	30	(t)	1.0	19	.1
4	2.3	150	b .9	.42	--		.55	--	(t)
5	1.2	110	b .4	.32	--		3.3	1,900	s 74
6	.69	95		.32	12		7.5	1,500	sa 38
7	.69	--	e .2	.22	--		1.8	170	.8
8	1.2	--	e .4	.22	--	(t)	.84	--	e .1
9	1.2	55	.2	.22	--		.69		
10	1.0	--	e .1	.22	16		1.0	--	e .2
11	.84			.32	--		1.8	--	e .9
12	.84			.32	--		1.0	--	e .1
13	.84	--	e .1	.32	--	(t)	.69		
14	.69			.42	--		.69		
15	.84			.42	12		.69	--	(t)
16	.69			1.8	140	sa 0.8	.69		
17	.69			.69	74	.1	.55	--	
18	.55	--	e .1	.42	55	b .1	.42	13	
19	.55			.42			.42	--	
20	1.0	90	a .2	.42	--	(t)	.55	--	(t)
21	1.4	37		.42	6		.69	6	
22	1.4	--	e .1	.32	--		.42		
23	1.0	--		.42	--	(t)	.42		
24	.84	--		.42	13		.42	--	(t)
25	.69	--		.32	--		.42		
26	.69	--	(t)	.32	70	sb .1	.55	--	
27	.84	--		3.4	260	sa 2.4	.55	--	
28	.69	18		4.7	800	sa 12	.55	--	(t)
29	.42	--		1.8	135	.7	.55	13	
30	.55	--	e .1	.84	80	b .2	.55	--	
31	.69	33	.1	.69	18	(t)	--	--	--
Total	168.02	--	3,119.3	22.66	--	16.8	33.46	--	117.4

Total discharge for year (cfs-days) 1,046.60
Total load for year (tons) 39,206.2

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

MULE CREEK NEAR MALVERN, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 29, 1957	9:25 p.m.	763	63	20,100	4,300		31		53		96	99	100		--		SPWCM
June 7	5:30 p.m.	437	--	25,700	2,530		32		50		86	97	99		100		SPWCM
June 17	7:45 a.m.	9.7	64	15,400	3,280	30	36	44	57	80	97	99	100		--		SPWCM
July 1	12:40 p.m.	678	--	18,800	3,850		28		48		95	99	100		--		SPWCM
Sept. 5	7:40 p.m.	9.7	62	7,520	2,580		33		71		99	99	99		100		SPWCM

NISHNABOTNA RIVER BASIN--Continued

DAVIDS CREEK NEAR HAMLIN, IOWA

LOCATION.--At gaging station, on downstream side of bridge on State Highway 64, 5.2 miles east of Hamlin, Audubon County, and 8 miles upstream from mouth and East Nishnabotna River.
DRAINAGE AREA.--26.0 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1953.
Sediment records: July 1952 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 7,500 ppm June 16; minimum daily, not determined.
Sediment loads: Maximum daily, 14,000 tons June 16; minimum daily, less than 0.050 ton on many days.
EXTREMES, 1952-57.--Sediment concentrations: Maximum daily, 10,700 ppm Apr. 23, 1955; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 14,000 tons June 16, 1957; minimum daily, 0 tons on many days.
REMARKS.--Maximum observed sediment concentration during water year, 16,700 ppm June 17. Flow affected by ice Nov. 20 to Mar. 9. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.83	31		1.4			3.8	16	
2	.75	--		1.4	--	0.1	4.7	--	
3	.75	--		1.2			5.0	--	e 0.2
4	.75	38	e 0.1	9.5	200	sa 12	4.6	--	
5	.75	--		63	900	sa 200	4.0	--	
6	.75	45		22	100	5.9	2.6	--	
7	.67	19		14	65	2.5	1.9	--	
8	.83	--		10	46	b 1.2	1.5	16	
9	.83	--	(t)	9.5	32	b .8	1.4	--	
10	.92	--		8.5	22		2.5	--	e .1
11	1.0			7.6	--		2.1	--	
12	1.0	--	.1	6.4	--	e .4	1.5	--	
13	1.6	280	sa 3.2	6.0	--		1.3	--	
14	5.6	600	sa 12	6.4	--		1.8	--	
15	28	650	a 48	5.6	--		2.0	36	
16	6.8	140	2.6	3.6	--		2.2	--	
17	3.4	60	.6	4.9	22		1.7	--	
18	2.8			4.9	--	e .2	1.4	--	
19	2.4	--	e .2	4.0	--		1.8	--	
20	2.1	17		3.0	--		1.9	--	
21	2.0	--		1.9			2.1	--	
22	2.0	33		1.6	--	e .2	2.4	36	e .2
23	1.6	--	e .1	2.7			2.0	--	
24	1.6	--		4.0	19		1.5	--	
25	1.6	--		4.5	--		1.3	--	
26	1.6	--		3.9	--		1.6	--	
27	1.2	25		3.6	--	e .2	1.9	--	
28	1.1	--		3.2	--		2.2	--	
29	1.2	--	e .1	3.0	--		2.0	36	
30	1.6	--		3.5	--		2.3	--	
31	1.4	--		--	--	--	1.8	--	
Total	79.43	--	69.0	224.8	--	228.1	70.8	--	5.4

e Estimated
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1.4			0.60			0.90	--	
2	1.0		e 0.1	.70	--	(t)	.82	27	e 0.1
3	1.2			.80			.96	--	
4	1.0			.90			1.2	12	
5	.94	16	(t)	1.0			1.5	--	
6	1.0			1.0	--	0.1	1.6	--	
7	.92			1.0			1.2	--	(t)
8	1.2			1.3			1.2	--	
9	.90			5.0	190	2.6	1.3	9	
10	.70			4.0	120	b 1.3	1.4	--	
11	.60			2.6	195	1.4	2.0	30	
12	.60			2.0	105	.6	1.4	--	
13	.60		(t)	1.8	59		1.6	--	e .1
14	.60			1.5	--	e .2	1.8	--	
15	.60			1.3	--		.59	--	
16	.60			1.2	75		.83	80	a .2
17	.60			1.1	--		2.0	180	b 1.0
18	.60			1.1	--	e .2	15	600	a 24
19	.60			1.0	--		6.8	--	e 3.0
20	.80			.86	--		4.6	--	e 1.5
21	1.5		e .1	.80	--	e .1	4.2	--	e 1.0
22	1.1		e .1	.70	--		3.6	--	e .7
23	.82			.90	31		3.6	52	e .5
24	.70			1.5	--		3.4	--	
25	.62			2.5	54	e .2	.67	--	e .1
26	.56		(t)	1.2	--		.59		
27	.50			.92	--		.83		
28	.50			1.3	46	e .1	2.8	--	e 3.0
29	.50			--	--	--	16	1,300	a 55
30	.50			--	--	--	14	--	e 20
31	.54			--	--	--	22	1,200	a 70
Total	24.30		1.4	40.58	--	9.1	120.39	--	181.8

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	25	800	54	3.6			4.6	42	0.5
2	23	470	29	3.4			4.0		
3	15	220	8.9	3.1			4.0	23	.2
4	17	158	7.3	2.8	20	0.2	4.0		
5	19	173	8.9	2.8			3.1	54	.5
6	15	290	12	2.6			3.1	42	.4
7	16	130	5.6	2.6	82	.6	5.6	68	1.0
8	14	120	4.5	2.6	50	.4	4.9	38	.5
9	13	75	2.6	2.8	27	.2	4.6	70	.9
10	13	115	4.0	6.7	75	1.4	5.3	78	1.1
11	10	75	2.0	4.6	27	.3	6.4	60	1.0
12	8.0	46	b 1.0	5.6	55	.8	4.6	50	.6
13	9.0	60	1.5	6.4	46	.8	4.2	30	.3
14	8.0	70	1.5	18	868	s 47	13	1,700	s 78
15	8.0	48	1.0	12	220	7.1	36	4,800	sa 2,800
16	8.0			10	110	3.0	483	7,500	sa14,000
17	8.0			12	124	4.0	89	4,880	s 1,810
18	7.2	29	.6	9.5	78	2.0	49	973	s 170
19	7.2			8.5	55	1.3	25	340	23
20	6.0			13	500	sa 38	20	230	12
21	5.3			15	600	sa 30	16	190	8.2
22	5.6			8.5	140	3.2	20	250	14
23	5.6	28	.4	7.6	97	2.0	14	145	5.5
24	4.6			7.2	126	2.5	13	110	3.9
25	4.2			8.0	105	2.3	18	280	s 14
26	7.6	110	sa 2.4	6.4	64		13	180	6.3
27	5.6	24	.4	5.6	52		13	90	3.2
28	4.6	25	.3	5.3	70		16	260	sa 12
29	4.0	28	.3	5.3	--	e .9	11	140	4.2
30	3.6	32	.3	6.4	--		9.5	95	2.4
31	--	--	--	5.6	50		--	--	--
Total	300.1	--	152.5	213.5	--	153.5	916.9	--	18,974.1

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from partly estimated concentration graph.
b Computed from estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	9.5	95	2.4	1.2	38		1.2	85	sb 0.7
2	9.5	120	3.1	1.2	--		9.0	335	8.1
3	8.5	85	2.0	1.2	23	e 0.1	4.0	72	.8
4	8.0	105	2.3	1.0	--		1.5	46	b .2
5	7.2			1.0	--		1.4	28	.1
6	6.8	80	1.5	.92	21		4.6	120	1.5
7	6.4			.75	--	(t)	3.6	68	.7
8	6.0			.67	--		2.1	32	.2
9	5.6	55	.8	.59	32		1.5	22	b .1
10	5.3			.59	35		1.4		
						e .1			
11	4.9			.67	--		5.1	75	1.0
12	4.6	74	.9	.59	--		7.2	82	1.6
13	4.0			.67	82	.1	3.4	50	b .5
14	4.0	85	b .9	1.2	--	e .3	2.8	32	
15	6.8	120	2.2	.92	33		2.8	--	e .2
						e .1			
16	4.9	150	b 2.0	.59	--		2.1	--	
17	3.6	160	1.6	.59	--		1.6	26	
18	3.1	170	1.4	.92			1.4	--	
19	2.8	170	b 1.3	.92	--	e .1	1.4	--	e .1
20	2.6	150	1.1	.92			1.4	--	
21	3.1	103	.9	2.0	--	e .4	1.6	16	
22	3.1	80	b .7	1.1	--	e .3	1.4	--	
23	2.8	81		.92			1.2	13	
24	2.4	--	e .6	.92	--	e .2	1.1	--	(t)
25	2.1	--		.83	72	.2	1.0	--	
26	2.1	--	e .3	.59	75	b .1	1.0	--	
27	2.1	45		2.4	100	.6	.92	--	
28	2.1	--		4.0	51	.6	.92	21	(t)
29	1.8	39		2.8	66	.5	.92	--	
30	1.6	--	e .2	2.0	34	.2	.92	11	
31	1.5	--		1.2	40	.1	--	--	--
Total	138.8	--	34.5	35.87	--	5.4	70.48	--	17.1

Total discharge for year (cfs-days) 2,235.95
Total load for year (tons) 19,831.9

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
b Computed from estimated concentration graph.

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Nov. 5, 1956.....	9:20 a.m.	94	48	1,320	3,690		54		80		99	100	--				SPWCM
May 14, 1957	11:30 a.m.	24	57	2,000	3,080		54		80		100	--	--				SPWCM
May 14.....	11:30 a.m.	24	57	2,000	3,020		38		81		100	--	--				SPNM
June 14.....	9:15 a.m.	22	68	6,320	2,530		76		95		100	--	--				SPWCM
June 14.....	9:15 a.m.	22	68	6,320	2,000		70		97		100	--	--				SPNM
June 16.....	8:30 a.m.	1,030	64	5,290	3,720		74		93		99	99	100				SPWCM
June 16.....	8:30 a.m.	1,030	64	5,290	4,010		43		76		99	99	100				SPNM
June 17.....	3:15 p.m.	130	70	16,600	2,840	30	43	56	74	87	98	99	100				SPWCM
June 17.....	8:00 p.m.	199	70	7,080	2,970		50		78		95	96	98		100		SPWCM

KANSAS RIVER BASIN

REPUBLICAN RIVER AT McCOOK, NEBR.

LOCATION.--At gaging station at bridge on U. S. Highway 83 at south edge of McCook, Red Willow County, 2½ miles downstream from Driftwood Creek and 10½ miles upstream from Red Willow Creek.
DRAINAGE AREA.--12,560 square miles, approximately, of which a large area does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: September 1956 to September 1957 (discontinued).
Water temperatures: September 1956 to September 1957 (discontinued).
EXTREMES, September 1956 to September 1957.--Dissolved solids: Maximum, 379 ppm Oct. 1-24; minimum, 194 ppm May 17-18.
Hardness: Maximum, 220 ppm Oct. 1-24; minimum, 122 ppm May 17-18.
Specific conductance: Maximum daily, 601 micromhos May 3; minimum daily, 275 micromhos May 17.
Water temperatures: Maximum, 78°F July 29; minimum, freezing point on many days during December to March.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, September 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 12-30, 1956 a.	44.1	55	0.01	53	18	33	15	272	54	8.5	0.9	4.4	0.14	373	0.51	44.4	208	0	24	1.0	550	8.2	5
Oct. 1-24..	55.4	54	.01	57	19	31	15	b 287	47	9.0	.9	5.3	.12	379	.52	56.7	220	0	22	.9	560	8.3	5
Oct. 25-Nov. 30	125	53	.02	56	16	23	14	270	34	6.5	.8	5.0	.13	336	.46	113	205	0	18	.7	496	8.0	6
Dec. 1-31	139	49	.01	57	16	22	12	270	34	6.5	.8	4.1	.10	329	.45	123	208	0	18	.7	498	7.8	5
Jan. 1-31, 1957	110	54	.00	58	17	22	12	278	35	6.0	.8	3.0	.11	342	.47	102	216	0	17	.7	512	8.1	4
Feb. 1-28	145	52	.00	54	15	21	11	254	32	5.5	.9	3.3	.09	313	.43	123	196	0	18	.7	474	8.0	4
Mar. 1-31	143	52	.00	56	16	21	11	262	33	5.8	1.0	4.8	.10	329	.45	127	206	0	17	.6	493	8.0	4
Apr. 1-22	168	49	.01	58	16	23	14	271	33	7.2	1.1	4.6	.11	345	.47	156	211	0	18	.7	515	7.8	6
Apr. 23	656	32	.02	63	7.5	6.4	15	240	15	.2	.4	2.5	.06	268	.36	475	188	0	6	.2	410	7.6	18
Apr. 24-May 10	125	45	.01	26	36	25	14	269	41	7.5	.9	5.4	.11	345	.47	116	211	0	19	.8	528	8.0	7
May 11-16	429	37	.02	53	11	16	14	230	28	4.0	.7	3.9	.10	279	.38	323	179	0	15	.5	428	7.7	17
May 17-18	1,623	23	.03	40	5.4	8.0	11	162	16	1.2	.4	3.1	.63	194	.26	850	122	0	11	.3	293	8.0	--
May 19-29	1,812	19	.01	46	15	29	15	215	62	6.5	1.1	.7	.10	304	.41	1,490	175	0	25	1.0	483	7.6	16
May 30-June 4	1,130	28	.03	56	8.9	19	15	226	40	4.0	.5	1.3	.10	284	.39	866	176	0	18	.6	442	8.1	6
June 5-19	1,410	17	.01	46	13	28	13	216	59	6.5	1.0	.7	.11	291	.40	1,110	169	0	25	.9	471	7.7	6
June 20-27	182	41	.02	58	15	27	14	268	50	7.8	1.0	4.4	.12	348	.47	171	208	0	21	.8	536	7.7	5
June 28-July 1	603	29	.02	42	12	9.0	12	194	19	1.0	.4	3.0	.06	230	.31	374	154	0	10	.3	363	8.2	--
July 2-8	251	42	.01	35	28	28	16	262	46	9.0	.8	3.6	.10	338	.46	229	203	0	21	.9	517	8.1	5
July 9-26	448	25	.00	46	11	23	14	206	38	6.0	.7	2.8	.08	267	.36	323	160	0	22	.8	431	7.7	10
July 27-Aug. 27	393	21	.01	28	20	29	9.1	204	49	7.0	1.0	1.6	.10	274	.37	291	154	0	28	1.0	445	7.9	10
Aug. 28-Sept. 30	134	27	.00	48	15	28	15	234	56	9.0	.9	2.0	.10	320	.44	116	181	0	23	.9	499	7.7	15
Weighted average c	310	30	0.01	47	15	25	13	228	46	6.2	0.9	2.2	0.12	298	0.41	249	178	0	22	0.8	467	--	--

a Not included in weighted average. b Includes equivalent of 8 ppm of carbonate (CO_3). c Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER AT McCOOK, NEBR.--Continued

Temperature (° F) of water, September 1956
(Once-daily measurement between 7 a.m. and 8 a.m.)

Day	September	Day	September	Day	September
1		11	--	21	60
2		12	a 73	22	57
3		13	--	23	58
4		14	--	24	55
5		15	63	25	57
6		16	--	26	59
7		17	--	27	a 76
8		18	59	28	60
9		19	56	29	56
10		20	59	30	51

a Measurement between 12 m. and 3 p.m.

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 9 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	44	34	32	32	37	46	59	61	74	76	69
2	52	45	35	32	32	35	44	61	61	76	77	64
3	59	38	35	32	32	39	36	60	62	77	74	63
4	51	38	34	32	32	42	40	59	66	71	72	65
5	53	38	33	32	32	35	36	52	69	66	69	64
6	52	34	a 32	33	32	33	40	55	69	68	70	67
7	48	41	32	32	32	32	39	56	67	71	74	58
8	53	33	32	32	32	35	35	58	68	70	76	59
9	47	35	32	32	32	35	42	55	68	68	77	59
10	45	39	32	32	32	41	45	49	69	71	74	68
11	53	44	32	32	32	40	42	54	71	74	76	51
12	54	39	32	32	32	38	37	53	65	74	75	59
13	59	40	32	32	33	42	37	59	69	75	74	60
14	42	40	32	32	36	35	37	50	66	74	74	59
15	54	33	32	32	38	33	45	56	66	76	75	55
16	51	33	32	32	34	38	55	48	64	75	72	58
17	54	33	33	32	34	37	51	48	64	72	69	59
18	56	38	32	32	33	33	54	50	61	71	71	63
19	50	37	32	32	33	35	58	53	64	74	--	51
20	48	33	32	32	32	38	52	58	66	76	69	54
21	42	33	32	33	35	44	54	54	65	74	74	52
22	44	36	32	32	32	42	59	58	60	74	72	49
23	43	35	32	a 32	32	35	48	58	60	74	70	51
24	50	34	32	32	32	--	51	57	63	75	68	53
25	49	36	32	32	37	36	59	56	67	75	69	54
26	42	33	32	--	36	33	51	58	65	72	73	54
27	a 50	33	32	--	36	39	50	60	62	75	69	58
28	43	34	34	--	38	43	50	62	64	73	71	51
29	53	33	34	--	--	41	51	64	69	78	69	57
30	44	35	35	32	--	41	58	56	75	77	73	57
31	43	--	34	32	--	43	--	64	--	77	67	--
Average	50	37	33	32	33	38	47	56	66	73	72	58

a Measurement between 11 a.m. and 1 p.m.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER ABOVE MEDICINE CREEK, AT CAMBRIDGE, NEBR.

LOCATION.--At bridge on State Highway 47, 2 miles upstream from gaging station at Cambridge, Furnas County, 1.5 miles upstream from Medicine Creek, and 3.3 miles upstream from Cambridge diversion dam.
DRAINAGE AREA.--13,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 388 ppm Jan. 9-31; minimum, 186 ppm May 14.
Hardness: Maximum, 244 ppm Jan. 9-31; minimum, 121 ppm May 14.
Specific conductance: Maximum daily, 703 micromhos Jan. 12; minimum daily, 284 micromhos May 17.
Water temperatures: Maximum, 93°F July 12, Aug. 14; minimum, freezing point on many days during November to February.
EXTREMES, 1950-57.--Dissolved solids: Maximum (1951-57), 444 ppm Nov. 26 to Dec. 3, 1952; minimum, 186 ppm May 14, 1957.
Hardness: Maximum, 272 ppm Nov. 26 to Dec. 3, 1952; minimum, 113 ppm Sept. 1-5, 1953.
Specific conductance: Maximum daily (1951-57), 830 micromhos Aug. 21, 1952; minimum daily, 267 micromhos Aug. 17, 1954.
Water temperatures: Maximum, 97°F Aug. 19, 1952, July 28, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge from that of the Republican River at Cambridge from Oct. 1 to July 31, and the discharge of Medicine Creek below Harry Strunk Lake from that of Republican River at Cambridge from Aug. 1 to Sept. 30. Discharge records for the Republican River at Cambridge, Medicine Creek at Cambridge, and Medicine Creek below Harry Strunk Lake for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-26, 1956....	17.8	--	--	--	--	32	--	280	--	--	--	--	--	371	0.50	17.8	214	0	25	0.9	554	7.8	--
Oct. 27-Nov. 30 ...	131	--	--	--	--	24	--	277	--	--	--	--	--	351	.48	124	216	0	19	.7	532	7.6	--
Dec. 1-13.....	114	51	0.03	59	21	25	13	304	36	7.0	0.9	3.2	0.11	364	.50	112	232	0	18	.7	552	7.8	15
Dec. 14-Jan. 8, 1957	163	--	--	--	--	23	--	278	--	--	--	--	--	335	.46	147	216	0	19	.7	511	7.8	--
Jan. 9-31	86.1	--	--	--	--	26	--	317	--	--	--	--	--	388	.53	90.2	244	0	19	.7	581	7.7	--
Feb. 1-4.....	104	--	--	--	--	25	--	280	--	--	--	--	--	350	.48	98.3	218	0	20	.7	526	7.8	--
Feb. 5-19.....	172	--	--	--	--	20	--	247	--	--	--	--	--	302	.41	140	192	0	18	.6	466	7.6	--
Feb. 20-24.....	146	--	--	--	--	22	--	282	--	--	--	--	--	339	.46	134	217	0	18	.7	515	7.7	--
Feb. 25-Mar. 31...	183	54	.00	58	16	23	12	273	29	7.0	1.5	3.9	.08	329	.45	163	212	0	18	.7	506	7.8	3
Apr. 1-22.....	234	--	--	--	--	23	--	284	--	--	--	--	--	344	.47	217	218	0	19	.7	533	7.8	--
Apr. 23-24.....	895	--	--	--	--	10	--	213	--	--	--	--	--	246	.33	594	164	0	12	.3	375	7.7	--
Apr. 25-30.....	244	--	--	--	--	22	--	267	--	--	--	--	--	331	.45	218	205	0	19	.7	506	7.8	--
May 1-13.....	171	--	--	--	--	25	--	278	--	--	--	--	--	345	.47	159	213	0	20	.7	531	7.7	--
May 14	2,300	--	--	--	--	6.4	--	163	--	--	--	--	--	186	.25	1,160	121	0	10	.3	288	7.7	--
May 15-16.....	1,245	--	--	--	--	13	--	198	--	--	--	--	--	238	.32	800	149	0	16	.5	364	8.1	--

May 17-19.....	2,463	--	--	--	--	9.3	--	172	--	--	--	--	--	199	.27	1,320	127	0	14	.4	310	8.0	--
May 20-31.....	2,242	--	--	--	--	27	--	208	--	--	--	--	--	293	.40	1,770	164	0	26	.9	466	7.7	--
June 1-15	1,390	20	.00	48	14	29	14	229	57	7.0	1.0	.5	.09	305	.41	1,140	179	0	24	.9	490	7.6	10
June 16-17	3,175	--	--	--	--	11	--	179	--	--	--	--	--	232	.32	1,990	138	0	15	.4	336	8.0	--
June 18-27	487	--	--	--	--	25	--	242	--	--	--	--	--	314	.43	413	189	0	22	.8	485	7.9	--
June 28-July 11....	481	--	--	--	--	13	--	216	--	--	--	--	--	250	.34	325	166	0	15	.4	398	7.6	--
July 12-Aug. 7.....	345	--	--	--	--	23	--	224	--	--	--	--	--	286	.39	266	193	9	21	.7	457	7.7	--
Aug. 8-29.....	241	--	--	--	--	30	--	198	--	--	--	--	--	293	.40	191	148	0	31	1.1	468	7.4	--
Aug. 30-Sept. 30...	133	30	.00	50	12	25	16	232	43	7.0	.7	3.9	.14	304	.41	109	176	0	22	.8	474	7.8	10
Weighted average a	357	--	--	--	--	23	--	227	--	--	--	--	--	293	0.40	282	177	0	22	0.8	459	--	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 10 a.m. and 1 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 58	50	37	b 33	32	39	49	67	67	79	88	a 70
2	a 55	47	b 41	34	33	34	b 42	65	a 62	79	89	68
3	b 75	42	35	36	a 33	36	37	63	72	82	82	a 64
4	a 57	a 40	34	32	32	43	45	b 55	b 82	74	a 72	68
5	--	41	33	33	b 34	40	b 51	55	b 81	a 70	79	67
6	--	40	b 33	32	b 34	33	46	67	--	78	82	69
7	--	45	32	34	34	b 42	a 38	72	69	84	84	61
8	--	37	32	33	34	b 46	a 36	72	69	80	89	b 75
9	--	38	b 32	32	33	42	b 56	55	69	74	84	58
10	b 61	46	33	32	b 34	a 40	a 46	61	a 70	80	86	60
11	69	b 49	33	32	35	42	42	59	72	88	a 77	67
12	68	b 48	33	32	35	49	37	b 69	69	b 93	80	70
13	69	a 38	32	32	35	52	37	b 60	b 78	87	81	59
14	60	42	32	32	35	42	a 37	55	70	b 82	b 93	b 60
15	66	--	33	32	40	44	b 65	b 57	62	83	82	a 54
16	66	32	32	32	39	b 54	b 58	b 51	a 64	87	72	68
17	66	32	33	32	a 33	a 38	58	52	67	86	69	b 75
18	63	b 46	34	32	41	a 34	b 73	56	b 67	84	a 72	71
19	62	33	34	32	33	34	b 72	a 54	73	b 86	80	58
20	62	32	33	32	b 34	a 35	a 57	59	72	84	79	56
21	b 67	34	34	33	33	44	69	56	72	--	77	60
22	51	a 33	34	32	32	42	54	60	75	b 80	80	b 69
23	49	39	32	b 32	32	b 36	62	61	a 62	b 88	72	b 70
24	56	40	32	32	33	34	57	59	72	b 87	80	b 77
25	50	b 46	a 32	32	34	43	65	60	80	80	a 72	b 75
26	48	36	34	32	37	44	62	61	68	a 77	76	69
27	48	b 40	33	32	35	50	59	68	70	78	82	63
28	b 59	34	34	32	41	48	58	69	73	a 82	77	b 72
29	60	36	33	32	--	48	60	b 75	73	88	81	b 76
30	54	40	33	32	--	44	60	67	a 77	89	82	65
31	49	--	36	32	--	b 44	--	65	--	90	80	--
Average	59	40	33	32	35	42	53	61	69	83	80	64

a Measurement between 8 a.m. and 9 a.m.
b Measurement between 2 p.m. and 6 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.

LOCATION.--At bridge on county road (revised) 150 feet upstream from gaging station, a quarter of a mile east of Maywood, Frontier County, and 5 miles upstream from Brushy Creek.
DRAINAGE AREA.--207 square miles, approximately, of which about 82 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: April 1951 to September 1957.
Sediment records: April 1951 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 84°F Aug. 2; minimum, freezing point on several days during January and February.
Sediment concentrations: Maximum daily, 7,380 ppm May 16; minimum daily, not determined.
Sediment loads: Maximum daily, 2,940 tons Apr. 22; minimum daily, 3 tons Oct. 5, 7-10.
EXTREMES, 1951-57.--Water temperatures: Maximum, 86°F July 13, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 20,000 ppm July 12, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 22,700 tons May 20, 1951; minimum daily, 2 tons Oct. 27, 28, 1952, Sept. 1, 1956.
REMARKS.--Maximum observed sediment concentration during water year, 25,600 ppm Apr. 22. Flow affected by ice Dec. 6-11, 13, Jan. 9 to Feb. 10, Feb. 22-24. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	a 50	38	--	--	--	b 48	62	b 65	b 79	78	70
2	b 62	--	--	--	--	a 42	--	62	--	b 82	a 84	a 63
3	55	a 44	39	a 35	--	--	--	b 60	62	b 81	--	61
4	a 50	--	--	--	b 33	--	a 43	b 56	64	72	70	--
5	b 60	b 45	--	--	a 32	a 43	a 44	a 58	a 70	b 75	--	65
6	b 58	a 44	--	--	--	a 39	a 44	b 64	b 74	b 77	a 80	64
7	52	b 44	--	a 37	--	a 36	a 40	b 66	67	b 80	a 79	62
8	b 57	--	a 34	--	--	37	b 47	a 70	b 72	71	75	62
9	a 54	41	b 34	--	--	38	a 47	b 54	--	a 73	--	58
10	52	--	--	--	38	b 47	a 46	57	a 73	a 73	a 82	58
11	b 59	--	--	--	--	a 48	b 44	a 55	70	72	a 80	68
12	b 60	a 54	a 34	--	--	a 48	a 43	--	a 70	--	75	67
13	a 55	a 56	--	--	--	a 45	a 43	b 55	68	b 78	74	57
14	--	--	--	b 32	--	a 40	a 49	--	a 69	73	70	54
15	56	38	b 34	--	--	b 45	--	b 57	b 65	76	66	60
16	b 60	a 36	--	--	a 41	a 46	--	b 46	b 67	76	67	58
17	a 59	--	b 36	a 32	--	b 38	b 55	b 54	64	75	70	61
18	b 58	--	--	--	--	b 41	55	b 55	b 72	a 80	70	63
19	54	--	--	--	--	a 43	b 48	52	b 72	b 76	--	55
20	--	35	--	--	--	41	a 59	--	b 74	a 75	70	56
21	50	--	a 38	--	b 36	a 50	b 56	b 62	b 75	74	--	55
22	50	--	--	b 32	--	b 44	55	a 58	67	b 77	--	53
23	b 59	a 40	--	--	--	--	b 51	--	67	71	69	52
24	--	--	a 37	--	--	--	a 62	a 58	--	b 77	--	53
25	--	--	--	--	b 48	--	a 61	55	66	b 77	69	--
26	48	b 38	--	--	b 43	b 45	56	55	--	72	69	56
27	48	a 40	--	--	--	a 44	b 58	61	a 65	--	--	57
28	--	--	--	--	--	a 44	b 61	63	b 72	78	67	58
29	53	--	a 41	b 32	--	b 46	a 60	63	72	75	68	--
30	b 53	--	--	--	--	38	b 62	b 69	--	--	--	--
31	--	--	--	--	--	a 47	--	69	--	--	73	--
Average	55	--	--	--	--	43	51	59	69	76	--	59

a Measurement between 12 m. and 3 p.m.
b Measurement between 4 p.m. and 7 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	15	110	4	24	160	10	26	120	
2	15	95	4	26	160	a 11	25	--	
3	15	125	5	28	145	11	26	115	
4	15	95	4	26	115	8	25	--	
5	14	80	3	25	100	7	25	--	
6	15	90	4	25	110	7	25	--	
7	15	80	3	25	110	7	27	--	
8	15	80	3	24	95	6	27	95	
9	15	85	3	24	90	6	26	160	
10	15	75	3	25	100	7	27	--	
11	15	95	4	37	--	e 55	24	--	
12	16	115	5	36	570	55	25	435	
13	16	100	4	38	545	56	24	--	
14	16	95	4	35	465	a 44	24	--	
15	17	90	4	31	300	25	25	160	
16	18	90	4	35	345	33	27	--	e 12
17	18	85	4	31	200	a 17	28	175	
18	19	120	6	37	--	e 36	27	--	
19	20	100	5	46	--	e 42	26	--	
20	20	90	5	52	265	37	26	--	
21	20	80	4	33	160	a 14	26	140	
22	20	80	4	41	--	e 44	26	--	
23	20	75	4	36	300	29	25	--	
24	21	100	6	29	205	a 16	25	120	
25	24	180	12	27	165	a 12	25	--	
26	26	115	8	25	140	9	27	--	
27	24	85	6	30	270	22	28	--	
28	24	125	8	28	165	a 12	29	--	
29	25	215	15	26	130	a 9	30	215	
30	37	880	a 90	26	120	a 8	30	--	
31	26	290	a 20	--	--	--	30	175	
Total	591	--	258	931	--	655	816	--	372

Day	January			February			March		
1	28	--		24	--		33	--	
2	27	--		24	--		32	350	
3	27	155		25	--		31	--	e 30
4	28	--		26	145		31	--	
5	27	150		26	150		29	290	23
6	28	--		27	--		29	280	22
7	28	140		29	--		29	305	24
8	27	--		31	--		28	250	19
9	25	--		34	--		29	320	25
10	23	--		38	795		29	440	34
11	24	--		33	--		31	450	38
12	24	--		31	--		30	340	28
13	25	--		32	--		28	280	21
14	25	165		33	--		28	290	22
15	25	--		34	340	e 34	28	310	23
16	25	--	e 8	32	320		35	550	52
17	25	90		31	--		32	320	28
18	25	--		31	--		31	285	24
19	26	--		31	--		30	290	23
20	26	--		29	--		30	300	24
21	26	--		30	565		30	340	28
22	24	115		27	--		29	300	23
23	23	--		26	--		34	--	e 38
24	23	--		30	--		39	--	e 55
25	23	--		33	575		36	--	e 48
26	23	--		35	475		39	595	63
27	23	--		33	--		42	615	70
28	24	--		32	--		41	520	58
29	24	55		--	--	--	38	470	48
30	24	--		--	--	--	33	370	33
31	24	--		--	--	--	36	430	42
Total	779	--	248	847	--	952	1,000	--	1,056

e Estimated.

a Computed from estimated concentration graph.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	36	450	44	31	670	56	110	3,000	891
2	36	480	a 46	27	600	44	54	1,080	sa 170
3	41	585	65	43	2,880	s 523	29	520	41
4	42	470	53	64	3,040	525	27	410	30
5	40	480	52	40	1,000	108	22	280	17
6	42	560	64	31	770	64	21	260	15
7	40	440	48	17	405	19	22	315	19
8	35	385	36	12	230	7	25	380	26
9	31	320	27	13	310	11	22	245	15
10	28	305	23	24	830	54	41	1,460	s 263
11	28	280	21	16	290	13	74	2,650	s 624
12	28	320	24	26	--	e 130	27	525	38
13	30	360	29	54	4,350	s 860	23	330	20
14	29	330	26	74	3,110	620	22	270	16
15	28	335	25	50	1,400	189	21	255	14
16	27	320	23	120	7,380	s 2,890	32	830	s 84
17	28	350	26	123	2,800	930	43	1,110	129
18	27	400	29	77	1,350	281	28	480	36
19	29	460	36	28	665	s 53	24	310	20
20	31	525	44	20	440	24	21	245	14
21	27	405	30	18	320	16	20	215	12
22	87	5,760	s 2,940	14	180	7	18	225	11
23	108	4,750	1,390	16	170	7	17	220	10
24	42	1,210	137	20	410	s 27	18	220	11
25	29	800	63	37	1,050	105	17	245	11
26	30	850	69	36	610	59	17	295	14
27	26	550	39	28	395	30	60	2,700	s 481
28	25	480	32	24	400	26	80	2,370	512
29	24	430	28	23	300	19	42	835	s 101
30	28	690	52	30	760	s 79	26	470	33
31	--	--	--	88	3,320	789	--	--	--
Total	1,082	--	5,521	1,224	--	8,565	1,003	--	3,678

	July			August			September		
1	24	395	26	14	190	7	16	335	14
2	22	320	19	14	195	7	15	245	10
3	20	220	12	13	175	6	14	195	7
4	19	250	13	13	160	6	14	230	9
5	19	200	10	13	145	5	14	225	8
6	18	170	8	12	135	4	14	210	8
7	19	425	s 35	12	150	5	14	190	7
8	22	895	s 63	14	295	11	14	180	7
9	21	420	24	15	245	a 10	16	290	13
10	19	320	16	15	190	8	18	380	18
11	18	280	14	14	190	7	18	275	13
12	17	240	11	13	195	7	17	290	13
13	20	910	sa 65	13	175	6	33	2,500	s 352
14	40	1,810	s 213	12	165	5	66	3,120	556
15	37	1,280	s 149	12	165	5	54	1,890	276
16	22	510	30	13	165	6	28	780	59
17	19	330	17	13	155	5	22	470	28
18	16	235	10	13	150	5	20	370	20
19	16	190	8	13	155	5	21	580	33
20	18	250	12	13	165	6	22	380	23
21	21	480	27	13	165	6	21	240	14
22	23	495	31	13	170	6	20	200	11
23	19	325	17	14	190	7	20	210	11
24	18	240	12	16	275	a 12	20	195	11
25	17	215	10	14	315	12	19	180	9
26	18	230	11	13	260	9	19	175	9
27	18	235	11	13	270	a 9	19	180	9
28	17	215	10	28	1,770	s 148	19	195	10
29	15	200	8	20	680	37	20	185	10
30	15	195	8	21	500	28	20	--	e 12
31	15	195	8	17	420	19	--	--	--
Total	622	--	908	446	--	419	647	--	1,580

Total discharge for year (cfs-days) 9,988
Total load for year (tons) 24,212

e Estimated.
s Computed by subdividing day.
a Computed from estimated concentration graph.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 15, 1957	5:10 p.m.	28	45	318	1,010	--	20	--	41	--	93	98	100				SPWCM
Apr. 22	4:00 p.m.	310	--	21,800	3,910	--	23	--	43	--	98	100	--				VPWCM
May 3	5:56 p.m.	92	59	8,790	2,330	--	24	--	40	--	97	100	--				VPWCM
May 3	9:10 p.m.	73	--	4,490	2,880	13	18	24	32	48	96	100	--				VPWCM
May 3	9:10 p.m.	73	--	4,490	2,890	1	4	12	28	46	96	100	--				VPNM
May 13	6:40 p.m.	92	55	11,800	3,780	--	24	--	38	--	98	100	--				VPWCM
May 16	8:50 a.m.	192	47	23,100	6,980	--	20	--	35	--	98	100	--				VPWCM
May 31	9:10 p.m.	107	63	3,240	2,710	16	22	29	35	--	90	100	--				VPWCM
May 31	9:10 p.m.	107	63	3,240	2,620	2	4	18	30	--	90	100	--				VPNM
June 11	11:55 a.m.	101	70	2,140	2,980	--	26	--	34	--	93	100	--				VPWCM
June 27	4:30 p.m.	85	65	3,520	4,250	--	30	--	46	--	96	100	--				SPWCM
Aug. 28	3:50 p.m.	49	69	3,210	3,430	--	28	--	45	--	97	100	--				SPWCM
Sept. 13	11:10 p.m.	74	--	4,720	2,140	--	28	--	41	--	95	99	100				SPWCM

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.

LOCATION.--At bridge on U. S. Highway 83, 420 feet (revised) upstream from gaging station, 2 miles south of Maywood, Frontier County, 2½ miles upstream from Frazier Creek, and 5 miles upstream from mouth.
DRAINAGE AREA.--130 square miles, approximately, of which about 72 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: April 1951 to September 1957.
Sediment records: April 1951 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 86°F Aug. 25; minimum, freezing point Dec. 11, Jan. 15, and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 14,300 ppm May 13; minimum daily, no flow on several days during October.
Sediment loads: Maximum daily, 45,000 tons Apr. 22; minimum daily, 0 tons on several days during October.
EXTREMES, 1951-57.--Water temperatures: Maximum, 89°F Aug. 1, 1953; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 22,700 ppm June 8, 1951; minimum daily, no flow on many days during 1951, 1953-57.
Sediment loads: Maximum daily, 58,000 tons Sept. 2, 1951; minimum daily, 0 tons on many days during 1951, 1953-57.
REMARKS.--Flow affected by ice Nov. 20, 22, 26-28, Dec. 4-8, 11-14, Jan. 1-9, 17-21, 26-29, Feb. 1-10, Mar. 23-26. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 8 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		--	--	a 56	a 35	a 45	a 49	a 68	58	68	71	68
2		b 40	--	--	--	--	a 40	a 69	55	73	73	60
3		--	--	--	--	--	a 36	a 60	57	72	70	56
4		--	b 37	a 35	--	--	a 42	a 55	60	67	68	57
5		b 38	--	--	a 36	--	a 51	b 56	63	--	65	60
6		a 45	--	--	--	a 38	a 44	a 64	64	65	66	62
7		--	b 36	--	--	a 37	a 40	a 65	65	67	71	53
8		--	--	a 35	a 36	a 45	a 52	a 67	63	68	72	60
9		b 40	--	--	--	a 44	a 52	--	--	66	70	b 58
10		--	--	--	--	a 50	a 54	50	65	67	67	57
11		--	a 32	a 34	--	a 46	a 42	55	67	--	70	55
12		b 40	--	--	--	a 53	a 45	a 65	62	70	69	53
13		--	--	--	--	a 50	a 41	a 55	64	70	70	58
14		--	a 37	--	--	a 40	a 52	53	60	70	66	53
15		--	--	a 32	a 38	a 48	--	54	61	71	--	54
16		a 38	--	--	a 38	a 47	a 46	45	61	--	67	52
17		--	--	--	--	a 36	a 55	47	60	71	65	60
18		--	a 36	a 35	--	a 44	a 60	52	59	a 82	65	60
19		--	--	--	a 37	a 48	a 61	53	61	--	64	55
20		b 36	--	--	--	a 50	a 64	55	63	70	67	54
21		--	a 33	--	--	a 49	a 65	52	64	78	70	51
22		--	--	a 34	a 36	a 42	a 45	50	60	71	67	50
23		b 36	--	--	--	a 35	a 59	52	64	67	65	49
24		--	a 37	--	--	a 34	a 63	55	58	70	60	--
25		--	--	--	--	a 40	a 56	--	65	68	a 86	56
26		a 36	--	a 35	a 38	a 42	a 58	55	62	71	a 66	56
27		b 36	--	--	--	a 50	47	--	61	71	64	54
28		--	a 36	--	a 43	a 48	51	60	61	69	66	56
29		--	--	a 34	--	a 46	50	62	65	72	67	55
30	b 48	b 37	--	--	--	a 44	a 63	57	70	72	69	53
31		--	--	--	--	b 43	--	62	--	70	67	--
Average		--	--	--	--	44	51	57	62	70	68	56

a Measurement between 4 p.m. and 7 p.m.
b Measurement between 9 a.m. and 10 a.m.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0		0	0.2	--		0.2	--	
2	0		0	.2	33		.2	--	
3	0		0	.2	--		.2	--	
4	0		0	.2	--		.2	18	
5	0		0	.2	18		.2	--	
6	0		0	.2	18		.2	--	
7	0		0	.2	--		.3	82	
8	0		0	.2	--		.3	--	
9	0		0	.2	13		.3	--	
10	0		0	.2	--		.4	--	
11	0		0	3	--		.4	24	
12	0		0	.2	10		.4	--	
13	.1		(t)	.3	--		.4	--	
14	0		0	.3	--		.4	15	
15	0		0	.3	--	(t)	.4	--	(t)
16	.1			.3	20		.4	--	
17	.1			.3	--		.4	--	
18	.1			.2	--		.4	13	
19	.1			.2	--		.4	--	
20	.2			.2	15		.4	--	
21	.2			.3	--		.4	13	
22	.2			.2	--		.4	--	
23	.2		(t)	.2	13		.4	--	
24	.2			.2	--		.4	9	
25	.2	13		.2	--		.4	--	
26	.2			.2	15		.4	--	
27	.2			.2	49		.4	--	
28	.2			.2	--		.4	9	
29	.2			.2	--		.4	--	
30	.7		e 3.6	.2	34		.5	--	
31	.2		(t)	--	--		.6	14	
Total	3.4		3.8	6.7	--	0.3	11.2	--	0.6

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.4	5		0.3	29		0.6	8	
2	.4	--		.3	--		.6	--	
3	.4	11		.3	--		.5	--	(t)
4	.4	7		.3	--		.4	--	
5	.4	--		.3	17		.4	--	
6	.4	--		.3	4		.4	6	
7	.4	--		.3	--		.4	4	
8	.4	7		.3	19		.4	7	
9	.4	--		.3	--		.3	15	
10	.3	--		.4	--		.4	16	
11	.3	28		.5	--		.5	6	
12	.3	--		.5	13		.7	10	
13	.3	--		.6	--		.7	14	(t)
14	.3	--		.6	--		.5	9	
15	.3	8		.6	33	(t)	.5	6	
16	.3	--	(t)	.5	18		.5	5	
17	.3	--		.5	--		.4	5	
18	3	58		.5	--		.5	4	
19	.3	--		.4	12		.5	21	
20	.3	--		.4	--		.6	106	0.2
21	.3	--		.5	--		.6	109	.2
22	.3	77		.5	70		.5	26	(t)
23	.3	--		.6	--		.4	52	.1
24	.3	--		.5	--		.4	14	(t)
25	.3	--		.6	--		.8	123	.3
26	.3	18		6	11		.7	24	
27	.3	--		.7	--		.7	21	
28	.3	--		.7	9		.7	16	
29	.3	9		--	--		.6	9	(t)
30	.3	--		--	--		.6	13	
31	.3	--		--	--		.7	12	
Total	10.2	--	0.6	12.9	--	0.8	16.5	--	1.2

e Estimated.
t Less than 0.050 ton.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.7	9	(t)	0.5	45	0.1	7.8	2,950	s 120
2	.8	74	0.2	.6	40	.1	1.5	495	2.0
3	.9	75	.2	9.4	5,840	s 393	1.1	147	.4
4	.8	25	.1	2.3	2,300	14	1.0	132	.4
5	.7	42	.1	.5	405	.5	1.0	124	.3
6	.7	19		.5	165	.2	1.2	175	.6
7	.6	12		.5	106	.1	1.0	180	.5
8	.6	14		.5	66	.1	.9	132	.3
9	.6	9		.7	--	e .5	.9	108	.3
10	.5	9		.6	145	.2	1.0	79	.2
11	.5	13		.5	116	.2	.9	90	
12	.5	10		2.8	--	e 6.5	.7	87	
13	.5	7		271	14,300	s 25,500	.6	93	.2
14	.5	10	(t)	21	4,480	s 392	.6	96	
15	.5	15		2.5	650	4.4	.7	91	
16	.5	11		269	11,800	s 15,900	22	3,460	s 1,030
17	.5	9		6.9	1,340	s 32	33	4,650	s 1,040
18	.5	13		2.7	275	2.0	1.1	630	1.9
19	.5	19		2.3	85	.5	.7	170	.3
20	.5	13		2.3	60	.4	.7	85	.2
21	.5	11		2.3	57	.4	.7	58	
22	375	14,200	s 45,000	2.3	63	.4	.7	39	
23	14	4,000	s 177	1.5	61	.2	.7	40	
24	10	700	19	.9	860	s 5.3	.7	47	.1
25	15	1,940	s 255	6.7	2,980	s 67	.6	43	
26	2.8	3,100	s 41	1.6	402	1.7	.7	52	
27	.9	430	1.0	1.2	108	.3	2.4	1,790	s 19
28	.5	170	.2	.9	62	.2	1.2	240	.8
29	.5	90	.1	13	3,320	s 629	.7	100	.2
30	.7	70	.1	12	2,980	s 116	.7	77	.1
31	--	--	--	84	11,600	s 4,290	--	--	--
Total	431.8	--	45,494.3	723.5	--	47,357.3	87.5	--	2,219.1

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.6	61		0.4	36		0.2	47	
2	.6	60		.4	40		.2	35	
3	.5	48		.4	35		.2	29	
4	.4	49	0.1	.4	35	(t)	.2	23	
5	.4	46		.4	38		.2	21	
6	.4	41		.4	46		.2	17	
7	45	2,910	s 4,080	1.5	1,170	s 29	.2	18	(t)
8	60	5,150	s 2,450	6.6	3,050	s 161	.2	19	
9	1.0	370	1.0	.4	178	.2	.4	38	
10	.7	176	.3	.4	98	.1	.4	20	
11	.6	138	.2	.4	62	.1	.4	14	
12	.5	90	.1	.4	42		.4	13	
13	.9	180	.4	.3	37		38	2,950	s 792
14	2.2	1,300	7.7	.3	32		4.8	1,990	s 35
15	.7	400	.8	.4	29		.7	610	1.2
16	.3	150	.1	.4	28		.4	194	.2
17	.2	88	(t)	.4	36		.3	112	.1
18	.1	340	.1	.4	22		.3	95	.1
19	2.2	2,420	s 74	.4	30		.3	60	
20	3.4	2,260	21	.4	37	(t)	.3	35	
21	5.7	3,050	s 145	.4	23		.3	25	
22	.7	650	1.2	.4	24		.3	26	
23	.5	266	.4	.3	28		.3	28	
24	.5	96	.1	.2	19		.3	18	
25	.5	81	.1	.2	23		.3	17	(t)
26	.5	57		.1	18		.2	15	
27	.5	39		2.1	901	s 56	.2	17	
28	.5	36		18	2,560	s 283	.2	12	
29	.5	34	(t)	.4	278	.3	.2	12	
30	.4	35		.4	97	.1	.2	15	
31	.4	36		.3	70	.1	--	--	--
Total	131.4	--	6,783.4	37.9	--	530.6	50.8	--	829.1

Total discharge for year (cfs-days) 1,523.8

Total load for year (tons) 103,221.1

e Estimated.

s Computed by subdividing day.

t Less than 0.050 ton.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 22, 1957	3:10 p.m.	180	45	34,500	5,260	--	24	--	39	--	94	100					VPWCM
Apr. 22	4:05 p.m.	3,750	45	70,600	6,310	--	18	--	31	--	97	100					VPWCM
Apr. 23	4:11 a.m.	18	52	6,570	1,740	47	58	62	67	72	94	100					VPWCM
Apr. 23	4:11 a.m.	18	52	6,570	1,850	26	43	58	62	69	94	100					VPNM
May 3	7:13 p.m.	15	58	8,700	2,660	30	41	50	58	69	94	100					VPWCM
May 3	7:13 p.m.	15	58	8,700	2,550	8	20	44	59	69	94	100					VPNM
May 13	2:50 p.m.	1,750	55	54,800	4,410	--	17	--	27	--	94	100					VPWCM
May 13	4:20 p.m.	1,440	55	24,100	7,080	17	23	29	36	53	94	100					VPWCM
May 13	4:20 p.m.	1,440	55	24,100	6,800	3	6	24	34	53	94	100					VPNM
May 14	4:40 p.m.	3.7	--	2,460	1,400	--	72	--	74	--	97	100					SPWCM
May 31	5:45 p.m.	486	62	32,400	5,240	--	25	--	42	--	98	100					VPWCM
May 31	6:25 p.m.	660	62	23,600	4,020	--	29	--	46	--	98	100					VPWCM
May 31	7:30 p.m.	394	62	15,200	5,100	--	31	--	47	--	96	100					VPWCM
June 16	8:20 p.m.	83	62	19,800	5,240	--	21	--	34	--	92	100					VPWCM
June 16	9:00 p.m.	80	64	14,200	4,380	--	25	--	40	--	95	100					VPWCM
July 7	11:45 p.m.	948	68	36,600	4,710	--	17	--	29	--	92	100					VPWCM
Sept. 13	4:50 p.m.	360	51	10,500	3,290	--	36	--	57	--	98	100					SPWCM

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.

LOCATION.--At bridge on State Highway 23N, 50 feet downstream from gaging station, half a mile upstream from mouth, and 1 mile east of Curtis, Frontier County.
DRAINAGE AREA.--77 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: April 1951 to August 1952, October 1953 to September 1957.
Sediment records: April 1951 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 83°F July 12; minimum, freezing point Feb. 5 and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 5,580 ppm May 16; minimum daily, not determined.
Sediment loads: Maximum daily, 6,790 tons Aug. 28; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1951-57.--Water temperatures: Maximum (1951-52, 1953-57), 86°F July 18, 1954; minimum (1951-52, 1955, 1957), freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 37,600 ppm June 8, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 131,000 tons May 31, 1951; minimum daily, less than 0.50 ton on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 19,200 ppm July 14. Flow affected by backwater from Medicine Creek May 13. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 12 m. and 1 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	62	50	--	--	--	46	52	67	62	75	77	70
2	60	--	--	--	--	45	43	68	65	78	--	67
3	a 60	46	46	--	--	a 50	41	60	67	77	65	67
4	58	--	--	--	37	46	46	54	69	72	78	67
5	59	44	--	--	a 32	44	48	62	71	70	71	69
6	58	41	--	--	--	a 43	45	64	68	74	73	64
7	57	45	--	--	--	40	42	67	64	76	78	63
8	--	--	--	--	--	45	49	68	67	a 73	75	64
9	54	44	b 35	--	--	43	52	55	66	--	72	58
10	54	--	37	--	--	b 46	57	56	72	a 77	74	58
11	58	a 49	--	--	42	47	44	56	68	--	74	62
12	59	--	--	--	--	48	45	b 56	--	a 83	75	62
13	--	48	--	--	--	51	42	57	71	71	74	56
14	b 55	--	--	33	--	43	52	60	67	71	73	54
15	59	40	--	--	--	45	58	56	61	77	75	b 56
16	58	a 38	--	a 33	b 37	48	56	45	66	78	66	60
17	59	44	37	--	--	a 42	57	52	65	77	71	63
18	57	--	--	--	46	41	56	55	67	78	b 68	65
19	57	42	--	--	--	47	64	54	70	75	70	55
20	55	--	--	--	--	49	63	64	72	--	72	54
21	53	--	--	35	--	52	62	62	73	--	68	55
22	52	--	37	--	--	45	66	59	70	74	73	58
23	52	44	--	--	--	40	58	61	68	74	67	57
24	55	--	--	--	--	--	62	56	68	72	68	59
25	52	--	--	--	47	42	64	59	72	72	68	59
26	a 53	42	41	--	--	44	59	b 61	67	74	69	58
27	51	a 40	--	--	a 45	49	55	64	65	78	70	61
28	54	--	--	35	--	46	62	68	67	a 81	63	--
29	55	--	--	--	--	49	60	71	69	77	68	62
30	53	--	--	--	--	46	57	68	75	77	72	62
31	50	--	40	--	--	47	--	64	--	78	71	--
Average	56	--	--	--	--	46	54	60	68	76	71	61

a Measurement between 2 p.m. and 5 p.m.
b Measurement between 10 a.m. and 11 a.m.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	3.4	45	0.4	5.0	35		7.4	--	
2	3.7	62	6	5.9	--		7.0	--	
3	3.7	44	4	5.9	29		7.0	21	
4	3.7	44	4	5.9	--		7.1	--	
5	3.7	45	4	6.1	24		7.1	--	
6	3.7	43	.4	6.1	43		6.8	--	
7	3.7	31	3	5.7	35		6.6	--	
8	3.7	36	.4	4.7	--		6.5	--	
9	4.0	36	.4	5.7	23		6.8	36	
10	3.8	34	3	5.7	--		7.2	35	
11	4.7	43	.5	6.1	30		7.6	--	
12	4.0	39	.4	5.5	--		7.4	--	
13	4.0	--	e .5	5.7	21		7.2	--	
14	4.3	64	.7	5.8	--		7.4	--	
15	4.1	49	.5	5.9	19	a 0.5	7.7	--	e 0.6
16	4.0	42	.5	6.2	26		7.7	--	
17	3.8	45	.5	6.1	23		7.6	40	
18	3.8	42	.4	5.9	--		7.4	--	
19	3.8	44	.5	5.9	26		7.7	--	
20	3.7	39	4	5.9	--		7.7	--	
21	3.7	27	.3	6.2	--		7.7	--	
22	3.6	26	.3	6.1	--		7.7	30	
23	4.4	25	.3	6.4	35		7.4	--	
24	2.4	26	.2	6.4	--		7.4	--	
25	3.6	50	.5	6.4	--		7.4	--	
26	2.4	24	2	6.4	34		7.4	23	
27	3.3	30	3	6.8	24		7.6	--	
28	4.7	29	.4	7.0	--		7.6	--	
29	5.7	50	.8	6.6	--		7.6	--	
30	4.8	43	6	7.2	--		7.7	--	
31	4.7	41	.5	--	--	--	7.7	22	
Total	120.6	--	13.3	181.2	--	15.0	228.1	--	18.6

Day	January			February			March		
1	7.6	--		7.2	--		7.8	51	1.1
2	7.4	--		7.4	--		7.7	53	1.1
3	7.6	28		7.4	--		7.6	36	.7
4	7.6	--		7.4	24		7.6	42	.9
5	7.6	--		7.4	51		7.6	37	.8
6	7.6	--		7.4	--		7.4	46	.9
7	7.6	20		7.7	--		7.1	48	.9
8	7.7	--		7.6	--		7.1	37	.7
9	6.4	--		7.7	--		7.1	49	.9
10	7.6	--		7.7	--		7.2	59	1.1
11	7.6	--		7.4	57		7.2	63	1.2
12	7.8	--		7.6	--		8.0	51	1.1
13	7.7	--		7.7	--		8.0	64	1.4
14	7.8	17		7.7	--		7.8	49	1.0
15	7.4	--		8.0	--	e 1.2	7.6	28	.6
16	7.6	21	e 0.4	8.0	60		7.0	38	.7
17	7.7	--		8.0	--		6.5	38	.7
18	7.8	--		8.0	86		6.5	36	.6
19	8.0	--		8.0	--		6.2	30	.5
20	7.8	--		8.0	--		6.2	44	.7
21	7.8	16		8.2	--		6.2	40	.7
22	6.2	--		7.2	--		6.8	56	1.0
23	6.4	--		7.6	--		7.0	39	.7
24	6.6	--		8.0	--		8.0	--	e 1.4
25	7.0	--		8.2	52		9.4	72	1.8
26	7.6	--		8.2	--		8.5	42	1.0
27	7.4	--		8.2	67		8.5	62	1.4
28	7.4	20		8.2	--		8.3	53	1.2
29	6.8	--		--	--	--	7.7	47	1.0
30	7.2	--		--	--	--	7.8	36	.8
31	7.2	--		--	--	--	9.0	37	.9
Total	229.5	--	12.4	217.1	--	33.6	232.4	--	29.5

e Estimated.

a Computed from samples obtained about three times a week.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	8.8	59	1.4	7.4	248	5.0	9.6	--	e 8.5
2	8.5	53	1.2	6.8	250	4.6	7.8	162	3.4
3	9.0	37	.9	51	3,190	s 1,260	7.6	179	3.7
4	9.0	34	.8	18	3,410	s 196	7.2	181	3.5
5	8.5	33	.8	8.5	450	10	7.0	204	3.9
6	8.5	34	.8	7.8	260	5.5	7.0	170	3.2
7	8.2	25	.6	7.6	282	5.8	7.6	175	3.6
8	8.2	33	.7	6.6	282	5.0	7.2	172	3.3
9	8.2	38	.8	7.2	229	4.5	7.1	168	3.2
10	8.3	60	1.3	7.7	128	2.7	7.0	170	3.2
11	8.2	42	.9	7.6	154	3.2	6.6	168	3.0
12	7.4	39	.8	12	690	22	6.8	159	2.9
13	7.8	31	.7	58	3,450	s 976	6.8	176	3.2
14	7.0	32	.6	24	3,310	s 257	6.8	165	3.0
15	7.1	48	.9	9.1	630	15	7.0	155	2.9
16	6.8	66	1.2	175	5,580	s 3,040	17	--	e 320
17	7.0	67	1.3	27	3,270	s 296	12	1,660	s 108
18	7.0	89	1.7	12	630	20	7.6	214	4.4
19	7.4	84	1.7	10	299	8.1	7.4	225	4.5
20	7.1	75	1.4	10	260	7.0	7.1	186	3.6
21	6.8	92	1.7	9.1	214	5.3	6.8	190	3.5
22	43	1,260	s 368	8.5	183	4.2	6.5	193	3.4
23	28	4,220	s 450	8.6	173	4.0	6.8	199	3.7
24	9.1	700	17	8.6	172	4.0	7.1	189	3.6
25	8.0	342	7.4	11	456	14	6.6	165	2.9
26	7.8	257	5.4	8.8	289	6.9	7.2	--	e 6.5
27	7.6	202	4.1	8.3	167	3.7	20	1,860	s 127
28	7.4	200	4.0	8.0	185	4.0	24	2,340	s 214
29	7.2	231	4.5	7.8	174	3.7	7.2	520	10
30	7.8	238	5.0	8.0	162	3.5	7.2	360	7.0
31	--	--	--	8.2	230	5.1	--	--	--
Total	290.7	--	887.6	568.2	--	6,201.8	259.6	--	876.6

Day	July			August			September		
1	7.4	370	7.4	5.1	177	2.4	5.9	205	3.3
2	15	1,050	s 63	5.1	180	2.5	5.7	268	4.1
3	7.8	500	11	14	1,290	s 59	5.5	115	1.7
4	7.1	330	6.3	6.1	410	6.8	5.2	106	1.5
5	7.0	275	5.2	5.0	200	2.7	5.1	105	1.4
6	7.0	255	4.8	3.6	155	1.5	5.1	89	1.2
7	11	608	s 32	3.1	157	1.3	5.1	78	1.1
8	96	3,460	s1,640	15	1,910	s 126	5.0	65	.9
9	6.5	500	8.8	5.7	580	8.9	5.9	78	1.2
10	6.4	280	4.8	4.7	308	3.9	6.5	68	1.2
11	6.2	235	3.9	4.0	226	2.4	6.5	50	.9
12	5.8	219	3.4	3.8	217	2.2	6.2	54	.9
13	5.8	238	3.7	3.4	147	1.3	38	2,090	s 544
14	25	3,430	s 619	3.1	123	1.0	45	3,680	s 559
15	6.4	402	6.9	3.4	151	1.4	9.1	523	13
16	5.8	251	3.9	4.1	152	1.7	7.0	208	3.9
17	5.5	249	3.7	5.4	144	2.1	6.6	136	2.4
18	5.4	239	3.5	5.2	144	2.0	6.5	147	2.6
19	5.8	237	3.7	5.2	151	2.1	23	2,160	s 288
20	5.8	237	3.7	4.8	148	1.9	8.6	800	19
21	8.8	288	6.8	4.0	137	1.5	7.1	306	5.9
22	6.4	340	5.9	3.8	127	1.3	6.4	147	2.5
23	5.8	212	3.3	3.3	128	1.1	6.4	130	2.2
24	5.7	175	2.7	3.1	127	1.1	6.2	116	1.9
25	5.5	179	2.7	3.6	130	1.3	6.2	123	2.1
26	5.8	156	2.4	3.6	151	1.5	5.9	117	1.9
27	5.7	173	2.7	3.7	270	2.7	5.7	99	1.5
28	5.5	169	2.5	311	4,900	s 6,790	5.4	104	1.5
29	5.5	178	2.6	14	1,260	s 53	5.2	102	1.4
30	5.4	171	2.5	7.4	398	8.0	5.4	89	1.3
31	5.4	171	2.5	6.4	258	4.5	--	--	--
Total	314.2	--	2,475.3	473.7	--	7,099.1	271.4	--	1,473.5

Total discharge for year (cfs-days) 3,386.7

Total load for year (tons) 19,136.3

e Estimated.

s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 3, 1957	4:05 p.m.	378	58	17,600	4,600	--	29	--	55	--	98	100					SPWCM
May 4	10:55 a.m.	16	54	3,580	2,700	--	73	--	91	--	99	100					SPWCM
May 13	7:55 p.m.	165	53	5,190	3,560	--	48	--	79	--	100	--					SPWCM
May 14	1:00 a.m.	50	--	7,300	4,010	--	39	--	61	--	100	--					SPWCM
May 16	5:45 p.m.	308	42	6,770	4,500	--	41	--	66	--	100	--					SPWCM
June 27	2:30 a.m.	42	--	5,570	3,660	--	22	--	38	--	97	100					SPWCM
June 27	12:10 p.m.	16	--	1,320	1,720	--	54	--	74	--	99	100					SPWCM
July 2	7:05 p.m.	26	73	9,400	5,890	--	49	--	71	--	100	--					SPWCM
July 8	1:40 a.m.	275	68	13,300	5,090	25	37	50	65	85	99	100					VPWCM
July 8	1:40 a.m.	275	68	13,300	4,950	8	19	42	63	84	99	100					VPNM
July 14	8:05 a.m.	190	67	11,700	3,490	--	38	--	62	--	98	100					SPWCM
Aug. 28	12:11 p.m.	426	63	5,930	3,780	--	49	--	73	--	99	100					SPWCM
Sept. 13	9:40 p.m.	153	--	5,860	4,420	--	40	--	61	--	98	100					SPWCM
Sept. 19	12:54 p.m.	49	55	6,070	4,240	--	50	--	76	--	100	--					SPWCM

KANSAS RIVER BASIN--Continued

DRY CREEK NEAR CURTIS, NEBR.

LOCATION.--At gaging station at county road bridge, 2½ miles upstream from mouth and 3½ miles east of Curtis, Frontier County.
DRAINAGE AREA.--20 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: April 1951 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 20,000 ppm May 16; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 50,000 tons May 13; minimum daily, 0 tons on many days.
EXTREMES, 1951-57.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 95,000 tons (estimated) June 8, 1951; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 50,400 ppm May 16. No flow during period October to March; record is omitted. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, April to September 1957

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0		0	0	--	0	0	--	0
2	0		0	0	--	0	0	--	0
3	0		0	0	--	0	0	--	0
4	0		0	0	--	0	0	--	0
5	0		0	0	--	0	0	--	0
6	0		0	0	--	0	0	--	0
7	0		0	0	--	0	0	--	0
8	0		0	0	--	0	0	--	0
9	0		0	0	--	0	0	--	0
10	0		0	0	--	0	0	--	0
11	0		0	0	--	0	0	--	0
12	0		0	0	--	0	0	--	0
13	0		0	305	15,000	sa 50,000	0	--	0
14	0		0	3.6	1,920	s 40	0	--	0
15	0		0	0	--	0	0	--	0
16	0		0	71	20,000	sa 6,100	51	6,500	sa 7,000
17	0		0	3.0	1,100	sa 22	18	7,000	sa 830
18	0		0	0	--	0	0	--	0
19	0		0	0	--	0	0	--	0
20	0		0	0	--	0	0	--	0
21	0		0	0	--	0	0	--	0
22	.1	670	sa 1.3	0	--	0	0	--	0
23	0		0	0	--	0	0	--	0
24	0		0	0	--	0	0	--	0
25	0		0	.2	2,000	sa 5.5	0	--	0
26	0		0	0	--	0	6.0	2,200	s 658
27	0		0	0	--	0	29	7,240	s 1,090
28	0		0	0	--	0	2.8	1,580	s 27
29	0		0	0	--	0	0	--	0
30	0		0	0	--	0	0	--	0
31	--		--	0	--	0	--	--	--
Total	0.1		1.3	382.8	--	56,167.5	106.8	--	9,605

s Computed by subdividing day.
a Computed from estimated concentration graph.

KANSAS RIVER BASIN--Continued

DRY CREEK NEAR CURTIS, NEBR.--Continued

Suspended sediment, April to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	0	--	0	0		0	0	--	0
2.....	35	6,130	s 3,260	0		0	0	--	0
3.....	2.9	2,600	sa 55	0		0	0	--	0
4.....	0	--	0	0		0	0	--	0
5.....	0	--	0	0		0	0	--	0
6.....	0	--	0	0		0	0	--	0
7.....	28	2,200	sa 3,200	0		0	0	--	0
8.....	59	6,350	s 4,370	0		0	0	--	0
9.....	0	--	0	0		0	0	--	0
10.....	0	--	0	0		0	0	--	0
11.....	0	--	0	0		0	0	--	0
12.....	0	--	0	0		0	0	--	0
13.....	0	--	0	0		0	31	3,580	s 1,150
14.....	26	3,860	s 631	0		0	2.2	888	s 15
15.....	.7	458	s 1.8	0		0	0	--	0
16.....	0	--	0	0		0	0	--	0
17.....	0	--	0	0		0	0	--	0
18.....	0	--	0	0		0	0	--	0
19.....	0	--	0	0		0	0	--	0
20.....	2.8	1,700	sa 36	0		0	0	--	0
21.....	8.2	3,400	sa 140	0		0	0	--	0
22.....	5.1	1,470	s 36	0		0	0	--	0
23.....	0	--	0	0		0	0	--	0
24.....	0	--	0	0		0	0	--	0
25.....	0	--	0	0		0	0	--	0
26.....	0	--	0	0		0	0	--	0
27.....	0	--	0	0		0	0	--	0
28.....	0	--	0	4.1	2,000	sa 60	0	--	0
29.....	0	--	0	0		0	0	--	0
30.....	0	--	0	0		0	0	--	0
31.....	0	--	0	0		0	--	--	--
Total.	167.7	--	11,729.8	4.1		60	33.2	--	1,165

Total discharge for year (cfs-days)..... 694.7
Total load for year (tons)..... 78,728.6

s Computed by subdividing day.
a Computed from estimated concentration graph.

DRY CREEK NEAR CURTIS, NEBR.--Continued

Particle-size analyses of suspended sediment, April to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 13, 1957.....	5:59 p.m.	710	50	39,800	3,580	18	22	29	37	55	93	100					VPWCM
May 13	5:59 p.m.	710	50	39,800	3,670	6	11	22	33	52	93	100					VPNM
May 16	9:10 p.m.	35	49	7,200	4,460	--	42	--	59	--	97	100					SPWCM
June 26.....	11:25 p.m.	292	60	47,200	6,380	--	22	--	40	--	98	100					VPWCM
June 27.....	9:30 a.m.	7.4	63	2,770	1,720	--	89	--	97	--	100	--					SPWCM
June 27.....	6:09 p.m.	170	69	25,600	4,640	--	30	--	48	--	97	100					VPWCM
July 2	7:10 p.m.	345	69	45,200	5,860	20	25	34	42	57	94	100					VPWCM
July 2	7:10 p.m.	345	69	45,200	6,020	7	13	28	39	56	94	100					VPNM
July 8	12:10 a.m.	888	66	40,600	3,990	14	21	28	37	59	95	100					VPWCM
July 8	12:10 a.m.	888	66	40,600	3,920	10	17	25	37	58	95	100					VPNM
July 14	6:50 a.m.	73	66	46,500	4,320	33	46	59	73	91	100	--					VPWCM
July 14	6:50 a.m.	73	66	46,500	4,700	12	24	47	70	91	100	--					VPNM
July 20	12:55 a.m.	15	72	10,000	2,110	--	72	--	96	--	100	--					SPWCM
July 21	8:10 p.m.	60	--	8,890	5,600	--	62	--	83	--	100	--					SPWCM
Sept. 13	5:30 p.m.	132	48	11,700	5,240	--	38	--	62	--	99	100					SPWCM

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.

LOCATION.--At gaging station, a third of a mile downstream from top of Harry Strunk Lake flood-control pool, Frontier County, 3¾ miles southeast of Stockville, and 13½ miles upstream from Medicine Creek Dam.
RECORDS AVAILABLE.--Water temperatures: October 1952 to September 1957.
Sediment records: April 1951 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum, 81°F July 18; minimum, freezing point on several days during December to February.
Sediment concentrations: Maximum daily, 15,100 ppm Apr. 23, June 17; minimum daily, not determined.
Sediment loads: Maximum daily, 91,400 tons May 13; minimum daily, not determined.
EXTREMES, 1951-57.--Water temperatures: Maximum (1956-57), 81°F July 18, 1957; minimum (1952-57), freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1952-57), 20,000 ppm May 16, 1954; minimum daily, not determined.
Sediment loads: Maximum daily, 490,000 tons (estimated) June 22, 1951; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 39,200 ppm Apr. 22. Flow affected by ice Nov. 16, 17, 29, Dec. 6-18, 23, Jan. 2, 7, Jan. 9 to Feb. 12, Feb. 21-24. Records of discharge for water year 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	a 49	--	--	--	--	48	60	62	73	75	70
2	a 56	--	--	--	--	39	44	66	61	76	76	69
3	--	--	b 39	--	--	42	36	62	62	72	--	59
4	--	--	--	33	--	42	41	54	62	70	71	59
5	b 68	b 41	34	--	--	38	42	55	67	67	68	60
6	b 63	--	b 32	--	32	36	43	51	67	70	69	60
7	--	b 37	--	--	--	37	40	59	--	74	78	55
8	--	--	--	33	--	38	40	60	65	68	76	60
9	--	b 44	--	--	--	39	45	60	66	70	74	68
10	a 58	--	--	--	--	42	47	50	68	71	71	68
11	--	b 49	a 32	--	--	43	42	62	68	75	79	b 70
12	--	--	--	b 32	--	42	40	57	66	75	74	59
13	--	b 46	--	--	b 44	44	40	59	--	74	74	57
14	--	40	b 32	--	b 45	38	42	55	64	70	75	52
15	--	--	--	--	--	36	48	56	63	75	74	57
16	--	b 35	--	--	--	40	57	46	62	75	70	--
17	55	--	--	--	--	40	54	48	56	74	67	61
18	--	--	b 34	--	--	36	54	53	61	a 81	69	64
19	--	35	--	--	--	38	59	54	67	78	71	56
20	--	--	--	--	--	41	55	57	67	74	--	54
21	--	--	--	--	--	46	57	55	68	75	71	53
22	--	b 50	--	a 32	--	43	60	55	--	73	71	54
23	--	--	a 36	--	--	38	49	57	66	75	68	52
24	--	b 40	--	--	a 34	33	53	56	64	72	63	55
25	--	--	--	--	--	36	57	57	68	78	68	55
26	--	--	--	--	--	37	54	57	66	74	71	a 60
27	b 50	b 37	--	--	--	43	53	59	60	--	68	58
28	a 48	b 37	--	--	--	44	55	63	64	78	68	57
29	b 58	b 38	--	--	--	46	58	67	70	78	a 71	59
30	--	--	--	--	--	43	59	67	76	71	73	56
31	--	--	--	--	--	39	--	66	--	77	70	--
Average	--	--	--	--	--	40	49	58	65	74	71	59

a Measurement between 11 a.m. and 2 p.m.
b Measurement between 3 p.m. and 6 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	30	--		49	--	e 100	51	--	
2	28	105		47	--		51	--	
3	28	110		48	150		51	105	e 18
4	28	--		50	--		51	--	
5	28	95		50	130		51	160	
6	27	100		49	--		45	220	
7	27	--		48	135	e 18	40	--	
8	28	--	e 8	48	--		45	--	
9	28	--		49	135		50	--	
10	30	80		49	--		60	--	
11	30	--		49	120		66	280	
12	31	--		59	--		60	--	e 42
13	31	--		59	275		50	--	
14	32	--		61	395	e 55	55	380	
15	34	--		60	--		55	--	
16	35	--		55	300		50	--	
17	35	85		57	--		54	--	
18	35	--		57	--		50	335	
19	37	--		60	245		55	--	
20	38	--	e 9	67	270		54	--	
21	39	--		72	--	e 44	54	--	
22	40	--		60	285		54	--	
23	39	--		64	--		54	320	
24	39	--		61	250		54	--	
25	44	--		55	--		53	--	e 48
26	44	--		52	--		53	--	
27	44	110	e 14	51	155		54	--	
28	44	120		53	190	e 26	55	--	
29	44	140		50	205		57	--	
30	45	110		51	--		57	--	
31	57	--	e 150	--	--	--	57	--	
Total	1,099	--	436	1,640	--	1,067	1,646	--	1,260

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	57	--		40	--		63	--	e 110
2	55	--		40	--		64	640	111
3	54	--		45	--		63	665	113
4	54	185		45	--		61	700	115
5	54	--		45	--		61	610	100
6	54	--		45	170		61	595	98
7	54	--		50	--	e 24	61	530	87
8	54	185		50	--		61	575	95
9	50	--		50	--		61	680	112
10	40	--		55	--		63	640	109
11	35	--		65	--		63	740	126
12	40	205		66	--		63	770	131
13	40	--		66	870		63	675	115
14	40	--		64	710		59	620	99
15	40	--		64	--		58	505	79
16	40	--	e 17	61	--		58	540	85
17	40	--		61	--		61	650	107
18	40	--		60	--		58	490	77
19	40	--		60	--		58	480	75
20	40	--		59	--		57	475	73
21	45	--		58	--	e 140	55	430	64
22	42	95		50	--		55	420	62
23	35	--		45	--		63	590	100
24	31	--		55	950		67	670	121
25	30	--		65	845		72	1,080	210
26	32	--		64	--		67	700	127
27	35	--		66	--		70	755	143
28	37	70		64	--		73	815	161
29	38	--		--	--	--	71	740	142
30	40	--		--	--	--	69	680	127
31	40	--		--	--	--	66	580	103
Total	1,326	--	527	1,558	--	2,528	1,945	--	3,377

e Estimated.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	67	625	113	69	455	85	190	10,600	s 5,940
2	70	620	117	67	430	78	128	5,000	1,730
3	73	635	125	133	4,750	s 3,900	90	1,400	340
4	80	690	149	267	10,800	s 8,920	72	700	136
5	77	670	139	120	2,600	842	67	535	97
6	76	650	133	82	950	210	60	395	64
7	76	640	131	66	560	100	59	365	58
8	70	570	108	53	385	55	59	315	50
9	65	535	94	50	340	46	60	365	59
10	60	560	91		335	45	57	445	68
11	60	480	78		395	53	70	--	e 260
12	58	485	76	73	3,000	s 748	85	2,100	a 480
13	59	435	69	2,590	9,270	s 91,400	58	545	85
14	55	415	62	1,600	10,900	s 40,400	53	370	53
15	53	410	59	210	3,980	s 2,460	52	320	45
16	58	465	73	1,370	13,700	s 56,000	223	9,830	s 7,780
17	55	430	64	879	13,600	s 35,200	275	15,100	s 13,200
18	57	435	67	227	4,100	2,510	95	3,450	885
19	59	540	86	132	1,280	456	66	1,290	230
20	58	535	84	95	970	a 240	55	350	52
21	60	520	84	86	--	e 340	52	305	43
22	149	10,200	s 12,400	63	510	87	49	475	63
23	830	15,100	s 31,200	54	370	54	49	430	57
24	156	5,380	s 2,440	123	1,840	s 4,310	49	415	55
25	89	1,250	300	452	10,200	s 22,800	47	430	55
26	76	700	144	93	1,190	299	47	430	55
27	95	670	172	81	850	186	224	11,700	s 8,350
28	75	580	117	73	540	106	168	7,960	3,610
29	69	500	93	67	410	74	116	2,500	783
30	70	465	88	75	2,030	s 460	81	1,000	219
31	--	--	--	116	5,850	s 2,290	--	--	--
Total	2,955	--	48,956	9,466	--	274,754	2,756	--	44,902

	July			August			September		
1	84	2,320	s 580	34	190	17	38	250	26
2	377	4,990	s 17,000	158	6,250	s 8,270	35	210	20
3	791	9,140	s 25,900	180	12,600	s 9,070	33	225	20
4	102	1,100	303	45	1,500	182	31	200	17
5	85	415	95	35	365	34	31	170	14
6	81	350	77	31	245	21	30	150	12
7	78	310	65	29	190	15	31	135	11
8	668	9,620	s 22,300	46	--	e 360	31	120	10
9	105	2,720	s 852	45	1,950	237	31	110	9
10	63	720	122	30	380	31	35	150	14
11	53	380	54	29	175	14	38	235	24
12	49	310	41	28	145	11	39	230	24
13	46	240	30	27	105	8	331	7,810	s 18,000
14	277	13,700	s 13,800	27	95	7	403	10,300	s 12,600
15	102	2,800	s 824	25	85	6	111	2,700	809
16	67	910	165	26	100	7	85	1,170	269
17	54	365	53	29	115	9	63	545	93
18	47	260	33	27	130	9	52	370	52
19	142	3,690	s 6,030	28	150	11	61	1,400	sa 360
20	194	9,580	7,610	27	145	11	69	2,200	s 448
21	63	1,500	255	27	140	10	53	395	57
22	66	2,500	446	27	150	11	50	255	34
23	54	790	115	27	145	11	48	215	28
24	49	410	54	27	135	10	47	180	23
25	48	350	45	30	210	17	44	185	22
26	48	270	35	27	155	11	44	440	a 50
27	47	270	34	27	160	12	35	210	a 20
28	46	245	30	176	5,640	s 5,690	42	170	19
29	42	200	23	127	3,720	s 1,400	42	145	16
30	41	225	25	59	975	155	42	135	15
31	40	210	23	46	520	65	--	--	--
Total	4,009	--	97,019	1,506	--	25,722	2,025	--	33,116

Total discharge for year (cfs-days) 31,931

Total load for year (tons) 533,664

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Nov. 1, 1956	11:42 a.m.	50	49	744	2,160	--	75	--	90	--	98	100	--		--		SPWCM
Apr. 23, 1957	1:10 a.m.	681	50	26,300	4,160	--	30	--	45	--	95	100	--		--		VPWCM
Apr. 23	10:00 a.m.	1,760	49	9,600	3,000	--	58	--	77	--	99	100	--		--		SPWCM
Apr. 23	12:15 p.m.	1,550	--	8,140	6,570	36	50	66	--	--	98	99	100		--		VPWCM
Apr. 23	12:15 p.m.	1,550	--	8,140	6,510	3	4	19	--	--	98	99	100		--		VPNM
Apr. 24	1:10 p.m.	151	61	4,610	4,170	--	42	--	64	--	99	100	--		--		VPWCM
May 3	8:15 p.m.	146	60	4,690	4,380	19	28	38	48	66	99	100	--		--		VPWCM
May 3	8:15 p.m.	146	60	4,690	4,050	1	3	21	44	65	99	100	--		--		VPNM
May 4	12:55 a.m.	521	57	15,800	5,930	17	23	31	41	63	96	99	100		--		VPWCM
May 4	12:55 a.m.	521	57	15,800	6,000	3	6	22	38	60	96	99	100		--		VPNM
May 5	2:50 p.m.	111	--	2,150	1,930	31	37	46	55	71	96	100	--		--		VPWCM
May 5	2:50 p.m.	111	--	2,150	1,900	2	8	32	52	70	96	100	--		--		VPNM
May 13	6:15 p.m.	10,930	53	14,000	4,520	--	36	--	56	--	99	100	--		--		SPWCM
May 13	11:15 p.m.	5,200	53	7,260	4,860	--	49	--	75	--	100	--	--		--		SPWCM
May 14	3:15 a.m.	3,470	53	7,920	5,420	--	49	--	74	--	100	--	--		--		SPWCM
May 14	9:15 a.m.	1,910	55	8,630	3,100	--	49	--	70	--	99	100	--		--		SPWCM
May 14	12:15 p.m.	884	--	15,900	5,140	22	30	37	47	66	96	100	--		--		VPWCM
May 14	12:15 p.m.	884	--	15,900	5,060	5	13	34	45	65	96	100	--		--		VPNM
May 16	9:30 a.m.	1,150	46	24,600	4,490	--	23	--	37	--	97	100	--		--		VPWCM
May 16	4:30 p.m.	2,180	48	11,600	3,920	--	33	--	54	--	98	100	--		--		SPWCM
May 25	1:10 a.m.	1,660	56	21,600	3,270	--	30	--	47	--	98	100	--		--		VPWCM
May 25	5:10 a.m.	793	54	23,000	4,100	--	26	--	42	--	98	100	--		--		VPWCM
June 1	9:25 a.m.	326	62	18,000	8,160	14	19	24	33	--	95	99	100		--		VPWCM
June 1	9:25 a.m.	326	62	18,000	9,000	2	3	12	30	--	95	99	100		--		VPNM
June 16	6:15 a.m.	436	62	19,000	3,530	--	21	--	37	--	98	99	100		--		VPWCM
July 1	10:50 a.m.	111	75	4,500	6,270	--	35	--	54	--	94	100	--		--		VPWCM
July 3	12:20 a.m.	2,920	69	14,400	5,340	--	53	--	83	--	100	--	--		--		SPWCM
July 8	11:59 a.m.	1,090	69	13,600	6,950	26	35	47	58	71	94	99	99		100		VPWCM
July 8	11:59 a.m.	1,090	69	13,600	6,780	7	14	40	54	70	94	99	99		100		VPNM
July 19	11:00 p.m.	1,140	70	19,200	4,360	--	29	--	46	--	98	100	--		--		VPWCM
Aug. 2	9:15 p.m.	574	72	19,400	3,560	--	24	--	42	--	95	100	--		--		VPWCM
Sept. 15	10:45 a.m.	110	57	2,520	4,560	--	44	--	65	--	96	--	100		--		SPWCM

KANSAS RIVER BASIN--Continued

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.

LOCATION.--At gaging station at top of Harry Strunk Lake flood-control pool, Frontier County, 2¼ miles southwest of Orafino, 9½ miles upstream from Medicine Creek Dam, and 14 miles northwest of Cambridge.
DRAINAGE AREA.--53 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1951 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 10,400 ppm Apr. 23; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 23,000 tons (estimated) June 16; minimum daily, 0 tons on many days.
EXTREMES, 1951-57.--Sediment concentrations: Maximum daily, 25,000 ppm June 17, 1955; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 23,000 tons (estimated) June 16, 1957; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 66,900 ppm May 13. No flow during period October to March; record is omitted. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, April to September 1957

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	0	--	0	0	--	0	0		0
2.....	0	--	0	0	--	0	0		0
3.....	0	--	0	0	--	0	0		0
4.....	0	--	0	0	--	0	0		0
5.....	0	--	0	0	--	0	0		0
6.....	0	--	0	0	--	0	0		0
7.....	0	--	0	0	--	0	0		0
8.....	0	--	0	0	--	0	0		0
9.....	0	--	0	0	--	0	0		0
10.....	0	--	0	0	--	0	0		0
11.....	0	--	0	0	--	0	0		0
12.....	0	--	0	0	--	0	0		0
13.....	0	--	0	19	--	e 2,300	0		0
14.....	0	--	0	51	9,000	sa 2,300	0		0
15.....	0	--	0	.9	--	e 6	29		e 1,500
16.....	0	--	0	118	--	e 8,700	268		e 23,000
17.....	0	--	0	25	4,630	sa 400	54		e 2,800
18.....	0	--	0	.7	--	e 5	3.1	4,800	40
19.....	0	--	0	0	--	0	.6		e 4
20.....	0	--	0	0	--	0	.1		(t)
21.....	0	--	0	2.1	--	e 22	0		0
22.....	84	--	e 6,700	.1	2,700	a 1	0		0
23.....	66	10,400	sa 3,100	0	--	0	0		0
24.....	.3	3,300	3	.3	--	e 6	0		0
25.....	0	--	0	98	--	e 8,500	0		0
26.....	0	--	0	.6	--	e 6	1.5		e 8
27.....	0	--	0	0	--	0	8.3		e 100
28.....	0	--	0	0	--	0	1.9		e 15
29.....	0	--	0	0	--	0	.5		e 2
30.....	0	--	0	.8	--	e 15	0		0
31.....	--	--	--	.4	--	e 4	--		--
Total.	150.3	--	9,803	316.9	--	22,265	367.0		27,469

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

KANSAS RIVER BASIN--Continued

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, April to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	0		0	0		0
2	64	4,600	s 6,050	39	4,730	s 2,600	0		0
3	329	7,600	sa 9,500	15		e 220	0		0
4	2.1	--	e 23	.2		e 1	0		0
5	.5	--	e 3	0		0	0		0
6	.2	--	e 1	0		0	0		0
7	.2	--	(t)	0		0	0		0
8	97	--	e 6,000	0		0	0		0
9	5.5	--	e 75	0		0	0		0
10	1.0	--	e 6	0		0	0		0
11	.2	1,700	1	0		0	0		0
12	0	--	0	0		0	0		0
13	0	--	0	0		0	56		e 3,800
14	4.3	--	e 120	0		0	46	7,150	s 1,200
15	1.9	--	e 19	0		0	1.3		e 12
16	.3	--	e 1	0		0	0		0
17	0	--	0	0		0	0		0
18	0	--	0	0		0	0		0
19	2.7	--	e 50	0		0	0		0
20	1.6	--	e 14	0		0	0		0
21	.9	--	e 5	0		0	0		0
22	0	--	0	0		0	0		0
23	0	--	0	8.8		e 240	0		0
24	2.2	--	e 1	0		0	0		0
25	.1	--	(t)	0		0	0		0
26	0	--	0	0		0	0		0
27	0	--	0	0		0	0		0
28	0	--	0	0		0	0		0
29	0	--	0	0		0	0		0
30	0	--	0	0		0	0		0
31	0	--	0	0		0	--		--
Total	513.7	--	21,869	63.0		3,061	103.3		5,012

Total discharge for year (cfs-days) 1,514.2
Total load for year (tons) 89,479

e Estimated.
s Computed by subdividing day.
t Less than 0.50 ton.
a Computed from partly estimated concentration graph.

KANSAS RIVER BASIN--Continued

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Particle-size analyses of suspended sediment, April to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 13, 1957.....	10:30 p.m.	308	--	66,900	11,300	16	21	27	35	--	96	100					VPWCM
May 13	10:30 p.m.	308	--	66,900	12,300	1	2	10	33	--	96	100					VPNM
June 16	11:40 p.m.	97	64	26,100	4,220	--	28	--	42	--	99	100					VPWCM
July 2	9:30 p.m.	214	70	54,000	4,450	--	36	--	53	--	96	100					VPWCM
July 2	11:44 p.m.	964	70	25,700	5,090	--	43	--	69	--	98	100					VPWCM
July 3	2:28 a.m.	1,170	69	11,000	3,710	--	55	--	77	--	98	100					VPWCM
July 9	4:40 p.m.	2.8	70	3,390	2,610	--	96	--	98	--	100	--					SPWCM
Aug. 2	9:50 p.m.	341	64	28,600	3,820	21	26	36	41	66	96	100					VPWCM
Sept. 14	12:04 a.m.	431	51	13,300	4,810	23	34	46	59	75	98	100					VPWCM
Sept. 14	12:04 a.m.	431	51	13,300	4,620	16	24	37	53	74	98	100					VPNM
Sept. 14	1:07 a.m.	276	51	10,300	6,140	--	41	--	66	--	98	100					SPWCM

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.

LOCATION.--At gaging station, 100 feet upstream from highway bridge, three-quarters of a mile north of Cambridge, Furnas County, 2½ miles upstream from mouth, and 7½ miles downstream from Harry Strunk Lake.
DRAINAGE AREA.--1,070 square miles, approximately, of which about 680 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: March 1951 to June 1957 (discontinued).
Sediment records: November 1945 to December 1949, March 1951 to June 1957 (discontinued).
EXTREMES, 1956-57.--Water temperatures: Minimum, freezing point on several days during December to February.
Sediment concentrations: Maximum daily, 3,330 ppm May 16, minimum daily, not determined.
Sediment loads: Maximum daily, 5,810 tons May 16; minimum daily, less than 0.050 ton Dec. 1-10.
EXTREMES, 1945-49, 1951-57.--Water temperatures: Maximum (1951-56), 94°F June 20, 1952; minimum (1951-57), freezing point on many days during winter months.
Sediment concentrations (1951-56): Maximum daily, 9,800 ppm Sept. 2, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 3,700,000 tons (estimated) June 22, 1947; minimum daily, less than 0.050 ton Dec. 1-10, 1956.
REMARKS.--Since August 1949, flow partially regulated by Medicine Creek Dam. Flow affected by ice Nov. 16, 17, Dec. 10 to Feb. 25, Mar. 23-26. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Temperature (° F) of water, October 1956 to June 1957
(Once-daily measurement between 9 a.m. and 11 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	--	--	--	--	--	46	64	--			
2	64	--	--	--	--	--	--	61	a 58			
3	b 70	--	--	b 32	--	--	34	b 61	a 60			
4	b 68	--	--	--	32	b 44	35	53	a 62			
5	b 69	--	32	--	--	b 49	34	55	a 64			
6	55	b 47	--	--	b 32	--	40	55	a 66			
7	--	--	--	--	b 35	b 39	38	55	a 64			
8	57	--	--	b 32	--	b 48	a 33	56	a 65			
9	52	--	--	--	--	37	39	54	65			
10	52	--	--	--	--	--	a 41	a 51	a 64			
11	b 66	b 53	--	--	--	b 49	37	54	--			
12	57	--	b 32	--	--	b 50	35	--	64			
13	b 66	--	--	--	34	b 59	37	58	b 71			
14	--	b 48	b 34	--	b 32	b 48	--	61	a 63			
15	57	--	--	--	--	b 51	a 43	a 56	--			
16	b 67	--	--	--	--	40	b 65	a 51	66			
17	56	--	--	b 32	--	b 40	b 60	a 52	a 63			
18	56	b 50	--	--	--	35	b 60	a 53	a 62			
19	b 64	--	b 32	b 34	--	b 55	b 77	55	a 65			
20	--	--	--	--	--	37	b 76	a 55	b 57			
21	44	--	--	--	b 32	b 51	--	a 53	66			
22	--	--	--	--	--	40	62	a 53	b 77			
23	b 59	36	--	--	--	35	61	a 54	--			
24	b 54	b 43	--	b 32	b 38	--	59	a 55	--			
25	--	b 40	--	--	33	--	b 76	a 54	b 78			
26	--	--	b 34	--	--	--	59	58	--			
27	--	b 38	b 32	--	--	--	51	60	--			
28	--	--	--	b 32	--	45	60	a 58	--			
29	--	--	--	--	--	42	61	a 58	b 79			
30	50	--	--	--	--	40	b 68	a 59	a 73			
31	--	--	--	--	--	43	--	a 63	--			
Average	--	--	--	--	--	--	51	56	--			

a Measurement between 6 a.m. and 8 a.m.
b Measurement between 2 p.m. and 5 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Suspended sediment, October 1956 to June 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	51	95	13	11	27			--	
2	50	77	10	11	--			9	
3	43	65	7.5	11	--			--	
4	38	58	6.0	11	--			--	
5	20	58	s 5.1	11	--		1.5	10	(t)
6	45	80	9.7	11	32			--	
7	46	70	8.7	11	--			--	
8	46	89	11	12	--			--	
9	46	87	11	11	--	a 0.7		--	
10	52	90	13	11	--		1.6	--	
11	52	75	11	10	24		2.0	--	
12	51	78	11	10	--		2.9	14	e 0.1
13	45	68	8.3	11	--		2.3	--	
14	41	60	6.6	11	17		2.8	--	
15	41	67	7.4	10	--		5.3	--	
16	41	59	6.5	10	--		5.9	--	
17	28	44	3.3	8.0			5.0	--	
18	10	23		6.5			4.8	--	
19	9.3	25					5.6	9	
20	9.3	--		6.0			5.1	--	
21	9.7	24					5.1	--	
22	9.7	--			--	e .2	5.1	--	e .1
23	10	46		5.6			4.8	--	
24	11	26		5.6			5.6	--	
25	12	--	a .9	5.7			5.4	--	
26	11	--		5.8			5.4	--	
27	10	--		5.8			5.3	12	
28	10	--					4.9	--	
29	10	--		2.0	--	e .1	4.6	--	
30	12	52					4.5	--	
31	10	--		--	--	--	4.3	--	
Total	880.0	--	161.7	246.0	--	13.7	111.8	--	2.5

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	4.4	--		4.7	--		5.1		
2	4.0	--		4.7	--		6.5		
3	4.0	10		4.6	--		6.5		
4	4.5	--		4.5	15		6.5		
5	4.5	--		4.3	--		6.5		
6	5.5	--		4.7	13		6.5		
7	6.0	--		4.6	31		6.8		
8	5.0	30		5.4	--		6.5		
9	3.0	--		5.6	--		6.1		
10	3.0	--		5.3	--		5.8		
11	3.0	--		5.6	--		5.1		
12	3.0	--		5.9	--		4.8		
13	3.0	--		6.7	11		4.8		
14	3.0	--		7.5	30		5.1		
15	3.0	--		7.0	--	e 0.4	6.1		
16	3.0	--	e 0.2	6.0	--		5.1	34	0.5
17	3.4	13		5.2	--		5.4		
18	5.0	--		5.0	--		6.1		
19	5.0	12		4.0	--		5.8		
20	6.0	--		3.5	--		5.4		
21	4.0	--		4.0	36		4.8		
22	2.5	--		5.0	--		4.1		
23	2.5	--		5.0	--		4.8		
24	2.5	18		5.0	62		9.0		
25	2.7	--		5.6	16		10		
26	3.0	--		6.1	--		6.8		
27	3.6	--		5.8	--		6.1		
28	4.0	20		5.4	--		5.1		
29	4.1	--		--	--	--	5.4		
30	4.5	--		--	--	--	5.8		
31	4.5	--		--	--	--	6.1		
Total	119.2	--	6.2	146.7	--	11.2	184.5		15.5

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from samples obtained about twice weekly.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Suspended sediment, October 1956 to June 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	4.4			6.1	12	0.2	186	560	281
2	6.1			6.1	22	.4	178	480	231
3	7.6			26	1,340	s 172	169	350	160
4	5 8			31	895	s 70	162	310	136
5	5.1			57	380	58	154	300	125
6				59	290	46	145	285	112
7				60	275	45	140	275	104
8				62	310	52	133	210	75
9				72	430	84	127	155	53
10	5 0			70	315	60	148	425	s 188
11				68	175	32	215	535	311
12				73	320	63	222	545	327
13				134	2,440	s 1,010	289	825	644
14				377	3,270	3,330	348	1,020	958
15	4.0	20	0.3	451	2,140	2,610	425	1,080	1,240
16				630	3,330	s 5,810	412	2,900	s 3,920
17				602	1,910	3,100	219	2,430	1,440
18				605	1,650	2,700	168	600	272
19	4.5			577	1,730	2,700	158	435	186
20				551	1,900	2,830	148	375	150
21				504	1,570	2,140	139	315	118
22	4.9			502	1,230	1,670	132	470	168
23	5.8			504	1,300	1,770	125	420	142
24	4.0			492	1,280	1,700	119	280	90
25	4.8			478	2,830	s 4,290	113	215	66
26				331	1,030	921	108	250	73
27				398	1,350	s 1,570	134	605	219
28	5.0			506	1,170	1,600	127	385	132
29				422	1,100	1,250	128	320	111
30	6.3			202	740	404	125	220	74
31	--		--	186	590	296	--	--	--
Total	150.8		9 0	9,042.2	--	42,383.6	5,396	--	12,106

Total discharge for period Oct. 1, 1956, to June 30, 1957 (cfs-days)..... 16,277.2
Total load for period Oct. 1, 1956, to June 30, 1957 (tons)..... 54,709.4

s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Particle-size analyses of suspended sediment, October 1956 to June 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 4, 1957	3:10 p.m.	31	54	372	821	31	42	53	67	83	94	98	99		100		SBWCM
May 4	6:32 p.m.	48	55	825	1,060	24	36	45	63	78	94	98	99		100		VBWCM
May 4	7:00 p.m.	51	55	772	772	27	33	48	62	80	93	97	99		100		SBWCM
May 15	7:50 p.m.	497	57	2,180	3,900	10	12	15	21	36	83	97	100		--		VPWCM
May 15	9:30 p.m.	502	57	2,020	3,170	10	12	16	22	34	81	95	98		100		VPWCM
May 17	10:45 p.m.	612	55	1,890	2,980	14	14	18	24	37	78	92	98		100		VPWCM
May 17	10:45 p.m.	612	55	1,890	2,800	2	3	14	24	34	78	92	98		100		VPNM
June 25	3:10 p.m.	113	78	224	1,200	34	34	38	46	57	93	99	100		--		VPWCM

Particle-size analyses of bed material, October 1956 to June 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
Apr. 24, 1957	4:10 p.m.	a 4.0	2		4	10	14	40	76	92	99	100	--	--		SV
May 4	7:00 p.m.	51	17		13	21	39	75	93	97	99	99	99	100		SV
May 15	7:50 p.m.	497	10		9	14	26	57	80	89	96	98	99	99	100	SV
May 17	10:45 p.m.	612	10		3	6	14	56	86	94	98	99	100	--		SV
June 12	10:40 a.m.	205	23		2	8	28	65	86	93	98	99	100	--		SV
June 25	3:10 p.m.	113	19		6	17	28	62	86	95	99	100	--	--		SV

a Daily mean discharge.

REPUBLICAN RIVER NEAR HARDY, NEBR.

LOCATION.--At gaging station at highway bridge, 1½ miles southwest of Hardy, Nuckolls County.
DRAINAGE AREA.--22,400 square miles, approximately, of which a large area does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1951, August 1956 to September 1957 (discontinued).
Water temperatures: August 1956 to September 1957 (discontinued).
EXTREMES, September 1956 to September 1957.--Dissolved solids: Maximum, 447 ppm Jan. 10-19; minimum, 116 ppm June 16.
Hardness: Maximum, 303 ppm Jan. 10-19; minimum, 72 ppm June 16.
Specific conductance: Maximum daily, 721 micromhos Jan. 17; minimum daily, 182 micromhos June 16.
Water temperatures: Maximum, 93°F Aug. 15; minimum, freezing point Dec. 7, 14, Feb. 22-23.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1956....	54.8	26	0.00	54	16	25	13	236	54	13	0.5	2.1	0.12	316	0.43	46.8	201	7	20	0.8	511	7.7	4
Nov. 1-4.....	82.5	24	.00	57	12	21	11	226	46	11	.4	3.9	.09	307	.42	68.4	192	7	18	.7	481	8.2	5
Nov. 5-Dec. 6.....	61.0	35	.00	65	15	22	9.1	258	46	11	.3	2.5	.09	331	.45	54.5	224	12	17	.6	517	8.1	4
Dec. 7-19.....	58.6	31	.00	73	13	23	8.0	282	47	13	.2	.1	.10	351	.48	55.5	234	3	17	.7	554	7.9	7
Dec. 20-31.....	79.0	28	.00	63	12	20	6.9	246	40	9.5	.2	.1	.07	302	.41	64.4	205	3	17	.6	480	7.8	6
Jan. 1-9, 1957.....	70.8	30	.01	64	16	23	8.2	270	46	10	.5	.0	.05	331	.45	63.3	225	4	18	.7	527	7.3	7
Jan. 10-19	44.8	42	.01	88	20	29	11	358	60	16	.5	.0	.09	447	.61	54.1	303	9	17	.7	698	7.3	5
Jan. 20-30	43.4	36	.01	75	16	24	9.2	303	49	13	.5	.0	.06	374	.51	43.8	254	6	16	.7	592	7.4	8
Jan. 31-Feb. 6	55.7	32	.00	29	34	21	8.0	256	40	11	.4	.3	.06	316	.43	47.5	214	4	17	.6	509	7.7	10
Feb. 7-17.....	126	25	.00	40	17	16	7.2	200	34	8.0	.5	1.6	.09	253	.34	86.1	170	6	16	.5	404	7.7	7
Feb. 18-28.....	105	31	.00	29	36	19	8.4	260	44	10	.5	2.5	.05	321	.44	91.0	220	7	15	.6	521	7.9	6
Mar. 1-27.....	104	28	.01	61	13	19	9.7	242	38	10	.4	.7	.07	306	.42	85.9	206	8	16	.6	490	7.5	4
Mar. 28-Apr. 1....	107	29	.01	66	13	22	9.8	258	40	12	.4	.2	.07	330	.45	95.3	220	8	17	.6	520	8.1	2
Apr. 25-27.....	191	26	.05	54	9.1	13	12	198	35	5.0	.5	3.7	.08	264	.36	136	172	10	13	.4	407	8.1	8
Apr. 28-May 8.....	156	27	.02	64	9.8	14	9.8	238	35	8.3	.5	.5	.05	294	.40	124	200	5	13	.4	462	7.3	5
May 9-25.....	537	20	.01	42	5.4	7.6	8.2	156	21	4.7	.3	.5	.04	194	.26	281	127	0	11	.3	299	7.2	9
May 26-June 10....	136	29	.02	66	13	21	11	251	50	12	.3	.3	.10	332	.45	122	219	13	16	.6	517	7.3	6
June 11-15	230	20	.01	38	6.8	9.5	10	145	27	4.0	.5	2.2	.07	195	.27	121	123	4	13	.4	304	7.5	10
June 16	4,140	19	.02	23	3.6	3.3	7.9	86	10	.2	.3	7.2	.03	116	.16	1,300	72	1	8	.2	182	7.4	--
June 17-18	22,700	--	.02	35	3.6	2.7	8.6	124	9.0	.0	.3	3.5	.07	140	.19	8,580	102	0	5	.1	230	8.0	--

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER NEAR HARDY, NEBR.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
June 19, 1957	6,200	20	0.02	51	8.0	11	11	182	36	6.8	0.4	0.9	0.05	240	0 33	4,020	160	11	12	0.4	376	7.8	--
June 20	1,680	19	.02	43	6.9	8.3	10	156	28	4.4	.4	1.6	.04	208	.28	943	136	8	11	.3	319	7.7	--
June 21-26	676	26	.01	67	12	19	12	241	56	11	.3	.4	.09	321	.44	586	218	20	15	.6	511	7.8	6
June 27	3,230	17	.03	46	8.0	12	11	172	32	4.2	.5	2.5	.06	240	.33	2,090	148	7	14	.4	356	7.6	20
June 28	5,580	14	.00	36	5.4	10	10	142	26	2.8	.5	2.8	.05	184	25	2,770	112	0	15	.4	286	7.5	22
June 29-July 27	2,683	15	.01	47	9.6	15	15	201	34	5.0	.6	.3	.07	244	.33	1,770	157	0	16	.5	396	7.4	11
July 28-Aug. 29	373	21	.01	52	11	18	14	214	42	6.8	.6	1.1	.08	273	.37	275	176	1	17	.6	437	7.6	12
Aug. 30	2,050	15	.00	41	5.2	5.9	10	152	20	.4	.5	3.9	.04	180	.24	996	124	0	9	.2	292	7.4	12
Aug. 31-Sept. 30	272	23	.01	59	11	17	13	228	46	7.3	.4	1.2	.07	290	.39	213	192	5	15	.5	463	7.4	12
Weighted average a	582	19	0.01	45	8.6	12	12	182	29	4.5	0.5	1.5	0.07	224	0.30	352	148	0	14	0.4	360	--	--
Weighted average b	553	19	0.01	46	8.3	12	12	183	29	4.6	0.5	1.5	0.07	225	0.30	336	149	0	14	0.4	361	--	--

a Includes estimate where datum is missing. Represents 99 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER NEAR HARDY, NEBR.--Continued

Temperature (° F) of water, August to September 1956
(Once-daily measurement between 8 a.m. and 12 m.)

Day	August	Day	August	Day	September	Day	September
2	a 89	17		1	68	16	64
3	76	18		2	67	17	b 73
4	78	19		3	a 82	18	68
5	79	20		4	a 78	19	b 78
6	77	21		5	a 60	20	62
7	74	22		6	60	21	63
8	79	23		7	a 70	22	a 75
9	--	24		8	b 57	23	--
10	--	25		9	59	24	--
11	--	26		10	b 77	25	--
12	--	27		11	80	26	60
13	--	28	72	12	78	27	60
14	--	29		13	a 85	28	60
15	--	30		14	66	29	55
16	--	31		15	a 84	30	52
Average							68

a Measurement between 3 p.m. and 5 p.m.
b Measurement between 6 a.m. and 7 a.m.

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 3 p.m. and 6 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	74	a 58	a 45	a 39	--	48	48	a 73	a 70	83	a 87	--
2	78	56	a 46	42	--	a 42	43	66	77	85	b 90	--
3	a 57	49	47	a 49	--	39	38	67	a 80	--	85	b 77
4	a 57	a 46	45	--	--	a 38	40	a 62	a 70	79	a 75	78
5	a 54	49	38	37	--	a 37	48	74	a 90	79	b 77	78
6	a 55	50	33	45	--	39	54	a 67	70	b 77	a 80	73
7	a 52	48	32	a 43	33	40	--	75	a 78	a 78	a 82	b 72
8	a 52	--	a 33	55	--	45	58	a 54	78	a 77	--	75
9	58	50	33	--	37	a 41	56	57	a 75	a 76	a 78	64
10	64	a 55	35	--	a 35	a 42	--	59	a 71	78	b 82	a 64
11	a 60	56	34	--	a 36	53	43	a 67	80	a 78	--	b 74
12	b 55	52	33	--	33	58	43	b 69	79	a 77	a 88	68
13	70	55	34	a 46	--	59	a 46	62	83	85	b 86	70
14	70	53	31	--	38	38	a 52	65	b 78	82	a 84	b 67
15	--	39	33	a 54	--	52	52	b 60	71	a 78	93	a 62
16	73	39	a 34	51	a 38	a 49	58	55	a 68	--	75	71
17	71	a 46	33	36	a 39	59	63	a 56	70	87	78	70
18	a 59	a 46	35	38	a 46	40	66	61	--	a 79	a 74	78
19	68	--	39	45	--	51	70	64	a 77	a 79	a 74	64
20	a 63	--	34	51	43	50	b 72	68	a 70	a 78	a 85	57
21	63	35	35	--	35	44	--	72	a 77	a 76	--	67
22	62	37	35	51	a 32	43	70	63	a 71	a 74	a 74	--
23	62	42	a 39	33	a 32	a 41	67	b 68	75	a 77	--	a 67
24	61	a 43	--	--	35	--	67	69	b 82	a 74	79	73
25	60	a 40	a 37	--	38	37	--	a 69	a 77	a 74	--	a 65
26	a 44	40	a 38	--	46	47	68	a 67	a 70	a 76	78	a 74
27	a 49	42	a 38	--	47	56	68	75	a 66	a 79	85	a 74
28	a 48	34	44	--	52	50	--	a 71	72	--	a 70	a 67
29	61	37	a 36	--	--	53	b 78	a 78	a 71	88	b 80	--
30	--	44	48	--	--	46	a 64	--	a 74	a 80	78	--
31	57	--	a 43	--	--	a 46	--	77	--	a 80	b 80	--
Average	61	46	37	--	--	46	57	66	75	79	81	70

a Measurement between 7 a.m. and 2 p.m.
b Measurement between 7 p.m. and 9 p.m.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER AT MILFORD, KANS.

LOCATION.--At gaging station at bridge on State Highway 82, at southwest city limits of Milford, Geary County.
DRAINAGE AREA.--24,900 square miles, approximately, of which a large area does not contribute to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 596 ppm Oct. 1-13; minimum, 146 ppm May 15-25.
Hardness: Maximum, 376 ppm Oct. 1-13; minimum 80 ppm Apr. 24.
Specific conductance: Maximum daily, 921 micromhos Dec. 18; minimum daily, 163 micromhos May 17.
Water temperatures: Maximum, 85°F July 20.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 596 ppm Oct. 1-13, 1956; minimum, 146 ppm May 15-25, 1957.
Hardness: Maximum, 376 ppm Oct. 1-13, 1956; minimum, 80 ppm Apr. 24, 1957.
Specific conductance: Maximum daily, 925 micromhos Dec. 11, 1955; minimum daily, 163 micromhos May 17, 1957.
Water temperatures: Maximum, 85°F July 20, 1957; minimum (1955-56), freezing point on several days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-13, 1956	10.2	24	0.00	105	28	40	9.1	282	0	190	33	0.5	0.5	0.13	596	0.81	16.4	376	145	18	0.9	872	7.9
Oct. 14-16	34.7	21	.27	77	19	39	11	208	0	148	30	.5	2.0	.13	460	.63	43.1	272	101	23	1.0	702	7.9
Oct. 17-18	35.0	18	.08	53	12	25	9.6	164	0	75	24	.5	6.3	.11	316	.43	29.9	182	48	22	.8	499	7.6
Oct. 19-31	26.5	19	.00	89	21	44	9.9	262	0	140	40	.5	2.5	.12	509	.69	36.4	308	93	23	1.1	791	7.7
Nov. 1-12	55.8	20	.01	73	16	37	10	244	0	93	33	.4	2.5	.12	405	.55	61.0	246	46	24	1.0	647	7.7
Nov. 13-30	52.7	22	.02	90	18	43	9.9	286	0	113	39	.4	1.4	.11	487	.66	69.3	298	63	23	1.1	753	8.0
Dec. 1-31	53.4	17	.02	89	22	45	8.2	291	0	119	46	.4	.7	.24	496	.67	71.5	312	73	23	1.1	789	8.0
Jan. 1-9, 1957	63.8	14	.00	74	15	37	7.1	251	0	83	25	.5	.4	.09	394	.54	67.9	248	42	24	1.0	648	8.1
Jan. 10-Feb. 6	21.7	10	.04	102	22	39	6.6	274	0	158	36	.4	.2	.12	522	.71	30.6	346	121	19	.9	808	8.2
Feb. 7-9	60.0	8.2	.04	98	21	36	5.7	236	0	168	36	.4	.5	.11	516	.70	83.6	332	138	19	.9	779	8.2
Feb. 10-13	75.0	7.8	.01	74	15	46	5.5	212	0	105	53	.4	.6	.08	414	.56	83.8	248	74	28	1.3	689	8.2
Feb. 14-15	114	9.7	.05	59	9.0	41	6.5	196	4	57	44	.4	.3	.10	332	.45	102	184	17	32	1.3	559	8.3
Feb. 16-21	133	13	.00	55	10	25	7.2	200	0	47	21	.4	1.9	.07	286	.39	103	180	16	22	.8	476	8.1
Feb. 22-28	105	16	.01	72	15	31	7.6	243	0	76	28	.5	1.2	.08	371	.50	105	240	41	21	.9	603	8.1
Mar. 1-31	129	17	.00	67	15	40	8.8	238	0	75	36	.4	1.0	.09	379	.52	132	228	33	27	1.1	620	8.1
Apr. 1-2	213	17	.03	63	10	28	9.1	206	4	59	25	.5	.3	.16	336	.46	193	200	25	22	.9	502	8.3
Apr. 3	620	9.1	.04	45	7.2	12	8.0	150	0	40	9.0	.7	7.4	.04	234	.32	392	142	19	15	.4	351	7.7
Apr. 4-6	815	11	.03	39	1.1	16	7.6	104	0	34	11	.4	6.3	.05	184	.25	405	102	17	24	.7	276	7.7
Apr. 7-9	420	12	.01	42	6.6	20	8.8	146	4	34	18	.4	1.7	.16	231	.31	262	132	6	23	.8	365	8.4
Apr. 10-14	248	16	.00	60	12	26	9.4	206	0	64	21	.5	.5	.07	312	.42	209	198	29	21	.8	503	7.9

Apr. 15-23	162	16	.00	63	19	36	11	245	0	83	31	.5	.2	.19	389	.53	170	236	35	24	1.0	616	8.2
Apr. 24	535	12	.01	26	3.6	21	8.3	68	4	53	18	.4	.3	.02	176	.24	254	80	18	33	1.0	399	8.5
Apr. 25-26	596	10	.02	39	4.5	13	9.2	128	0	29	10	.6	2.3	.07	190	.26	306	116	11	18	.5	300	7.9
Apr. 27-28	398	14	.02	38	6.1	26	10	130	0	29	34	.5	7.0	.08	236	.32	254	120	13	30	1.0	388	7.9
Apr. 29-May 14	295	17	.01	54	10	23	9.6	192	0	44	20	.5	4.5	.07	285	.39	227	176	19	21	.8	461	7.6
May 15-25	2,467	12	.03	30	3.2	7.8	6.8	104	0	14	7.0	.3	5.3	.04	146	.20	972	88	3	15	.4	229	7.4
May 26-June 4	568	15	.01	44	5.6	15	8.2	150	0	27	15	.5	3.5	.05	208	.28	319	133	10	18	.6	340	7.3
June 5-15	422	16	.02	46	5.8	22	9.0	155	0	35	23	.5	3.0	.06	245	.33	279	139	12	24	.8	392	7.5
June 16-23	6,411	14	.02	23	10	5.8	8.6	121	0	12	5.7	.6	5.1	.04	157	.21	2,720	99	0	10	.3	244	7.5
June 24-30	2,617	17	.02	49	7.7	15	10	175	0	34	13	.5	.9	.07	235	.32	1,660	154	10	16	.5	386	7.6
July 1-4	3,530	15	.01	38	7.1	11	11	144	0	26	6.4	.5	.9	.06	186	.25	1,770	124	6	15	.4	299	8.0
July 5-21	2,958	16	.02	45	9.6	16	14	188	0	36	7.9	.6	.3	.07	246	.33	1,960	152	0	17	.6	393	7.7
July 22	4,570	12	.02	31	7.9	10	12	134	0	18	3.4	.5	2.6	.06	184	.25	2,270	110	0	15	.4	280	7.3
July 23-Aug. 1	2,366	17	.01	44	10	17	15	190	0	35	8.0	.6	.3	.10	245	.33	1,570	153	0	18	.6	392	7.8
Aug. 2-20	655	21	.01	53	15	27	14	228	0	52	20	.6	.4	.08	324	.44	573	195	8	22	.8	517	8.0
Aug. 21-Sept. 7	617	17	.01	47	9.1	18	12	179	0	40	13	.5	2.3	.07	252	.34	420	155	8	19	.6	401	7.6
Sept. 8-30	414	18	.01	56	12	26	12	207	0	55	22	.4	2.1	.08	308	.42	344	187	17	22	.8	501	7.8
Weighted average a..	709	15	0.02	41	9.1	15	11	b 164	--	32	11	0.5	2.4	0.07	226	0.31	433	140	6	17	0.5	361	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.
b Includes carbonate as bicarbonate.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER AT MILFORD, KANS.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 10 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	61	52	35	a 35	--	a 38	a 57	64	68	73	82	77
2	55	55	a 45	a 34	--	36	a 57	a 60	67	72	83	76
3	55	51	46	a 35	--	35	54	a 58	63	74	82	69
4	54	45	40	a 34	--	a 36	54	57	63	78	80	67
5	50	52	38	36	--	a 44	a 50	50	69	72	79	66
6	56	45	33	35	--	a 35	a 54	a 60	78	75	74	68
7	--	--	34	34	a 33	a 36	53	61	77	75	77	64
8	52	a 44	a 33	38	34	a 36	50	a 65	75	78	79	66
9	50	37	33	33	34	a 38	52	62	76	77	80	61
10	51	41	34	--	36	a 45	55	a 59	76	75	81	65
11	55	44	36	--	34	a 47	a 49	56	74	79	79	60
12	60	44	35	--	33	a 50	47	a 57	77	81	80	59
13	66	46	34	--	34	a 44	49	59	75	82	80	60
14	59	57	a 33	--	35	a 47	52	60	a 72	83	79	59
15	52	a 33	34	--	35	a 47	54	58	73	82	81	63
16	59	a 33	35	--	35	a 49	58	60	71	83	79	58
17	58	34	a 33	--	36	a 55	56	62	73	82	78	67
18	56	38	a 33	--	34	a 54	58	58	69	80	78	61
19	57	38	34	--	33	a 53	59	63	70	83	77	59
20	57	36	36	--	33	a 56	--	61	69	85	77	54
21	54	a 34	a 37	34	36	a 56	61	63	71	81	79	58
22	54	33	38	--	33	a 56	a 62	63	73	79	78	59
23	50	36	--	--	33	55	61	62	70	82	76	54
24	55	34	a 34	--	33	a 54	64	65	68	77	72	53
25	54	38	a 38	--	35	47	63	63	71	76	76	54
26	--	33	37	--	35	44	60	65	72	79	77	55
27	53	34	38	--	36	47	61	63	67	78	74	53
28	54	36	38	--	36	a 56	63	66	72	79	78	52
29	56	--	37	--	--	a 56	61	66	73	78	78	56
30	57	a 36	37	--	--	57	64	69	71	82	74	52
31	52	--	36	--	--	--	--	67	--	79	80	--
Average	55	41	36	--	--	47	56	61	71	79	78	61

a Measurement between 11 a.m. and 1 p.m.

BIG CREEK NEAR OGALLAH, KANS.

LOCATION.--At gaging station at bridge on State Highway 565, 5 miles south of Ogallah, Trego County, 9.0 miles upstream from Ogallah Creek, and 10 miles west of Ellis.
DRAINAGE AREA.--347 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
Sediment records: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 372 ppm Jan. 11-13, 15-22, 25; minimum, 122 ppm May 16-21.
Hardness: Maximum, 282 ppm Jan. 11-13, 15-22, 25; minimum, 80 ppm May 16-21, June 17.
Specific conductance: Maximum daily, 655 micromhos Jan. 18; minimum daily, 146 micromhos Sept. 15.
Water temperatures: Maximum, 81°F July 14; minimum, 33°F on several days during December to April.
Sediment concentrations: Maximum daily, 9,630 ppm June 30; minimum daily, no flow on many days during October to February.
Sediment loads: Maximum daily, 139,000 tons June 17; minimum daily, 0 tons on many days during October to February.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 372 ppm Jan. 11-13, 15-22, 25, 1957; minimum, 122 ppm May 16-21, 1957.
Hardness: Maximum, 282 ppm Jan. 11-13, 15-22, 25, 1957; minimum, 80 ppm May 16-21, June 17, 1957.
Specific conductance: Maximum daily, 655 micromhos Jan. 18, 1957; minimum daily, 146 micromhos Sept. 15, 1957.
Water temperatures: Maximum, 82°F Aug. 18, 1955; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 9,630 ppm June 30, 1957; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 139,000 tons June 17, 1957; minimum daily, 0 tons on many days each year.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 30, 1956	234	24	--	60	4.5	4.4	12	224	0	10	0.2	0.2	1.1	0.04	226	0.31	143	168	0	5	0.1	351	7.4
Oct. 31-Nov. 4	3.12	14	0.13	31	4.0	7.0	10	124	0	11	.4	.2	5.3	.08	166	.23	1.40	94	0	12	.3	239	8.0
Dec. 1-2, 4-7, 11-20	.23	14	.00	84	11	15	7.7	307	0	30	13	.2	.2	.09	340	.46	.21	256	4	11	.4	545	8.0
Dec. 21-Jan. 10, 1957.	.42	23	.00	64	9.8	12	5.3	243	0	18	11	.3	.0	.05	274	.37	.31	200	1	11	.4	435	8.1
Jan. 11-13, 15-22, 25	.33	32	.00	71	26	18	7.0	326	6	28	16	.3	.1	.10	372	.51	.33	282	5	12	.5	595	8.3
Feb. 2-7	.32	27	.01	73	9.2	13	5.4	254	4	22	12	.4	.2	.06	294	.40	.25	220	5	11	.4	470	8.3
Feb. 8-28	.79	19	.00	55	8.0	10	4.7	206	0	19	8.5	.3	.1	.06	226	.31	.48	170	1	11	.3	373	8.1
Mar. 1-24	.76	21	.00	67	10	13	5.6	253	0	21	10	.4	.2	.05	274	.37	.56	208	1	12	.4	447	7.9
Mar. 25-Apr. 1	.80	19	.01	55	6.1	10	6.0	196	0	19	7.4	.3	1.4	.06	230	.31	.50	162	1	11	.3	364	8.0
Apr. 2-5	34.0	15	.01	33	3.3	4.6	7.8	114	0	15	4.0	.2	3.3	.04	144	.20	13.2	96	3	9	.2	230	7.8
Apr. 6-7	8.10	23	.08	53	7.8	8.0	8.1	196	0	19	6.0	.3	2.7	.05	230	.31	5.03	164	3	9	.3	365	8.0
Apr. 8-30	3.66	21	.00	42	26	12	6.8	250	0	24	10	.4	.6	.07	276	.38	2.73	210	5	11	.4	452	8.0
May 1-14	2.79	19	.01	49	21	11	7.6	239	0	20	9.5	.4	.7	.06	261	.35	1.97	208	12	10	.3	437	7.8
May 15	442	24	.03	49	4.3	4.7	12	176	0	13	2.0	.4	3.8	.08	208	.28	248	140	0	6	.2	324	7.9
May 16-21	956	16	.03	28	2.5	.7	10	106	0	5.0	.2	.1	5.2	.01	122	.17	315	80	0	2	.0	189	7.5

KANSAS RIVER BASIN--Continued

BIG CREEK NEAR OGALLAH, KANS.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
May 22-31, 1957	40.9	23	0.02	49	8.6	5.5	10	185	0	15	4.0	0.3	5.7	0.10	221	0.30	24.4	158	6	7	0.2	350	7.7
June 1-9	55.7	21	.01	70	9.4	10	9.0	250	0	23	8.8	.4	2.4	.05	279	.38	42.0	213	8	9	.3	454	7.6
June 10-16	519	22	.02	41	4.0	1.1	13	154	0	5.3	.2	.3	6.2	.03	170	.23	238	119	0	2	.0	266	7.5
June 17	6,720	21	.13	28	2.5	.8	11	106	0	3.0	.8	.3	6.7	.03	128	.17	2,320	80	0	2	.0	184	7.3
June 18-20	1,222	23	.06	--	--	1.3	12	124	0	2.0	1.0	.2	8.0	.17	144	.20	475	100	0	2	.1	218	7.6
June 21-26	109	24	.02	49	4.7	3.6	12	172	0	17	3.4	.3	8.0	.07	204	.28	60.0	142	1	5	.1	318	7.6
June 27-July 4	1,018	25	.00	40	2.0	1.5	11	135	0	4.7	.1	.2	7.4	.04	167	.23	459	108	0	3	.1	245	7.8
July 5-26	29.5	27	.01	63	8.0	8.3	12	224	0	22	6.0	.4	5.1	.06	266	.36	21.2	190	6	8	.3	422	7.6
July 27-Aug. 28	5.75	26	.01	68	12	14	11	257	0	27	11	.4	2.7	.07	312	.42	4.84	220	9	12	.4	490	7.6
Aug. 29-Sept. 19	223	23	.00	29	2.6	1.1	11	108	0	6.3	.0	.2	6.6	.03	127	.17	76.5	83	0	2	.1	196	7.6
Sept. 20-30	16.3	41	.00	65	8.8	7.8	12	242	0	20	5.0	.4	4.2	.12	282	.38	12.4	198	0	7	.2	424	8.1
Weighted average a	99.8	22	0.04	32	5.4	1.7	11	b 129	--	5.8	0.8	0.2	6.5	0.05	153	0.21	41.2	102	0	3	0.1	231	--

a Represents 100 percent of runoff for water year October 1956 to September 1957. Includes estimates where data are missing.
b Includes carbonate as bicarbonate.

KANSAS RIVER BASIN--Continued

BIG CREEK NEAR OGALLAH, KANS.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 7 a.m. and 9 a.m. Many days of no flow/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	48	37	35	--	40	36	60	--	--	77	73
2	--	46	39	34	33	41	34	62	60	77	77	72
3	--	50	--	35	34	39	33	61	a 68	79	74	64
4	--	42	40	36	34	41	33	55	68	77	73	69
5	--	--	37	34	34	37	33	60	70	71	72	68
6	--	--	34	35	35	35	37	57	70	73	71	64
7	--	--	34	34	34	34	39	57	71	80	74	60
8	--	--	--	36	35	35	34	60	72	74	75	63
9	--	--	--	34	35	38	40	62	73	75	75	64
10	--	--	--	34	35	42	43	53	68	73	75	60
11	--	--	37	33	34	43	45	60	74	76	77	58
12	--	--	35	34	35	39	35	57	68	76	77	60
13	--	--	35	35	34	43	39	62	67	77	75	62
14	--	--	34	--	34	38	43	58	64	81	76	--
15	--	--	34	33	34	48	46	53	70	77	75	56
16	--	--	35	34	35	40	54	50	72	77	75	61
17	--	--	34	34	36	47	53	50	65	74	70	60
18	--	--	34	34	35	39	55	55	62	74	71	65
19	--	--	34	35	35	40	59	58	65	76	71	59
20	--	--	34	34	35	43	54	59	a 71	74	70	57
21	--	--	35	34	35	43	59	59	69	74	72	56
22	--	--	35	34	34	41	62	58	65	74	71	63
23	--	--	33	--	34	37	65	57	64	74	70	57
24	--	--	34	--	35	--	55	60	65	75	66	60
25	--	--	34	34	34	--	59	59	70	74	71	60
26	--	--	34	--	35	35	55	60	67	75	71	61
27	--	--	35	--	36	34	55	63	61	71	72	62
28	--	--	a 35	--	39	33	54	58	66	75	72	62
29	--	--	35	--	--	34	58	68	74	79	71	62
30	51	--	36	--	--	34	58	66	--	79	71	61
31	48	--	36	--	--	34	--	70	--	78	73	--
Average	--	--	35	34	35	39	48	59	68	76	73	62

a Measurement between 10 a.m. and 1 p.m.

KANSAS RIVER BASIN--Continued

BIG CREEK NEAR OGALLAH, KANS.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0	--	0	2.4	970	6	0.1	--	(t)
2	0	--	0	1.3	690	2	.2		
3	0	--	0	.6	425	1	0	--	0
4	0	--	0	.3	240	(t)	.2		
5	0	--	0	0	--	0	.2		
								--	(t)
6	0	--	0	0	--	0	.2		
7	0	--	0	0	--	0	.1		
8	0	--	0	0	--	0	0	--	0
9	0	--	0	0	--	0	0	--	0
10	0	--	0	0	--	0	0	--	0
11	0	--	0	0	--	0	.2	--	
12	0	--	0	0	--	0	.2	--	
13	0	--	0	0	--	0	.2	--	
14	0	--	0	0	--	0	.2	--	
15	0	--	0	0	--	0	.2	--	
16	0	--	0	0	--	0	.4	--	
17	0	--	0	0	--	0	.4	15	
18	0	--	0	0	--	0	.2	--	
19	0	--	0	0	--	0	.3	--	
20	0	--	0	0	--	0	.3	--	
21	0	--	0	0	--	0	.4	--	(t)
22	0	--	0	0	--	0	.3	--	
23	0	--	0	0	--	0	.2	--	
24	0	--	0	0	--	0	.3	--	
25	0	--	0	0	--	0	.4	15	
26	0	--	0	0	--	0	.4	--	
27	0	--	0	0	--	0	.4	--	
28	0	--	0	0	--	0	.4	--	
29	0	--	0	0	--	0	.5	--	
30	234	4,690	s 4,140	0	--	0	.4	--	
31	11	1,810	s 66	--	--	--	.4	10	
Total	245	--	4,206	4.6	--	9	7.7	--	(t)

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.4	10		0	--	0	0.8		
2	.2	--		.2	--		.6		
3	.3	--		.2	--		.8		
4	.4	--		.2	--		.7		
5	.6	--		.4	--		.7		
6	.6	--		.3	--		.7		
7	.6	--	(t)	.6	--		.7		
8	.6	5		.6	--		.6		
9	.6	--		1.4	--		1.0		
10	.4	--		1.4	--		1.0		
11	.3	--		1.2	--		1.2		
12	.1	--		.6	--		.9		
13	.1	--		.9	10		.6		
14	0	--	0	.9	--		.6		
15	.6	--		1.0	--	(t)	.3		
16	.6	--		.6	--		.6	40	(t)
17	.4	--		.8	--		.9		
18	.5	--		.6	10		.9		
19	.4	--	(t)	.4	--		.6		
20	.4	--		.6	--		.5		
21	.2	15		.6	--		.6		
22	.2	--		.6	--		.7		
23	0	--	0	.6	--		1.2		
24	0	--	0	.6	--		1.0		
25	.2	--	(t)	1.2	10		.8		
26	0	--	0	.7	--		.6		
27	0	--	0	.6	--		.9		
28	0	--	0	.6	--		1.5		
29	0	--	0	--	--		1.0		
30	0	--	0	--	--		.4		
31	0	--	0	--	--		.9		
Total	8.7	--	(t)	18.4	--	(t)	24.3		2

s Computed by subdividing day.
t Less than 0.50 ton.

KANSAS RIVER BASIN--Continued

BIG CREEK NEAR OGALLAH, KANS.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.3	135	(t)	2.6			18	720	s 68
2	27	450	33	5.2			7.7	265	6
3	46	565	s 74	4.4			7.7	220	5
4	47	545	69	3.9			7.4	245	5
5	16	455	20	3.6			7.2	210	4
6	9.8	180	5	2.9			6.2	205	3
7	6.4	170	3	1.7			4.4	210	2
8	6.9			1.8	115	1	5.6	235	4
9	6.4			2.0			437	2,300	s 5,990
10	6.4			2.0			485	4,030	5,280
11	6.4			2.4			152	3,050	1,250
12	5.2			2.6			66	2,630	469
13	4.6	60	1	2.6			69	1,900	354
14	3.9			1.3			338	6,210	s 6,710
15	3.6			442	6,390	s 10,300	76	3,500	718
16	3.9			1,900	6,440	33,000	2,450	5,330	s 103,000
17	3.6			2,640	5,480	39,100	6,720	7,010	s 139,000
18	3.9			838	4,000	s 9,970	2,930	4,890	s 41,200
19	1.3			202	2,900	1,580	512	3,000	4,150
20	2.6			100	2,050	554	223	2,070	1,250
21	2.6			54	1,280	187	140	1,360	514
22	2.2			35	840	79	168	1,550	703
23	2.6			24	540	35	130	1,770	621
24	3.4	85	1	18	380	18	77	1,360	283
25	2.6			15	285	12	78	770	162
26	2.4			13	255	9	58	620	97
27	2.6			11	240	7	1,330	5,620	s 26,700
28	2.6			205	3,050	s 2,670	1,220	5,170	s 18,700
29	2.2			42	300	34	798	3,590	s 8,310
30	2.2			9.3	240	6	2,670	9,630	69,400
31	--	--	--	37	1,850	s 560	--	--	--
Total	236.6	--	227	6,624.3	--	98,135	21,191.2	--	434,958

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,400	6,160	23,300	8.8	195	5	42	1,450	164
2	368	3,890	3,870	11	415	s 16	17	1,160	53
3	230	3,310	2,060	10	385	10	10	700	19
4	127	2,440	837	9.0	205	5	8.2	490	11
5	88	1,090	259	8.2	160	4	114	2,540	s 1,300
6	66	595	106	6.5	500	9	250	4,230	s 3,190
7	52	415	58	5.2	115	2	128	2,400	829
8	42	350	40	5.5	210	3	75	1,840	373
9	44	365	43	4.8	110	1	42	1,600	181
10	44	355	42	4.8	145	2	22	1,170	69
11	31	250	21	4.5	175	2	179	2,200	s 1,330
12	26	240	17	4.0			88	1,830	435
13	25	245	17	4.0			66	1,610	287
14	21	225	13	3.2			1,750	4,870	s 24,400
15	16	185	8	3.2			1,350	3,440	12,500
16	16	200	9	2.6	140	1	387	3,120	3,260
17	14	180	7	3.4			150	2,200	891
18	12	185	6	3.4			74	1,550	310
19	10	195	5	3.4			48	1,030	133
20	50	510	s 133	2.6			34	600	55
21	22	250	s 17	1.7			24	365	24
22	27	955	s 82	1.2			18	285	14
23	13	500	18	1.1			17	245	11
24	11	310	9	1.2			16	210	9
25	10	300	8	1.2	120	(t)	14	180	7
26	10	315	8	1.0			13	155	5
27	9.0	180	4	1.1			12	145	5
28	12	235	8	11	320	s 28	11	130	4
29	19	265	14	16	625	27	10	125	3
30	12	235	8	4.5	545	7	10	150	4
31	10	250	7	85	1,640	s 429	--	--	--
Total	2,837.0	--	31,034	233.1	--	562	4,979.2	--	49,876

Total discharge for year (cfs-days) 36,410.1
Total load for year (tons) 619,010

s Computed by subdividing day.
t Less than 0.50 ton.

KANSAS RIVER BASIN--Continued

BIG CREEK NEAR OGALLAH, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 30, 1956....	7:30 a.m.	467	51	6,420	4,950	--	73	--	98		100	--					SPWCM
Oct. 30	2:30 p.m.	158	55	4,730	1,870	--	84	--	98		99	99	100				SPWCM
Apr. 3, 1957	10:30 a.m.	57	--	823	1,190	--	93	--	94		100	--					SPWCM
May 15.....	8:00 a.m.	706	--	10,700	3,230	--	84	--	97		100	--					SPWCM
May 15.....	1:20 p.m.	681	52	9,770	5,030	62	82	94	100		--	--					PWCM
May 16.....	9:30 a.m.	1,480	--	5,910	3,850	--	80	--	94		100	--					SPWCM
May 16.....	10:50 a.m.	3,700	--	8,210	5,120	--	71	--	91		100	--					SPWCM
May 16.....	4:40 p.m.	2,820	56	6,840	3,260	54	75	88	96		100	--					SPWCM
May 16.....	4:40 p.m.	2,820	56	6,840	3,330	44	65	84	97		100	--					SPNM
May 20.....	3:25 p.m.	90	64	1,890	2,250	--	90	--	97		100	--					SPWCM
June 9	4:35 p.m.	1,280	68	5,050	3,220	--	82	--	97		100	--					SPWCM
June 17	7:00 a.m.	7,310	65	7,170	4,870	--	64	--	90		100	--					SPWCM
June 30	4:30 p.m.	3,430	--	10,100	3,370	--	64	--	86		100	--					SPWCM
July 1	9:00 a.m.	1,750	--	6,400	4,830	--	72	--	92		100	--					SPWCM
Sept. 3.....	11:43 a.m.	9.8	71	639	1,580	--	97	--	100		--	--					PWCM
Sept. 6.....	9:00 a.m.	472	--	7,500	4,570	--	73	--	96		100	--					SPWCM
Sept. 6.....	4:00 p.m.	284	--	4,360	3,650	--	80	--	96		99	100					SPWCM
Sept. 14.....	6:00 a.m.	2,820	60	6,250	3,980	--	70	--	90		100	--					SPWCM

SALINE RIVER NEAR WAKEENEY, KANS.

LOCATION.--At gaging station at bridge on U. S. Highway 283, 1 mile upstream from Trego Creek and 5 miles north of Wakeeney, Trego County.
DRAINAGE AREA.--696 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
Sediment records: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 405 ppm July 10 to Aug. 1; minimum, 148 ppm May 15-23.
Hardness: Maximum, 270 ppm July 10 to Aug. 1; minimum, 104 ppm May 15-23.
Specific conductance: Maximum daily, 646 micromhos July 27; minimum daily, 205 micromhos May 15.
Water temperatures: Maximum, 84°F July 10, 14, Aug. 6, 22, 23.
Sediment concentrations: Maximum daily, 6,400 ppm June 17; minimum daily, no flow on many days during October to March.
Sediment loads: Maximum daily, 140,000 tons June 17; minimum daily, 0 tons on many days during October to March.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 475 ppm Jan. 19-27, 1956; minimum, 148 ppm May 15-23, 1957.
Hardness: Maximum, 334 ppm Jan. 19-27, 1956; minimum, 104 ppm May 15-23, 1957.
Specific conductance: Maximum daily, 726 micromhos Jan. 25, 26, 1956; minimum daily, 205 micromhos May 15, 1957.
Water temperatures: Maximum, 85°F July 23, 1956; minimum (1955-56), freezing point Jan. 30, 1956, and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 8,400 ppm May 30, 1956; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 140,000 tons June 17, 1957; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period Oct. 1 to Mar. 30. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, March to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Mar. 31-Apr. 11, 1957	15.1	18	0.01	57	9.7	14	11	188	0	51	12	0.5	2.5	0.09	274	0.37	11.2	182	28	13	0.5	434	7.4
Apr. 12-21	10.3	18	.01	65	15	20	11	239	0	60	16	.7	.3	.08	330	.45	9.18	225	29	15	.6	525	7.8
Apr. 22-25	16.2	17	.01	55	8.5	10	13	190	0	34	7.2	.5	3.2	.07	268	.36	11.7	172	16	10	.3	398	8.0
Apr. 26-May 2	5.53	15	.00	78	17	21	12	284	0	63	18	.7	.4	.08	376	.51	5.61	264	31	14	.6	608	7.6
May 3-14	18.5	18	.01	56	10	11	12	196	0	38	7.0	.5	2.6	.12	262	.36	13.1	182	21	11	.4	418	7.9
May 15-23	804	16	.04	35	4.0	2.0	10	132	0	10	.4	.3	4.0	.03	148	.20	321	104	0	4	.1	238	7.8
May 24-31	72.4	29	.00	59	26	17	13	260	0	64	13	.6	3.7	.12	367	.50	71.7	252	39	12	.5	566	7.7
June 1-7	65.4	23	.05	54	9.1	10	11	186	0	39	8.0	.5	2.4	.15	254	.35	44.9	172	19	11	.3	391	7.6
June 8-15	279	22	.04	52	5.5	3.5	13	180	0	16	1.0	.4	7.1	.06	216	.29	163	152	4	4	.1	326	7.6
June 16-19	2,668	19	.04	47	2.6	1.5	11	158	0	3.5	.4	.3	7.1	.08	168	.23	1,210	128	0	2	.1	273	7.6
June 20-26	134	25	.05	57	6.8	7.7	16	191	0	36	4.2	.5	4.4	.06	256	.35	92.6	170	13	8	.3	395	7.6
June 27-July 2	1,405	22	.01	50	6.6	3.8	11	174	0	19	1.6	.4	5.9	.05	214	.29	812	152	9	5	.1	331	8.0
July 3-6	173	31	.02	77	12	14	15	224	12	60	10	.4	4.4	.08	360	.49	168	242	39	10	.4	526	8.6
July 7-9	58.3	29	.01	67	9.0	11	16	222	0	49	8.0	.5	3.8	.08	315	.43	49.6	204	22	10	.3	474	8.2
July 10-Aug. 1	24.1	30	.01	83	15	20	14	278	0	70	15	.6	2.8	.10	405	.55	26.4	270	42	13	.5	609	8.0
Aug. 2-30	20.2	28	.02	66	13	14	16	232	0	56	10	.5	2.1	.08	328	.45	17.9	218	28	11	.4	507	7.8
Aug. 31-Sept. 15	133	19	.03	43	6.4	5.1	16	164	0	19	2.0	.4	3.3	.06	204	.28	73.3	134	0	7	.2	316	7.6
Sept. 16-30	52.3	26	.01	63	9.7	9.7	16	228	0	35	6.7	.5	3.2	.06	290	.39	41.0	197	10	9	.3	451	7.6
Weighted average a	98.8	20	0.03	48	5.6	4.2	12	b 168	--	17	2.1	0.4	5.4	0.06	202	0.27	53.9	143	5	5	0.2	316	--

a Represents 100 percent of runoff for water year October 1956 to September 1957. b Includes carbonate as bicarbonate.

KANSAS RIVER BASIN--Continued

SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Temperature (° F) of water, April to September 1957
(Once-daily measurement between 3 p.m. and 6 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1							41	67	67	a 77	78	77
2							42	b 68	69	78	82	81
3							38	62	71	80	81	82
4							40	60	72	a 80	82	80
5							48	65	72	81	83	b 82
6							48	66	74	82	84	79
7							41	68	75	82	83	b 78
8							48	70	70	83	83	78
9							52	64	a 70	83	79	79
10							52	61	b 72	84	81	80
11							38	56	73	83	82	77
12							38	72	74	82	82	78
13							42	62	75	83	83	79
14							42	61	69	84	83	b 71
15							53	56	70	82	82	69
16							54	54	a 69	81	83	67
17							55	54	a 65	81	83	67
18							48	60	72	82	83	66
19							56	61	70	81	83	66
20							65	67	71	80	83	67
21							68	69	72	80	83	69
22							65	65	73	81	84	70
23							62	67	a 68	80	84	68
24							66	68	69	80	82	69
25							65	68	70	80	83	69
26							67	71	71	83	82	67
27							66	73	66	83	83	66
28							66	74	a 64	83	80	65
29							65	75	68	83	81	68
30							66	75	70	a 80	78	a 60
31							--	b 72	--	a 79	79	--
Average							53	66	70	81	82	72

a Measurement between 7 a.m. and 9 a.m.
b Measurement between 12 m. and 2 p.m.

KANSAS RIVER BASIN--Continued

SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Suspended sediment, January to September 1957

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1							0		0
2							0		0
3							0		0
4							0		0
5							0		0
6							0		0
7							0		0
8							0		0
9							0		0
10							0		0
11							0		0
12							0		0
13							0		0
14							0		0
15							0		0
16							0		0
17							0		0
18							0		0
19							0		0
20							0		0
21							0		0
22							0		0
23							0		0
24							0		0
25							0		0
26							0		0
27							0		0
28							0		0
29							0		0
30							0		0
31							6.9	340	s 8
Total	0		0	0		0	6.9		8

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	7.2	320	s 12	5.3	190	2	208	2,100	s 2,000
2	31	600	50	5.1	140	2	47	420	53
3	22	320	19	50	670	s 110	41	260	29
4	18	290	14	29	700	55	52	270	38
5	14	200	8	19	700	36	50	200	27
6	11	120	4	13	580	20	31	200	17
7	9.9	90	2	9.6	430	11	29	210	16
8	15	440	s 20	8.2	310	7	108	1,400	s 1,000
9	17	200	9	7.5	200	4	243	3,200	2,100
10	15	300	12	6.9	120	2	372	2,900	2,900
11	14			6.9	76	1	236	2,100	1,300
12	14			6.9	64	1	110	1,000	s 320
13	13	450	16	8.4	130	3	79	350	75
14	12			56	3,000	s 540	777	5,600	s 14,000
15	11			132	4,100	s 1,700	309	2,800	s 2,700
16	9.6			1,500	5,600	23,000	671	3,500	s 15,000
17	9.6			3,590	6,100	59,000	8,010	6,400	140,000
18	9.0			1,000	3,700	s 11,000	1,460	3,900	s 17,000
19	8.6	340	8	449	3,100	3,800	530	3,300	4,700
20	8.2			225	2,400	s 1,500	277	2,000	s 1,600
21	8.0			160	1,700	730	152	910	370
22	16	1,200	s 120	107	770	220	135	710	260
23	31	2,400	s 210	70	340	64	148	720	290
24	11	880	s 29	51	270	37	114	340	110
25	6.9	490	9	40	240	26	63	220	37
26	6.3	340	6	34	230	21	46	230	29
27	6.1	170	3	32	220	19	609	3,400	s 8,100
28	5.9	110	2	32	240	21	3,590	4,200	41,000
29	4.9	80	1	32	240	21	815	1,900	s 4,500
30	5.1	85	1	44	340	s 43	1,080	5,100	s 20,000
31	--	--	--	314	3,800	s 7,400	--	--	--
Total	370.3	--	659	8,043.8	--	109,397	20,392	--	279,571

s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Suspended sediment, January to September 1957--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	1,700	4,500	s 24,000	17	200	9	41	520	58
2.....	633	2,900	s 5,400	16	210	9	28	450	34
3.....	223	2,100	1,300	22	210	12	22	400	24
4.....	199	1,200	s 750	20	170	9	20	340	18
5.....	158	340	150	17	160	7	21	290	16
6.....	111	260	78	15	160	6	21	240	14
7.....	81	200	44	14	250	9	82	1,500	s 410
8.....	55	200	30	13	250	9	85	1,400	s 340
9.....	39	220	23	36	350	34	62	620	100
10.....	34	190	17	33	310	26	32	350	30
11.....	33	180	16	26	250	18	34	280	26
12.....	30	170	14	21	220	12	30	120	10
13.....	26	160	11	21	210	12	30	120	10
14.....	24	150	10	20	190	10	964	3,200	s 14,000
15.....	24	140	9	18	180	9	605	3,200	s 6,200
16.....	24	150	10	17	160	7	146	1,600	s 770
17.....	24	130	8	16	85	4	147	1,700	s 800
18.....	24	140	9	13	80	3	94	690	180
19.....	23	93	6	11	270	8	54	620	90
20.....	24	100	6	10	290	8	42	470	53
21.....	32	160	14	8.7	170	4	39	330	35
22.....	29	140	11	7.0	150	3	36	220	21
23.....	26	120	8	6.5	80	1	32	170	15
24.....	24	110	7	6.1	85	1	31	150	13
25.....	24	100	6	5.8	72	1	31	140	12
26.....	22	100	6	5.2	90	1	28	100	8
27.....	21	110	6	4.5	200	2	28	91	7
28.....	20	100	5	5.6	250	4	26	130	9
29.....	17	110	5	68	2,200	s 660	26	110	8
30.....	16	120	5	108	1,100	s 350	24	63	4
31.....	17	150	7	57	600	92	--	--	--
Total.	3,737	--	31,971	658.4	--	1,342	2,861	--	23,315

Total discharge for year (cfs-days)..... 36,069.4
Total load for year (tons)..... 446,263

s Computed by subdividing day.

SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Particle-size analyses of suspended sediment, January to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 15, 1957.....	3:55 p.m.	130	56	4,920	3,490	68	79	97	99	99	100	--	--		--	--	SPWCM
May 15.....	3:55 p.m.	130	56	4,920	3,610	8	15	91	99	99	100	--	--		--	--	SPNM
May 16	6:30 p.m.	2,590	55	4,840	3,170	51	69	79	87	90	99	100	--		--	--	SPWCM
May 16	6:30 p.m.	2,590	55	4,840	3,330	20	50	77	88	94	99	100	--		--	--	SPNM
May 17	5:20 a.m.	5,590	53	6,860	5,100	--	73	--	96	--	100	--	--		--	--	SPWCM
June 17.....	12:15 p.m.	9,660	67	6,300	5,550	--	76	--	96	--	99	100	--		--	--	SPWCM
June 27.....	11:30 a.m.	645	64	6,440	3,630	--	55	--	--	--	96	97	97		99	100	SPWCM
July 1	10:30 a.m.	2,260	--	7,340	4,620	--	70	--	90	--	98	99	100		--	--	SPWCM
Sept. 14	3:45 p.m.	1,530	59	5,300	4,070	--	76	--	91	--	99	99	99		99	100	SPWCM

KANSAS RIVER BASIN--Continued

SMOKY HILL RIVER AT ENTERPRISE, KANS.

LOCATION.--At gaging station at Atchison, Topeka and Santa Fe Railway Co. bridge in Enterprise, Dickinson County, and 18.4 miles upstream from Chapman Creek.
DRAINAGE AREA.--19,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 3,220 ppm Jan. 22-24; minimum, 199 ppm May 17-22.
Hardness: Maximum, 652 ppm Jan. 22-24; minimum, 131 ppm May 17-22.
Specific conductance: Maximum daily, 5,340 micromhos Jan. 24; minimum daily, 292 micromhos May 20.
Water temperatures: 83°F on several days during July and August; minimum, freezing point on several days during January.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 3,220 ppm Jan. 22-24, 1957; minimum, 199 ppm May 17-22, 1957.
Hardness: Maximum, 652 ppm Jan. 22-24, 1957; minimum, 124 ppm Oct. 5-7, 1955.
Specific conductance: Maximum daily, 5,340 micromhos Jan. 24, 1957; minimum daily, 292 micromhos May 20, 1957.
Water temperatures: Maximum, 88°F June 21, 1956; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1955 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-13, 1956	48.8	7.1	0.01	109	25	473	12	192	250	730	0.4	4.2	0.22	1,730	1,710	2.35	228	374	217	73	11	3,020	7.5	
Oct. 14	754	4.9	.08	101	20	369	12	188	203	588	.4	2.6	.16	1,420	1,400	1.93	2,890	336	182	70	8.8	2,500	7.5	
Oct. 16	507	8.5	.04	87	17	232	10	154	175	369	.5	6.8	.13	1,020	982	1.39	1,400	285	159	63	6.0	1,750	7.3	
Oct. 17-25	192	9.4	.02	67	12	145	9.6	164	95	220	.4	5.8	.09	676	--	.92	351	216	82	58	4.3	1,180	7.5	
Oct. 26-Nov. 5	129	15	.02	105	22	340	11	222	198	518	.4	5.3	.19	1,360	1,320	1.85	474	354	172	67	7.8	2,330	7.6	
Nov. 6	215	14	.04	156	50	840	14	266	460	1,250	.4	6.0	.32	2,990	2,920	4.07	1,740	596	378	75	15	4,960	7.8	
Nov. 7-8	166	11	.05	111	32	550	12	202	305	837	.4	8.5	.23	1,990	1,970	2.71	892	408	242	74	12	3,400	7.7	
Nov. 9-15	103	15	.02	84	17	270	11	196	160	408	.4	5.7	.16	1,080	1,070	1.47	300	280	119	67	7.0	1,900	7.6	
Nov. 16-28	74.5	17	.02	109	22	355	10	248	195	533	.3	4.9	.20	1,400	1,370	1.90	282	364	161	67	8.1	2,300	7.6	
Nov. 29-Dec. 2	66.8	13	.08	119	30	416	10	284	218	157	.4	4.2	.23	1,660	1,610	2.26	299	420	187	68	8.8	2,870	8.0	
Dec. 3-5	69.0	12	.07	137	33	543	10	308	280	837	.4	4.3	.27	2,050	2,010	2.79	382	476	223	71	11	3,490	8.1	
Dec. 6-8	66.3	12	.07	137	36	588	10	324	280	896	.4	3.6	.36	2,180	2,120	2.96	390	488	222	72	12	3,690	8.1	
Dec. 9-12	68.3	12	.04	129	34	528	9.5	326	275	767	.3	2.2	.26	1,970	1,920	2.68	363	460	193	71	11	3,340	8.0	
Dec. 13-16	66.3	12	.07	134	38	570	10	346	290	827	.4	4.5	.31	2,100	2,060	2.86	376	490	206	71	11	3,530	8.2	
Dec. 17-18	74.0	12	.07	141	40	668	9.1	a 370	320	976	.4	4.1	.25	2,410	2,350	3.28	482	518	215	73	13	4,050	8.3	
Dec. 19-30	82.8	9.7	.04	131	39	580	9.7	342	295	862	.3	2.7	.23	2,180	2,100	2.96	487	488	208	72	11	3,590	8.0	
Dec. 31-Jan. 3, 1957	77.5	8.6	.04	127	43	610	8.2	328	325	850	.4	1.3	.26	2,290	2,140	3.11	479	494	225	72	12	3,860	8.1	
Jan. 4-13	65.3	6.9	.04	127	47	660	8.8	340	335	976	.4	1.9	.26	2,400	2,330	3.26	423	510	231	73	13	4,040	8.1	
Jan. 14-15	56.5	7.4	.24	129	54	720	8.8	b 365	370	1,070	.4	1.6	.28	2,640	2,540	3.59	403	542	243	75	13	4,410	8.4	
Jan. 16-21	59.8	7.7	.04	155	50	790	10	390	390	1,160	.5	3.6	.30	2,820	2,760	3.84	455	592	272	74	14	4,680	7.9	
Jan. 22-24	54.3	8.1	.04	168	57	890	11	432	440	1,320	.5	2.2	.32	3,220	3,110	4.38	472	652	298	74	15	5,310	8.1	

Jan. 25.....	45	6.2	.06	160	49	770	11	398	295	1,130	.5	2.3	.29	2,790	2,620	3.79	339	600	274	73	14	4,650	8.0
Jan. 26-Feb. 4.	51.9	9.0	.01	168	51	850	13	c 432	427	1,210	.5	6.8	.36	2,990	2,950	4.07	419	630	276	74	15	4,930	8.3
Feb. 5-9	80.4	8.6	.02	155	46	730	11	c 406	392	1,060	.5	7.7	.39	2,670	2,610	3.63	580	576	243	73	13	4,450	8.3
Feb. 10-15	109	8.0	.00	123	36	600	10	d 320	322	855	.4	3.2	.30	2,140	2,120	2.91	630	455	193	74	12	3,640	8.3
Feb. 16-20	110	5.0	.00	110	35	540	9.6	284	278	776	.5	2.0	.24	1,920	1,900	2.61	570	420	187	73	11	3,300	8.2
Feb. 21-24	82.3	7.0	.04	130	45	700	10	d 332	373	985	.5	1.5	.37	2,460	2,420	3.35	547	508	236	75	13	4,130	8.3
Feb. 25-26	94.0	6.3	.02	125	34	560	9.8	c 302	312	796	.4	1.5	.32	1,990	1,990	2.71	505	450	202	72	11	3,390	8.3
Feb. 27-Mar. 5	78.0	6.2	.00	130	39	670	10	308	348	971	.5	1.6	.27	2.350	2,330	3.20	495	486	233	74	13	4,000	8.1
Mar. 6-13.....	73.5	6.4	.00	115	35	600	10	272	295	855	.5	1.6	.25	2,080	2,050	2.83	413	430	207	75	13	3,570	8.0
Mar. 14-22....	57.8	6.0	.01	123	42	780	11	290	388	1,120	.4	1.3	.34	2,630	2,620	3.58	410	480	242	77	15	4,480	8.0
Mar. 23-24....	85.0	6.1	.02	130	46	830	11	298	402	1,250	.4	1.5	.37	2,860	2,820	3.89	656	512	268	77	16	4,850	8.2
Mar. 25-26....	128	6.0	.02	125	43	690	11	d 320	360	1,000	1.1	1.0	.31	2,400	2,400	3.26	829	488	226	75	14	4,080	8.3
Mar. 27.....	152	6.0	.02	158	44	550	10	284	452	801	.4	.7	.29	2,200	2,160	2.99	903	576	343	67	10	3,570	7.7
Mar. 28-29....	261	6.4	.02	108	33	500	9.8	256	295	716	.3	.9	.24	1,830	1,800	2.49	1,290	406	196	72	11	3,090	8.0
Mar. 30-31....	227	9.8	.03	68	18	198	8.4	204	120	275	.5	.5	.18	820	--	1.12	503	242	75	63	5.6	1,470	7.9
Apr. 1	258	8.4	.05	79	23	312	8.6	226	163	428	.5	3.1	.17	1,150	1,140	1.56	801	292	107	69	8.0	2,070	7.8
Apr. 2-3	464	9.1	.07	88	31	432	9.7	252	245	610	.6	3.4	.25	1,640	1,550	2.23	2,050	348	141	72	10	2,780	8.0
Apr. 4-6	1,360	9.9	.07	62	17	191	8.3	164	123	265	.5	4.0	.13	788	--	1.07	2,890	224	90	64	5.5	1,390	7.8
Apr. 7	2,620	13	.06	68	5.5	101	7.7	206	70	133	.6	.1	.09	508	--	.69	3,590	192	23	52	3.2	902	7.7
Apr. 8-11	886	12	.03	54	6.2	55	7.7	170	49	67	.5	4.6	.08	336	--	.46	804	160	21	41	1.9	601	7.9
Apr. 12-16	272	11	.01	55	9.5	97	8.3	144	80	134	.4	5.5	.11	478	--	.65	351	176	58	53	3.2	844	8.1
Apr. 17-20	204	11	.01	73	14	157	8.7	162	136	214	.4	5.5	.10	705	--	.96	388	240	107	58	4.4	1,220	7.7
Apr. 21-23	198	9.7	.02	88	20	198	9.8	182	170	289	.4	4.4	.19	908	--	1.23	485	300	151	58	5.0	1,560	7.9
Apr. 24-26	616	9.5	.03	72	15	138	8.9	156	124	203	.5	3.2	.14	666	--	.91	1,110	242	114	54	3.9	1,160	7.9
Apr. 27-28	694	11	.05	55	9.0	80	8.4	148	70	110	.5	3.8	.10	448	--	.61	839	174	53	49	2.6	760	7.8
Apr. 29	525	8.6	.10	80	15	182	9.6	206	139	256	.5	.3	.11	824	--	1.12	1,170	262	93	59	4.9	1,410	7.5
Apr. 30-May 11	403	10	.00	74	18	211	10	184	151	288	.4	3.9	.15	872	--	1.19	949	257	106	63	5.7	1,500	7.5
May 12-16.....	2,826	12	.00	57	7.8	61	8.2	167	53	81	.3	4.8	.10	390	--	.53	2,980	174	37	42	2.0	635	7.8
May 17-22.....	11,250	10	.00	45	4.5	14	6.8	145	21	16	.2	5.0	.05	199	--	.27	6,040	131	12	18	.5	334	7.7
May 23-31.....	4,853	10	.00	54	7.2	32	7.5	146	50	52	.3	3.9	.06	315	--	.43	4,130	164	44	29	1.1	507	7.4
June 1-15.....	5,289	12	.01	59	5.8	41	7.8	159	45	62	.4	3.5	.05	326	--	.44	4,660	171	41	33	1.4	550	7.3
June 16-17.....	8,575	9.5	.06	91	21	360	8.8	228	179	510	.4	2.7	.17	1,310	1,290	1.78	30,330	312	125	71	8.9	2,280	7.6
June 18-30.....	11,610	13	.01	51	3.6	13	8.8	154	28	18	.4	4.5	.04	219	--	.30	6,860	142	16	16	.5	363	7.3
July 1-10.....	11,640	14	.00	51	10	20	9.4	174	31	27	.3	1.0	.04	262	--	.36	8,230	168	25	19	.7	441	7.4
July 11-31.....	4,785	15	.01	46	23	50	10	182	73	69	.4	.8	.06	398	--	.54	5,140	208	59	33	1.5	660	7.4
Aug. 1-15	3,101	13	.00	38	25	66	11	168	101	85	.4	1.5	.08	458	--	.62	3,830	197	59	40	2.0	749	7.4
Aug. 16-23	2,825	14	.00	29	37	83	12	170	121	101	.4	1.5	.08	532	--	.72	4,060	226	87	43	2.4	866	7.3
Aug. 24	2,800	6.5	.03	24	75	355	11	228	215	504	.4	1.0	.16	1,370	1,300	1.86	10,360	368	181	67	8.0	2,320	7.6
Aug. 25-Sept. 3	3,166	13	.01	76	11	76	12	178	118	100	.4	2.7	.09	509	--	.69	4,350	236	90	40	2.2	838	7.6
Sept. 4-30.....	2,406	13	.01	66	9.8	53	10	170	88	70	.5	3.3	.08	405	--	.55	2,630	205	66	35	1.6	673	7.7
Weighted average e.....	2,193	13	0.01	54	12	57	9.2	168	64	80	0.4	2.9	0.07	390	--	0.53	2,310	185	47	39	1.8	652	--

a Includes equivalent of 14 ppm of carbonate (CO_3).
b Includes equivalent of 20 ppm of carbonate (CO_3).
c Includes equivalent of 10 ppm of carbonate (CO_3).
d Includes equivalent of 8 ppm of carbonate (CO_3).
e Represents 33.9 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 7 a.m. and 8 a.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	57	45	38	36	45	51	65	65	71	82	77
2	67	57	45	39	38	48	53	67	66	75	83	77
3	66	55	46	39	38	46	46	67	66	75	83	75
4	67	55	46	40	38	47	44	59	67	75	82	74
5	67	55	46	41	40	47	43	58	67	75	78	72
6	67	53	43	40	41	47	45	60	69	75	75	72
7	66	53	38	41	43	42	44	62	69	75	75	71
8	62	53	37	42	45	40	42	63	71	77	75	68
9	62	50	33	39	45	40	45	65	71	77	77	68
10	59	50	36	32	43	45	48	63	71	77	77	68
11	62	46	39	33	40	50	50	61	74	77	79	68
12	62	49	40	32	40	50	43	60	72	82	82	68
13	67	49	35	32	45	50	41	63	74	82	83	68
14	66	55	36	32	45	50	43	63	72	83	83	68
15	60	48	36	32	46	45	43	64	72	83	83	66
16	63	46	39	32	47	46	48	61	72	83	83	66
17	65	45	40	32	43	52	52	60	73	83	83	65
18	62	45	36	32	45	50	55	57	69	83	78	65
19	65	46	39	34	42	47	60	59	69	83	78	65
20	67	45	43	38	42	47	60	61	69	83	77	64
21	65	45	43	41	43	53	62	63	72	82	77	64
22	65	40	44	38	36	49	63	61	72	80	78	63
23	63	43	43	33	33	48	60	61	69	79	78	63
24	63	45	42	33	37	46	63	62	69	78	77	63
25	63	45	38	32	43	45	63	63	69	78	76	63
26	59	43	39	32	39	41	63	64	72	78	77	64
27	59	43	42	--	40	43	63	64	71	78	77	64
28	57	43	43	32	43	46	63	65	69	78	77	64
29	59	40	43	32	--	50	62	66	70	82	77	63
30	59	41	43	--	--	50	63	67	71	82	77	66
31	55	--	44	33	--	50	--	69	--	82	77	--
Average	63	48	41	35	41	47	53	63	70	79	79	67

Periodic determinations of suspended-sediment discharge, June to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
June 20, 1957	9,230	5,040	126,000
June 24, 5:30 a.m.	12,200	2,560	84,300
June 24, 1:30 p.m.	12,600	2,380	81,000
June 25	13,800	2,060	76,800
June 27	12,900	3,900	136,000
June 28, 7:15 a.m.	14,700	4,260	169,000
June 28, 4:15 p.m.	15,600	3,710	156,000
June 29	12,800	2,860	98,800
July 2	10,200	2,840	78,200
July 3	12,300	2,200	73,100
July 5	14,600	2,220	87,500
July 6	14,600	2,160	85,100
July 10	5,140	3,220	44,700
July 15	4,680	2,020	25,500
July 23	8,070	2,470	53,800
July 26	4,180	1,430	16,100
Aug. 5	3,110	744	6,250
Aug. 21	2,800	642	4,850
Aug. 28	2,700	677	4,940
Sept. 3	3,390	5,970	54,600
Sept. 11	1,280	1,060	3,660
Sept. 12	1,790	1,530	7,400
Sept. 17	3,420	3,040	28,100
Sept. 28, 7:00 a.m.	2,780	584	4,380
Sept. 28, 4:45 p.m.	2,770	653	4,880
Sept. 30	2,720	597	4,390

SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Particle-size analyses of suspended sediment; June to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 20, 1957....	11:45 a.m.	9,230	73	5,040	4,510	69	82	92	97	97	99	99	100		--	--	VPWCM
June 20	11:45 a.m.	9,230	73	5,040	4,580	22	60	90	94	98	99	99	100		--	--	VPN
June 24	5:30 a.m.	12,200	--	2,560	4,760	68	77	82	85	93	97	99	99		100	--	VPWCM
June 25	12:00 m.	13,800	73	2,060	1,760	63	70	72	77	82	96	99	99		100	--	VPWCM
June 25	12:00 m.	13,800	73	2,060	1,660	49	64	68	78	83	96	99	99		100	--	VPN
June 27	11:15 a.m.	12,900	72	3,900	3,220	63	77	83	89	93	99	99	100		--	--	VPWCM
June 27	11:15 a.m.	12,900	72	3,900	3,220	20	53	82	88	93	99	99	100		--	--	VPN
June 28	7:15 a.m.	14,700	69	4,260	3,770	62	75	84	91	96	98	99	100		--	--	VPWCM
June 28	7:15 a.m.	14,700	69	4,260	3,740	35	61	80	89	94	98	99	100		--	--	VPN
June 28	4:15 p.m.	15,600	70	3,710	3,170	60	73	85	90	92	97	98	98		99	100	VPWCM
June 28	4:15 p.m.	15,600	70	3,710	3,130	42	66	--	87	93	97	98	98		99	100	VPN
June 29	11:10 a.m.	12,800	74	2,860	5,260	56	74	--	90	--	100	--	--		--	--	SPWCM
July 2	9:50 a.m.	10,200	76	2,840	2,570	65	74	83	86	92	98	99	99		100	--	VPWCM
July 2	9:50 a.m.	10,200	76	2,840	2,430	41	66	81	84	94	98	99	99		100	--	VPN
July 3	9:30 a.m.	12,300	80	2,200	3,510	55	66	72	76	88	96	99	100		--	--	VPWCM
July 5	3:30 p.m.	14,600	80	2,220	2,080	58	61	72	74	84	96	98	99		99	100	VPWCM
July 5	3:30 p.m.	14,600	80	2,220	2,000	46	59	70	75	83	96	98	99		99	100	VPN
July 6	9:50 a.m.	14,600	80	2,160	1,820	62	69	74	78	83	97	99	100		--	--	VPWCM
July 6	9:50 a.m.	14,600	80	2,160	1,830	43	60	69	74	83	97	99	100		--	--	VPN
July 10.....	12:30 p.m.	5,140	--	3,220	4,630	53	66	74	82	91	99	100	--		--	--	VPWCM
July 15.....	3:40 p.m.	4,680	84	2,020	3,000	54	67	77	84	92	99	100	--		--	--	VPWCM
Aug. 5.....	3:30 p.m.	3,110	81	744	2,160	47	59	66	74	88	--	100	--		--	--	SPWCM
Sept. 3.....	3:35 p.m.	3,390	78	5,970	4,430	61	75	--	92	--	100	--	--		--	--	SPWCM
Sept. 17.....	9:10 a.m.	3,420	65	3,040	5,100	51	66	--	87	--	99	100	--		--	--	VPWCM
Sept. 17.....	9:10 a.m.	3,420	65	3,040	4,980	9	31	--	84	--	99	100	--		--	--	VPN

KANSAS RIVER BASIN--Continued

LITTLE BLUE RIVER NEAR DEWEESE, NEBR.

LOCATION.--At bridge on State Highway 14, a quarter of a mile downstream from gaging station, three-quarters of a mile upstream from Walnut Creek, 4 miles southeast of Deweese, Clay County, and 5¾ miles northwest of Angus. Prior to May 16, 1957, gaging station at site 1,500 feet downstream.
RECORDS AVAILABLE.--Chemical analyses, August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
Sediment records, August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Water temperatures: Maximum, 80°F Aug. 13, 1957; minimum, 33°F Nov. 22.
Sediment concentrations: Maximum daily, 5,740 ppm Aug. 16, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 129,000 tons June 16; minimum daily, not determined.
REMARKS.--Flow affected by ice Nov. 29, Dec. 6-10, 18, Jan. 9 to Feb. 5, Feb. 22, 23. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to August 1957

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 29, 1956	54	35	0.01	59	10	15	6.1	224	0	35	8.0	0.3	0.8	0.05	281	0.38		189	5	14	0.5	438	8.0
Nov. 21	66	35	.00	60	8.4	17	5.9	218	0	35	8.5	.5	1.2	.06	271	.37		184	5	16	.5	433	7.9
Dec. 10	a 63	34	.00	58	9.4	15	5.6	220	0	35	8.5	.5	1.0	.07	270	.37		183	3	15	.5	422	8.0
Jan. 2, 1957	68	33	.01	60	8.9	16	5.8	219	0	35	8.5	.2	.8	.05	270	.37		186	6	15	.5	423	7.8
Jan. 22	a 40	35	.09	62	9.4	16	6.2	227	0	34	8.5	.2	1.0	.04	286	.39		193	7	15	.5	433	7.8
Mar. 4	63	34	.00	59	9.0	16	5.5	217	0	29	8.5	.2	.9	.04	275	.37		184	6	15	.5	419	8.1
Apr. 15	70	30	.01	62	7.2	17	5.5	217	0	31	8.6	.4	1.0	.05	272	.37		184	6	16	.5	420	7.5
May 22	585	21	--	12	3.4	1.9	5.9	64	0	--	.8	.1	1.0	.03	82	.11		44	0	7	.1	116	6.9
June 17	10,600	16	.19	7.5	1.3	1.8	5.3	33	0	7.5	.5	.2	.6	.04	73	.10		24	0	11	.2	69.0	6.8
June 28	288	21	.09	26	3.4	7.1	8.5	95	0	19	4.5	.4	4.9	.04	141	.19		79	1	15	.3	215	7.2
July 9	86	35	.00	59	10	15	7.1	216	0	32	9.3	.4	1.6	.04	278	.38		189	12	14	.5	429	7.8
Aug. 19	178	29	.07	15	2.6	5.2	12	64	0	12	1.2	.3	1.0	.04	118	.16		48	0	15	.3	148	7.0

a Daily mean discharge.

KANSAS RIVER BASIN--Continued

LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 8 a.m. and 10 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	57	49	39	--	a 36	44	47	--	b 63	79	71	71
2	56	53	40	36	--	--	46	b 62	a 73	71	73	68
3	57	43	41	--	a 37	39	41	61	63	77	74	69
4	56	45	39	36	--	a 43	38	a 62	67	75	73	b 66
5	54	45	37	--	34	a 44	38	a 57	70	69	71	b 64
6	54	42	34	41	--	--	45	a 63	72	71	73	b 66
7	55	42	34	--	a 38	a 44	43	b 57	73	76	70	61
8	54	35	34	40	--	--	40	b 59	66	74	72	64
9	49	39	34	--	a 45	46	45	b 62	69	b 71	75	62
10	48	51	34	34	--	--	a 50	51	70	70	74	59
11	55	51	--	--	37	49	43	55	b 68	73	75	61
12	57	44	34	a 34	--	--	40	56	69	b 75	78	66
13	62	44	--	--	a 48	50	42	59	b 69	75	80	62
14	60	44	--	a 34	--	--	45	56	69	76	74	58
15	62	36	35	--	a 48	38	46	b 58	70	74	73	58
16	58	34	--	a 34	--	42	a 51	54	68	73	b 68	58
17	59	37	34	--	a 49	45	a 61	53	66	a 75	79	60
18	58	44	--	--	--	40	a 58	55	61	75	71	63
19	57	41	36	--	a 43	42	a 70	55	69	71	b 70	60
20	56	35	--	a 35	--	44	a 71	56	69	75	b 70	57
21	52	34	37	--	a 35	48	a 71	57	69	74	b 70	67
22	53	33	--	a 34	--	45	a 67	55	62	70	70	58
23	42	39	38	--	35	43	58	55	66	74	71	57
24	56	40	--	a 34	--	40	59	--	61	73	65	60
25	52	35	40	--	36	38	59	62	63	b 72	70	63
26	44	34	--	a 34	--	37	58	62	61	74	74	61
27	47	35	42	--	38	48	55	62	61	76	69	60
28	49	36	--	a 35	--	47	a 68	68	64	77	71	59
29	55	34	42	--	--	46	a 65	65	70	77	68	61
30	47	39	--	a 34	--	42	a 68	b 64	73	78	72	62
31	45	--	41	--	--	46	--	67	--	77	72	--
Average	54	40	--	--	--	43	53	59	67	74	72	62

a Measurement between 5 p.m. and 7 p.m.
b Measurement between 6 a.m. and 7 a.m.

KANSAS RIVER BASIN--Continued

LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	49	112	15	58	149	23	63	46	8
2	49	113	15	58	102	16	65	43	8
3	49	112	15	56	82	12	64	51	9
4	49	82	11	58	69	11	65	47	8
5	50	95	13	58	78	12	63	56	10
6	49	67	9	59	69	11	60	32	5
7	50	60	8	59	71	11	55	30	4
8	50	97	13	58	72	11	55	22	3
9	51	69	10	61	59	10	60	23	4
10	51	71	10	61	64	11	63	59	10
11	51	105	14	64	60	10	63	--	
12	51	160	22	62	58	10	63	21	
13	51	95	13	63	57	10	64	--	
14	52	90	13	64	69	12	65	--	
15	53	106	15	64	74	13	65	61	
16	54	95	14	65	46	8	65	--	
17	54	100	15	65	56	10	66	23	
18	54	93	14	67	44	8	65	--	
19	54	84	12	66	48	9	66	26	
20	55	109	16	68	69	13	69	--	
21	54	92	13	67	42	8	68	43	a 5
22	54	84	12	69	88	16	68	--	
23	54	74	11	66	48	9	68	17	
24	55	74	11	66	42	7	67	--	
25	55	101	15	63	35	6	69	13	
26	53	66	9	65	42	7	68	--	
27	53	60	9	63	45	8	69	24	
28	54	70	10	62	52	9	71	--	
29	55	72	11	62	41	7	70	26	
30	62	494	83	63	49	8	70	--	
31	62	546	91	--	--	--	69	36	
Total	1,637	--	542	1,880	--	316	2,021	--	174

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	67	--		55	34		64	116	
2	67	33		60	--		65	--	
3	69	--		60	63		66	51	
4	68	26		55	--		64	50	
5	67	--	a 7	60	114		64	61	
6	68	27		63	--		63	--	
7	70	--		62	51		63	54	
8	68	67		65	--		62	--	a 13
9	60	--		65	61		64	55	
10	50	19		65	--		63	--	
11	45	--		64	61		64	119	
12	45	31		63	84		63	--	
13	45	--		64	45		64	82	
14	45	20		63	--		62	--	
15	45	--		66	65	a 11	62	76	
16	49	17		68	--		63	57	10
17	50	--		67	44		67	58	10
18	55	18		67	--		68	78	14
19	55	--		65	31		66	47	8
20	50	17	a 3	64	--		67	54	10
21	45	--		65	--		66	57	10
22	40	25		58	--		69	67	12
23	40	--		57	48		70	64	12
24	40	18		67	--		87	148	35
25	40	--		67	107		87	113	27
26	45	22		66	--		90	97	24
27	45	--		66	66		77	75	16
28	50	25		66	--		77	76	16
29	55	--		--	--	--	74	73	15
30	55	24		--	--	--	74	43	9
31	55	--		--	--	--	73	54	11
Total	1,648	--	129	1,773	--	308	2,128	--	434

a Computed from samples obtained about three times a week.

KANSAS RIVER BASIN--Continued

LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1956 to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	74	64	13	64	150	26	91	360	88
2	72	112	22	484	4,580	s 7,230	86	335	78
3	79	64	14	186	2,450	s 1,380	81	245	54
4	84	85	19	116	700	219	77	190	40
5	82	67	15	84	360	82	73	168	33
6	80	60	13	76	531	109	71	145	28
7	78	55	12	71	280	54	69	135	25
8	73	53	10	71	250	48	69	134	25
9	73	102	20	350	2,240	s 3,970	67	141	26
10	74	458	92	879	5,150	s 13,000	69	180	34
11	77	180	37	212	1,820	s 1,120	85	250	57
12	74	81	16	132	1,030	367	70	240	45
13	72	72	14	677	5,210	s 10,500	68	222	41
14	71	67	13	1,180	5,550	17,700	100	370	100
15	70	240	45	375	3,180	3,220	601	2,950	s 11,000
16	73	440	87	402	2,560	s 3,260	9,880	4,830	129,000
17	72	405	79	554	2,840	4,250	11,300	4,110	125,000
18	70	271	51	393	1,950	2,070	5,520	2,870	42,800
19	69	559	104	244	1,390	916	2,400	2,780	18,000
20	67	397	72	169	810	370	710	1,980	3,800
21	67	128	23	166	1,250	s 927	451	2,600	s 3,980
22	64	400	69	620	4,350	7,280	415	4,410	4,940
23	130	1,730	s 734	385	2,690	2,800	222	1,020	611
24	102	1,190	s 347	211	1,520	866	178	397	191
25	80	610	132	157	890	377	155	265	111
26	76	482	99	131	560	198	145	202	79
27	67	173	31	116	385	121	544	4,340	s 7,720
28	61	249	41	106	380	109	346	1,770	1,650
29	61	389	64	101	300	82	232	1,040	651
30	64	210	36	124	630	s 233	162	440	192
31	--	--	--	104	645	181	--	--	--
Total	2,256	--	2,324	8,940	--	83,065	34,337	--	350,399

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	128	335	116	35	78	7	126	1,000	340
2	131	415	147	36	90	9	116	1,230	385
3	105	260	74	47	190	24	102	465	128
4	97	210	55	58	222	35	101	475	130
5	93	150	38	55	225	33	92	435	108
6	91	132	32	51	235	32	82	360	80
7	90	112	27	41	245	27	78	238	50
8	88	100	24	38	170	17	76	193	40
9	87	113	27	33	144	13	72	155	30
10	86	100	23	31	114	10	73	125	25
11	85	100	23	33	126	11	73	141	28
12	82	101	22	30	98	8	71	197	38
13	81	94	21	30	.93	8	80	185	40
14	114	205	s 76	30	97	8	78	161	34
15	85	104	24	34	300	s 37	72	150	29
16	76	99	20	1,200	5,740	s 23,400	70	109	21
17	70	92	17	810	3,370	s 8,210	68	124	23
18	60	123	20	385	2,010	2,090	67	124	22
19	54	108	16	202	1,280	698	66	109	19
20	126	2,300	s 1,380	129	810	282	66	87	16
21	128	2,260	s 909	99	440	118	68	94	17
22	184	2,100	s 1,490	87	290	68	67	52	9
23	161	1,640	s 809	80	218	47	64	46	8
24	79	860	183	75	178	36	66	50	9
25	60	410	66	72	127	25	63	51	9
26	50	225	30	70	96	18	64	39	7
27	43	195	23	70	90	17	64	34	6
28	39	140	15	70	73	14	64	36	6
29	41	113	13	625	5,530	s 12,100	66	44	8
30	38	108	11	283	3,380	s 3,100	61	74	12
31	38	85	9	158	1,010	431	--	--	--
Total	2,690	--	5,740	4,997	--	50,933	2,276	--	1,677

Total discharge for year (cfs-days) 66,583

Total load for year (tons) 496,041

s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Dec. 10, 1956....	6:00 p.m.	a 63	40	78	280	31	35	45	55	73	90	92	98	100	--		SBWCM
May 2, 1957	6:00 p.m.	618	64	5,450	3,280	--	73	--	--	--	97	98	100	--	--		SPWCM
May 14	6:40 p.m.	818	57	4,270	5,920	52	60	65	72	84	93	96	98	100	--		VPWCM
May 14	6:40 p.m.	818	57	4,270	6,110	34	49	60	68	80	93	96	98	100	--		VPNM
May 21	11:50 a.m.	51	62	800	2,370	63	71	76	85	--	98	99	100	--	--		VPWCM
May 22	4:02 p.m.	582	67	3,600	4,430	65	75	81	86	94	98	99	100	--	--		VPWCM
May 22	4:02 p.m.	582	67	3,600	4,290	54	70	77	86	93	97	98	100	--	--		SPNM
June 16.....	9:00 a.m.	12,370	68	4,390	3,100	--	84	--	95	--	100	--	--	--	--		SPWCM
June 17.....	12:15 p.m.	12,300	--	4,450	6,330	64	74	--	92	97	98	98	99	99	100		VPWCM
June 17.....	12:15 p.m.	12,300	--	4,450	6,480	50	68	--	91	96	98	98	99	99	100		VPNM
June 19.....	9:03 a.m.	2,550	69	2,740	3,430	--	63	--	71	--	92	94	98	100	--		SPWCM
June 19.....	7:04 p.m.	1,310	74	2,820	1,870	--	60	--	70	--	95	96	97	97	98	100	SPWCM
Aug. 19	4:15 p.m.	152	79	1,290	2,490	73	82	88	93	--	100	--	--	--	--		SPWCM
Aug. 19	4:15 p.m.	152	79	1,290	2,610	60	71	78	82	96	100	--	--	--	--		SPNM
Aug. 29	12:00 p.m.	794	72	9,600	3,360	--	60	--	79	--	99	100	--	--	--		SPWCM

a Daily mean discharge.

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
Apr. 15, 1957.....	1:10 p.m.	66	8		0	1	12	29	52	64	73	86	96	100		SV
May 21	11:50 a.m.	51	11			0	10	47	76	86	94	98	100	--		SV
May 22	4:02 p.m.	582	3			0	6	39	69	81	92	99	100	--		SV
June 17.....	12:15 p.m.	12,300	6			--	0	8	39	58	81	96	99	100		SV
Aug. 19	4:15 p.m.	152	7			--	--	--	53	67	80	90	95	100		S

BIG BLUE RIVER NEAR MANHATTAN, KANS.

LOCATION.--At gaging station at highway bridge, 4 miles north of Manhattan, Riley County, and 7.0 miles upstream from mouth.
DRAINAGE AREA.--9,560 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 405 ppm Jan. 12-31; minimum, 126 ppm June 17-29.
Hardness: Maximum, 238 ppm Jan. 12-31; minimum, 65 ppm June 17-29.
Specific conductance: Maximum daily, 753 micromhos Jan. 20; minimum daily, 123 micromhos June 24.
Water temperatures: Maximum, 89°F July 15; minimum, freezing point Dec. 8, 12.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 414 ppm May 31, 1956; minimum, 112 ppm July 5-7, 1956.
Hardness: Maximum, 238 ppm Jan. 17-31, 1956, Jan. 12-31, 1957; minimum, 52 ppm July 5-7, 1956.
Specific conductance: Maximum daily, 753 micromhos Jan. 20, 1957; minimum daily, 123 micromhos June 24, 1957.
Water temperatures: Maximum, 89°F July 15, 1957; minimum, freezing point Nov. 28, 1955, Dec. 8, 12, 1956.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-17, 1956.....	147	24	0.05	58	12	33	7.8	230	0	39	33	0.4	1.0	0.11	325	0.44	129	194	5	26	1.0	531	8.0
Oct. 18-26	186	17	.04	46	9.5	29	8.4	175	0	39	31	.4	5.0	.08	273	.37	137	154	10	28	1.0	448	7.6
Oct. 27-Nov. 29	188	26	.03	61	13	41	6.9	238	0	41	43	.3	1.7	.10	350	.48	178	204	9	29	1.2	573	7.9
Nov. 30-Dec. 20.....	207	21	.04	63	15	46	5.1	258	0	46	47	.2	.4	.06	375	.51	210	218	6	31	1.3	638	8.0
Dec. 21-31.....	274	23	.03	59	14	43	4.5	242	0	43	42	.2	.7	.10	345	.47	255	203	5	31	1.3	580	8.0
Jan. 1-11, 1957.....	236	23	.04	63	13	42	4.8	250	0	46	43	.4	.9	.05	361	.49	230	212	7	30	1.3	596	8.0
Jan. 12-31	186	23	.04	70	15	50	5.2	283	0	52	49	.4	1.3	.13	405	.55	203	238	6	31	1.4	694	7.9
Feb. 1-8.....	215	23	.00	73	11	48	4.8	273	0	48	47	.4	1.4	.11	384	.52	223	228	4	31	1.4	644	8.1
Feb. 9-28.....	351	20	.00	62	11	41	4.1	236	0	41	38	.4	1.1	.07	337	.46	319	198	4	30	1.3	561	8.0
Mar. 1-23.....	295	17	.00	62	11	39	5.8	236	0	43	38	.3	.8	.06	327	.44	260	200	6	29	1.2	570	8.1
Mar. 24-31.....	534	16	.00	53	9.7	35	6.2	198	0	41	33	.4	1.9	.05	289	.39	417	172	10	30	1.2	499	7.9
Apr. 1-3.....	617	18	.00	61	8.8	37	5.7	220	0	43	34	.5	1.7	.06	324	.44	540	188	8	29	1.4	535	8.1
Apr. 4.....	5,250	14	.05	42	9.5	14	5.5	156	0	34	10	.5	3.4	.26	210	.29	2,980	144	16	17	.5	341	7.8
Apr. 5-11.....	1,672	13	.02	29	5.8	14	6.1	108	0	23	12	.4	6.5	.05	171	.23	772	96	7	23	.6	277	7.9
Apr. 12-18.....	451	15	.01	38	7.1	20	6.6	139	0	31	20	.4	3.6	.07	214	.29	261	124	10	25	.8	349	7.8
Apr. 19-28.....	483	18	.01	48	9.7	29	6.8	183	0	39	26	.3	2.8	.06	273	.37	356	160	10	27	1.0	451	7.9
Apr. 29-May 1.....	404	14	.02	39	6.4	20	7.1	145	0	24	18	.5	3.3	.05	212	.29	231	124	5	25	.8	348	7.6
May 2-14.....	535	16	.00	54	11	32	7.5	208	0	45	30	.4	2.0	.08	303	.41	438	179	8	27	1.0	508	7.5
May 15-18.....	4,343	13	.01	33	6.4	10	6.8	121	0	21	7.8	.3	5.1	.07	172	.23	2,020	109	10	16	.4	277	7.4
May 19-21.....	2,400	12	.12	21	3.8	6.3	7.0	78	0	15	2.4	.3	5.9	.04	140	.19	907	68	4	15	.3	179	7.3

KANSAS RIVER BASIN--Continued

BIG BLUE RIVER NEAR MANHATTAN, KANS.--Continued

Chemical analyses, in parts per million, water year October 1956 to September 1957--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
May 22-30, 1957	1,326	13	0.04	28	5.1	9.6	7.8	104	0	17	7.4	0.3	5.6	0.06	155	0.21	555	91	6	17	0.4	241	7.3
May 31-June 16	841	17	.01	38	7.8	17	7.4	144	0	26	17	.4	5.2	.05	209	.28	475	127	9	21	.7	338	7.8
June 17-29	13,680	13	.13	19	4.3	3.3	7.4	74	0	11	2.5	.3	6.1	.05	126	.17	4,650	65	4	9	.2	156	7.0
June 30-July 6	3,797	14	.02	34	5.6	7.5	7.8	120	0	16	6.0	.4	5.5	.05	164	.22	1,680	108	10	12	.3	261	7.7
July 7-26	1,190	19	.01	42	8.3	21	9.1	166	0	30	20	.5	3.0	.05	243	.33	781	139	3	23	.8	388	7.9
July 27-Aug. 4	980	15	.03	24	4.6	9.0	9.1	90	0	16	9.0	.3	4.5	.05	140	.19	370	79	5	18	.4	220	7.5
Aug. 5-17	489	20	.01	33	15	22	10	176	0	29	21	.4	3.2	.03	238	.32	314	143	0	24	.8	394	7.7
Aug. 18-Sept. 19	2,301	14	.03	25	4.8	9.1	7.7	100	0	16	7.0	.4	4.9	.04	142	.19	882	82	0	18	.4	222	7.3
Sept. 20-30	534	17	.01	40	6.6	18	7.7	148	0	28	18	.4	2.5	.05	207	.28	298	127	6	22	.7	346	7.5
Weighted average a	1,247	15	0.07	30	6.1	12	7.4	116	--	20	11	0.4	4.9	0.05	174	0.24	586	100	5	19	0.5	263	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

BIG BLUE RIVER NEAR MANHATTAN, KANS.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 1 p.m. and 4 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 62	60	--	36	33	43	a 49	a 67	b 76	a 76	a 86	a 78
2	70	b 56	a 34	35	34	43	a 48	a 71	a 75	76	a 86	a 77
3	71	56	40	37	34	44	45	a 68	a 70	a 80	a 87	b 75
4	68	a 51	42	a 34	33	42	40	a 62	--	a 80	a 82	a 74
5	a 69	51	38	a 34	34	a 43	41	a 60	a 76	a 77	a 79	a 74
6	67	51	36	36	34	39	41	68	a 80	a 78	--	a 72
7	a 60	51	33	34	34	38	43	b 70	a 81	a 81	a 77	a 68
8	a 61	49	32	b 35	35	37	40	a 66	80	a 82	a 77	a 68
9	63	44	a 33	33	35	39	b 47	a 68	a 76	84	a 79	69
10	63	46	36	33	35	42	a 48	65	79	78	a 81	a 68
11	64	a 45	35	33	35	a 48	a 46	a 61	a 81	a 78	a 84	a 68
12	b 66	49	32	33	36	52	44	a 62	a 80	a 82	a 85	a 66
13	67	a 46	33	33	36	60	43	a 68	a 77	a 83	--	a 65
14	a 61	54	33	33	35	56	a 43	a 66	a 79	a 86	a 87	a 67
15	67	42	33	a 33	36	45	a 44	a 67	a 78	a 89	a 84	a 66
16	a 66	44	a 33	33	40	49	b 50	65	a 75	a 87	a 83	67
17	68	43	33	33	a 38	50	a 51	a 59	77	a 86	a 78	69
18	67	a 40	34	34	a 39	48	62	a 59	b 72	--	a 73	a 66
19	b 66	44	35	34	38	a 47	a 64	b 60	a 72	a 86	b 75	a 71
20	64	39	36	35	39	47	a 65	b 64	a 71	a 87	b 74	a 64
21	a 64	39	a 34	36	39	47	65	b 67	a 72	a 84	--	a 66
22	a 60	36	36	a 34	33	46	a 67	67	a 73	a 80	a 75	a 63
23	62	37	a 34	33	33	47	b 67	b 68	a 73	b 82	a 73	66
24	62	40	--	33	35	43	a 68	b 69	a 72	a 82	a 74	65
25	58	a 38	35	33	a 35	41	a 67	70	73	a 78	a 72	a 65
26	57	37	36	33	35	a 39	a 67	b 70	a 74	a 79	77	a 66
27	b 56	37	36	33	41	44	a 65	b 72	a 73	a 80	77	a 65
28	--	36	37	33	b 42	45	a 66	b 73	a 73	a 86	a 76	a 65
29	59	35	38	a 33	--	50	65	b 74	a 72	a 80	a 78	a 64
30	59	36	a 36	33	--	a 50	a 65	75	a 74	a 85	a 77	a 64
31	58	--	35	33	--	50	--	b 75	--	a 86	a 77	--
Average	64	44	35	34	36	46	54	67	75	82	79	68

a Measurement between 8 a.m. and 11 a.m.
b Measurement between 5 p.m. and 8 p.m.

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT WAMEGO, KANS.

LOCATION.--At gaging station at bridge on State Highway 99 at Wamego, Pottawatomie County, and 3 miles downstream from Antelope Creek.
DRAINAGE AREA.--55,240 square miles, approximately, of which a large area does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Dissolved solids: Maximum, 1,180 ppm Feb. 2; minimum, 165 ppm June 19-27.
Hardness: Maximum, 448 ppm Feb. 2; minimum, 112 ppm June 19-27.
Specific conductance: Maximum daily, 1,980 micromhos Nov. 12; minimum daily, 235 micromhos June 23.
Water temperatures: Maximum, 83°F on several days during July and August 1957; minimum, freezing point on several days during November to January.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, August 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Aug. 10, 1956 a.	2,740	14	0.07	55	5.6	19	5.8	180	26	21	0.4	7.6	0.02	242	--	0.33	1,790	160	12	20	0.7	411	7.7	20
Aug. 11 a	2,040	16	.06	53	5.8	42	6.7	162	41	56	.4	6.8	.06	320	--	.44	1,760	156	23	36	1.5	530	7.8	25
Aug. 12 a	1,440	20	.05	50	6.6	27	6.8	168	30	34	.4	6.9	.05	268	--	.36	1,040	152	14	27	.9	439	7.4	17
Aug. 13-16 a ...	833	18	.01	51	11	51	7.8	173	53	67	.4	4.1	.08	349	--	.47	785	171	29	38	1.7	589	7.6	10
Aug. 17 a	1,300	20	.06	67	12	102	10	212	84	138	.4	4.2	.09	562	--	.76	1,970	218	44	49	3.0	935	7.6	22
Aug. 18 a	1,710	23	.05	87	17	235	11	208	163	348	.6	3.5	.14	1,020	990	1.39	4,710	288	117	63	6.0	1,730	7.7	18
Aug. 19-26 a ...	1,076	24	.01	50	8.5	53	8.6	174	56	61	.4	5.7	.09	352	--	.48	1,020	160	17	40	1.8	576	7.7	10
Aug. 27-Sept. 7a	546	24	.01	60	11	68	9.4	202	60	87	.4	3.8	.08	429	--	.58	632	196	30	42	2.1	719	7.7	10
Sept. 8-10 a	387	16	.01	45	8.6	29	6.6	159	28	39	.3	7.0	.06	260	--	.35	272	148	18	29	1.0	443	7.6	10
Sept. 11-19 a ...	418	20	.03	52	11	59	8.1	171	51	78	.4	4.9	.08	373	--	.51	421	174	34	41	1.9	637	7.7	10
Sept. 20-30 a ...	243	22	.00	67	15	95	9.3	225	71	142	.4	3.0	.11	553	--	.75	363	229	44	46	2.7	935	7.9	10
Oct. 1-16	207	22	.01	76	18	128	9.2	250	89	184	.4	2.6	.15	664	--	.90	371	264	59	50	3.4	1,130	7.6	5
Oct. 17	872	15	.05	83	21	198	12	228	125	309	.6	7.9	.15	880	--	1.20	2,070	292	105	58	4.9	1,540	7.7	8
Oct. 18-Nov. 3 .	428	19	.00	65	13	84	8.4	197	72	120	.4	6.5	.10	492	--	.67	569	215	53	45	2.5	846	7.6	6
Nov. 4-7	435	16	.00	69	17	124	8.5	211	95	184	.4	3.8	.13	634	--	.86	745	243	70	51	3.4	1,090	7.7	4
Nov. 8-11	478	17	.00	81	19	173	8.8	228	121	259	.5	3.1	.13	819	--	1.11	1,060	281	94	56	4.5	1,410	7.8	4
Nov. 12-13	408	17	.07	87	24	251	8.9	236	158	378	.6	3.1	.17	1,070	1,040	1.46	1,180	316	122	63	6.2	1,850	8.0	9
Nov. 14-15	379	19	.10	76	19	177	8.0	228	120	259	.6	2.7	.15	814	--	1.11	833	268	81	58	4.7	1,400	8.1	7
Nov. 16-Dec. 10.	358	20	.00	76	16	106	6.9	254	85	144	.4	2.0	.12	583	--	.79	564	257	49	46	2.9	997	7.8	6
Dec. 11-31	399	16	.00	79	19	132	6.2	268	102	184	.4	2.2	.11	685	--	.93	738	276	56	50	3.5	1,170	7.8	5
Jan. 1-9, 1957..	436	17	.04	75	19	124	6.1	258	94	174	.4	1.6	.08	660	--	.90	777	264	52	50	3.3	1,150	8.0	15
Jan. 10-15	283	19	.04	84	23	143	6.8	298	106	208	.5	2.7	.11	764	--	1.04	584	306	62	50	3.6	1,310	7.9	14
Jan. 16-19	278	19	.05	98	28	208	9.2	350	153	279	.6	3.3	.14	991	--	1.35	744	360	73	55	4.8	1,680	8.0	13
Jan. 21-22	290	14	.08	71	21	132	5.4	250	102	179	.4	3.4	.10	668	--	.91	523	262	57	52	3.6	1,160	8.1	8
Jan. 23-26	270	13	.04	81	24	144	7.1	292	110	199	.5	3.4	.12	772	--	1.05	563	300	59	50	3.6	1,330	7.7	16

Jan. 27.....	240	12	.19	96	31	202	9.6	--	168	289	.6	.3	.15	1,000	987	1.36	648	368	--	54	4.6	1,690	7.6	--
Jan. 28-30.....	260	16	.01	91	27	172	8.3	324	135	246	.4	2.9	.13	890	--	1.21	625	336	70	52	4.1	1,500	7.9	11
Jan. 31-Feb. 1..	275	14	.04	101	23	170	8.6	344	127	249	.5	1.4	.14	908	--	1.23	674	348	66	51	4.0	1,530	8.0	--
Feb. 2	275	13	.09	122	35	217	12	468	155	319	.7	.3	.21	1,180	1,110	1.60	876	448	64	50	4.5	1,920	7.7	--
Feb. 3-5	283	17	.03	105	25	180	8.5	354	135	257	.5	4.3	.16	934	--	1.27	714	364	74	51	4.1	1,580	7.9	10
Feb. 6-23	531	16	.01	72	17	128	5.9	242	94	174	.4	3.9	.13	643	--	.87	922	248	50	52	3.5	1,110	8.1	5
Feb. 24.....	584	12	.03	111	26	198	11	402	139	277	.8	.4	.18	1,010	973	1.37	1,590	382	52	52	4.4	1,690	7.9	--
Feb. 25-Mar. 22.	522	16	.00	72	17	131	6.8	245	89	164	.4	1.5	.12	618	--	.84	871	249	48	53	3.6	1,080	7.7	3
Mar. 23-28.....	768	14	.00	61	14	97	6.0	215	68	122	.5	1.9	.09	493	--	.67	1,020	211	35	49	2.9	863	7.7	3
Mar. 29-30.....	808	16	.01	67	15	133	7.0	218	89	172	.6	2.9	.11	608	--	.83	1,330	230	51	55	3.8	1,060	8.0	3
Mar. 31-Apr. 2..	865	13	.00	69	16	150	7.8	210	110	199	.4	3.3	.11	682	--	.93	1,590	236	64	57	4.3	1,180	7.8	4
Apr. 3.....	1,150	11	.02	62	8.6	78	6.7	192	53	99	.4	3.3	.08	412	--	.56	1,280	190	33	46	2.5	729	8.2	0
Apr. 4.....	4,780	14	.00	68	9.4	42	6.0	220	51	46	.5	5.2	.12	352	--	.48	4,540	208	28	30	1.3	594	7.6	0
Apr. 5-7	5,017	15	.03	40	8.3	25	8.1	b 119	40	30	.3	12	.06	246	--	.33	3,330	134	36	27	.9	387	9.3	25
Apr. 8-9	3,345	12	.02	55	7.5	76	7.6	168	60	93	.3	2.5	.07	384	--	.52	3,470	168	30	48	2.6	687	7.9	0
Apr. 10-15	1,585	13	.02	39	14	38	8.1	167	45	43	.3	1.3	.06	291	--	.40	1,250	154	17	33	1.3	494	7.7	18
Apr. 16-May 2..	1,267	6.8	.01	44	18	53	10	176	64	63	.4	.4	.08	357	--	.49	1,220	184	40	37	1.7	612	8.0	17
May 3-14.....	1,339	15	.00	62	13	82	9.0	198	78	103	.4	3.3	.14	473	--	.64	1,710	208	46	45	2.5	793	7.5	10
May 15-18.....	13,960	12	.00	48	7.8	19	7.1	162	29	20	.4	6.0	.06	242	--	.33	9,120	152	19	20	.7	392	7.3	17
May 19-27.....	13,240	12	.00	45	4.7	13	7.2	145	25	15	.3	4.7	.11	204	--	.28	7,290	132	13	17	.5	338	7.3	10
May 28-June 18..	7,430	13	.01	59	6.3	28	7.6	173	40	40	.4	5.4	.08	289	--	.39	5,800	173	31	25	.9	486	7.3	10
June 19-27.....	32,980	14	.02	37	4.7	5.6	7.6	130	13	5.9	.3	5.9	.07	165	--	.22	14,690	112	5	9	.2	263	7.3	15
June 28-July 12.	19,610	14	.00	52	7.2	15	8.9	181	24	16	.4	1.8	.04	238	--	.32	12,600	159	11	16	.5	396	8.0	10
July 13-Aug. 3..	9,026	15	.00	60	9.1	33	11	186	53	42	.5	1.0	.06	328	--	.45	7,990	187	34	26	1.1	540	7.5	10
Aug. 4-24	5,180	15	.01	60	9.1	45	10	166	68	56	.3	2.7	.07	356	--	.48	4,980	187	51	33	1.4	593	7.4	10
Aug. 25-30	4,575	20	.00	68	11	63	12	180	99	80	.5	.8	.17	444	--	.60	5,480	216	68	37	1.9	729	7.4	15
Aug. 31-Sept. 22.	5,340	19	.00	54	7.2	36	9.4	162	53	44	.4	4.3	.05	304	--	.41	4,380	164	31	31	1.2	512	7.5	15
Sept. 23-30	3,686	20	.01	69	11	49	11	178	95	64	.5	2.3	.07	415	--	.56	4,130	216	70	32	1.5	672	7.5	10
Weighted average c.....	4,300	15	0.01	53	7.5	30	8.7	168	41	37	0.4	3.6	0.07	285	--	0.39	3,310	163	25	27	1.0	474	--	--

a Not included in weighted average.
b Includes equivalent of 24 ppm of carbonate (CO_3).
c Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT WAMEGO, KANS.--Continued

Temperature (° F) of water, August to September 1956
/Once-daily measurement between 6 a.m. and 7 a.m./

Day	August	Day	August	Day	September	Day	September
2	--	17	80	1	64	16	62
3	--	18	81	2	68	17	62
4	--	19	69	3	68	18	60
5	--	20	65	4	67	19	60
6	--	21	63	5	68	20	55
7	--	22	68	6	51	21	73
8	--	23	73	7	50	22	76
9	--	24	73	8	53	23	58
10	--	25	70	9	60	24	54
11	76	26	71	10	67	25	63
12	79	27	70	11	68	26	56
13	75	28	72	12	70	27	56
14	70	29	73	13	77	28	69
15	79	30	74	14	72	29	59
16	80	31	70	15	64	30	44
Average							62

Temperature (° F) of water, water year October 1956 to September 1957
/Once-daily measurement between 6 a.m. and 8 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	57	56	a 46	a 38	a 40	a 51	a 52	64	70	75	83	77
2	56	56	a 47	a 32	a 38	--	a 49	68	59	76	82	77
3	50	45	a 50	a 45	a 36	a 49	a 43	64	65	81	83	75
4	63	48	a 43	a 39	a 37	a 44	a 49	55	68	80	73	75
5	48	50	a 37	a 36	a 40	a 50	--	53	71	72	72	73
6	68	42	a 40	a 41	a 36	a 40	--	57	76	72	73	73
7	44	45	a 35	a 37	a 35	a 39	39	61	75	82	74	68
8	62	36	a 32	a 40	a 40	a 40	39	62	74	81	76	67
9	52	43	a 34	a 32	a 39	a 51	42	66	73	78	76	67
10	52	40	a 39	--	--	a 60	45	62	73	75	78	69
11	65	42	--	a 35	a 44	a 57	44	59	77	77	81	67
12	70	45	a 34	a 36	a 49	a 59	38	59	77	82	80	65
13	76	40	a 35	a 33	a 50	a 63	39	67	73	82	80	67
14	68	60	a 32	a 32	a 46	a 44	42	62	76	82	79	69
15	61	38	a 36	a 34	a 49	a 50	47	65	75	83	80	67
16	56	36	a 44	a 34	a 47	a 58	47	60	78	83	79	65
17	60	38	a 40	a 40	a 47	a 52	52	60	77	82	74	66
18	60	45	a 38	a 35	a 48	a 47	56	61	68	83	77	67
19	60	44	a 42	a 38	a 44	a 56	63	59	70	83	74	70
20	61	37	a 44	a 40	a 40	a 53	59	61	69	82	74	64
21	52	36	a 48	a 39	a 39	--	64	64	74	80	72	61
22	56	34	a 43	a 33	a 40	a 46	63	63	71	79	75	61
23	52	40	a 42	a 33	a 38	a 44	61	60	70	82	75	63
24	61	--	a 39	a 34	a 36	a 45	59	63	70	80	75	63
25	68	45	a 40	a 33	a 44	a 40	63	67	71	76	75	64
26	48	36	a 45	a 34	a 46	a 48	65	66	72	80	76	63
27	52	32	a 45	a 36	a 47	a 49	60	60	69	82	75	63
28	56	45	a 43	a 34	a 48	a 53	63	68	69	83	74	62
29	64	34	a 47	a 33	--	a 55	60	70	73	82	77	67
30	63	--	a 41	a 32	--	a 54	--	71	74	83	77	62
31	50	--	a 42	a 39	--	a 50	--	72	--	83	77	--
Average	58	42	41	36	42	50	52	63	72	80	77	67

a Measurement between 2 p.m. and 4 p.m.

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT WAMEGO, KANS.--Continued

Periodic determinations of suspended-sediment discharge, June to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
June 21, 1957	44,200	5,720	683,000
June 24	29,600	3,740	299,000
June 25	28,000	3,350	253,000
June 28	30,800	4,060	338,000
June 29	26,800	3,720	269,000
July 2	20,800	3,160	177,000
July 3	17,300	2,800	131,000
July 5	18,200	2,550	125,000
July 6	18,800	2,310	117,000
July 12	9,320	2,000	50,300
July 16	8,390	1,350	30,600
July 17	8,390	1,500	34,000
July 24	12,800	1,980	68,400
July 26	12,000	1,440	46,700
Aug. 6	4,140	760	8,500
Aug. 7	3,960	704	7,530
Aug. 22	5,480	1,450	21,500
Aug. 27	4,140	619	6,920
Sept. 4	7,640	2,670	55,100
Sept. 5	6,500	3,780	66,300
Sept. 12	3,620	1,570	15,300
Sept. 17	5,200	2,770	38,900
Sept. 26	3,660	1,420	14,000

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT WAMEGO, KANS.--Continued

Particle-size analyses of suspended sediment, June to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 21, 1957....	5:20 a.m.	44,200	72	5,720	3,980	58	66	74	81	87	94	97	99	100			VPWCM
June 24	4:10 p.m.	29,600	--	3,740	4,100	58	67	75	77	83	94	96	99	100			VPWCM
June 24	4:10 p.m.	29,600	--	3,740	3,970	55	67	74	82	90	94	96	99	100			VPN
June 25	6:00 a.m.	28,000	68	3,350	3,660	52	64	68	76	83	92	94	98	100			VPWCM
June 25	6:00 a.m.	28,000	68	3,350	3,500	51	64	71	78	86	92	94	98	100			VPN
June 28	11:40 a.m.	30,800	77	4,060	4,770	52	61	69	78	88	96	97	99	100			VPWCM
June 29	1:15 p.m.	26,800	76	3,720	4,190	52	66	74	81	87	93	95	98	100			VPWCM
June 29	1:15 p.m.	26,800	76	3,720	4,160	43	62	74	81	87	93	95	98	100			VPN
July 2.....	12:20 p.m.	20,800	79	3,160	2,980	71	74	80	87	93	97	98	99	100			VPWCM
July 3.....	11:30 a.m.	17,300	82	2,800	2,620	66	78	80	83	89	98	99	100	--			VPWCM
July 5.....	6:30 p.m.	18,200	82	2,550	3,050	66	69	76	82	91	96	98	99	100			VPWCM
July 6.....	6:45 a.m.	18,800	79	2,310	2,750	57	66	75	80	87	95	97	98	100			VPWCM
July 6.....	6:45 a.m.	18,800	79	2,310	2,780	41	62	68	77	83	95	97	98	100			VPN
July 12.....	2:50 p.m.	9,320	--	2,000	3,540	54	68	75	83	92	99	99	100	--			VPWCM
July 16.....	8:10 a.m.	8,390	83	1,350	2,690	51	61	71	79	88	98	99	100	--			VPWCM
July 17.....	11:40 a.m.	8,390	84	1,500	2,870	51	56	64	73	83	90	91	92	97	100		VPWCM
Aug. 6	8:50 a.m.	4,140	76	760	1,580	39	66	--	80	--	96	97	99	100			VPWCM
Aug. 6	8:50 a.m.	4,140	76	760	1,350	28	52	--	82	--	96	97	99	100			VPN
Aug. 7.....	11:10 a.m.	3,960	78	704	1,320	51	54	--	76	--	95	96	97	100			VPWCM
Sept. 4.....	11:20 a.m.	7,640	77	2,670	6,030	55	67	--	86	--	99	100	--	--			VPWCM
Sept. 5.....	10:45 a.m.	6,500	74	3,780	5,060	50	69	--	92	--	99	100	--	--			VPWCM
Sept. 17.....	11:25 a.m.	5,200	67	2,770	2,060	62	78	--	91	--	99	99	100	--			VPWCM
Sept. 17.....	11:25 a.m.	5,200	67	2,770	2,090	26	58	--	88	--	99	99	100	--			VPN
Sept. 26.....	2:25 p.m.	3,660	--	1,420	3,590	59	75	--	89	--	97	97	98	100			VPWCM

KANSAS RIVER AT WAMEGO, KANS.--Continued

Particle-size analyses of bed material, June to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
June 28, 1957	11:40 a.m.	30,800	6			0	8	36	66	79	89	96	99	100		SV
July 6	6:45 a.m.	18,800	6			0	4	46	65	80	90	97	100	--		SV
July 12	2:50 p.m.	9,320	6			0	4	49	73	88	96	97	100	--		SV
Sept. 4	11:20 a.m.	7,640	7			0	1	23	47	59	65	75	100	--		SV
Sept. 17	11:25 a.m.	5,200	5			--	0	10	40	76	96	100	--	--		SV
Sept. 26	2:25 p.m.	3,660	4			0	4	35	65	80	92	96	97	100		SV

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT TOPEKA, KANS.

LOCATION.--At Kansas Avenue Bridge in Topeka, Shawnee County, 0.3 mile downstream from gaging station and 1.9 miles upstream from Soldier Creek.
DRAINAGE AREA.--56,710 square miles, approximately, of which a large area does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: November 1955 to September 1957.
Water temperatures: November 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 847 ppm Nov. 10-17; minimum, 184 ppm June 20-30.
Hardness: Maximum, 332 ppm Jan. 11-20; minimum, 126 ppm June 20-30.
Specific conductance: Maximum daily, 1,710 micromhos Nov. 13; minimum daily, 271 micromhos June 25.
Water temperatures: Maximum, 86°F on several days during July and August; minimum, freezing point on several days during December to February.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 1,180 ppm Aug. 19, 1956; minimum, 139 ppm July 6-8, 1956.
Hardness: Maximum, 344 ppm Aug. 19, 1956; minimum, 86 ppm July 6-8, 1956.
Specific conductance: Maximum daily, 2,000 micromhos Aug. 19, 1956; minimum daily, 202 micromhos July 7, 1956.
Water temperatures: Maximum, 86°F on several days during July 1956, July and August 1957; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-19, 1956.....	283	15	0.00	74	16	111	7.9	235	0	85	158	0.4	3.6	0.10	598	0.81	457	250	57	48	3.1	1,040	7.5
Oct. 20	888	12	.06	60	9.4	33	6.6	192	0	52	37	.4	7.0	.13	312	.42	748	188	31	27	1.1	509	7.7
Oct. 21-30	407	16	.00	66	14	99	7.7	196	0	83	137	.4	6.5	.10	541	.74	595	221	60	48	2.9	919	7.6
Oct. 31-Nov. 5	423	18	.04	64	14	79	7.8	215	0	67	108	.4	3.5	.13	470	.64	537	216	40	43	2.3	809	7.6
Nov. 6-9.....	460	13	.02	73	16	119	8.2	221	0	93	175	.3	3.3	.11	616	.84	765	248	67	50	3.3	1,080	7.6
Nov. 10-17.....	424	14	.01	81	20	196	8.9	234	0	126	271	.3	2.6	.13	847	1.15	970	286	94	59	5.1	1,460	7.7
Nov. 18-30.....	373	18	.01	75	16	102	7.6	253	0	83	137	.3	2.8	.11	569	.77	573	254	47	46	2.8	983	7.8
Dec. 1-13.....	343	15	.00	73	20	100	7.0	267	0	84	139	.3	.5	.10	579	.79	536	266	47	44	2.7	1,000	7.8
Dec. 14-31.....	412	17	.00	83	18	126	6.3	271	0	100	179	.3	.8	.15	668	.91	743	279	57	49	3.3	1,160	7.8
Jan. 1-10, 1957.....	436	16	.00	81	17	125	6.1	266	0	95	174	.2	1.9	.10	659	.90	776	270	52	49	3.3	1,130	8.0
Jan. 11-20	285	19	.00	95	23	151	7.2	290	16	114	218	.2	2.8	.14	818	1.11	629	332	68	49	3.6	1,380	8.2
Jan. 21-24	280	13	.00	76	18	127	5.7	256	0	96	179	.2	3.3	.13	662	.90	500	264	54	50	3.4	1,140	8.1
Jan. 25-Feb. 5	279	18	.01	94	20	150	6.4	310	0	112	214	.5	3.1	.14	786	1.07	592	316	62	50	3.7	1,350	8.2
Feb. 6-21.....	540	11	.01	75	15	128	5.4	242	0	95	181	.5	2.0	.09	639	.87	932	248	50	52	3.5	1,120	8.0
Feb. 22-26.....	530	13	.00	71	15	108	5.6	244	0	81	143	.4	2.3	.09	571	.78	817	240	40	49	3.0	988	7.9
Feb. 27-Mar. 3.....	576	15	.00	74	18	142	6.2	256	0	101	185	.3	1.6	.11	670	.91	1,040	260	50	54	3.8	1,160	8.1
Mar. 4-18.....	510	12	.00	72	18	125	6.8	250	0	95	164	.4	1.3	.12	618	.84	851	254	49	51	3.4	1,070	8.1
Mar. 19-23.....	524	8.0	.00	67	18	118	6.4	240	0	83	145	.3	1.5	.11	567	.77	802	242	45	51	3.3	991	8.2
Mar. 24-30.....	857	11	.00	62	14	95	5.8	214	0	76	123	.3	1.8	.09	492	.67	1,140	212	37	48	2.9	872	8.0
Mar. 31-Apr. 3.....	1,050	--	.01	62	17	140	7.3	168	14	100	189	.4	.1	.17	606	.82	1,720	224	63	57	4.1	1,070	8.8

Apr. 4-8	5,412	13	.00	49	9.1	38	7.0	162	0	48	43	.2	6.2	.06	301	.41	4,400	160	27	33	1.3	499	7.6
Apr. 9-10	4,070	12	.02	59	11	97	8.1	184	0	73	129	.5	4.9	.08	486	.66	5,340	192	41	51	3.0	854	7.9
Apr. 11-29	1,465	13	.01	57	10	47	7.1	180	0	63	55	.3	4.2	.06	349	.47	1,380	183	35	35	1.5	587	7.4
Apr. 30-May 3	1,525	13	.00	57	9.7	54	7.8	177	0	61	67	.4	4.4	.08	372	.51	1,530	182	37	38	1.7	615	7.7
May 4-15	1,653	14	.00	64	13	72	7.1	197	0	77	89	.4	4.4	.10	440	.60	1,960	212	50	41	2.2	744	7.7
May 16-28	15,670	11	.00	47	5.7	13	6.5	154	0	23	16	.3	6.3	.05	214	.29	9,050	141	15	16	.5	356	7.4
May 29-June 8	8,935	12	.01	56	6.7	24	7.0	168	0	37	36	.5	3.8	.06	271	.37	6,540	167	29	23	.8	452	7.5
June 9-17	5,554	12	.01	59	7.3	37	7.8	165	0	52	56	.4	4.0	.07	331	.45	4,960	177	42	30	1.2	545	7.5
June 18-19	20,000	17	.02	53	4.4	14	6.9	164	0	26	19	.4	7.4	--	235	.32	12,690	150	16	16	.5	375	7.8
June 20-30	33,100	13	.03	45	3.3	7.2	7.9	143	0	18	7.6	.3	6.1	.04	184	.25	16,440	126	9	10	.3	298	7.5
July 1-12	18,700	15	.00	49	8.1	13	9.0	172	0	29	16	.4	3.3	.04	234	.32	11,810	156	15	15	.5	387	7.7
July 13-Aug. 3	8,796	15	.01	51	13	32	11	163	0	68	39	.3	1.3	.06	315	.43	7,480	176	42	26	1.0	524	7.7
Aug. 4-19	4,334	16	.00	56	16	50	12	178	0	82	65	.5	1.9	.08	395	.54	4,620	206	60	33	1.5	656	7.5
Aug. 20-25	7,370	13	.01	52	10	32	9.5	157	0	51	42	.4	3.6	.06	304	.41	6,050	172	43	27	1.1	507	7.5
Aug. 26-30	4,012	14	.01	68	12	66	12	179	0	100	85	.4	1.0	.09	449	.61	4,860	217	70	38	2.0	749	7.5
Aug. 31-Sept. 6	6,417	14	.01	61	8.8	44	10	171	0	69	56	.4	2.7	.07	358	.49	6,200	188	48	32	1.4	596	7.6
Sept. 7-14	4,820	13	.01	51	7.1	23	8.8	166	0	39	26	.4	3.0	.08	257	.35	3,340	156	20	23	.8	431	7.4
Sept. 15-30	4,019	13	.01	61	8.8	43	9.4	173	0	69	55	.3	2.5	.08	353	.48	3,830	188	46	32	1.4	591	7.6
Weighted average a	4,453	14	0.01	52	8.1	28	8.5	b 165	--	43	36	0.4	4.1	0.06	282	0.38	3,390	163	28	26	1.0	469	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1956 to September 1957.
b Includes carbonate as bicarbonate.

KANSAS RIVER BASIN--Continued

KANSAS RIVER AT TOPEKA, KANS.--Continued

Temperature (° F) of water, water year October 1956 to September 1957
(Once-daily measurement between 11 a.m. and 1 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	66	a 59	36	--	32	43	a 50	69	73	76	86	78
2	68	56	39	33	33	46	49	70	a 70	76	86	a 80
3	67	54	43	36	33	42	43	64	69	80	86	76
4	67	54	45	35	33	42	42	59	71	81	--	76
5	64	52	43	34	34	42	40	62	73	79	78	75
6	64	51	a 39	34	34	41	42	65	78	79	77	73
7	62	a 51	34	--	33	35	44	66	79	82	76	72
8	63	43	32	35	34	34	44	67	76	82	78	71
9	58	48	34	32	35	36	47	68	a 78	78	79	70
10	59	47	34	32	a 37	a 47	51	63	76	77	82	68
11	62	50	35	33	35	54	a 48	60	81	79	--	67
12	64	51	34	35	39	49	43	65	79	82	85	69
13	68	50	34	a 33	40	51	44	66	79	83	84	71
14	67	57	34	32	a 42	48	48	67	79	85	82	70
15	67	46	33	32	44	39	49	70	79	86	84	--
16	69	38	35	32	40	45	49	a 61	a 79	84	81	68
17	69	41	34	32	a 43	49	53	61	79	85	77	68
18	68	42	34	34	44	48	58	62	78	85	a 79	70
19	66	44	a 36	33	39	43	64	a 63	--	86	79	70
20	64	43	36	34	36	46	64	63	72	85	75	63
21	62	36	39	36	35	46	a 64	66	72	82	74	65
22	63	a 35	43	32	--	44	64	65	75	81	74	64
23	60	38	38	32	--	43	62	65	a 73	78	75	65
24	62	39	33	32	34	a 44	67	66	73	78	a 78	66
25	60	39	--	32	35	36	a 72	68	72	79	a 78	67
26	55	36	34	32	39	38	67	68	74	80	78	66
27	55	37	36	32	40	43	64	69	72	82	75	66
28	55	38	39	32	42	47	--	70	71	83	76	66
29	59	a 34	a 40	32	--	48	64	72	72	85	79	--
30	60	36	a 41	32	--	48	66	74	a 76	--	80	65
31	57	--	39	32	--	a 49	--	75	--	86	80	--
Average	63	45	37	33	37	44	54	66	75	81	79	69

a Measurement between 2 p.m. and 4 p.m.

KANSAS RIVER AT LAWRENCE, KANS.

LOCATION.--At bridge on U. S. Highway 40 at Lawrence, Douglas County, and 13 miles downstream from gaging station at Lecompton.
DRAINAGE AREA.--58,420 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1955 to August 1957 (discontinued).
REMARKS.--Discharge records for gaging station at Lecompton, Kans., for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, in parts per million, October 1956 to August 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 22, 1956	570	11	0.04	54	10	40	7.0	180	0	57	46	0.4	6.9	0.06	322	0.44		177	29	32	1.3	547	7.5
Nov. 26	390	11	.00	74	17	100	7.2	254	0	79	130	.3	4.4	.12	552	.75		254	46	45	2.7	961	7.7
Dec. 28	416	13	.01	79	17	123	6.8	257	0	98	167	.2	4.5	.10	651	.89		267	56	49	3.3	1,110	7.5
Feb. 26, 1957	680	15	.01	73	17	115	6.2	253	0	84	151	.2	6.8	.09	595	.81		251	44	49	3.2	1,030	7.7
Apr. 1	1,520	9.5	.01	64	15	104	6.0	216	0	70	135	.3	3.9	.07	531	.72		221	44	50	3.0	914	7.6
Apr. 22	1,090	12	.07	59	8.3	52	6.7	178	0	61	64	.5	1.3	.08	372	.51		181	35	37	1.7	611	8.0
May 19	25,200	14	.02	55	5.8	13	6.3	180	0	24	12	.3	7.4	.04	222	.30		161	13	14	.4	374	7.7
July 9	18,100	16	.01	52	5.5	15	9.6	161	0	31	16	.4	5.2	.05	233	.32		152	20	16	.5	382	7.6
Aug. 27	4,480	14	.00	62	9.8	59	12	158	0	92	79	.5	3.6	.07	414	.56		195	65	38	1.8	687	7.5

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Pool elevation (feet)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
SWANSON LAKE NEAR TRENTON, NEBR.																							
Nov. 24, 1956	2,739.48	10	0.01	39	15	33	16	203	0	68	7.5	0.9	2.6	0.13	293	0.40		159	0	29	1.1	484	7.7
Feb. 5, 1957	2,742.40	13	.01	44	18	36	16	230	0	79	7.5	.8	1.0	.15	329	.45		182	0	28	1.2	530	8.2
June 10	2,751.42	8.8	.00	41	14	31	13	196	0	65	7.0	.9	.5	.13	271	.37		161	0	28	1.1	452	8.2
Aug. 14	2,752.20	--	.04	121	15	--	--	176	0	--	16	.7	--	--	--	--		363	219	--	--	936	7.1
ENDERS RESERVOIR NEAR ENDERS, NEBR.																							
Nov. 24, 1956	3,106.00	38	0.04	40	14	16	12	220	0	19	3.0	0.7	3.1	0.09	252	0.34		159	0	17	0.6	386	7.7
Feb. 5, 1957	3,109.35	39	.02	42	14	16	11	224	0	17	3.0	.8	3.1	.08	257	.35		164	0	16	.5	389	8.1
June 10	3,111.80	33	.01	41	13	14	11	208	0	23	3.0	.8	2.5	.09	232	.32		157	0	15	.5	396	7.9
Aug. 14	3,110.00	--	.01	33	14	--	--	192	0	--	4.0	.9	--	--	--	--		140	0	--	--	344	7.9
HARLAN COUNTY RESERVOIR NEAR REPUBLICAN CITY, NEBR.																							
Nov. 21, 1956	1,925.23	1.2	0.01	43	16	23	18	214	0	56	9.0	0.6	0.6	0.12	274	0.37		175	0	20	0.8	469	7.7
Feb. 2, 1957	1,926.46	2.7	.00	39	22	25	19	232	0	63	8.5	.7	.3	.12	298	.41		188	0	20	.8	494	8.0
June 25	1,954.83	12	.03	41	11	18	15	185	0	42	6.0	.6	1.6	.08	243	.33		148	0	19	.6	393	8.0
Aug. 11	1,946.35	17	.00	42	9.7	15	15	181	0	31	4.7	.6	3.1	.08	229	.31		145	0	17	.5	374	7.6
Sept. 9	1,946.63	16	.01	42	11	16	16	188	0	34	5.1	.7	3.1	.07	240	.33		149	0	17	.6	387	7.7
CEDAR BLUFF RESERVOIR NEAR ELLIS, KANS.																							
Nov. 19, 1956	2,133.6	1.7	0.00	112	23	33	19	149	0	313	19	0.6	1.0	0.14	620	0.84		373	251	15	0.7	873	7.8
Feb. 5, 1957	2,133.25	1.4	.00	94	24	30	17	138	0	280	17	.5	.7	.12	543	.74		332	219	16	.7	787	7.5
June 26	2,152.60	5.5	.01	72	18	20	15	120	0	200	11	.8	1.7	.08	404	.55		253	155	14	.5	607	7.6
Sept. 1	2,147.00	12	.00	67	11	16	11	129	0	139	8.0	.5	1.6	.09	345	.47		214	108	13	.5	521	7.4
KANOPOLIS RESERVOIR NEAR KANOPOLIS, KANS.																							
Nov. 20, 1956	1,456.93	2.5	0.01	76	15	118	10	141	0	112	206	0.2	1.8	0.11	654	0.89		250	134	49	3.2	1,110	7.4
Feb. 5, 1957	1,455.65	2.6	.00	68	27	132	11	160	0	133	237	.3	1.4	.10	736	1.00		282	151	49	3.4	1,250	7.8
June 25	1,474.00	9.7	.02	47	5.5	40	7.8	110	0	42	69	.4	3.0	.06	284	.39		140	50	37	1.5	496	7.3
Aug. 21	1,471.40	11	.00	64	8.9	26	12	136	0	103	33	.4	2.5	.07	339	.46		196	84	21	.8	536	7.6
KIRWIN RESERVOIR AT KIRWIN, KANS.																							
Aug. 30, 1956	1,696.80	14	0.00	47	7.4	11	13	164	0	38	7.5	0.4	3.4	0.04	221	0.30		148	14	13	0.4	371	7.6
Nov. 19	1,695.10	11	.01	54	9.8	12	15	191	0	46	7.5	.4	2.6	.08	258	.35		175	18	12	.4	421	7.7
Feb. 11, 1957	1,694.80	1.8	.00	25	1.6	2.5	3.1	77	0	10	1.0	.2	1.6	.06	89	.12		69	6	7	.1	161	7.7

June 27	1,725.10	14	.06	33	3.8	3.6	10	113		20	1.5	.3	2.7	.04	151	.21		98	5	7	.2	235	7.5
Aug. 21	1,726.48	--	.02	43	3.5	--	--	144		--	3.0	.3	--	--	--	--		122	4	--	--	290	7.3

WEBSTER RESERVOIR NEAR STOCKTON, KANS.

Sept. 4, 1956	1,857.18	1.1	0.00	59	6.0	15	16	190		51	11	0.5	3.5	0.05	258	0.35		180	24	14	0.5	441	7.3
Nov. 19	1,885.8	.9	.00	62	11	16	16	207		63	13	.2	1.1	.08	299	.41		198	28	14	.5	485	7.7
Feb. 13, 1957	1,855.40	.9	.01	64	11	17	17	214		66	14	.5	1.3	.09	321	.44		206	31	14	.5	515	7.5
May 24	1,873.59	12	.02	42	6.6	8.2	9.5	126		44	6.5	.5	2.0	.01	202	.27		132	29	11	.3	320	7.3
Aug. 30	1,691.05	--	.02	47	6.9	--	--	152		--	6.0	.3	--	--	--	--		146	21	--	--	337	7.7

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
MEDICINE CREEK BELOW HARRY STRUNK LAKE, NEBR.			
Jan. 4, 1957	5.1	15	0.2
Jan 12	5.1	10	.1
Feb. 4	4.8	7	.1
Mar 7	5 7	9	.1
Apr. 13	4.5	66	.8
May 4	55	55	8.2
May 15	392	22	23
June 12	262	26	18
June 13	313	19	16
June 17	171	37	17
June 25	105	38	11
July 9	200	22	12
July 12	164	21	9.3
Aug. 15	69	26	4.8
REPUBLICAN RIVER AT CLAY CENTER, KANS.			
June 19, 1957	10,800	4,520	132,000
June 20, 5:00 a.m.	13,000	3,970	139,000
June 20, 4:15 p.m.	15,600	3,440	145,000
June 21	13,300	2,670	95,900
June 25	2,360	1,040	6,630
June 29	3,260	1,130	9,950
July 1	3,260	1,840	16,200
July 3	2,980	3,230	26,000
July 5	2,210	1,020	6,090
July 6	2,430	774	5,080
July 10	2,730	631	4,650
July 15	2,940	578	4,590
July 17	3,380	617	5,630
July 24	3,140	581	4,930
July 26	3,260	447	3,930
Aug. 5	700	187	353
Aug. 7	784	292	618
Aug. 22	512	418	578
Aug. 27	454	224	274
Sept. 3	715	2,140	4,130
Sept. 5	560	1,680	2,540
Sept. 12, 6:45 a.m.	916	2,590	6,400
Sept. 12, 6:50 p.m.	635	1,190	2,040
Sept. 17	315	219	186
Sept. 25, 1:00 p.m.	250	132	89
Sept. 25, 2:20 p.m.	250	146	99
Sept. 27	240	135	87
Sept. 29	236	110	70
SALINE RIVER AT TESCOTT, KANS.			
June 19, 1957	2,870	4,750	36,800
June 20	3,860	4,760	49,600
June 24	4,020	3,530	38,300
June 27	3,220	6,620	57,600
June 28	5,200	4,240	59,500
June 29	5,560	4,470	67,100
July 2	11,000	1,770	52,600
July 5	6,170	2,800	46,600
July 6	3,220	7,570	65,800
July 10	988	5,110	13,600
July 15	472	1,280	1,630
July 23, 3:45 p.m.	746	7,530	15,200
July 23, 4:05 p.m.	737	7,170	14,100
July 26	344	1,110	1,030
Aug. 5	206	834	464

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
SALINE RIVER AT TESCOTT, KANS.--Continued			
Aug. 21, 1957	231	775	483
Aug. 28	771	5,380	11,200
Sept. 3	461	5,100	6,350
Sept. 11	494	3,130	4,170
Sept. 12	1,010	5,260	14,300
Sept. 16	934	3,760	9,480
SOLOMON RIVER AT NILES, KANS.			
June 20, 1957	5,430	4,960	72,700
June 24	9,700	1,220	32,000
June 25	9,160	1,180	29,200
June 27	4,090	5,460	60,300
June 28	2,240	4,180	25,300
July 2	3,500	2,460	23,200
July 3	4,580	4,340	53,700
July 5	5,340	3,180	45,800
July 6	5,710	2,920	45,000
July 10	1,170	3,400	10,700
July 15	1,750	2,000	9,450
July 23	1,700	1,200	5,510
Aug. 5	387	552	577
Aug. 21	313	663	560
Aug. 28	880	2,960	7,030
Sept. 3	1,070	6,210	17,900
Sept. 11	434	1,120	1,310
Sept. 17	669	1,780	3,220
BIG BLUE RIVER AT BARNESTON, NEBR.			
June 23, 1957	11,400	2,090	64,300
June 25, 4:50 p.m.	6,810	2,460	45,200
June 25, 5:50 p.m.	6,860	2,410	44,600
LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.[a]			
Oct. 15, 1956	106	1,820	521
Nov. 7	112	200	60
Dec. 28	138	152	57
Jan. 7, 1957	134	60	22
Feb. 19	105	134	38
Mar. 11	117	193	61
Apr. 5	184	426	212
Apr. 24, 10:10 a.m.	442	3,680	4,390
Apr. 24, 11:30 a.m.	502	5,340	7,240
Apr. 24, 1:15 p.m.	537	8,460	12,300
Apr. 24, 4:45 p.m.	548	9,530	14,100
May 11, 3:30 p.m.	813	4,820	10,600
May 11, 6:30 p.m.	922	6,070	15,100
May 13, 12:20 p.m.	774	4,440	9,280
May 13, 6:05 p.m.	866	4,480	10,500
May 13, 6:15 p.m.	906	4,730	11,600
May 13, 9:25 p.m.	1,170	6,550	20,700
May 14	1,590	8,380	36,000
May 15, 9:40 a.m.	1,880	6,220	31,600
May 15, 12:55 p.m.	1,880	6,400	32,500
May 17	1,540	4,420	18,400
May 21	426	1,660	1,910
June 4	159	432	185
June 13, 12:20 a.m.	786	3,940	8,360
June 13, 12:30 a.m.	826	4,180	9,320
June 13, 1:00 a.m.	1,080	6,560	19,100
June 13, 2:15 a.m.	1,530	13,400	55,400
June 13, 1:25 p.m.	584	6,980	11,000

a Prior to Sept. 25, 1957, gaging station and sampling site 3½ miles downstream.

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1956 to September 1957--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.[a]--Continued			
June 16, 1957	1,790	8,140	39,300
June 18 b	c 8,240	5,240	117,000
June 19 b	c 12,700	3,680	126,000
June 26	1,240	3,840	12,900
June 28	2,180	4,870	28,700
July 16	242	331	216
Aug. 7	154	451	188
Aug. 16	1,690	9,440	43,100
Aug. 17	4,720	5,310	67,700
Aug. 18	6,370	3,580	61,600
Aug. 28	1,520	7,940	32,600
Sept. 17	d 175	191	90
DELAWARE RIVER AT VALLEY FALLS, KANS.			
July 16, 1957	10	113	3.1
July 17	9.1	120	2.9
July 24	8.1	79	1.7
July 26	5.4	75	1.1
Aug. 6	1.8	70	.3
Aug. 22	1.4	69	.3
Aug. 27	2.8	74	.6
Sept. 4	4.7	42	.5
Sept. 12	95	1,600	409
STRANGER CREEK AT TONGANOXIE, KANS.			
July 12, 1957	35	176	16
July 16	7.4	99	2.0
July 17	6.4	120	2.1
July 24	10	310	8.4
July 26	4.0	107	1.2
Aug. 6	.9	92	.2
Aug. 7	.8	95	.2
Aug. 22	.2	97	.1
Aug. 27	.3	82	.1
Sept. 4	.2	98	.1
Sept. 5	.2	100	.1
Sept. 12	1.5	69	.3

a Prior to Sept. 25, 1957, gaging station and sampling site $3\frac{1}{2}$ miles downstream.
b Sampled about $3\frac{1}{2}$ miles upstream.
c Estimated.
d Daily mean discharge.

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
REPUBLICAN RIVER AT CLAY CENTER, KANS.																	
June 19, 1957	4:30 p.m.	10,800	73	4,520	6,740	64	76	82	87	89	92	93	96		100		VPWCM
June 19	4:30 p.m.	10,800	73	4,520	6,740	36	74	83	87	89	92	93	96		100		VPN
June 20	5:00 a.m.	13,000	70	3,970	4,980	66	76	79	82	87	90	92	96		100		VPWCM
June 20	5:00 a.m.	13,000	70	3,970	4,910	48	75	83	85	89	90	92	96		100		VPN
June 20	4:15 p.m.	15,600	75	3,440	4,270	66	74	77	80	85	92	94	97		100		VPWCM
June 20	4:15 p.m.	15,600	75	3,440	4,330	49	65	78	81	86	92	94	97		100		VPN
June 21	9:20 a.m.	13,300	76	2,670	4,060	70	76	80	82	85	91	93	96		100		VPWCM
June 21	9:20 a.m.	13,300	76	2,670	3,960	50	76	81	83	87	91	93	96		100		VPN
June 25	2:20 p.m.	2,360	77	1,040	3,120	62	73	80	85	88	93	95	97		100		VPWCM
June 29	3:45 p.m.	3,260	76	1,130	3,020	40	48	57	67	74	92	94	96		100		VPWCM
July 1	5:30 p.m.	3,260	77	1,840	2,510	62	75	81	84	87	96	98	100		--		VPWCM
July 1	5:30 p.m.	3,260	77	1,840	2,360	50	71	83	86	--	96	98	100		--		VPN
July 3	2:30 p.m.	2,980	83	3,230	4,380	64	81	90	93	95	96	98	98		100		VPWCM
July 3	2:30 p.m.	2,980	83	3,230	4,390	54	76	89	92	93	96	98	98		100		VPN
July 6	4:00 p.m.	2,430	83	774	2,340	51	62	70	79	84	91	94	97		100		VPWCM
July 10	10:50 a.m.	2,730	--	631	1,460	47	56	69	73	81	89	95	98		100		VPWCM
July 15	10:30 a.m.	2,940	81	578	2,000	38	48	--	67	--	87	94	97		99	100	VPWCM
July 17	2:10 p.m.	3,380	85	617	1,990	36	45	--	61	--	86	94	98		100		VPWCM
Aug. 5	10:45 a.m.	700	77	187	--	--	--	--	--	--	95	99	100		--		V
Aug. 7	1:45 p.m.	784	80	292	1,380	37	41	--	63	--	86	90	95		100		VPWCM
Sept. 3	10:50 a.m.	715	75	2,140	6,460	68	80	--	94	--	99	100	--		--		VPWCM
Sept. 5	2:05 p.m.	560	77	1,680	3,150	66	84	--	97	--	100	--	--		--		VPWCM
Sept. 5	2:05 p.m.	560	77	1,680	3,130	18	24	--	94	--	100	--	--		--		VPN
Sept. 17	1:40 p.m.	315	71	219	880	--	74	--	88	--	--	100	--		--		SPWCM
Sept. 25	2:20 p.m.	250	71	146	1,550	51	56	--	84	--	99	100	--		--		VPWCM

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
SALINE RIVER AT TESCOTT, KANS.																
June 19, 1957	8:45 p.m.	2,670	73	4,750	3,300	69	81	93	97	--	100	--					VPWCM
June 19	8:45 p.m.	2,670	73	4,750	3,350	26	60	90	95	--	100	--					VPN
June 20	7:45 p.m.	3,860	72	4,760	3,310	69	84	92	96	99	100	--					VPWCM
June 20	7:45 p.m.	3,860	72	4,760	3,400	37	76	91	96	99	100	--					VPN
June 24	9:30 a.m.	4,020	70	3,530	2,890	60	76	89	97	99	--	100					SPWCM
June 24	9:30 a.m.	4,020	70	3,530	2,830	11	31	86	95	97	--	100					SPN
June 27	4:50 p.m.	3,220	66	6,620	5,160	51	62	73	84	94	99	100					VPWCM
June 27	4:50 p.m.	3,220	66	6,620	5,250	27	52	70	83	94	99	100					VPN
June 28	9:10 p.m.	5,200	68	4,240	3,570	68	82	90	96	97	--	100					SPWCM
June 28	9:10 p.m.	5,200	68	4,240	3,560	40	77	86	96	98	--	100					SPN
June 29	8:30 a.m.	5,560	70	4,470	3,760	69	86	94	97	99	--	100					SPWCM
June 29	8:30 a.m.	5,560	70	4,470	3,800	45	76	92	97	98	--	100					SPN
July 2	5:20 p.m.	11,000	79	1,770	2,390	75	91	99	99	99	--	100					SPWCM
July 2	5:20 p.m.	11,000	79	1,770	2,460	43	80	91	94	97	--	100					SPN
July 5	12:45 p.m.	6,170	80	2,800	4,730	66	84	94	98	99	--	100					SPWCM
July 5	12:45 p.m.	6,170	80	2,800	4,780	12	37	95	--	99	--	100					SPN
July 6	1:45 p.m.	3,220	81	7,570	3,400	64	76	89	95	99	--	100					SPWCM
July 6	1:45 p.m.	3,220	81	7,570	3,480	50	68	86	94	99	--	100					SPN
July 10	3:25 p.m.	988	--	5,110	4,010	44	54	69	81	94	100	--					VPWCM
July 15	1:45 p.m.	472	83	1,280	3,380	44	59	73	85	94	--	100					SPWCM
Aug. 5	1:50 p.m.	203	80	834	1,910	55	65	82	90	93	--	100					SPWCM
Sept. 3	1:50 p.m.	461	76	5,100	3,670	58	73	89	95	99	100	--					VPWCM
Sept. 3	1:50 p.m.	461	76	5,100	3,670	10	29	81	91	96	100	--					VPN
Sept. 16	5:50 p.m.	934	67	3,760	6,260	50	70	--	91	--	100	--					VPWCM
Sept. 16	5:50 p.m.	934	67	3,760	5,440	8	25	--	92	--	100	--					VPN

SOLOMON RIVER AT NILES, KANS.

June 20, 1957	6:10 p.m.	5,430	74	4,960	4,060	66	83	93	99	99	--	100					SPWCM
June 20	6:10 p.m.	5,430	74	4,960	4,020	34	76	94	97	98	--	100					SPN
June 24	7:40 a.m.	9,700	--	1,220	952	86	--	--	93	--	--	100					SPWCM
June 24	7:40 a.m.	9,700	--	1,220	928	74	82	--	86	--	--	100					SPN
June 25	10:00 a.m.	9,160	72	1,180	1,740	68	82	89	93	--	--	100					SPWCM
June 25	10:00 a.m.	9,160	72	1,180	1,770	41	80	89	90	--	--	100					SPN
June 27	2:50 p.m.	4,090	71	5,460	4,210	55	67	76	84	92	100	--					VPWCM
June 28	6:10 p.m.	2,240	73	4,180	7,270	52	68	81	88	95	100	--					VPWCM
July 5	10:45 a.m.	5,340	78	3,180	5,700	73	82	--	94	--	100	--					VPWCM
July 6	11:45 a.m.	5,710	81	2,920	4,900	64	79	--	--	--	100	--					VPWCM
July 6	11:45 a.m.	5,710	81	2,920	4,770	28	74	--	--	--	100	--					VPN
July 10	5:10 p.m.	1,170	--	3,400	5,540	35	47	--	70	--	98	99	99		100		VPWCM
July 15	12:30 p.m.	1,750	83	2,000	3,220	37	53	--	80	--	99	100					VPWCM
July 15	12:30 p.m.	1,750	83	2,000	3,100	8	29	--	76	--	99	100					VPN
Aug. 5	12:40 p.m.	387	79	552	1,400	--	56	--	84	--	--	100					SPWCM
Sept. 17	8:00 a.m.	669	62	1,780	5,350	64	81	--	94	--	100	--					VPWCM

LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.[a]

Oct. 15, 1956	12:50 p.m.	106	68	1,820	--	75	85	94	96	98	--	100	--		--		SPWCM
Oct. 15	12:50 p.m.	106	68	1,820	--	27	61	82	96	97	--	100	--		--		SPN
Nov. 7	1:30 p.m.	112	49	200	968	66	75	84	91	95	--	100	--		--		SPWCM
Nov. 7	1:30 p.m.	112	49	200	992	31	51	78	93	96	--	100	--		--		SPN
Dec. 28	10:30 a.m.	138	37	152	1,290	49	53	76	84	89	--	100	--		--		SPWCM
Dec. 28	10:30 a.m.	138	37	152	1,060	18	31	58	79	90	--	100	--		--		SPN
Mar. 11, 1957	9:30 a.m.	117	47	193	1,300	34	45	79	--	--	--	100	--		--		SPWCM
Apr. 5	12:15 p.m.	184	41	426	3,010	61	69	76	86	--	96	97	98		99	100	VPWCM
Apr. 24	10:10 a.m.	442	--	3,680	8,920	39	53	64	76	--	98	99	100		--		VPWCM
Apr. 24	10:10 a.m.	442	--	3,680	8,360	17	30	46	63	--	98	99	100		--		VPN
Apr. 24	11:30 a.m.	502	--	5,340	4,270	52	59	70	79	--	99	100	--		--		VPWCM
Apr. 24	1:15 p.m.	537	--	8,460	--	55	64	76	85	--	99	100	--		--		VPWCM
Apr. 24	1:15 p.m.	537	--	8,460	--	26	38	54	74	--	99	100	--		--		VPN
Apr. 24	2:45 p.m.	548	67	9,530	--	52	66	78	86	--	100	--	--		--		VPWCM
Apr. 24	2:45 p.m.	546	67	9,530	--	35	46	62	80	--	100	--	--		--		VPN
May 13	12:20 p.m.	774	64	4,440	4,300	60	67	73	83	98	99	100	--		--		VPWCM
May 13	12:20 p.m.	774	64	4,440	4,350	41	57	68	80	92	99	100	--		--		VPN
May 15	9:40 a.m.	1,880	59	6,220	3,750	60	68	77	84	92	98	99	99		100		VPWCM
May 15	9:40 a.m.	1,880	59	6,220	3,770	42	59	72	82	93	98	99	99		100		VPN
May 15	12:55 p.m.	1,880	--	6,400	3,260	57	69	78	86	92	99	99	100		--		VPWCM
May 17	9:40 a.m.	1,540	58	4,420	4,140	55	62	70	79	89	98	99	100		--		VPWCM
May 17	9:40 a.m.	1,540	58	4,420	4,150	35	50	63	75	89	98	99	100		--		VPN
May 21	10:20 a.m.	426	62	1,660	4,580	61	70	77	82	90	98	98	100		--		VPWCM

a Prior to Sept. 25, 1957, gaging station and sampling site 3½ miles downstream.

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1956 to September 1957--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.[a]--Continued																	
June 13, 1957	1:25 p.m.	584	72	6,980	5,250	56	71	79	90	96	99	100	--		--		VPWCM
June 16	5:50 p.m.	1,790	73	8,140	7,180	54	67	77	86	94	99	100	--		--		VPWCM
June 18 b	2:40 a.m.	c 8,240	66	5,240	7,370	60	73	79	86	91	96	97	98		100		VPWCM
June 19 b	1:15 p.m.	c 12,700	73	3,680	2,660	71	74	--	86	--	96	97	99		100		VPWCM
June 26	11:15 a.m.	1,240	--	3,840	5,920	55	67	76	84	93	98	99	100		--		VPWCM
June 28	3:40 p.m.	2,180	--	4,870	7,160	40	51	60	71	86	97	99	100		--		VPWCM
July 16	12:40 p.m.	242	78	331	856	59	64	68	72	85	--	100	--		--		PWCM
Aug. 16	1:20 p.m.	1,690	--	9,440	6,060	50	58	67	--	92	98	99	99		100		VPWCM
Aug. 17	10:45 a.m.	4,720	--	5,310	4,580	57	64	71	--	87	96	98	99		100		VPWCM
Aug. 18	12:40 p.m.	6,370	--	3,580	2,670	66	68	--	80	--	96	98	99		100		VPWCM

a Prior to Sept. 25, 1957, gaging station and sampling site 3½ miles downstream.
b Sampled about 3½ miles upstream.
c Estimated.

MISCELLANEOUS ANALYSES OF STREAMS AND LAKES IN KANSAS RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1956 to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
REPUBLICAN RIVER AT CLAY CENTER, KANS.																
June 29, 1957	3:45 p.m.	3,260	5				0	3	33	71	85	95	99	100		SV
July 1	5:30 p.m.	3,260	3				0	7	46	76	86	95	99	99	100	SV
July 5	9:00 a.m.	2,210	5				0	2	24	54	72	86	100	--		SV
July 10	10:50 a.m.	2,730	5				0	10	49	71	83	93	100	--		SV
July 15	10:30 a.m.	2,940	5				0	3	39	78	88	94	100	--		SV
July 17	2:10 p.m.	3,360	5				0	5	42	83	91	95	99	100		SV
Aug. 5	10:45 a.m.	700	5				0	4	31	65	76	88	97	100		SV
Aug. 7	1:45 p.m.	784	5				0	2	33	57	80	93	100	--		SV
Sept. 5	2:05 p.m.	560	7				0	3	35	60	81	91	97	100		SV
Sept. 17	1:40 p.m.	315	5				0	2	31	50	60	72	97	100		SV
Sept. 25	2:20 p.m.	250	33				0	9	53	82	91	98	100	--		SV
SOLOMON RIVER AT NILES, KANS.																
June 28, 1957	6:10 p.m.	2,240	3				2	4	12	41	73	89	98	100		SV
July 10	5:10 p.m.	1,170	4				--	0	1	19	69	91	98	100		SV
Sept. 17	6:00 a.m.	669	5				0	1	1	20	50	83	96	100		SV
LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.[a]																
Oct. 15, 1956	12:50 p.m.	106	14				0	3	41	74	89	98	100	--		SV
Apr. 5, 1957	12:15 p.m.	164	20				0	4	41	72	85	95	99	100		SV
May 15	9:40 a.m.	1,880	10				0	6	35	59	73	87	97	100		SV
June 13	1:25 p.m.	584	9			0	1	22	44	62	76	87	99	100		SV

a Prior to Sept. 25, 1957, gaging station and sampling site 3½ miles downstream.

CHARITON RIVER BASIN

HONEY CREEK NEAR RUSSELL, IOWA

LOCATION.--At gaging station on downstream side of highway bridge, 0.7 mile upstream from Chariton River, and 5.5 miles southeast of Russell, Lucas County.
DRAINAGE AREA.--13.2 square miles.
RECORDS AVAILABLE.--Sediment records: June 1952 to September 1957.
EXTREMES, 1956-57.--Sediment concentrations: Maximum daily, 1,780 ppm June 14; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 550 tons May 21; minimum daily, 0 tons on many days.
EXTREMES, 1952-57.--Sediment concentrations: Maximum daily, 9,840 ppm June 20, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,500 tons (estimated) June 21, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to December; record is omitted. Maximum observed sediment concentration during water year, 5,890 ppm June 14. Backwater from Chariton River Apr. 3. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Suspended sediment, January to September 1957

Day	January			February			March		
		Suspended sediment			Suspended sediment			Suspended sediment	
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1							0		0
2							0		0
3							0		0
4							0		0
5							0		0
6							0		0
7							0		0
8							0		0
9							0		0
10							0		0
11							0		0
12							0		0
13							0		0
14							0		0
15							0		0
16							0		0
17							0		0
18							0		0
19							0		0
20							0		0
21							0		0
22							0		0
23							0		0
24							0		0
25							0		0
26							0		0
27							0		0
28							.86		e .2
29							3.5		e 1.0
30							3.8		e .9
31							4.1	73	.8
Total	0		0	0		0	12.26		2.9

e Estimated.

CHARITON RIVER BASIN--Continued

HONEY CREEK NEAR RUSSELL, IOWA.--Continued

Suspended sediment, January to September 1957--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	9.8	180	a 4.8	2.2			0.54	26	
2	14	160	sa 6.5	1.8			.37	--	
3	139	1,200	sa 460	1.4	--	e 0.1	.22	--	
4	48	260	34	1.1			.22	--	(t)
5	12	130	b 4.2	.70	9		.19	--	
6	7.0	105	2.0	.70	--		.14	--	
7	5.4	--	e 1.3	.62	--	(t)	1.9	320	sa 2.0
8	4.7	84	1.1	.47	13		2.2	110	a .7
9	4.1	--	e .8	.54	--		2.3	90	b .5
10	3.0	48	.4	1.3			1.4	65	.2
11	3.4	72	.7	1.4	--	e .2	17	550	sa 38
12	2.8			3.6	140	sb 1.6	6.6	480	sa 9.0
13	2.5	--	e .3	5.9	120	sa 2.0	14	500	sa 22
14	2.0			7.3	121	2.4	54	1,780	s 395
15	1.8	22	e .1	3.8	--	e 1.0	7.3	220	sa 5.0
16	1.9	--		3.6	120	sb 1.3	2.5	130	b .9
17	4.5	140	a 1.7	15	200	sa 8.5	1.5	130	
18	3.5	75	b .7	4.6	80	1.0	1.5	--	e .5
19	2.7			3.4	--	e .4	.95	--	
20	2.3	--	e .3	20	600	sb 240	.47	78	e .1
21	1.6			101	1,200	sa 550	.28	--	
22	92	890	s 302	6.4	187	3.2	.25	--	
23	19	185	s 10	4.0	65	.7	.19	--	(t)
24	6.2	--	e 2.0	2.6	--	e .2	.19	37	
25	3.5	--	e 1.0	2.2			.14	--	
26	6.5	--	e 2.0	1.7	--	e .1	.25	54	(t)
27	5.4	--	e 1.5	1.2			.62	77	.1
28	9.4	120	a 3.0	.86			.54		
29	4.6	60	b .7	.78	--	e .1	.37	--	(t)
30	2.8	40	b .3	.70			.16		
31	--	--	--	.86			--	--	--
Total	425.4	--	842.7	201.73	--	814.0	118.29	--	475.0

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.07			0.04		(t)	0	--	0
2	.05			0		0	0	--	0
3	.04	--	(t)	0		0	0	--	0
4	.05			0		0	0	--	0
5	.03			0		0	0	--	0
6	0	--	0	0		0	0	--	0
7	0	--	0	0		0	0	--	0
8	0	--	0	0		0	0	--	0
9	0	--	0	0		0	0	--	0
10	0	--	0	0		0	0	--	0
11	0	--	0	0		0	0	--	0
12	0	--	0	0		0	0	--	0
13	0	--	0	0		0	0	--	0
14	0	--	0	0		0	.06	220	sb .2
15	0	--	0	0		0	11	650	sb 26
16	0	--	0	0		0	1.3	220	b .8
17	0	--	0	0		0	.19	120	b .1
18	0	--	0	0		0	.03	--	(t)
19	0	--	0	0		0	0	--	0
20	0	--	0	0		0	.20	110	sb .3
21	0	--	0	0		0	.95	300	b .8
22	2.8	400	sa 8.0	0		0	.47	210	.3
23	.14	50	(t)	0		0	.14	--	(t)
24	0	--	0	0		0	.05		
25	0	--	0	0		0	0	--	0
26	0	--	0	0		0	0	--	0
27	0	--	0	0		0	0	--	0
28	14	600	sb 120	0		0	0	--	0
29	14	900	sa 46	0		0		--	0
30	1.1	480	b 1.4	0		0	0	--	0
31	.19	--	e .1	0		0	--	--	--
Total	32.47	--	175.5	0.04	--	(t)	14.39	--	28.5

Total discharge for year (cfs-days) 804.58

Total load for year (tons) 2,338.6

e Estimated.

s Computed by subdividing day.

t Less than 0.050 ton.

a Computed from partly estimated concentration graph.

b Computed from estimated concentration graph.

CHARITON RIVER BASIN--Continued

HONEY CREEK NEAR RUSSELL, IOWA--Continued

Particle-size analyses of suspended sediment, January to September 1957
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of Collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 3, 1957.....	3:10 p.m.	151	38	698	2,750		62		85		99	100					SPWCM
June 14.....	10:20 a.m.	80	70	971	3,490		68		90		99	99	100				SPWCM

MISSOURI RIVER AT BOONVILLE, MO.

LOCATION.--Temperature recorder at gaging station at Missouri-Kansas-Texas Railroad bridge at Boonville, Cooper County.
DRAINAGE AREA.--505,700 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1953 to September 1957.
EXTREMES, 1956-57.--Water temperatures: Maximum daily mean, 87°F July 18-20; minimum daily mean, freezing point Jan. 20-21.
EXTREMES, 1953-57.--Water temperatures: Maximum daily mean, 90°F July 31 to Aug. 3, 1955; minimum daily mean, freezing point Jan. 20-21, 1957.
REMARKS.--Records of discharge for water years 1953-57 given in WSP 1280, WSP 1340, WSP 1390, WSP 1440, WSP 1510.

Daily mean temperature (° F) of water, May to September 1953
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	May	June	July	August	September	Day	May	June	July	August	September
1		75	78	88	82	16	--	80	79	78	72
2		76	79	88	81	17	--	80	78	77	72
3		76	79	87	80	18	--	81	79	76	72
4		77	80	85	78	19	--	82	81	77	72
5		77	81	85	76	20	--	82	82	76	72
6		77	81	85	75	21	66	81	82	76	71
7		76	80	83	75	22	66	81	83	76	69
8		76	80	81	74	23	66	81	83	76	68
9		78	80	79	73	24	68	80	83	77	67
10		79	79	79	74	25	71	80	83	78	67
11		81	79	79	75	26	73	78	83	78	68
12		81	78	79	75	27	73	78	85	79	68
13		79	78	80	73	28	72	78	86	79	68
14		78	79	81	72	29	72	78	87	79	69
15		78	79	80	72	30	74	78	87	79	69
						31	75	--	88	80	--
Average							--	79	81	80	73

Daily mean temperature (° F) of water, water year October 1953 to September 1954
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	68	56	43	35	33	41	43	65	70	86	83	83
2	68	55	44	36	34	41	44	65	68	86	83	83
3	69	56	45	37	36	39	45	63	66	87	83	83
4	69	55	45	37	38	38	45	59	65	87	84	84
5	67	53	45	36	39	37	46	57	65	88	84	84
6	65	51	45	35	40	38	50	57	67	88	82	84
7	63	49	44	35	39	39	55	56	69	88	80	83
8	62	48	44	36	36	40	57	55	70	87	80	81
9	62	47	43	37	37	41	56	56	71	85	80	79
10	62	47	42	36	38	41	56	57	74	84	81	77
11	62	46	41	35	39	42	56	58	78	83	79	77
12	62	46	41	35	38	43	57	60	79	84	76	77
13	62	46	40	34	37	44	57	61	79	85	76	76
14	62	46	39	34	38	42	59	63	79	87	78	75
15	62	47	37	34	40	41	60	65	80	87	80	74
16	62	48	36	34	43	41	59	66	79	85	81	74
17	63	49	35	35	44	42	59	67	81	85	81	76
18	63	50	34	34	44	43	61	67	82	86	82	77
19	64	51	34	33	45	43	61	67	83	87	82	77
20	64	53	34	34	45	43	62	67	83	88	82	77
21	65	51	37	35	44	43	62	67	83	88	82	75
22	65	50	37	34	44	43	61	68	83	88	82	73
23	64	48	35	34	43	44	60	69	84	87	83	72
24	63	48	34	34	42	44	62	70	84	85	83	71
25	62	47	34	34	42	46	64	71	83	85	83	71
26	61	45	34	34	42	48	67	69	83	85	83	70
27	58	44	34	34	42	49	67	70	84	84	82	71
28	57	43	34	33	41	49	66	70	85	84	83	71
29	56	42	35	33	--	48	65	70	85	84	83	71
30	56	42	35	33	--	45	65	70	86	85	84	71
31	56	--	35	33	--	43	--	71	--	85	83	--
Average	63	49	38	35	40	43	58	64	78	85	82	77

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT BOONVILLE, MO.--Continued

Daily mean temperature (° F) of water, water year October 1954 to September 1955
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	71	52	42	37	38	39	48	67	70	79	90	74
2	71	49	42	38	38	39	49	68	70	81	90	76
3	72	47	41	38	38	41	51	70	72	81	89	76
4	73	46	42	39	38	43	52	72	75	83	88	75
5	73	45	42	40	38	44	54	73	76	84	86	76
6	70	45	41	44	38	42	55	75	76	83	84	76
7	68	45	40	45	38	38	55	74	75	83	83	77
8	66	47	39	43	38	38	56	72	74	84	80	76
9	65	48	39	42	38	40	57	71	74	85	79	76
10	66	49	39	41	39	43	58	70	73	85	80	75
11	67	50	39	40	38	47	59	69	70	87	81	73
12	67	51	40	39	38	49	60	68	69	87	81	70
13	67	52	39	39	37	49	61	67	69	85	81	68
14	66	52	38	38	37	48	62	65	70	84	81	68
15	64	52	38	38	36	48	62	66	71	84	80	70
16	61	53	38	38	36	47	62	67	73	85	80	71
17	59	53	38	38	36	46	63	68	74	85	80	72
18	58	53	38	39	37	44	64	70	75	84	81	73
19	57	53	37	39	38	44	65	72	75	84	82	74
20	56	52	37	39	39	45	67	73	77	84	83	74
21	55	52	37	38	38	45	67	74	78	86	83	74
22	55	52	37	38	37	41	68	74	79	86	82	74
23	55	51	38	38	37	41	69	75	79	87	82	73
24	56	49	39	38	37	42	67	76	79	87	81	71
25	56	46	39	38	38	42	65	75	75	87	81	69
26	57	45	40	38	39	39	65	74	75	88	81	67
27	57	45	42	38	39	38	66	75	74	89	81	66
28	56	46	42	38	39	39	66	74	73	89	81	66
29	55	45	39	38	--	41	67	71	75	89	79	67
30	54	43	37	38	--	43	67	70	78	89	75	67
31	53	--	37	38	--	45	--	70	--	90	75	--
Average	62	49	39	39	38	43	61	71	74	85	82	72

Daily mean temperature (° F) of water, water year October 1955 to September 1956
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	48	a 34	35	34	42	51	58	76	85	84	77
2	64	47	33	35	35	42	53	58	76	85	84	77
3	63	46	33	35	35	44	55	59	76	83	84	76
4	63	45	34	35	35	45	56	60	76	81	82	76
5	63	45	34	36	35	47	55	60	77	80	83	75
6	64	45	34	37	35	49	56	61	77	82	83	74
7	64	44	34	36	35	48	54	62	78	82	83	72
8	63	42	35	35	35	44	52	61	79	82	83	71
9	61	41	34	34	35	43	51	61	81	81	82	70
10	61	41	34	34	36	44	50	64	82	80	82	69
11	61	42	34	34	37	44	49	67	82	80	81	68
12	62	43	34	34	37	42	50	71	82	80	81	69
13	61	43	34	34	37	41	51	74	82	81	81	70
14	60	44	34	34	39	41	53	75	82	82	81	71
15	58	43	34	34	39	41	55	74	82	83	81	71
16	57	43	34	34	39	40	54	73	82	84	82	72
17	56	38	34	34	39	41	53	72	82	84	83	72
18	55	37	34	34	38	42	53	73	82	84	84	72
19	54	36	34	34	38	41	54	74	83	83	82	71
20	54	35	34	34	38	42	55	74	84	83	79	70
21	55	37	34	34	38	43	57	74	85	82	77	69
22	55	39	33	34	38	43	58	75	86	81	77	69
23	55	41	33	34	38	43	56	76	87	81	76	69
24	54	40	33	34	39	43	55	75	87	80	76	69
25	52	39	33	34	40	44	55	74	87	82	76	69
26	52	39	34	33	40	47	55	73	86	84	77	70
27	52	a 38	35	33	41	49	59	75	85	85	77	70
28	53	a 37	36	33	40	51	62	75	84	86	78	70
29	51	a 36	38	34	40	50	61	76	84	85	79	69
30	49	a 35	36	34	--	49	59	77	84	84	78	68
31	47	--	35	34	--	49	--	78	--	83	78	--
Average	58	41	34	34	37	44	55	70	82	83	80	71

a Estimated on basis of record for adjoining periods.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT BOONVILLE, MO.--Continued

Daily mean temperature (° F) of water, water year October 1956 to September 1957
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	67	58	36	38	33	40	46	66	70	73	85	77
2	67	58	37	37	33	41	47	66	70	74	84	76
3	67	57	38	36	33	41	46	66	69	76	84	76
4	67	57	38	36	33	41	45	63	70	78	83	76
5	66	57	40	36	33	41	44	62	71	79	81	75
6	65	56	41	36	33	42	42	63	73	79	80	74
7	64	54	40	35	33	41	42	64	75	80	78	73
8	62	51	38	35	33	39	42	65	76	81	78	72
9	61	48	35	35	33	39	43	66	76	81	78	72
10	60	47	34	34	34	39	44	67	76	81	79	71
11	59	48	34	33	37	42	46	67	75	80	79	70
12	60	48	34	33	38	44	46	67	75	81	80	69
13	60	48	33	33	37	45	45	67	75	81	81	69
14	61	49	33	33	37	47	46	67	75	82	82	69
15	62	51	33	33	39	46	47	67	76	83	82	69
16	62	48	33	33	39	45	46	66	77	84	82	69
17	63	46	34	33	40	46	47	63	78	85	79	69
18	64	45	34	33	41	47	49	62	78	87	78	68
19	64	45	34	33	41	47	54	61	77	87	78	69
20	64	45	35	32	40	45	57	61	76	87	77	69
21	64	43	35	32	39	46	59	63	74	86	75	67
22	64	40	36	36	38	45	60	65	74	85	75	65
23	64	39	37	34	37	45	62	65	75	83	75	64
24	63	39	37	33	38	44	63	65	74	82	74	64
25	62	38	36	33	39	43	65	66	74	82	74	64
26	60	38	36	34	39	42	67	67	74	81	75	65
27	59	37	36	33	39	41	66	67	74	81	76	64
28	58	37	37	33	39	43	65	67	74	80	75	63
29	57	37	37	33	--	44	65	68	74	82	76	62
30	58	36	37	33	--	45	65	69	73	83	76	63
31	58	--	37	33	--	45	--	70	--	84	77	--
Average	62	47	36	34	37	43	52	65	74	82	79	69

INDEX

☆ U.S. GOVERNMENT PRINTING OFFICE : 1961 O - 617130